Fourth Biennial Report of Luxembourg under the United Nations Framework Convention on Climate Change

2020 Report

23 November 2020

LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Environnement, du Climat
et du Développement durable

This report has been prepared by Eric De Brabanter from the MECDD. It benefits from contributions from Cherryl Dentzer (MECDD), Marc Schuman and Nora Becker (MECDD-AEV), Virginie Gilbert and Jean-Marc Lentz (MAEE-COOP).

The author would like to thank Jil Schmitz (MECDD) for proof-reading Chapters III to V of this Biennial Report.

Content

List of acronyms for Ministries & Administrations

MAEE – Ministry of Foreign and European Affairs (*Ministère des Affaires étrangères et européennes*)
COOP = Directorate for Development Cooperation and Humanitarian Affairs

MAVDR – Ministry of Agriculture, Viticulture and Rural Development (*Ministère de l'Agriculture, de la Viticulture et du Développement rural*)
SER = Department for Rural Economy (*Service d'Economie Rurale*)

MEA – Ministry for Energy and Spatial Planning (*Ministère de l'Énergie et de l'Aménagement du territoire*)

MECDD – Ministry of the Environment, Climate and Sustainable Development (*Ministère de l'Environnement, du Climat et du Développement durable*)
AEV = Environment Agency (*Administration de l'Environnement*)
AGE = Water Agency (*Administration de la Gestion de l'Eau*)
ANF = Nature and Forests Administration (*Administration de la Nature et des Forêts*)
Formerly: MDDI-DEV – Ministry of Sustainable Development and Infrastructure – Department of the Environment (*Ministère du Développement durable et des Infrastructures – Département de l'environnement*).
Previously: MEV – Ministry of the Environment (*Ministère de l'environnement*)

MECO – Ministry of the Economy (*Ministère de l'Economie*)
DCM = Medium and Small Businesses Directorate (*Direction des Classes Moyennes*)
STATEC = National Statistical Institute

MESR – Ministry of Higher Education and Research (*Ministère de l'Enseignement Supérieur et de la Recherche*)

MFIGR – Ministry of Family Affairs, Integration and the Greater Region (*Ministère de la Famille, de l'Intégration et à la Grande Région*)

MFIN – Ministry of Finance (*Ministère des Finances*)
ADA: Customs & Excises Administration (*Administration des Douanes et Accises*)
ACD: Direct Tax Administration (*Administration des Contributions Directes*)

MINT – Ministry of Home Affairs (*Ministère de l'Intérieur*)

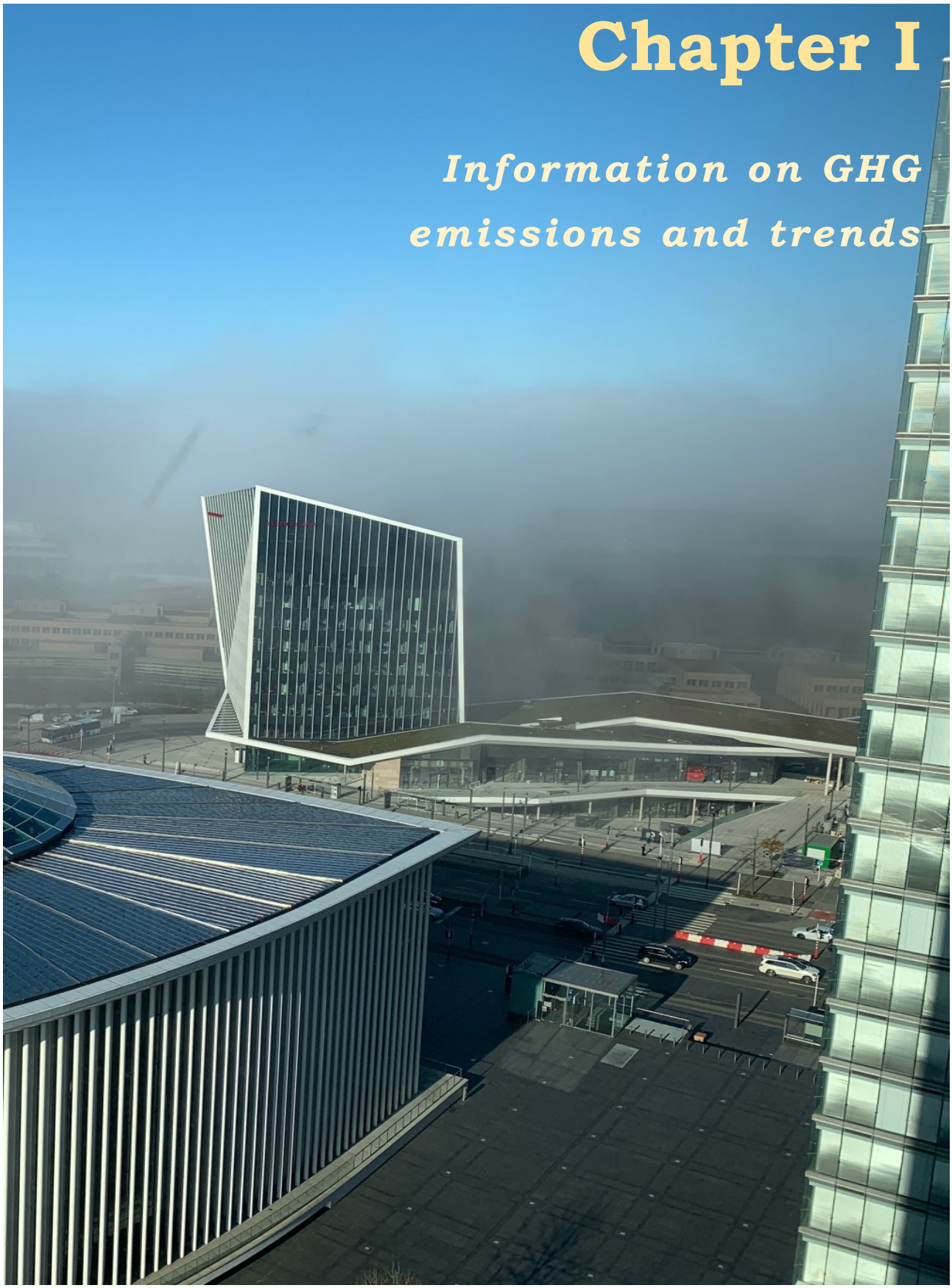
MLOG – Ministry of Housing (*Ministère du Logement*)

MMTP – Ministry of Mobility and Public Works (*Ministère de la Mobilité et des Travaux publics*)
ABP = Public Buildings Administration (*Administration des Bâtiments Publics*)

MTEES – Ministry of Labour, Employment and the Social and Solidarity Economy (*Ministère du Travail, de l'Emploi et de l'Économie sociale et solidaire*)

Chapter I

Information on GHG emissions and trends



I.1. INTRODUCTION

1. **Paragraph 2 of the UNFCCC biennial reporting guidelines for developed countries Parties** (BR GL) [UNFCCC (2011)] requests that summary information from the **national GHG inventory on emissions and emission trends** prepared according to part I of the **UNFCCC Guidelines for the preparation of national communications by Parties included in Annex I to the Convention** (NC GL)[1] shall be prepared for the period from 1990 to the latest year in the most recent inventory submission available. This information should be consistent with that provided in the most recent annual inventory submission, and any differences should be fully explained *[→ Section I.3]*.

2. **Paragraph 3 of the BR GL** requests summary information on **national inventory arrangements** in accordance with the reporting requirements related to national inventory arrangements contained in Part I of the NC GL, and on the changes thereof since their last National Communication or Biennial Report *[→ Section I.4]*.

3. When estimating GHG emission composition and trends in Luxembourg, one should keep in mind that the **IPCC methodology used for compiling GHG inventories is raising some peculiar issues for small countries**, in particular because of the "territory" or "origin" principle underpinning it. Therefore, **specific national circumstances are examined**. These specific conditions are relating to socio-economic characteristics that have significant effects on Luxembourg's GHG total emissions when applying IPCC accounting rules. This is complemented by a **discussion of how both the UNFCCC and the Kyoto Protocol are challenging Luxembourg's action** with regard to climate change and by a **general overview of the national circumstances** *[→ Section I.2]*.

4. **Annex 1 summarizes changes between the BR4 and the NC7/BR3** and **Annex 2** indicates whether **recommendations and encouragements from the latest review** – TRR.3 [UNFCCC (2019b)] – have been implemented or not.

5. This chapter has been written by the MECDD and the MECDD-AEV with specific contributions indicated where relevant.

[1] Part I of the NC GL is UNFCCC reporting guidelines on annual inventories.

I.2. NATIONAL CIRCUMSTANCES

I.2.1. The Grand Duchy of Luxembourg[2]

6. The Grand Duchy of Luxembourg has been an independent sovereign state since the Treaty of London was signed on 19 April 1839. The country is a **parliamentary democracy** in the form of a **constitutional monarchy** and is the second smallest Member State of the EU-28, after Malta. For many years, it has been characterized by **high economic and demographic growth rates**. The country is **located in the heart of North-Western Europe** and has direct borders with Belgium, Germany and France *[→ Figure I.2-1]*. It is therefore a crossroad for international trade and related transport flows, the most dynamic source of its GHG emissions.

7. The organisation of the Grand Duchy starts from the principle that the responsibilities of the different powers should be given to diverse apparatus of the state. As in every parliamentary democracy, the separation of powers is flexible in Luxembourg: many links exist between the legislative and executive branches, and solely the judicial power remains completely independent.

8. **Legislative power** resides in the joint action of the Parliament (*Chambre des Députés*), the Government and the Council of State *(Conseil d'Etat*); each entity serving a wholly separate function.

9. **Parliament** is made up of 60 members of Parliament (hereafter, MPs) elected for a five-year term combining a one-person-one-vote suffrage and a system of proportional representation. Its primary function is to vote on bills submitted by the Government and to control the executive branch. The MPs also possess a right of parliamentary initiative which is exercised by bringing in bills *(propositions de Loi*).

10. **The Government** has a right of initiative in legislative matters known as governmental initiative, which allows it to bring in bills (*projets de Loi*). After being examined by the Council of State, bills are put to the vote before Parliament, where the government normally holds a majority. After the parliamentary vote, the Grand Duke promulgates the legislative text, i.e. he commands its publication in the compendium of legislation known as the *Mémorial*, whereupon the text acquires legal status *[→ Box 1]*.

11. **The Council of State** is composed of 21 councillors. State councillors are formally appointed and dismissed by the Grand Duke on proposal by the Government, Parliament or the Council of State. In Luxembourg's unicameral system, the Council of State exerts the moderating influence of a second legislative assembly. It is required to voice its opinion on all items of legislation; that

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2 Part of this section is based on texts from the "official portal of the Grand-Duchy of Luxembourg", "Political System" section (https://luxembourg.public.lu/en/society-and-culture/political-system.html), as well as on the following document: Press and Information Service of the Luxembourg Government (2012).

is to say on all bills brought in before the Parliament prior to voting by the MPs. Its opinion must entail a thorough examination to ensure compliance of the draft texts with the Constitution, international conventions and the rule of law. The role of the Council of State is one of persuasion rather than enforcement and is therefore advisory in nature.

12. **Executive power** is the prerogative of the Grand Duke, together with the Government and its members, i.e. the Ministers and, eventually, Secretaries of State. In practice, the Grand Duke chooses the Prime Minister based on election results, which takes place every five years jointly with the election of the members of the European Parliament (the "European Elections"). Then, the Prime Minister himself proposes the members of the Government. The Government appointed by the Grand Duke presents its political programme to the Parliament, which takes a vote of confidence, thereby giving the newly appointed Government a parliamentary majority on which it can rely. The actual Government, stemming from the general elections of 14 October 2018, has been appointed on the 5 December 2018 and should remain in place up to the next general elections, in October 2023. It is made up of the Prime Minister, two Deputy Prime Ministers and 14 members bearing the title of Minister. It is worth noting that the number of ministerial departments generally exceeds the number of members of the Government called upon to serve in office; thus, a single minister normally holds more than one portfolio.[3]

13. As a conclusion, a parliamentary democracy in the form of a constitutional monarchy suits perfectly well to a country such as Luxembourg where social consensus and dialogue are key words. Consensus and dialogue have been, and will continue to be, of particular relevance for the definition of climate change related policies and action plans, as well as for the designing of related legislative texts. Luxembourg's second "Action Plan to reduce CO_2 emissions [MDDI-DEV (2013)] and the process leading to Luxembourg's National Energy and Climate Plan (NECP) [MECDD and MEA (2020)] *[→ Sections III.3.2 & III.3.3]* are good examples of bringing these two key words into play.

BOX 1 – LEGISLATIVE PROCEDURE IN LUXEMBOURG

Two types of legislative initiative are distinguishable:

> Projet de Loi: this preliminary draft of a law is drawn up by the relevant Ministry, approved by the Cabinet and then submitted to the Council of State for its opinion. It is then submitted to the Parliament.
>
> Proposition de Loi: one or more MPs may bring in a bill, which is submitted to the Conference of Presidents of the Parliament, which decides on its referral to a committee. The text of the proposal is submitted to the Council of State for its opinion and sent to the Government for its position.

Once the Council of State has given its opinion, the bill is sent to the relevant parliamentary committee, which examines it and reports to the Parliament.

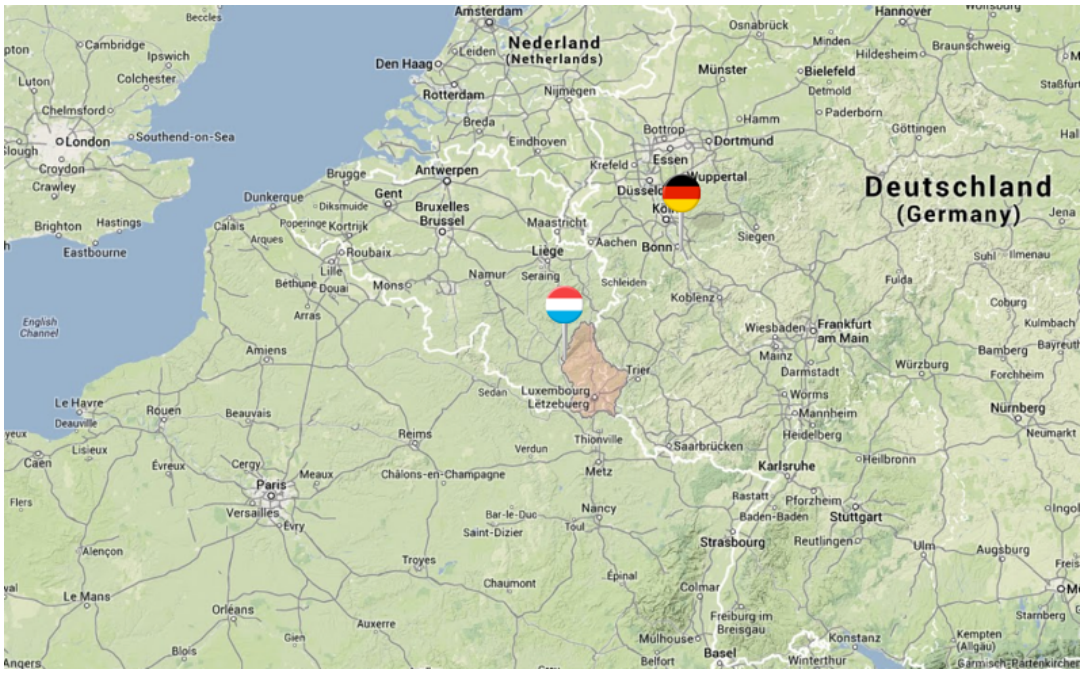
[3] For more information on the Government in place in Luxembourg since December 2018, refer to https://gouvernement.lu/fr.html. For its political programme, see [Government of the Grand Duchy of Luxembourg (2018)]. Climate change related actions are presented on pages 170 to 174.

The debate in plenary session of the Parliament is conducted in two stages: a general discussion and a discussion article by article. Any deputy may propose amendments.

In Luxembourg's unicameral system, once the Parliament has voted on the draft, it must vote a second time on the whole text after a period of at least three months. It can however dispense with this vote if the Council of State accepts the waiver. If the latter does not give its consent, the Parliament must hold a second vote after a minimum period of three months.

The law finally adopted by the Parliament enters into force only after it has been promulgated by the Grand Duke, i.e. published in the Mémorial (compendium of legislation).

FIGURE I.2-1 – GEOGRAPHIC LOCATION OF LUXEMBOURG



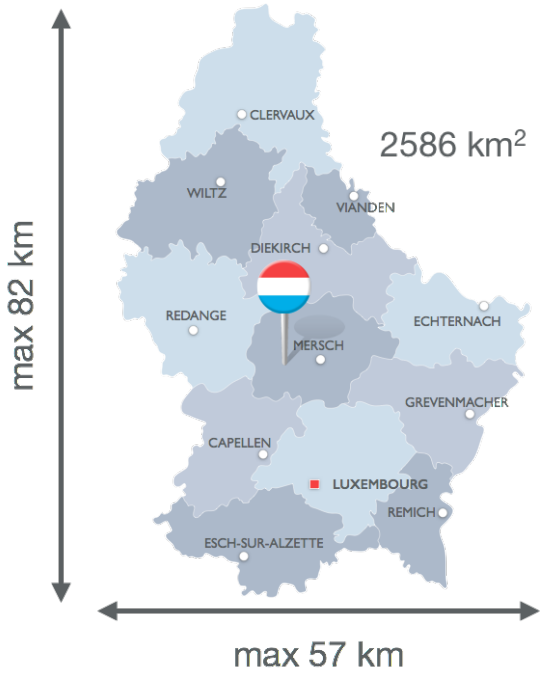
Source: Google Maps.

I.2.2. Geography

14. Luxembourg is a territory of 2 586 km². The maximum distance from north to south is some 82 km, from west to east about 57 km *[→ Figure I.2-2]*. Of the total area of Luxembourg, in 2019, 84.8 % was agricultural land and land under forest – with around 51 % for agriculture and 35 % for forests. The built-up areas occupied 9.8 % of the total surface and land covered by water and transport infrastructure about 5 % *[→Table I.2-1 & Figure I.2-3]*.

15. The north of Luxembourg is a part of the Ardennes and is called "Ösling". Its altitude is at an average of 400 to 500 meters above sea level. The "Ösling" landscape is affected by hills and deep river valleys, as for instance the Sure River (Sauer). With 560 m, the highest elevation is called the "Kneiff" in Wilwerdange. In the South of Luxembourg lies the rank "Gutland", which belongs to the "Lothringer Stufenland". This area has higher population and industrial densities than "Ösling". The lowest point in the country, called "Spatz" (129 m above sea level), is located at the confluence of the Moselle and the Sure rivers in Wasserbillig. Most important rivers are the Moselle, the Sure, the Our – all three delimiting the border with Germany – and the Alzette.

FIGURE I.2-2 – LUXEMBOURG SIZE



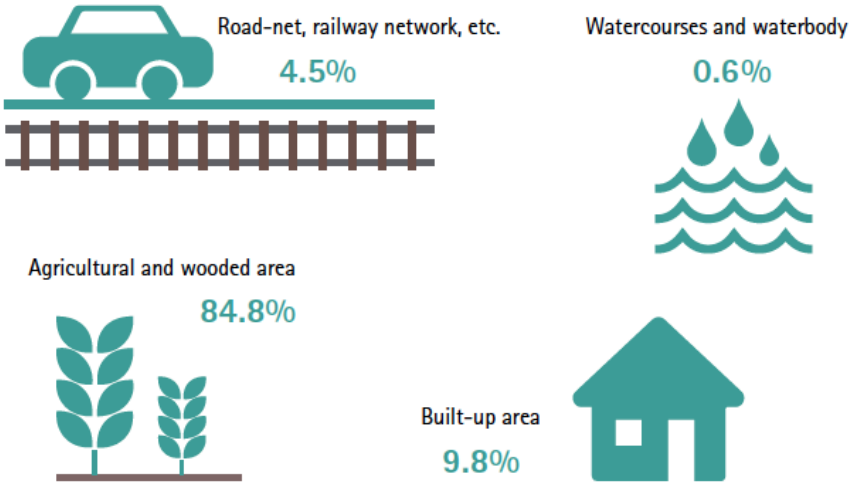
Source: MECDD.

TABLE I.2-1 – LAND USE IN LUXEMBOURG: 1972-2019

percentages	1972	1990	2000	2010	2015	2019
Total land	100.0	100.0	100.0	100.0	100.0	100.0
Agricultural & wooden area	93.2	91.8	87.4	85.7	85.3	84.8
Built-up area	3.1	4.3	8.1	9.3	9.7	9.8
of which industrial area & other	*na*	*na*	*2.7*	*3.0*	*3.0*	*3.1*
Transport network & sheets of water	3.2	3.4	3.9	4.4	4.4	4.5
Watercourses	**0.5**	**0.5**	**0.6**	**0.6**	**0.6**	**0.6**

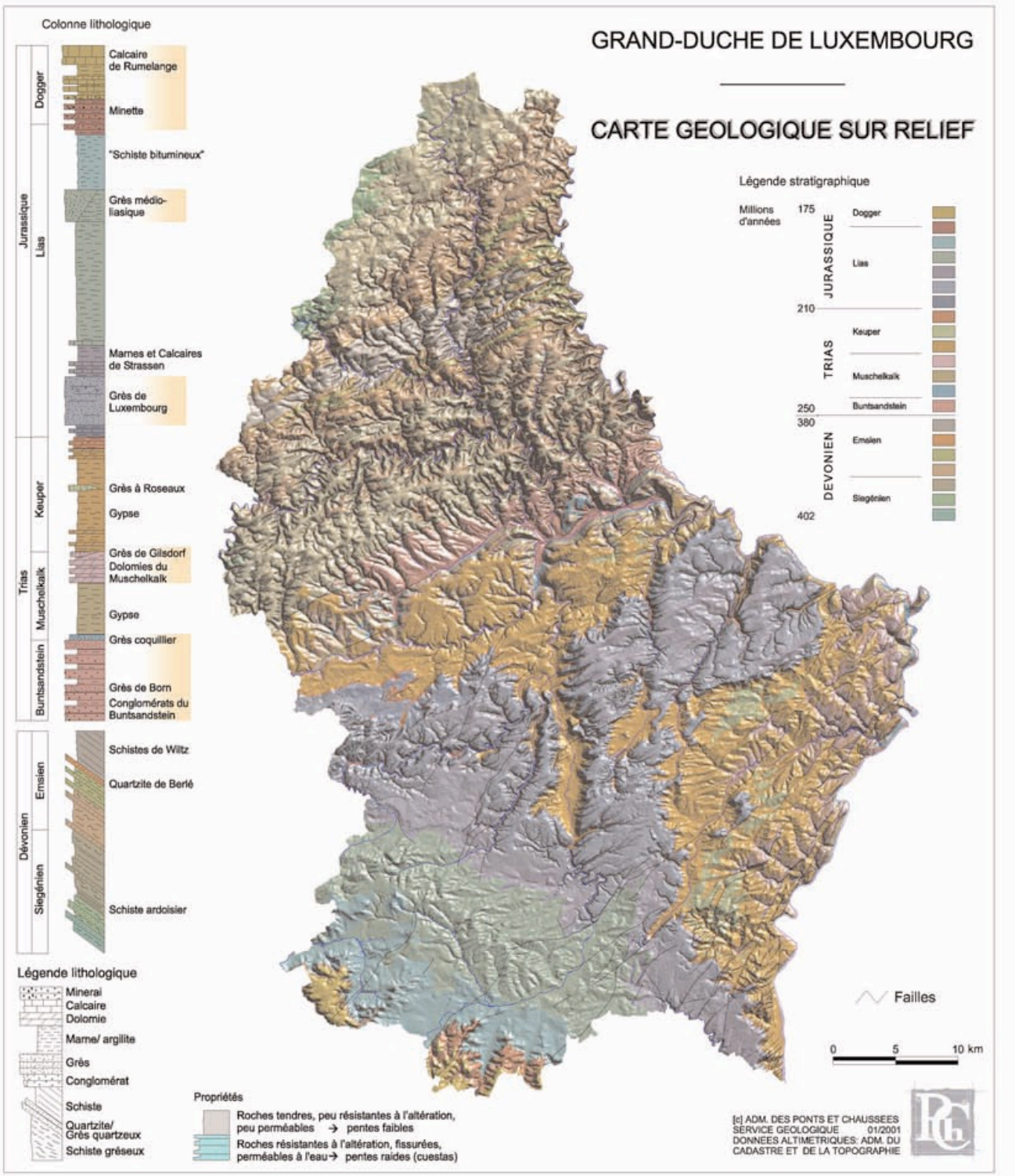
Source: STATEC, *Statistical Yearbook*, Table A.1101 (updated 11.03.2020):
http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12695&IF_Language=fra&MainTheme=1&FldrName=1.
Note: na = not available.

FIGURE I.2-3 – LAND USE IN LUXEMBOURG: 2019



Source: STATEC, *Luxembourg in Figures 2020* :
https://statistiques.public.lu/catalogue-publications/luxembourg-en-chiffres/2020/luxembourg-figures.pdf

FIGURE I.2-4 – GEOLOGICAL MAP OF LUXEMBOURG'S TERRITORY



Source: STATEC, *Annuaire statistique du Luxembourg 2012*, page 39: http://www.statistiques.public.lu/fr/publications/series/annuaire-stat-lux/index.html.

I.2.3. Climate[4]

16. The climate in Luxembourg can be characterized as a **moderate oceanic Western European climate** with mild winters and comfortable summers [Goergen et al., 2013].

17. As shown by the long-term annual means (WMO reference period from 1981-2010) measured at the Findel-Airport meteorological station WMO 06590 *[→ Table I.2-2]*, temperatures have an unimodal distribution, with the lowest long-term mean values occurring during January (0.8°C for the period 1981-2010) and the highest air temperature in July (18.2°C for the period 1981-2010). Absolute minimum and maximum air temperatures ever recorded at Findel station until 31 December 2019 were -20.2°C (2 February 1956) and 39.0°C (25 July 2019)[5]. According to definitions for GHG reporting, **Luxembourg is situated in a cool climate region** since its annual average air temperature is below 15°C: 9.3°C for the reference period 1981-2010.

TABLE I.2-2 – LONG-TERM MEAN VALUES (1981-2010) OF AIR TEMPERATURE AND PRECIPITATION FOR FINDEL-AIRPORT STATION

06590 (1981-2010)	Janv.	Févr.	Mars	Avril	Mai	Juin	Juil.	Août	Sept.	Oct.	Nov.	Déc.	Moyennes 1981-2010
Température (°C)	0,8	1,6	5,2	8,7	13,0	15,9	18,2	17,7	13,9	9,5	4,7	1,8	9,3
Précipitations (06-06) (mm)	76,6	62,5	69,1	58,2	78,5	79,9	71,0	75,4	76,3	86,8	76,0	86,7	896,9
Insolation (heures)	50,3	83,6	125,1	181,6	213,4	227,1	250,3	230,7	161,9	105,8	54,1	41,0	1724,9
Nombre de jours de brouillard	11,5	7,4	4,8	2,6	3,0	2,1	1,6	2,6	4,4	9,1	11,3	12,1	72,5
Nombre de jours de verglas	1,8	0,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,2	1,9	4,4
Nombre de cas d'orage	0,3	0,8	0,7	2,3	6,7	9,7	8,2	7,5	3,1	1,1	<0,1	0,3	40,7

Source: MeteoLux, details: https://www.meteolux.lu/fr/filedownload/73/luxembourg_wmo_06590_ta_rr_climatebulletin_2019_web.pdf/type/pdf

18. Climate conditions have significant impacts on energy use for heating or cooling purposes. An increase in average air temperature in the forthcoming years could have a positive impact on energy consumption, especially in the residential, commercial and institutional sectors. However, in case of a substantial increase of air temperatures, an increase in energy consumption related to a more frequent use of air conditioning systems could also be expected.

19. As shown by measurements at the Findel-Airport meteorological station *[→ Table I.2-3]*, two conclusions can be drawn: firstly, an increase in average air temperature is observed over the last decades *[→ Figures I.2-5 & I.2-6]*; secondly, annual precipitation does not show such clear trends *[→ Figure I.2-7 & I.2-8]*. Similar observations have been obtained in scientific studies on

4 The text of this Section has been prepared by Junk, J., Trebs, I., Hoffmann, L. of the *Luxembourg Institute of Science and Technology (LIST), Department Environmental Research and Innovation (ERIN)*, with additions by Andrew Ferrone of the *Administration des services techniques de l'agriculture (ASTA)*, Meteorological Service.

5 http://meteolux.lu/fr/climat/normales-et-extremes/.

the climate in Luxembourg, notably in Goergen et al. (2013), Lokys et al. (2015) and Junk et al. (2016). From 1990 onwards, annual mean air temperatures for the Findel-Airport station started to increase rather sharply to systematically exceed the 1961-1990 mean value *[→ Figure I.2-5]*. Temperature maxima have mostly been observed during the last 25 years *[→ Figure I.2-6]*. Further analysis of the data suggests that the average air temperature in Luxembourg has increased mainly during the winter seasons, coupled with longer frost-free periods [Molitor et al., (2014)].

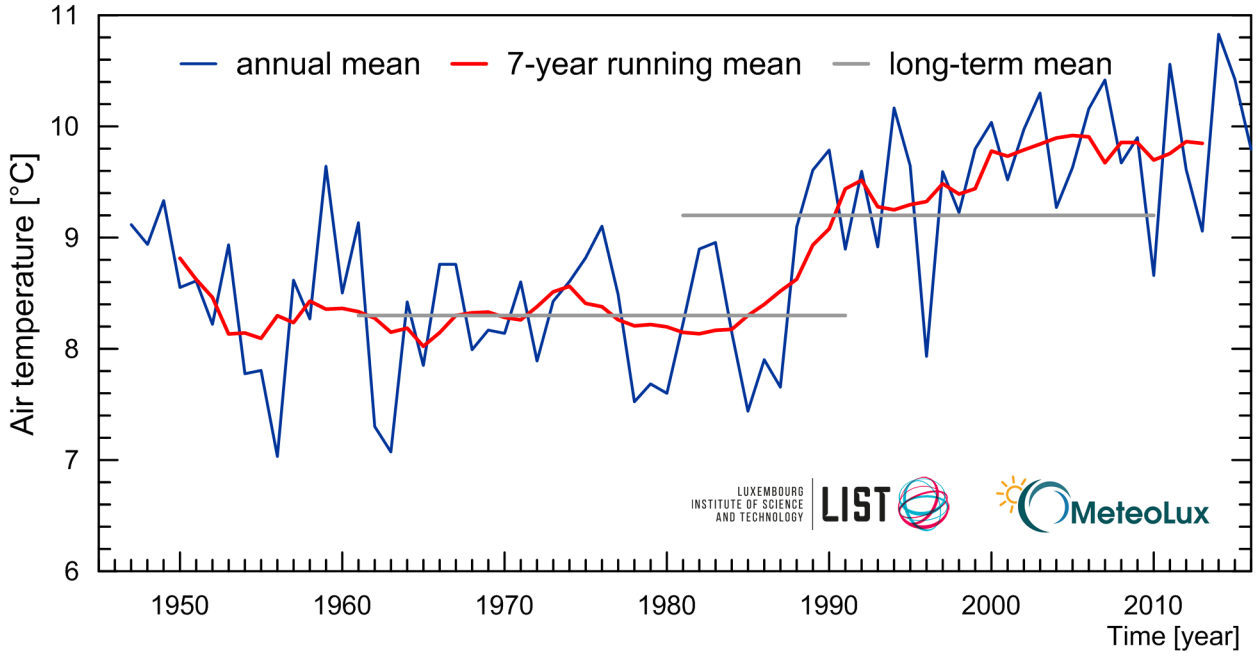
20. Further analysis of the data suggests that the average air temperature in Luxembourg has increased during the winter seasons, coupled with longer frost-free periods.

TABLE I.2-3 – MEAN VALUES OF AIR TEMPERATURE (DAILY MEAN. MAXIMUM & MINIMUM) AND PRECIPITATION FOR THE FINDEL-AIRPORT STATION FOR DIFFERENT TIME SPANS AND INDIVIDUAL YEARS

	1961-1990	1981-2010	2005	2010	2015	2016	2019
Mean air temperature [°C]	8.3	9.3	9.6	8.7	10.4	9.8	10.7
Mean minimum air temperature [°C]	4.7	5.6	5.9	5.1	6.6	6.1	
Mean maximum air temperature [°C]	12.3	13.1	13.6	12.4	14.3	13.7	
Mean yearly precipitation sum [mm]	875.0	898.0	722.5	917.2	605.9	864.6	781

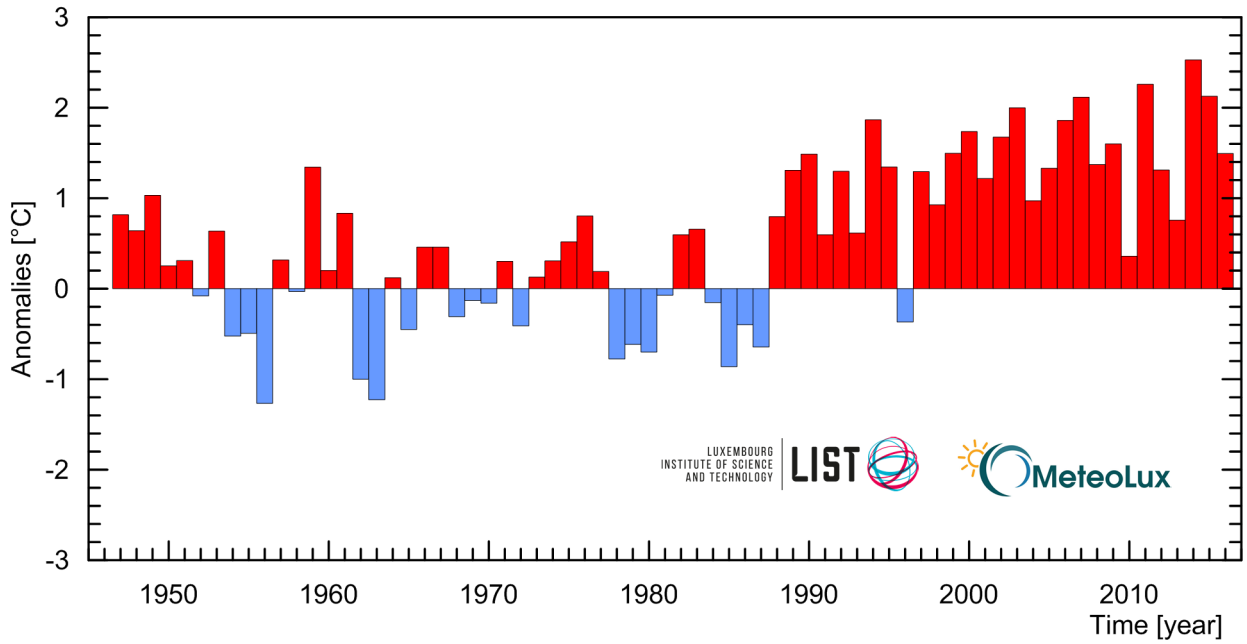
Source: MeteoLux (https://www.meteolux.lu/fr/filedownload/73/luxembourg_wmo_06590_ta_rr_climatebulletin_2019_web.pdf/type/pdf).

FIGURE I.2-5 – AVERAGE ANNUAL AIR TEMPERATURE (BLUE LINE), 7-YEAR RUNNING MEAN (RED LINE) AND LONG-TERM ANNUAL MEAN 1961-1990 AND 1981-2010 (GREY LINES) FOR THE FINDEL-AIRPORT STATION: 1947-2016



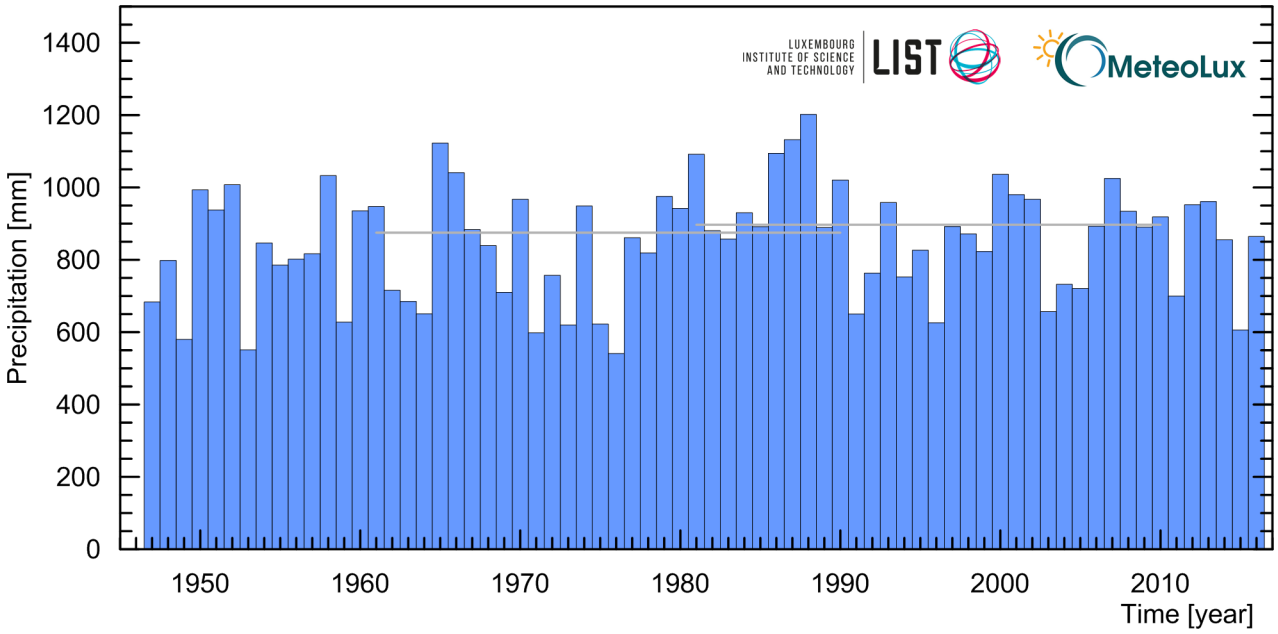
Sources: Findel-Airport station (MeteoLux) and Luxembourg Institute of Science and Technology (LIST). unpublished.

FIGURE I.2-6 – ANOMALIES OF ANNUAL AIR TEMPERATURE FROM THE REFERENCE PERIOD 1961-1990 FOR THE FINDEL-AIRPORT STATION: 1947-2016



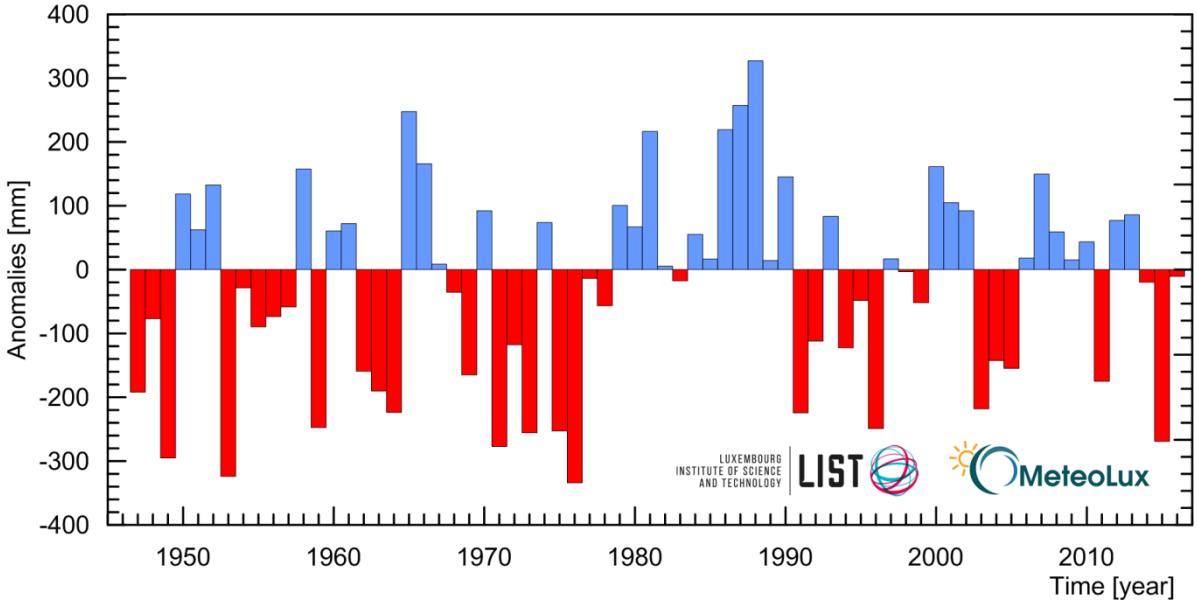
Sources: Findel-Airport station (MeteoLux) and Luxembourg Institute of Science and Technology (LIST). unpublished.
Note: anomalies from the reference period 1961 until 1990: long-term mean: 8.3°C.

FIGURE I.2-7 – ANNUAL PRECIPITATION TOTALS (BLUE COLUMNS) AND LONG-TERM ANNUAL MEAN 1961-1190 AND 1981-2010 (GREY LINES) FOR THE FINDEL AIRPORT STATION: 1947-2016.



Sources: Findel-Airport station (MeteoLux) and Luxembourg Institute of Science and Technology (LIST). unpublished.

FIGURE I.2-8 – ANOMALIES OF ANNUAL PRECIPITATION TOTALS FROM THE REFERENCE PERIOD 1961-1990 FOR THE FINDEL-AIRPORT STATION: 1947-2016

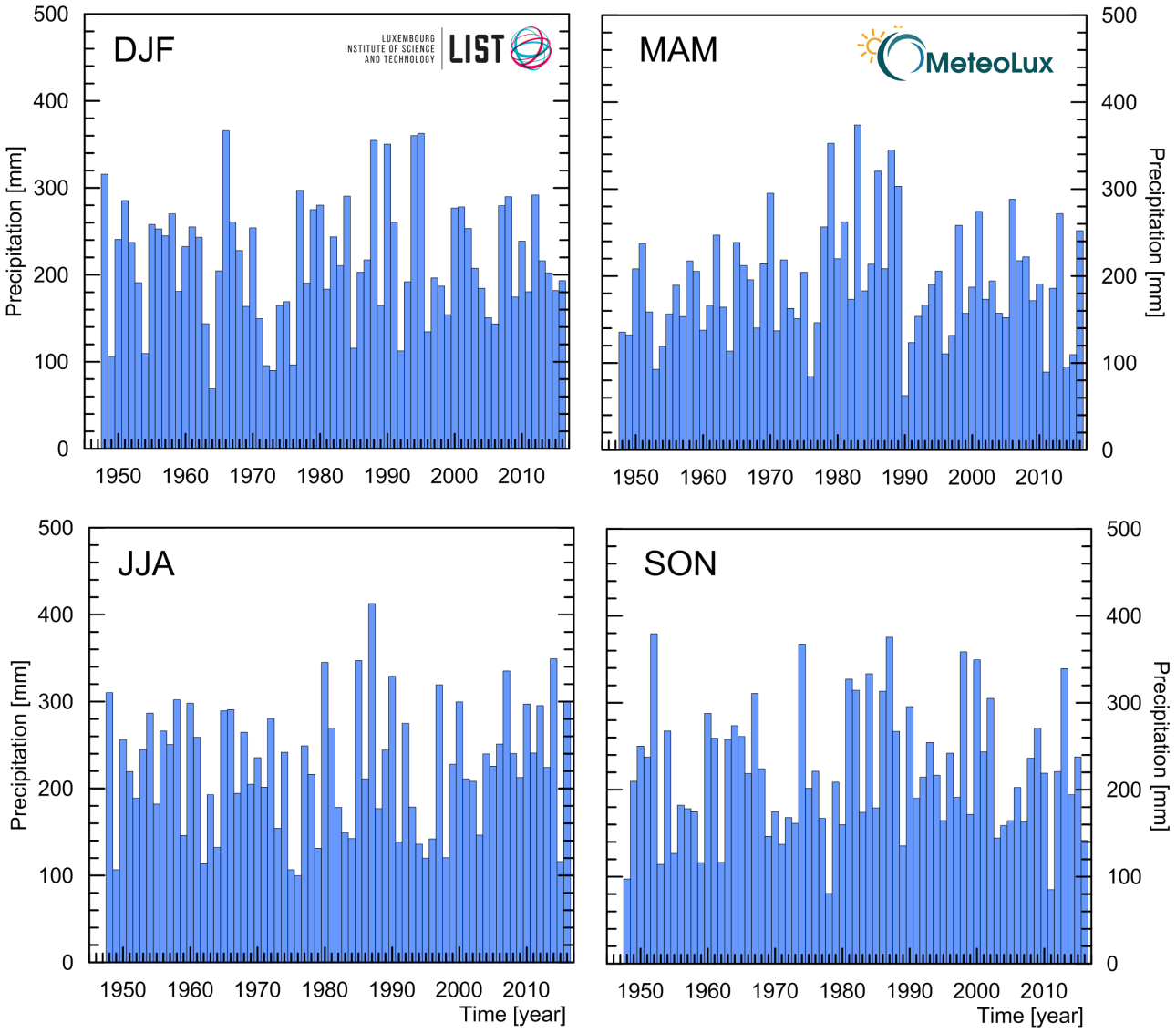


Sources: Findel-Airport station (MeteoLux) and Luxembourg Institute of Science and Technology (LIST). unpublished.
Note: anomalies from the reference period 1961 until 1990: long-term mean: 874 mm.

21. With regard to annual precipitation, no clear changes can be detected from the direct measurements *[→ Table I.2-3]*. During the hydrological winter half-year (October / November to March / April) evaporation is rather unimportant, which means that the precipitation falling during this period is almost completely discharged or stored underground. The most part of the precipitations falling during the summer half year evaporates and is very important for the development of the vegetation. However, the seasonal distribution of precipitation totals has shown substantial variability through the past 70 years *[→ Figure I.2-9]*.

22. Most of this variability can be attributed to changes in the large-scale atmospheric circulation patterns. An increase in westerly atmospheric fluxes during winter months was shown by Buchholz et al. (2010) for the past years. In combination with higher air temperatures, this has led to higher flood frequencies in most national river basins (Pfister et al. 2000 and 2004).

FIGURE I.2-9 – SEASONAL PRECIPITATION TOTALS (DJF = WINTER. MAM = SPRING. JJA = SUMMER. SON = AUTUMN) FOR THE FINDEL-AIRPORT STATION: 1947-2016



Sources: Findel-Airport station (MeteoLux) and Luxembourg Institute of Science and Technology (LIST). unpublished.

I.2.4. Population and workforce

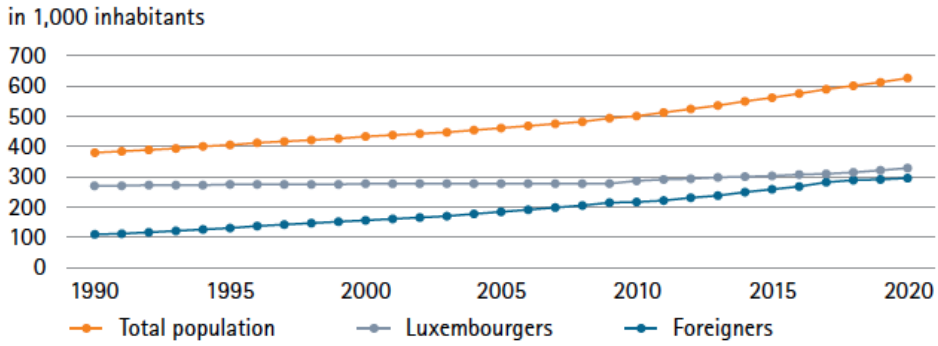
A strong population growth driven by immigration

23. At the end of 2018, the **population of Luxembourg** was estimated to 613 894 inhabitants. Since 1960, the residential population has grown by some 299 000 inhabitants or about 95 % – or 60 % since 1990 *[→ Figure I.2-10]*.

24. Demographic growth in Luxembourg is actually dominated by **immigration**. Nationals themselves saw their number stagnating, and without immigrants taking the citizenship of Luxembourg they would even have fallen. At the end of 2018, 47.5 % of the residential population did not have the citizenship of Luxembourg. This percentage was only around 30 %

in 1990, as depicted in *Figure I.2-11*. The main driver behind these demographic trends is the economic restructuring and development of the country towards the tertiary sector coupled with attractive wages *[→ Section I.2.5]*.

FIGURE I.2-10 – EVOLUTION OF THE POPULATION



Source: STATEC, *Luxembourg in Figures 2020* : https://statistiques.public.lu/catalogue-publications/luxembourg-en-chiffres/2020/luxembourg-figures.pdf

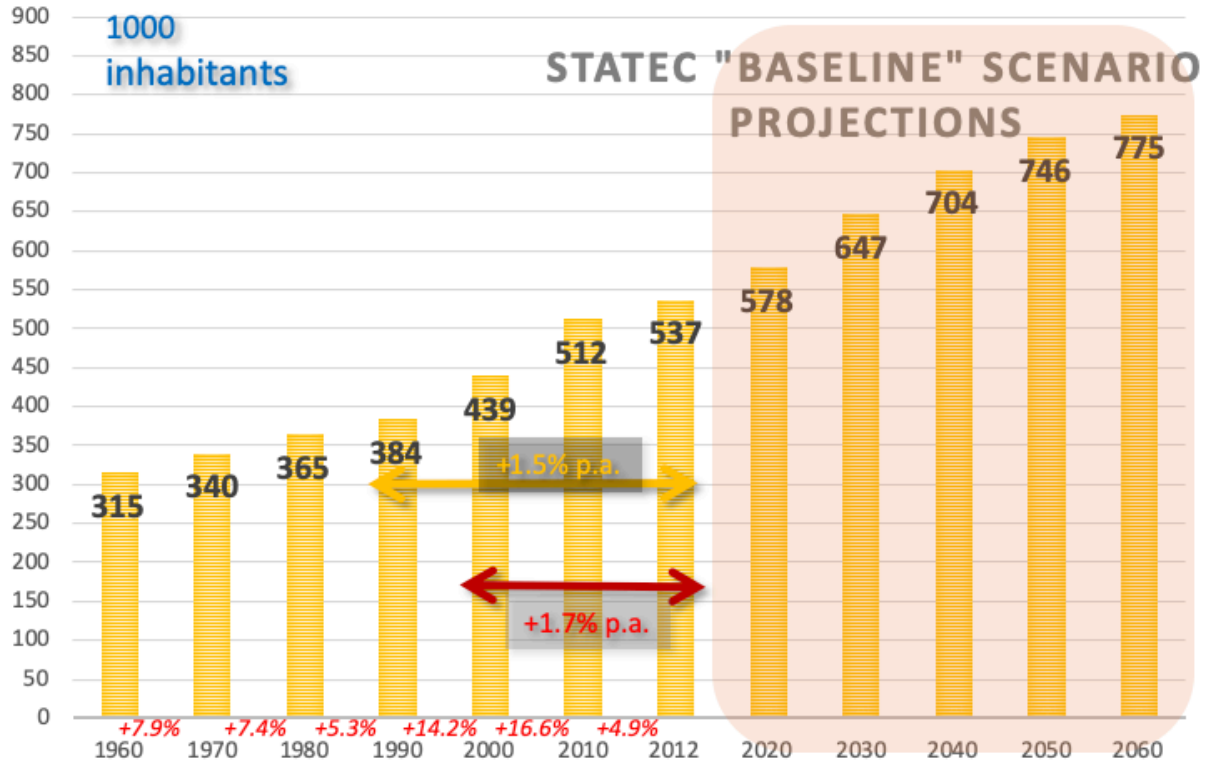
25. Since population projections are based on scenarios derived from past statistical data, population forecasts are a continuation of the demographic trend in Luxembourg. Projections calculated by STATEC in 2010 forecast, under the "baseline" scenario, that almost 750 000 inhabitants could be living in Luxembourg by 2050 *[→ Figure I.2-11]*.[6] As it is the case for any forecasts, these predictions should be treated with caution because they cannot predict radical changes in the economic structure or demographics of a country, especially a small one whose economy relies heavily on a few economic sectors. However, since population growth is one of the key drivers for domestic energy use, mainly in the housing and transportation sector, these forecasts illustrate the scale of one of the many challenges Luxembourg is facing in the definition of measures aiming at reducing its GHG emissions.

26. It is also worth analysing **households** when discussing population growth. Based on population censuses that are usually taking place every 10 years, the number of households grew by 44.1 % between the 1991 and 2011 censuses (from 144 696 households in 1991 to 208 565 in 2011); i.e. slightly more than the population (+34.7 % between 1991 and 2011). Consequently, the average number of persons per household fell from 2.69 in 1991 to 2.52 in 2011.[7] A projection calculated by STATEC in 2011 foresees an increase of households along with the population predicted growth, combined with a continuous decrease of the average number of persons per household (2.33 in 2020, 2.23 in 2030) *[→ Figure I.2-12]*.

6 For details, see STATEC (2012), *Projections socio-économiques 2010-2060*, Bulletin du STATEC N° 5/2010, Luxembourg, pages 262-272 (http://www.statistiques.public.lu/fr/publications/series/bulletin-statec/2010/05-10-Projpop/index.html).

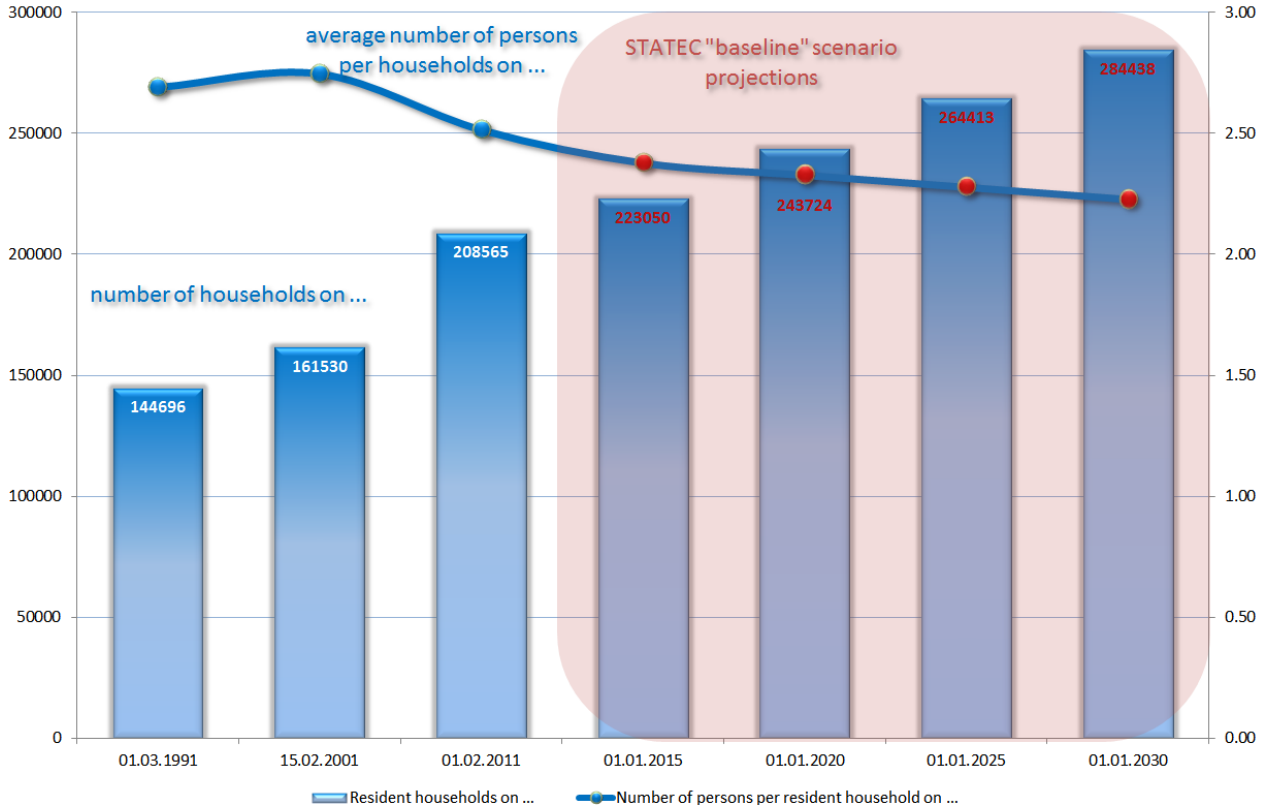
7 Data on households are gathered only during the population censuses. The last one took place in 2011. There are no updates for the subsequent years.

FIGURE I.2-11 – POPULATION GROWTH ON 31ST DECEMBER: 1960-2060



Source: STATEC, *Statistical Yearbook*, Table B.1101 (updated 01.04.2020) and internal calculations.

FIGURE I.2-12 – HOUSEHOLDS AND AVERAGE NUMBER OF PERSONS PER HOUSEHOLDS: 1991-2030



Source: STATEC, *Economie et Statistiques N° 55 – Projection des ménages privés et des besoins en logements 2010 - 2030* (published 26.10.2010), table 9, p. 26: http://www.statistiques.public.lu/catalogue-publications/economie-statistiques/2011/55-2011.pdf

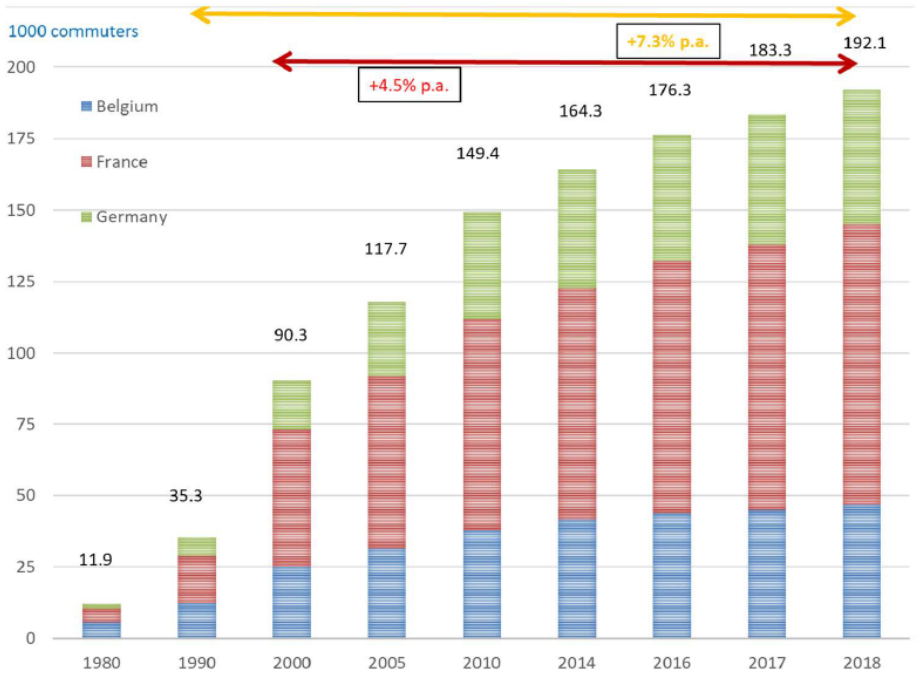
Workforce: the importance of cross-border commuters

27. The economic restructuring and development of Luxembourg led to a doubling of the workforce in the last 20 years. The resident population of Luxembourg nationality was unable to meet this increasing demand for labour. How, therefore, could this urgent economic need be satisfied? The initial response was to resort to **immigration**. The number of foreign employees living and working in Luxembourg rose from 54 900 in 1995 to 118 125 in 2018 – but, this was not enough. So, the **cross-border commuters** came into play. Between 1995 and 2018, the number of cross-border workers increased from 56 900 to 192 100 *[→ Figure I.2-13]*.[8]

28. For 2018, among the commuters employed in Luxembourg, 51.1 % came from France, 24.6 % from Germany and 24.3 % from Belgium. In total, the commuters accounted for 43 % of the total workforce in Luxembourg and for 31 % of the residential population.[9] The commuting flows amongst the various regions of the "*Grande Région*" *[→ Box 2]* clearly show the economic attraction of Luxembourg *[→ Figure I.2-14]*.

29. A vast majority of workers from abroad commute by car. However, in order to alter the current modal split of home-work journeys, Luxembourg invests predominantly and jointly with the neighbouring regions into the public transport offer.

FIGURE I.2-13 – CROSS-BORDER COMMUTERS GROWTH: ANNUAL CUMULATIVE AVERAGES 1980-2018

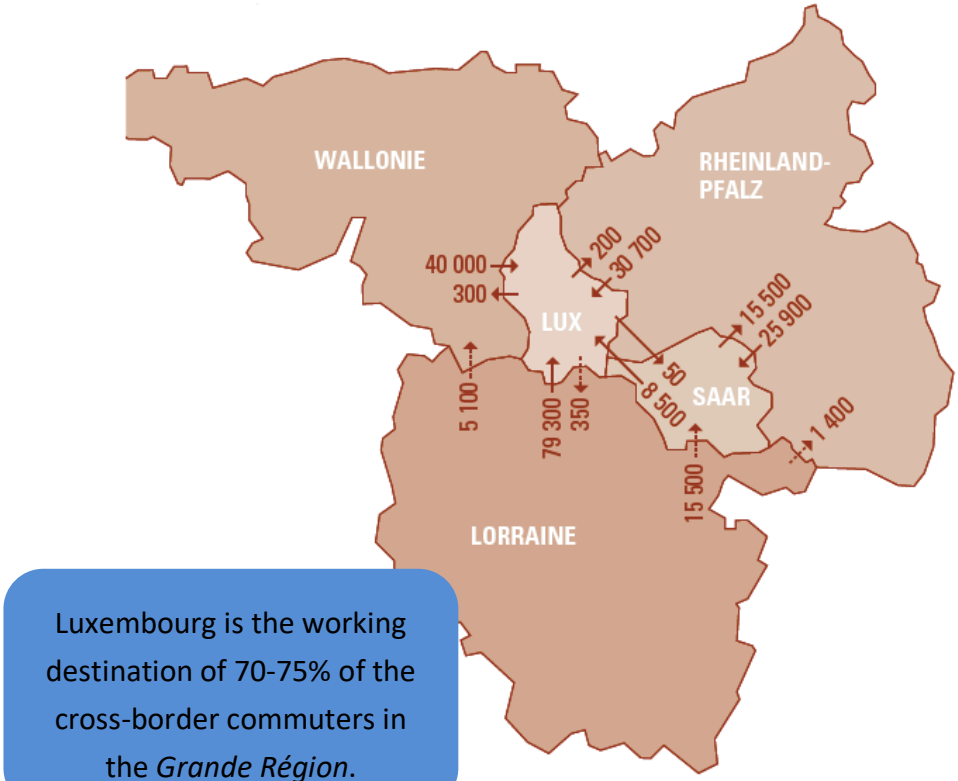


Source: STATEC, *Statistical Yearbook*, Table B.3100 (updated 9.06.2020)
https://statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12951&IF_Language=fra&MainTheme=2&FldrName=3&RFPath=92.

8 Figures indicated in this paragraph are annual cumulative averages.

9 Calculated from STATEC, Statistical Yearbook, Table B.3107:
http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12919&IF_Language=fra&MainTheme=2&FldrName=3&RFPath=92

FIGURE I.2-14 – COMMUTING FLOWS 2015



Luxembourg is the working destination of 70-75% of the cross-border commuters in the *Grande Région*.

Source: INSEE, IGSS, STATEC, IWEPS, Statistisches Amt Saarland, Statistisches Landesamt Rheinland-Pfalz: http://www.grande-region.lu/portal//images/publications/documents/statistiques-en-bref-2016-version-web.pdf.

BOX 2 – THE *GRANDE RÉGION*

The Grande Région is the geographic unit that includes Luxembourg, the Region of Wallonia in Belgium, Lorraine in France and two German Länder: Saarland and Rheinland-Pfalz.

Today, this structure is more a cooperative space than an effective integrated region defining and modelling its own policies and development. This is the result of the diversity of the territories constituting the Grande Région, of its dimension and of the barriers created by institutional and administrative structures in each country. De facto, being a sovereign state amongst country regions, Luxembourg has a special status in this cooperative space: it is the main driving force behind the Grande Région, a position re-enforced by its demographic and economic development as shown by the figures in the table below.

Grande Région entity	Population change (1st January)	Population annual average growth rate (1st January)	GDP at current price annual average growth rate	Total employment in 2015
	% 1990-2015	*% 1990-2015*	*% 1990-2015*	*1990=100*
BE-Wallonia	10.67%	0.41%	3.57%	116
DE-Rheinland-Pfalz	8.37%	0.32%	2.35%	117
DE-Saarland	-7.12%	-0.29%	2.48%	116
FR-Lorraine	1.51%	0.06%	2.06%	102
Luxembourg	**48.42%**	**1.59%**	**7.23%**	**201**

More information on the *Grande Région* can be found on line:

http://www.granderegion.net/

http://www.grande-region.lu/portal/

Effects on GHG emissions: rising emissions due to road transport flows

30. Rapid population and labour market growth in Luxembourg are likely to have an effect on GHG emissions The 3 CRF sub-categories that are the most likely influenced by these developments are the **residential sector** (CRF 1A4b), the **commercial & institutional sector** (CRF 1A4a) and **road transportation** (CRF 1A3b). For the latter, a distinction has been made between emissions due to residents and those generated by non-residents – whether they are in transit or commuting for work or leisure – i.e. "**road fuel sales to non-residents**" *[→ Figure I.2-14 & Box 3]*.[10]

31. Emissions from the **commercial and institutional sector** (1A4a) have decreased in the period 1990-2019[11] a trend that appears rather remarkable as economic activity in the tertiary sector has continued to increase throughout the period, and consequently the total built-up area of office buildings. Total emissions in this sector ranged from a minimum of 0.33 Mio. t CO_2e in 2011 to a maximum of 0.77 Mio. t CO_2e in 1998. *[→ Figure I.2-15]*.

32. Emissions development for the **residential sector** is, however, less favourable. Indeed, over the period 1990-2019, emissions increased by 53 %, whereas population augmented by 63 %. This growth has to be put compared to the one accounted for the number of households: +44.1 % between 1991 and 2011.[12] At the same time, the average number of persons per household diminishes from 2.69 to 2.52 (→ §26). For this sector, overall emissions have ranged between a minimum of 0.68 Mio. t CO_2e in 1990 and a maximum of 1.24 Mio. t CO_2e in 2004 *[→ Figure I.2-15].*

33. Nevertheless, there is a break in time series for building related energy statistics between 1999 and 2000 as the figure below clearly demonstrates. It is then more accurate to analyse the developments since 2000. This analysis gives the following results:
    - for the commercial and institutional sectors (1A4a), emissions increased by 10.2 % between 2000 and 2019 – range [0.33 ; 0.60] Mio. t CO_2e;
    - for the residential sector (1A4b), emissions declined by 4.0 % between 2000 and 2019 – range [0.97 ; 1.24] Mio. t CO_2e.

34. Concerning **road transportation**, both emissions generated by the national vehicles fleet – i.e. by vehicles owned by people living or business settled in Luxembourg – and by the non-residents – "**road fuel sales to non-residents**" – showed dramatic increases over the period 1990-2019: +119.9 % and +147.7 % respectively *[→ Figure I.2-15]*. For the national fleet, the evolution is

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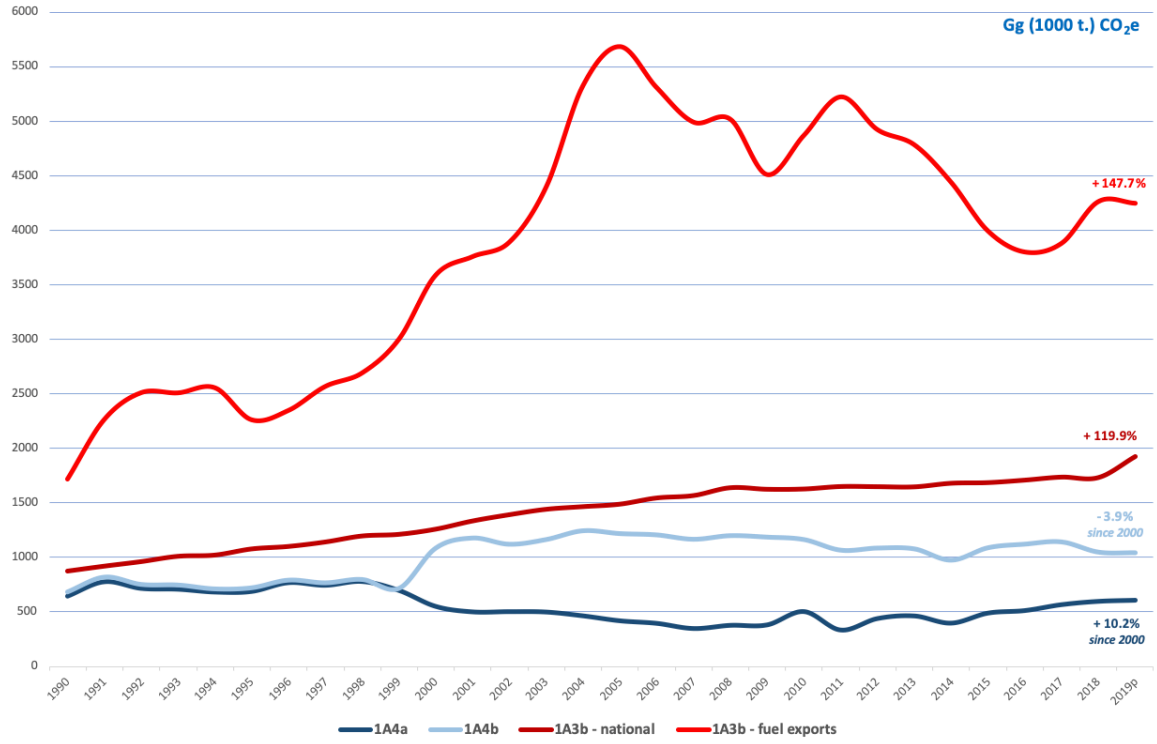
10 The notion and the importance of "road fuel sales to non-residents" in GHG emissions are discussed in *Section I.2.8* below.

11 Figures presented in this section are calculated on the basis of the GHG inventory submission 2020v1 and the "approximated inventory 2019" submitted in July 2020 to the European Commission *[→ Section II.2.1]*.

12 Data on households are gathered only during the population censuses. The last one took place in 2011. There are no updates for the subsequent years.

correlated with both the population and economic activity growth. It is also explained by an increasing rate for passenger cars per inhabitants (from 477 to 670 passenger cars per 1000 inhabitants between 1990 and 2017, i.e. the highest rate within the EU).[13] Regarding "**road fuel sales to non-residents**", the rise is undoubtedly linked to the growing number of commuters crossing the borders every working day as well as to the general increase of road freight traffic in Europe – amongst which an important share transit through Luxembourg because of its location and grasps the opportunity to fill up due to lower road fuel prices in Luxembourg compared to its neighbouring countries. Lower road fuel prices in Luxembourg are essentially the result of lower excise rates. These, though inferior than in the neighbouring countries (Belgium, France and Germany), are not the lowest within the EU *[→ Section I.2.8]*.[14]

FIGURE I.2-15 – GHG EMISSIONS FOR SELECTED CRF FUEL COMBUSTION ACTIVITIES SUB-CATEGORIES: 1990-2019



Source: MECDD-AEV – Submission 2020v1 and "approximated inventory" 2019.
Note: CRF 1A4a&b: there are breaks in time series between 1999 & 2000, hence the growth rates are calculated based on the year 2000.

13 Data extracted from European Commission (DG MOVE), *EU transport in figures – Statistical pocketbook*, 2019 edition, p.87. https://ec.europa.eu/transport/facts-fundings/statistics/pocketbook-2019_en.

14 Nevertheless, since a few years diesel prices for professional use are very similar, or even lower, in Belgium compared to Luxembourg. The reason stems from the fact that, in Belgium, professionals can reclaim the VAT.

I.2.5. Economic profile

35. One of the main characteristics of economic growth in Luxembourg is its volatility. Generally speaking, the economic cycle in Luxembourg follows that of other European countries, but the amplitude of the GDP variations is more pronounced. This is a common feature of small economies, open to the outside world, and therefore more vulnerable to external shocks.

A bit of history

36. The turn of the 20th century up to the First World War was characterized by a sustained growth in the steel industry that attracted new inhabitants, which induced a population concentration in the city of Luxembourg and the canton of Esch-sur-Alzette (mining region) while, up to then, Luxembourg was rather a rural country. Afterwards, up to the 1950s, economic development was mostly flat (annual average GDP growth of 1.6 %) due to the crises associated with the two World Wars and the economic recession in the early 1930's.

37. Following the Second World War, during the "*Trente glorieuses*" (i.e. 1945-1975), GDP growth reached levels of almost 4 % a year. The 1975-1985 world economic crisis brought a temporary end to these years of exceptional growth. The average annual GDP growth was "only" 2.3 % during this period.

38. Nevertheless, during the 1960s, Luxembourg's economic growth had been slightly beneath the percentages recorded for the, at that time, European Community Member States.[15] This is one of the reasons that encouraged authorities to diversify the economy, which gradually shift from an industry-dominated structure to a service one. This led to an exceptional growth in Luxembourg as from the mid-1980s, largely due to a boom in the financial sector: both the GDP level per inhabitant and the GDP growth then exceeded those of the majority of industrialised countries in Europe at that time.[16]

39. More precisely, when looking at labour productivity and employment respective contributions to economic growth in Luxembourg, a clear hiatus between the periods 1960-1985 and 1985 and after appears. This reveals a real change of "economic regime" in the country.[17] Up until the mid-1980s, annual GDP variations were largely due to variations in productivity. The period between the end of the Second World War and the 1980's is marked by what could be called an "industrial regime". Steelmaking was at the core of the Luxembourg economy at that time and, consequently, the economic somersaults could be attributed to this sector. Then, starting in the mid-1980s, variations in GDP and in labour productivity started to diverge and employment became the main driver of economic growth. Moreover, productivity showed a tendency to

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15 Annual average GDP growth 1960-1974: Luxembourg: +4.1 %, UE-15: +4.6 %.

16 Annual average GDP growth 1985-2007: Luxembourg: +5.3 %, UE-15: +2.3 %.

17 This is clearly illustrated by graphics published in STATEC (2009), graphics 1.1.15, and STATEC (2012), graphic 6.

subside. That is the period when the economy shifted towards a service economy boosted by the financial sector and that Luxembourg began, from the second half of the 1980's, to substantially outstrip growth in neighbouring countries. This period is also the one characterized by the beginnings of high population and cross-border commuters' growths (as depicted in *Section I.2.4*).

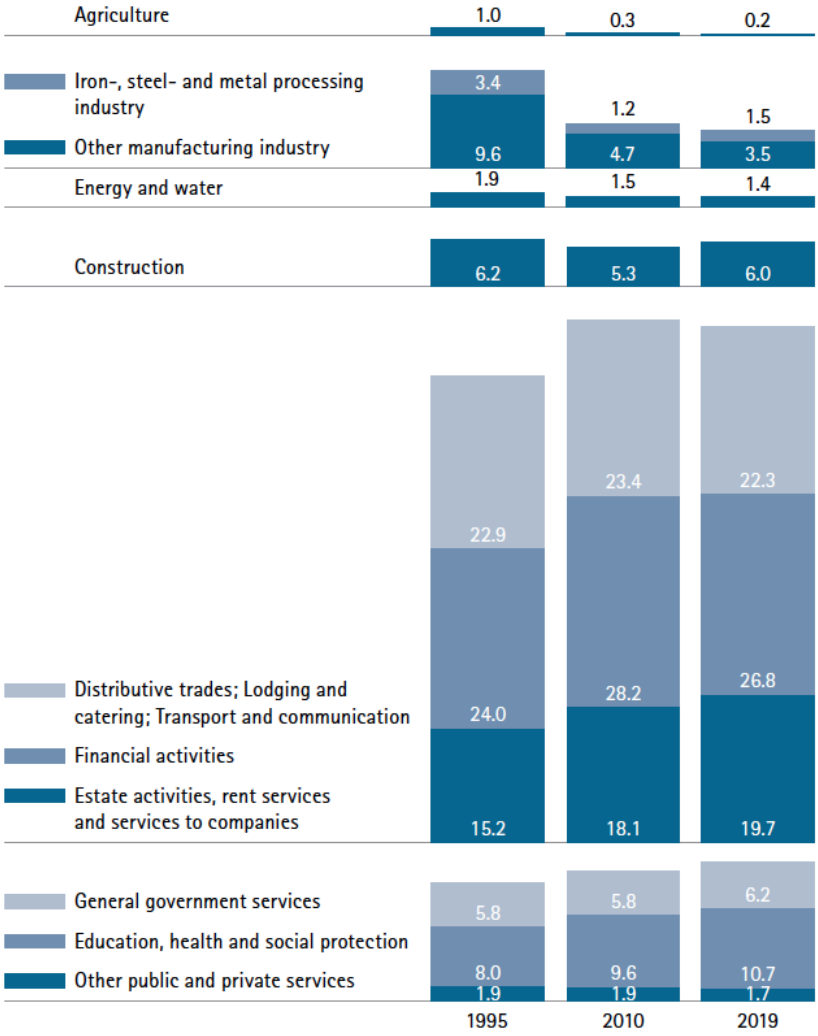
Recent economic development: the industrial decline and the increasing weight of financial & corporate services

40. The economic restructuring and development of the country towards the tertiary sector described in the previous section led to the following **economic cycles** since 1990:
    - up to 1992, the continuation of the exceptional growth initiated around 1985;
    - the effects of the economic slowdown in Luxembourg during the period between 1992 and 1996 and the economic downturn in 2001 – as well as the less impressive growth in 2002-2004 – which is mirrored by a stagnation of the GDP level per inhabitant in Luxembourg in comparison with the EU-15;
    - the good economic performance of Luxembourg between 2005 and 2008;
    - the financial and economic crisis that started end 2008 and that has been particularly pronounced in the first semester of 2009;
    - from 2010 onwards, a very slow recovery could be observed, though it flattened quickly for the industry and commercial sectors;
    - a steady growth from 2013 onwards that is being abruptly halted by the Covid-19 pandemic.

41. Nowadays, **gross value added** is mainly generated in the financial intermediation (banking and insurances), real estate and services to business sector. The share of total gross value added in this branch has increased from about 39 % in 1995 to 46 % in 2015.[18] While the commercial sector has maintained a relatively constant share at about 15 % to 18 %, the share of the industry sector has decreased significantly from 15 % in 1995 to 7 % in 2015. Other service activities ranged between a share of 20 % to 25 % and construction kept a rather constant share in total gross value added between 5 % and 6 %. The contribution of the agricultural sector is negligible with less than 1 % *[→ Figure I.2-16]*.

[18] Data prior to 1995 are and will not be translated into the new European System of Accounts (ESA).

FIGURE I.2-16– SECTORAL GROSS VALUE ADDED AT CURRENT PRICES: 1995-2018



Source: STATEC, *Luxembourg in Figures 2020* : https://statistiques.public.lu/catalogue-publications/luxembourg-en-chiffres/2020/luxembourg-figures.pdf

42. It is therefore obvious that the financial sector has been the principal engine driving the economy for three decades. Luxembourg is a global leader in the investment fund industry as well as the Euro area's private banking centre. When it comes to the amount of assets managed by undertakings for collective investment, Luxembourg ranks as the largest EU fund domicile jurisdiction and the second largest fund domicile jurisdiction globally.[19] However, the radical shift from an industrial economy based on steel to a service economy based on banking and finance initiated in the 1960s has led to an economy that is again dominated by a few activities. It is the case to such a point that there is, at the present, a high correlation between evolutions in banking activities and in GDP. In 2002, the Government, therefore, initiated a new process of

19 This concerns UCITS (Undertakings for Collective Investment in Transferable Securities Directives – http://en.wikipedia.org/wiki/Undertakings_for_Collective_Investment_in_Transferable_Securities_Directives). Some statistics available in the Luxembourg Bankers' Association (ABBL) Facts & Figures publication: https://www.ebf.eu/facts-and-figures/, as well as in the European Fund and Asset Management Association (EFAMA) Asset Management in Europe latest report (May 2017), Exhibit 28, p. 26 - https://www.efama.org/Publications/Statistics/Asset%20Management%20Report/Asset%20Management%20Report%202017.pdf.

diversification via the "**Luxembourg Cluster Initiative**" that actively encourages networking between the private and the public sectors in domains Luxembourg might have comparative advantages. The focus is placed on key technologies that have been identified as being important for the future sustainable development of the Luxembourg economy. The seven «clusters" are (i) Automobility, (ii) HealthTech, (iii) Creative Industries, (iv) CleanTech, (v) Information and Communication Technologies (ICT), (vi) Materials and Manufacturing, and (vii) Wood.[20] The auto-mobility, eco-innovation and, to a lesser extent, the materials and manufacturing as well as wood "clusters" might have implications with regard to measures for reducing GHG emissions in Luxembourg.

Effects on GHG emissions: it is not so much modifications in the economic structure than particular changes that affect the GHG emissions trend

43. Since the main structural changes affecting Luxembourg's economic profile took place before 1990, they do not come out in the GHG emissions trends for some emblematic CRF sub-categories: total GHG excluding LULUCF, public electricity and heat production (CRF 1A1a), manufacturing industries and construction combustion and processes emissions (CRF 1A2+2A+2C1) and "road fuel sales to non-residents" (CRF 1A3b, part) *[→ Figure I.2-17]*.

44. While the increasing shares in gross value added from less energy and carbon intensive sectors (as financial and services) has a positive effect on the carbon intensity of the Luxembourg economy, the overall GHG emissions trend is mostly determined by the developments of the 3 CRF (sub-) categories displayed in *Figure I.2-17*. The residential, commercial and institutional sectors do not really influence the general trend, as we have seen in *Section I.2.4*.

45. Regarding electricity and heat production, the jump in 2002 is the result of a new power plant that started its operation that year and its slowdown leading to its closure in 2016 *[→ Section I.2.6]*.

46. Manufacturing industries and construction sharp fall up to 1998 is linked to structural changes in one industrial sector, the steel industry *[→ Section I.2.7]*.

47. With regard to "road fuel sales to non-residents", the evolution has been briefly described in *Section I.2.4* and will be exposed in detail in *Section I.2.8* below.

48. Finally, the year 2009 – and to a lesser extent the year 2011 – have been impacted by the financial and economic crisis. Emission reductions were mostly due to a decrease in "road fuel sales to non-residents" and not to lower emissions for manufacturing industries and construction. This

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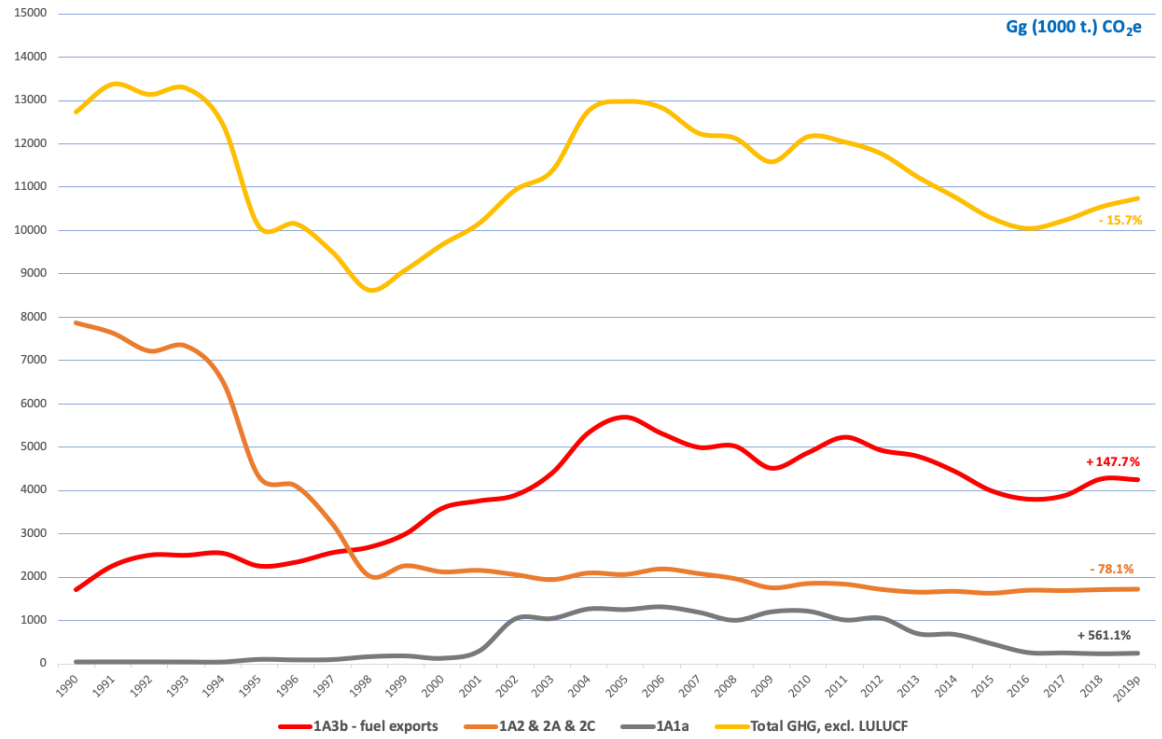
20 For more details, see the portal and the website presenting the "innovative clusters": https://www.luxinnovation.lu/innovate-in-luxembourg/luxembourg-cluster-initiative/.

reduction was in line with a sharp decline of road freight transport throughout Europe during that year.

49. To conclude, GHG emissions trends in Luxembourg are not so much influenced by the economic profile of the country, but for the most part by:
    - the energy-mix for both production and consumption of fuels (liquid, solid, gaseous, biomass) *[→ Section I.2.6]*;
    - due to its size and the size of its energy and industrial sector, structural changes in these sectors that could be initiated by a single entity *[→ Sections I.2.6 & I.2.7]*;
    - road transportation related fuel sales *[→ Section I.2.8]*.

FIGURE I.2-17 – GHG EMISSIONS FOR SELECTED CRF FUEL COMBUSTION ACTIVITIES SUB-CATEGORIES: 1990-2019



Source: MECDD-AEV – Submission 2020v1 and "approximated inventory" 2019.
Note: 2005, 2016, 2017 and 2018: the latest submission to the UNFCCC of 15 April 2020 has been comprehensively reviewed during the summer by the EU for the years 2005 and 2016 to 2018. This thorough review took place in order to determine the final emission levels for the years used either as base year (2005) or as starting year (average 2016 to 2018) for the trajectories EU Member States will have to follow between 2021 and 2030 in the context of the Effort Sharing Regulation, i.e. to fix the annual emission allocations for each Member State between 2021 and 2030 and to determine the level of emissions, excl. ETS, that each Member State has to cope with by 2030 (with 2005 as base year) *[→Section III.2.3]*. For Luxembourg, there was only one correction required: CRF sector 2.A.1 - cement production. This correction cannot be reflected in CTF Tables 1 that rely on a macro to be produced. However, it is considered for this figure.

I.2.6. Energy

CRF sub-category covered	1A1a		
share in total GHG emissions, excl. LULUCF	***1990***	0.3% =	35.64 Gg CO_2e
	2018	2.1% =	223.60 Gg CO_2e
	2019p	2.2% =	235.64 Gg CO_2e

A total change in Luxembourg's energy-mix

50. Primary and final energy consumption in Luxembourg experienced dramatic changes since 1990. Overall **primary energy consumption** increased by 27.3 % between 1990 and 2018. Whereas solid fuels and coal declined by more than 96.5 % over the period, liquid fuels (incl. kerosene) and natural gas consumptions increased by 84.1 % and 59.6 % respectively *[→ Table I.2-4 & Figure I.2-18]*.

51. **Final energy consumption** increased by 28.4 % between 1990 and 2018. As for primary energy consumption, all the energy sources have seen their consumption increase over the period, except solid fuels and coal *[→ Table I.2-5 & Figure I.2-19]*.

52. However, over the period 1990-2018, the final energy-mix of Luxembourg changed considerably with a dropping share for solid fuels – for which the main part was used in the iron and steel industry – in favour of liquid fuels and natural gas and, to a lesser extent, to new energy sources based on the biomass. Indeed, in 2018, 81.6 % of the **final energy consumption** was covered by fossil fuels – 65.1 % by liquid fuels including the important volume of road fuels as well as kerosene,[21] 15.9 % by natural gas and 0.9 % by coal. The remaining 18.4 % of the consumption were either electricity (12.5 %) and heat (1.7 %) or renewable energy sources, including organic waste incineration with energy recovery, biogas, and biofuels (4.2 %). Going back to 1990, 23.8 % of the final energy consumption was stemming from solid fuels and coal, 46 % from liquid fuels, 13.5 % from natural gas and 10.4 % from electricity *[→ Table I.2-5 & Figure I.2-19]*. What happened?
    - regarding **solid fuels and coal**, the important decline (-94.5 %) is the result of a change in production processes in the steel industry sector: the production process was moved from blast furnaces to electric arc furnaces between 1994 and 1998 and, therefore, solid fuels (mainly imported coke, but also imported anthracite) were replaced, to a very large extent, by electricity and natural gas;
    - **liquid fuels** increase (+72.1 %) was driven by road fuel sales and kerosene, but with the former being 4 to 5 times higher in quantity than the latter. This is especially "road fuel sales to non-residents" that explains a great deal of the sharp increase *[→ Section I.2.8]*;

[21] Diesel being the first liquid fuel in terms of volumes sold. The liquid fuel consumption in Luxembourg is much lower than the level of fuel sales, because large amounts of road fuels are bought by foreign commuters and transit traffic passing through Luxembourg: see *Section I.2.8* below.

- the 48 % increase in **natural gas** final consumption followed the continuous extension of the natural gas network in Luxembourg so that this fuel ranked second after the consumption of liquid fuels in 2015 – and even first if "road fuel sales to non-residents" and kerosene are not considered.

53. Natural gas has also become the main energy source of Luxembourg's national electricity production capacity. In 1990, more than 90 % of Luxembourg's electric energy consumption was imported and one medium size power plant of about 70 MW was run by the iron and steel company Arbed.[22] That power plant was mainly run on blast furnace gas – a side product of the blast furnaces in the steel industry – and was phased out in 1998 after the last blast furnace went out of service. In the early 1990s, small combined heat-power (CHP) installations (or cogeneration) plants appeared. Their installation was encouraged financially by the Government. This development was followed later by some industrial companies that installed gas turbines to produce electricity and heat simultaneously. In mid-2002, the ultra-modern TWINerg power plant started its commercial operation. Located in Esch-sur-Alzette, TWINerg was a gas and steam turbine power station running on natural gas, with an electrical output of 376 MWel (efficiency 55.7 %). If almost all of these cogeneration plants run on natural gas, gas oil remains the emergency fuel in case of a natural gas supply disruption.

54. The impact of TWINerg in the primary energy consumption mix is clearly visible in ***Table I.2-4*** and its associated ***Figure I.2-18***: electricity imports dropped and natural gas primary consumption increased in 2002, while in 2015 they reverted back to values similar than those recorded in 2001. After a few years of reduced activity, the TWINerg plant was finally shut down in 2016. To complement this analysis, an energy balance for electric power provided ***[→ Table I.2-6 & Figure I.2-20]***.

Effects on GHG emissions: a sharp increase between 2001 and 2002

55. GHG emissions of the public electricity and heat production (CRF 1A1a) are somewhat reflecting the changes described above. A sharp increase occurred in 2002 when the TWINerg power plant started to operate at full capacity. The impact of this installation on GHG emissions is around 0.9 to 1 Mio. t CO_2e per year, i.e. about 8 % of the total GHG emissions, excluding LULUCF. The rather important decreases observed between 2007 and 2008, and again between 2010 and 2011, are the result of maintenance operations of TWINerg over several months, i.e. months with no substantial production. However, from 2012 onwards, TWINerg started to reduce its production up to its closure in 2016 ***[→ Figure I.2-20]***.

22 Then Arcelor and now, Arcelor-Mittal.

TABLE I.2-4 – PRIMARY ENERGY CONSUMPTION: 1990-2018

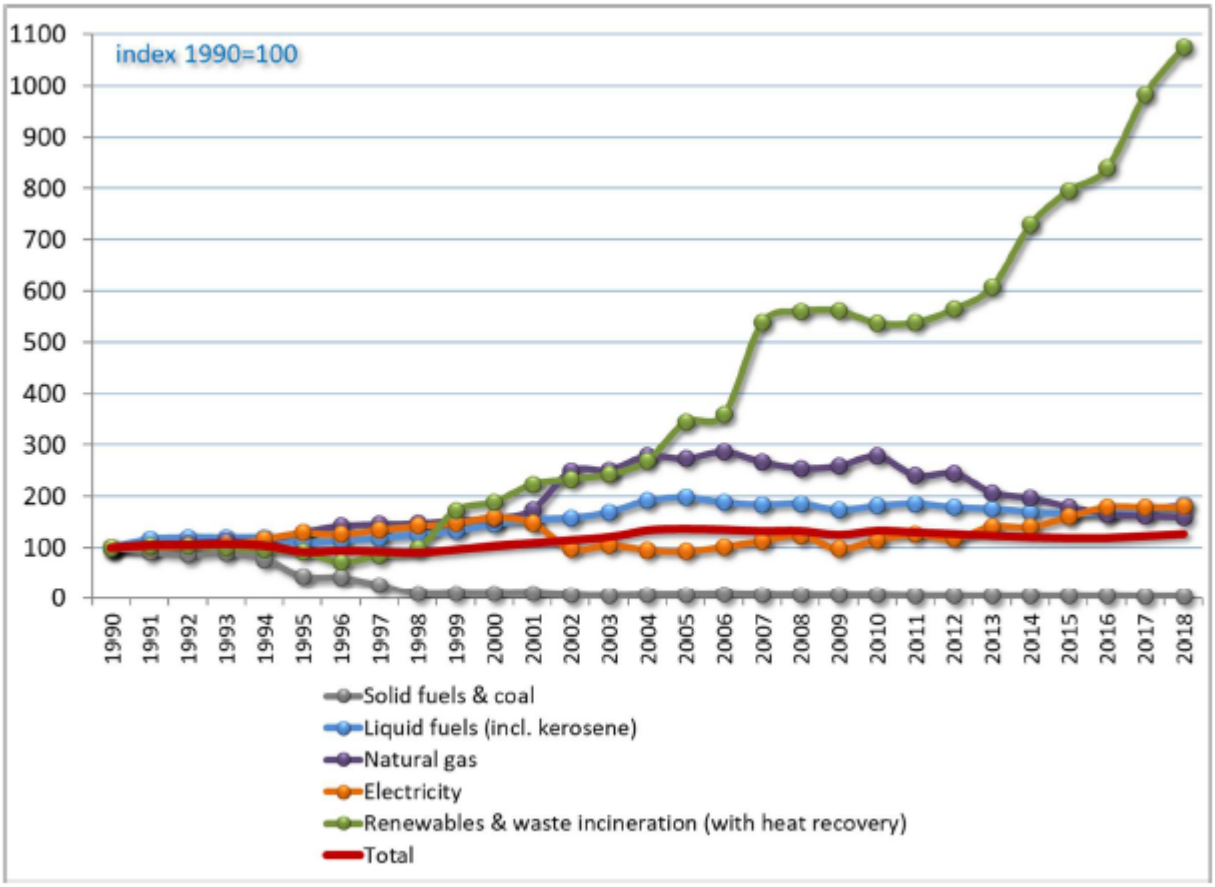
TJ	1990 (base year)	1991	1992	1993	1994	1995	1996	1997	1998
Solid fuels & coal	49939.83	45812.91	43145.01	44770.76	38726.29	22010.21	20893.02	13306.17	4861.42
	33.23%	28.98%	27.20%	27.75%	24.76%	15.90%	14.78%	9.57%	3.57%
Liquid fuels (incl. kerosene)	66030.62	76910.67	79078.34	78994.97	78578.11	72455.60	74715.90	77882.37	82209.79
	43.94%	48.66%	49.86%	48.97%	50.24%	52.35%	52.85%	56.00%	60.30%
Natural gas (1)	19925.91	20717.94	21593.35	22427.07	22593.81	25819.65	28324.39	29023.46	29305.68
	13.26%	13.11%	13.61%	13.90%	14.45%	18.65%	20.03%	20.87%	21.50%
Electricity	13256.15	13464.58	13631.32	14006.50	15423.82	17083.75	16644.80	17889.96	18859.16
	8.82%	8.52%	8.59%	8.68%	9.86%	12.34%	11.77%	12.86%	13.83%
Heat	NO	NO	NO	NO	NO	NO	NO	NO	NO
	NA	NA	NA	NA	NA	NA	NA	NA	NA
Renewable energy sources & waste	1125.52	1167.21	1167.21	1125.52	1083.84	1042.15	808.71	964.61	1100.93
Incineration (with heat recovery) (2)	0.75%	0.74%	0.74%	0.70%	0.69%	0.75%	0.57%	0.69%	0.81%
Total	150278.03	158073.31	158615.23	161324.82	156405.87	138411.36	141386.82	139066.58	136336.98

TJ	1999	2000	2001	2002	2003	2004	2005	2006	2007
Solid fuels & coal	4814.73	4594.52	4957.84	3083.62	2369.15	3328.54	3248.87	3876.79	3280.32
	3.33%	2.96%	3.02%	1.79%	1.31%	1.65%	1.58%	1.91%	1.65%
Liquid fuels (incl. kerosene)	87715.26	96236.54	102063.69	104261.62	111789.85	126709.57	130884.49	124310.30	121227.03
	60.72%	61.99%	62.27%	60.42%	61.74%	62.91%	63.82%	61.24%	60.92%
Natural gas (1)	30397.85	31231.01	34718.00	49629.00	50238.00	55632.00	54720.18	57237.24	53426.14
	21.04%	20.12%	21.18%	28.76%	27.74%	27.62%	26.68%	28.20%	26.85%
Electricity	19580.75	21059.69	19649.82	12952.77	13931.02	12698.58	12323.47	13490.64	14981.85
	13.55%	13.56%	11.99%	7.51%	7.69%	6.30%	6.01%	6.65%	7.53%
Heat	NO	0.03	2.02	6.47	9.85	13.60	17.53	21.62	28.95
	NA	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%
Renewable energy sources & waste	1946.32	2128.82	2520.68	2630.06	2736.22	3041.45	3883.23	4049.26	6063.63
Incineration (with heat recovery) (2)	1.35%	1.37%	1.54%	1.52%	1.51%	1.51%	1.89%	1.99%	3.05%
Total	144454.91	155250.60	163912.04	172563.50	181074.05	201423.74	205077.57	202985.71	199007.74

TJ	2008	2009	2010	2011	2012	2013	2014	2015	2016
Solid fuels & coal	3136.57	2801.27	2806.63	2443.45	2249.59	2005.86	2235.46	2057.27	2193.19
	1.57%	1.48%	1.40%	1.25%	1.17%	1.08%	1.24%	1.15%	1.23%
Liquid fuels (incl. kerosene)	122653.44	114781.92	120101.37	122553.58	118269.72	116297.53	112052.94	110128.94	109970.55
	61.51%	60.83%	60.05%	62.57%	61.77%	62.69%	62.07%	61.75%	61.55%
Natural gas (1)	50856.70	51751.75	55665.22	48021.10	48894.89	41398.28	39223.62	35770.96	32988.07
	25.50%	27.42%	27.83%	24.52%	25.54%	22.32%	21.73%	20.06%	18.46%
Electricity	16412.67	12987.43	15290.40	16677.00	15567.70	18791.88	18634.28	21238.39	23821.51
	8.23%	6.88%	7.65%	8.51%	8.13%	10.13%	10.32%	11.91%	13.33%
Heat	41.42	62.14	84.70	106.64	133.07	160.91	182.47	208.17	231.67
	0.02%	0.03%	0.04%	0.05%	0.07%	0.09%	0.10%	0.12%	0.13%
Renewable energy sources & waste	6310.98	6320.76	6052.85	6067.60	6363.53	6846.43	8208.17	8956.12	9453.53
Incineration (with heat recovery) (2)	3.16%	3.35%	3.03%	3.10%	3.32%	3.69%	4.55%	5.02%	5.29%
Total	199411.78	188705.27	200001.16	195869.37	191478.51	185500.90	180536.93	178359.85	178658.51

TJ	2017	2018
Solid fuels & coal	1897.95	1764.00
	1.03%	0.92%
Liquid fuels (incl. kerosene)	115043.66	121501.00
	62.35%	63.50%
Natural gas (1)	32244.57	31803.00
	17.48%	16.62%
Electricity	23785.11	23859.00
	12.89%	12.47%
Heat	257.20	289.00
	0.14%	0.15%
Renewable energy sources & waste	11075.00	12113.00
Incineration (with heat recovery) (2)	6.00%	6.33%
Total	184502.85	191329.00

FIGURE I.2-18 – PRIMARY ENERGY CONSUMPTION: 1990-2018



Source: STATEC, *Statistical Yearbook*, Table A.4200 (updated 15.11.2019): http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12759&IF_Language=fra&MainTheme=1&FldrName=4&RFPath=54

Notes: (1) Natural gas is expressed in GCV;
(2) Only the organic fraction of waste is counted. The biogas included as renewable energy source is expressed in GCV that also comprises blended biofuels. There is a break in the time-series between 1999 & 2000.

56. *Figure I.2-20* does include GHG emissions due to waste incineration since the sole incinerator of the country recovers energy during the process. Therefore, and according to the inventory accounting rules, related emissions for the non-organic part of waste incineration have to be reported under CRF sub-category 1A1a *[→ Section I.2.11].*

57. The decline observed in the 1990s for the industrial sector related emissions – mostly the result of the move from blast furnaces to electric arc furnaces in the steel industry – does not appear in *Figure I.2-11*. Indeed, and according to the inventory accounting rules, since those manufacturing industries that produce energy do it for their own needs – i.e. an auto-production that is not primarily intended to supply public networks – related emissions have to be recorded under CRF sub-category 1A2 (manufacturing industries).

TABLE I.2-5 – FINAL ENERGY CONSUMPTION: 1990-2018

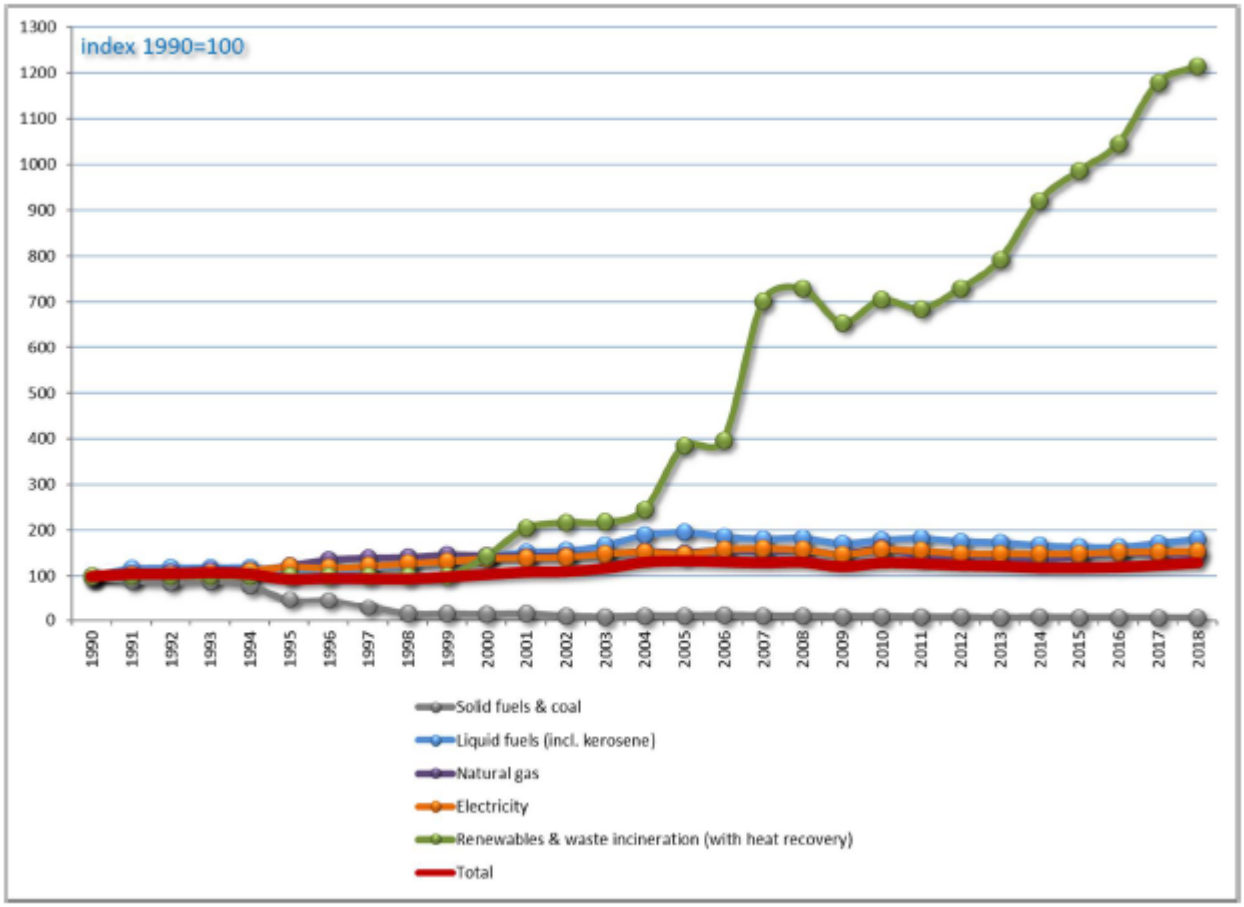
TJ	1990 (base year)	1991	1992	1993	1994	1995	1996	1997	1998
Solid fuels & coal	34331.76	30814.85	29475.07	30689.24	27268.21	16035.03	15670.77	10422.20	4882.65
	23.83%	20.38%	19.46%	19.85%	18.05%	11.91%	11.35%	7.64%	3.60%
Liquid fuels (incl. kerosene)	66193.31	76911.52	78669.97	78837.44	78753.71	72682.85	74734.38	78046.98	82554.07
	45.95%	50.87%	51.93%	51.00%	52.14%	53.99%	54.13%	57.20%	60.90%
Natural gas (1)	19426.75	20389.72	21227.08	22064.44	21989.91	23906.63	26251.24	27155.58	27436.94
	13.49%	13.49%	14.01%	14.27%	14.56%	17.76%	19.01%	19.90%	20.24%
Blast furnaces gas	8'457.34	7'234.79	6'196.46	6'514.24	5'503.55	2731.89	2'511.66	1'347.31	NO
	5.87%	4.79%	4.09%	4.21%	3.64%	2.03%	1.82%	0.99%	NA
Electricity	14988.74	15198.08	15281.82	15826.10	16747.20	18045.11	17710.16	18254.45	19091.81
	10.41%	10.05%	10.09%	10.24%	11.09%	13.40%	12.83%	13.38%	14.08%
Heat (2)	NO	NO	NO	NO	125.60	586.15	547.21	563.54	949.98
	NA	NA	NA	NA	0.08%	0.44%	0.40%	0.41%	0.70%
Renewable energy sources & waste	644.77	644.77	644.77	644.77	644.77	644.77	644.77	644.77	644.77
Incineration (with heat recovery) (3)	0.45%	0.43%	0.43%	0.42%	0.43%	0.48%	0.47%	0.47%	0.48%
Total	144043	151194	151495	154576	151033	134632	138070	136435	135560

TJ	1999	2000	2001	2002	2003	2004	2005	2006	2007
Solid fuels & coal	4835.75	4594.52	4957.84	3083.62	2369.15	3328.54	3248.87	3876.79	3280.32
	3.39%	3.07%	3.16%	1.95%	1.41%	1.78%	1.71%	2.07%	1.77%
Liquid fuels (incl. kerosene)	88082.74	94644.90	100723.34	103120.21	110821.65	125715.23	130171.42	123605.43	120541.81
	61.67%	63.27%	64.29%	65.18%	65.83%	67.37%	68.35%	65.86%	65.21%
Natural gas (1)	28436.00	28125.74	27997.84	28258.28	28673.98	29942.32	29338.04	30622.60	29822.71
	19.91%	18.80%	17.87%	17.86%	17.03%	16.04%	15.40%	16.32%	16.13%
Blast furnaces gas	NO	NO	NO	NO	NO	NO	NO	NO	NO
	NA	NA	NA	NA	NA	NA	NA	NA	NA
Electricity	19836.00	20790.21	21033.19	21260.54	22252.42	23007.38	22149.43	23806.48	24097.50
	13.89%	13.90%	13.43%	13.44%	13.22%	12.33%	11.63%	12.68%	13.04%
Heat (2)	986.41	503.93	624.35	1086.98	2818.44	3036.13	3055.77	3210.55	2581.94
	0.69%	0.34%	0.40%	0.69%	1.67%	1.63%	1.60%	1.71%	1.40%
Renewable energy sources & waste	644.77	929.70	1321.31	1405.98	1406.76	1586.77	2489.86	2562.50	4518.54
Incineration (with heat recovery) (3)	0.45%	0.62%	0.84%	0.89%	0.84%	0.85%	1.31%	1.37%	2.44%
Total	142821	149589	156659	158216	168342	186616	190453	187684	184843

TJ	2008	2009	2010	2011	2012	2013	2014	2015	2016
Solid fuels & coal	3136.57	2801.27	2806.63	2443.45	2249.59	2005.86	2235.46	2057.27	2193.19
	1.68%	1.61%	1.52%	1.34%	1.27%	1.14%	1.31%	1.21%	1.27%
Liquid fuels (incl. kerosene)	121613.03	113535.87	118859.54	121270.87	116787.74	114974.13	110826.74	108956.97	108684.56
	65.13%	65.36%	64.46%	66.45%	65.80%	65.54%	65.08%	64.12%	63.11%
Natural gas (1)	30616.00	28658.82	31411.99	27916.40	28262.17	27789.82	26536.40	27791.20	29226.32
	16.40%	16.50%	17.04%	15.30%	15.92%	15.84%	15.58%	16.35%	16.97%
Blast furnaces gas	NO	NO	NO	NO	NO	NO	NO	NO	NO
	NA	NA	NA	NA	NA	NA	NA	NA	NA
Electricity	23750.44	22004.89	23734.71	23343.11	22449.55	22315.52	22256.43	22406.96	22922.20
	12.72%	12.67%	12.87%	12.79%	12.65%	12.72%	13.07%	13.19%	13.31%
Heat (2)	2922.39	2483.81	3036.59	3102.44	3045.38	3230.12	2511.90	2355.44	2432.74
	1.56%	1.43%	1.65%	1.70%	1.72%	1.84%	1.47%	1.39%	1.41%
Renewable energy sources & waste	4697.03	4219.33	4540.66	4414.70	4700.15	5103.19	5938.32	6360.30	6742.58
Incineration (with heat recovery) (3)	2.52%	2.43%	2.46%	2.42%	2.65%	2.91%	3.49%	3.74%	3.92%
Total	186735	173704	184390	182491	177495	175419	170305	169928	172202

TJ	2017	2018
Solid fuels & coal	1897.95	1764.00
	1.07%	0.95%
Liquid fuels (incl. kerosene)	113906.00	120411.00
	63.96%	65.09%
Natural gas (1)	28760.25	28762.00
	16.15%	15.55%
Blast furnaces gas	NO	NO
	NA	NA
Electricity	23015.53	23120.00
	12.92%	12.50%
Heat (2)	2782.06	3094.00
	1.56%	1.67%
Renewable energy sources & waste	7599.00	7837.00
	4.27%	4.24%
Total	178102	184988

FIGURE I.2-19 – FINAL ENERGY CONSUMPTION: 1990-2018



S Source: STATEC, Statistical Yearbook, Table A.4300 (updated 15.11.2019):
http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12771&IF_Language=fra&MainTheme=1&FldrName=4&RFPath=51

Notes: (1) Natural gas is expressed in GCV;
(2) from 2000 onwards, heat that is consumed by the cogeneration power plants themselves is no longer included, hence there is a break in the time series
(3) only the organic fraction of waste is counted. The biogas included as renewable energy source is expressed in GCV that also comprises blended biofuels. There is a break in the time series between 1999 & 2000.

TABLE I.2-6 – ENERGY BALANCE FOR ELECTRIC POWER: 1990-2016

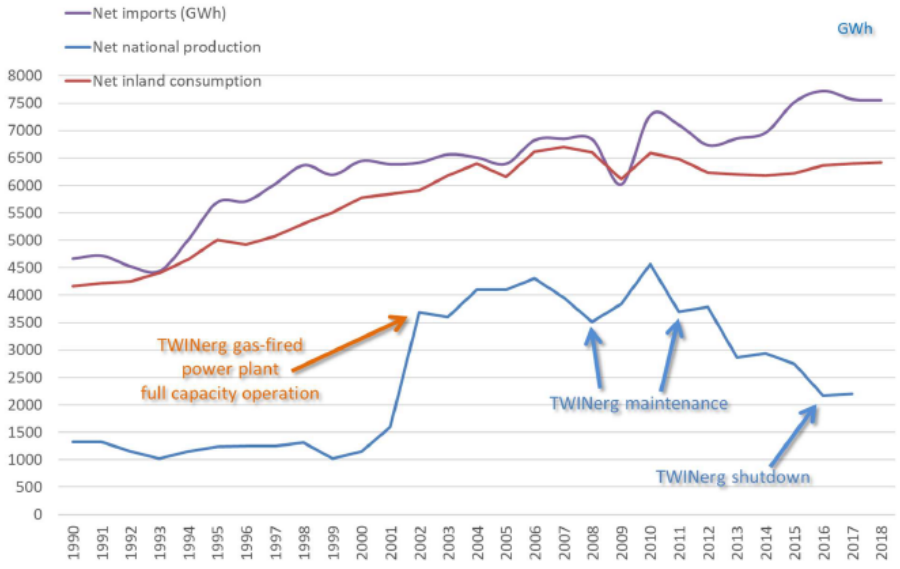
GWh	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Imports	**4665.46**	**4718.45**	**4523.56**	**4440.97**	**5015.24**	**5693.47**	**5712.33**	**6026.52**	**6366.60**	**6193.53**	**6445.38**	**6383.25**	**6413.64**
National production	**1322.04**	**1327.54**	**1144.30**	**1019.29**	**1150.11**	**1236.06**	**1251.78**	**1243.99**	**1311.39**	**1022.59**	**1148.34**	**1591.96**	**3687.51**
cogeneration	NO	NO	NO	NO	33.00	102.00	114.00	118.00	195.00	205.00	219.38	259.00	351.99
thermic power stations	558.72	622.11	594.14	607.83	538.96	448.53	420.24	331.96	299.76	256.62	270.88	726.25	2685.30
of which, TWINerg (2)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
hydro-electricity	804.24	751.85	593.24	454.16	648.62	821.85	858.42	932.62	1022.16	765.80	872.99	857.97	977.93
wind	NO	NO	NO	NO	NO	NO	NO	3.00	11.00	17.00	25.00	24.00	24.00
biomass & biogas	554.00	617.00	590.00	604.00	491.00	399.00	380.00	320.00	240.00	257.00	271.00	725.00	2685.00
gas from WWTPs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
gas from landfill sites	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
photovoltaic	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total	**5987.50**	**6045.99**	**5667.85**	**5460.26**	**6165.36**	**6929.53**	**6964.11**	**7270.50**	**7678.00**	**7216.12**	**7593.72**	**7975.21**	**10101.15**
Exports	**0.75**	**0.72**	**0.54**	**0.39**	**0.57**	**0.74**	**0.81**	**0.85**	**0.92**	**0.65**	**0.74**	**1.07**	**2.94**
Conversion uses and losses	**389.32**	**395.43**	**334.28**	**318.06**	**364.83**	**434.15**	**431.95**	**418.98**	**428.05**	**340.97**	**359.49**	**414.82**	**450.53**
Net inland consumption	**4149.00**	**4211.00**	**4231.00**	**4385.00**	**4644.00**	**4996.00**	**4907.00**	**5057.00**	**5292.00**	**5495.00**	**5775.00**	**5843.00**	**5904.00**
Total	**4539.08**	**4601.04**	**4620.87**	**4774.72**	**5033.89**	**5386.07**	**5297.13**	**5447.17**	**5682.25**	**5884.98**	**6165.06**	**6233.39**	**6296.26**

Summary in GWh	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Net imports	**4665.46**	**4718.45**	**4523.56**	**4440.97**	**5015.24**	**5693.47**	**5712.33**	**6026.52**	**6366.60**	**6193.53**	**6445.38**	**6383.25**	**6413.64**
Net national production (1)	**1322.04**	**1327.54**	**1144.30**	**1019.29**	**1150.11**	**1236.06**	**1251.78**	**1243.99**	**1311.39**	**1022.59**	**1148.34**	**1591.96**	**3687.51**
Net inland consumption	**4149.00**	**4211.00**	**4231.00**	**4385.00**	**4644.00**	**4996.00**	**4907.00**	**5057.00**	**5292.00**	**5495.00**	**5775.00**	**5843.00**	**5904.00**
Net inland consumption in Mio. MJ (3)	14936.40	15159.60	15231.60	15786.00	16718.40	17985.60	17665.20	18205.20	19051.20	19782.00	20790.00	21034.80	21254.40
Net inland consumption in 1000 toe	356.75	362.08	363.80	377.04	399.31	429.58	421.93	434.82	455.03	472.48	496.56	502.41	507.65

GWh	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Imports	**6562.18**	**6506.31**	**6391.61**	**6823.54**	**6846.58**	**6829.87**	**6022.47**	**7279.51**	**7096.34**	**6732.10**	**6851.52**	**6961.18**	**7518.76**	**7718.39**
National production	**3597.10**	**4102.05**	**4104.41**	**4301.32**	**3959.54**	**3516.43**	**3835.95**	**4560.28**	**3693.17**	**3786.31**	**2859.81**	**2937.81**	**2938.81**	**2939.81**
cogeneration	397.41	441.91	445.15	470.69	398.98	422.18	390.45	439.66	447.05	437.88	417.32	381.36	349.89	355.05
thermic power stations	2682.89	3229.29	3181.75	3337.18	2997.85	2511.43	2961.88	3047.06	2495.80	2541.81	1574.22	1622.00	1029.80	467.66
of which, TWINerg (2)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
hydro-electricity	902.91	842.98	867.65	906.31	906.12	951.92	820.53	1457.23	1124.76	1146.81	1145.22	1157.88	1158.88	1159.88
wind	26.00	39.00	52.00	58.00	64.00	61.00	63.00	55.00	64.00	77.00	83.00	80.00	102.00	101.00
biomass & biogas	2683.00	3230.00	3184.00	3339.00	2999.00	2513.00	2963.00	3046.00	2498.00	2543.00	1573.00	1622.00	1030.00	467.00
gas from WWTPs	NO	NO	NO	NO	NO	5.32	5.85	5.14	6.00	6.00	6.00	6.00	6.00	6.00
gas from landfill sites	NO	NO	NO	NO	NO	NO	0.26	0.41	0.00	1.00	1.00	1.00	1.00	1.00
photovoltaic	1.00	9.00	18.00	21.00	21.00	20.00	20.00	21.00	26.00	38.00	74.00	95.00	104.00	100.00
Total	**10159.28**	**10608.36**	**10496.01**	**11124.85**	**10806.12**	**10346.30**	**9858.42**	**11839.79**	**10789.51**	**10518.41**	**9711.33**	**9898.99**	**10457.57**	**10658.21**
Exports	**2.80**	**3.13**	**3.13**	**3.27**	**2.89**	**2.48**	**2.60**	**3.22**	**2.61**	**2.62**	**1.91**	**2.07**	**1.92**	**1.42**
Conversion uses and losses	**475.68**	**366.33**	**453.13**	**472.35**	**466.47**	**474.25**	**423.09**	**674.15**	**608.00**	**593.24**	**593.24**	**593.24**	**594.24**	**595.24**
Net inland consumption	**6182.00**	**6393.00**	**6150.00**	**6614.00**	**6695.00**	**6598.00**	**6114.00**	**6593.00**	**6485.00**	**6236.00**	**6201.00**	**6181.00**	**6225.00**	**6367.00**
Total	**6574.12**	**6785.46**	**6542.46**	**7006.59**	**7087.21**	**6989.81**	**6505.93**	**6985.54**	**6876.94**	**6627.95**	**6592.23**	**6572.39**	**6617.24**	**6759.74**

Summary in GWh	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Net imports	**6562.18**	**6506.31**	**6391.61**	**6823.54**	**6846.58**	**6829.87**	**6022.47**	**7279.51**	**7096.34**	**6732.10**	**6851.52**	**6961.18**	**7518.76**	**7718.39**
Net national production (1)	**3597.10**	**4102.05**	**4104.41**	**4301.32**	**3959.54**	**3516.43**	**3835.95**	**4560.28**	**3693.17**	**3786.31**	**2859.81**	**2937.81**	**2938.81**	**2939.81**
Net inland consumption	**6182.00**	**6393.00**	**6150.00**	**6614.00**	**6695.00**	**6598.00**	**6114.00**	**6593.00**	**6485.00**	**6236.00**	**6201.00**	**6181.00**	**6225.00**	**6367.00**
Net inland consumption in Mio. MJ (3)	22255.20	23014.80	22140.00	23810.40	24102.00	23752.80	22010.40	23734.80	23346.00	22449.60	22323.60	22251.60	22410.00	22921.20
Net inland consumption in 1000 toe	531.56	549.70	528.80	568.70	575.67	567.33	525.71	566.90	557.61	536.20	533.19	531.47	535.25	547.46

FIGURE I.2-20 – ENERGY BALANCE FOR ELECTRIC POWER: 1990-2018



Sources: Compiled by MECDD-AEV on 31 March 2020 using data published by the MEA, the *Institut Luxembourgeois de Régulation* and STATEC (Table A.4203). Net national production data for 2018 were not yet available at this date.

Notes: (1) The net national production is the difference between the national production and the conversion process uses and losses.
(2) Net inland consumption expressed in TJ (Mio. MJ) differs slightly from the corresponding figures in Table I.2-5 – less than 2 % – because data sources, units and calculations are not exactly the same

I.2.7. Industry

CRF (sub-)categories covered		1A2 & 2		
share in total GHG emissions, excl. LULUCF		***1990***	62.0% =	7905.12 Gg CO_2e
		2018	17.3% =	1824.70 Gg CO_2e
		2019p	17.3% =	1855.77 Gg CO_2e
	1A2	***1990***	49.2% =	6265.75 Gg CO_2e
		2018	11.0% =	1164.30 Gg CO_2e
		2019p	11.0% =	1176.39 Gg CO_2e
	2	***1990***	12.9% =	1639.38 Gg CO_2e
		2018	6.3% =	660.40 Gg CO_2e
		2019p	6.3% =	679.38 Gg CO_2e

An activity branch dominated by the metallurgy

58. Over the period under review, **metallurgy** – steel and aluminium in Luxembourg – usually represented around one third of the manufacturing industry total gross value added. Nevertheless, after reaching a peak in both 2007 and 2008 – with almost 40 % of the manufacturing industry total gross value added – the share of metallurgy dropped to about 20 % to 25 % since 2009 when the financial and economic crisis started to affect Luxembourg's industrial activities, and principally its steel industry. Looking at the metallurgy weight in manufacturing industry production, from 2009 onwards, it dropped from around 40 % to 30 %.

59. Consequently, it would be expected that GHG emissions trends in the industrial sector were driven by the activities and changes that occurred in these two branches. Nevertheless, aluminium production in Luxembourg is a secondary production using aluminium scraps. Since there are no transformation activities from bauxite, this branch only records emissions related to combustion activities, i.e. there are no emissions stemming from industrial processes. Then, as underlined in *Section I.2.6*, the iron and steel industry has been characterized by a move from blast furnaces to electric arc furnaces between 1994 and 1998. Consequently, industrial emissions are nowadays depending on changes in activities or processes in a various number of manufacturing branches as illustrated below.

60. **Industrial processes and product use** emissions include emissions from industrial installations pertaining to three sectors only: clinker, flat glass, iron and steel. They also cover consumption of halocarbons (HFCs) and sulphur hexafluoride (SF_6)[23] – the fluorinated gases or F-gases – as well as the use of solvent and other products.

[23] There are no emissions stemming from perfluorocarbons (PFCs) and nitrogen trifluoride (NF_3) in Luxembourg.

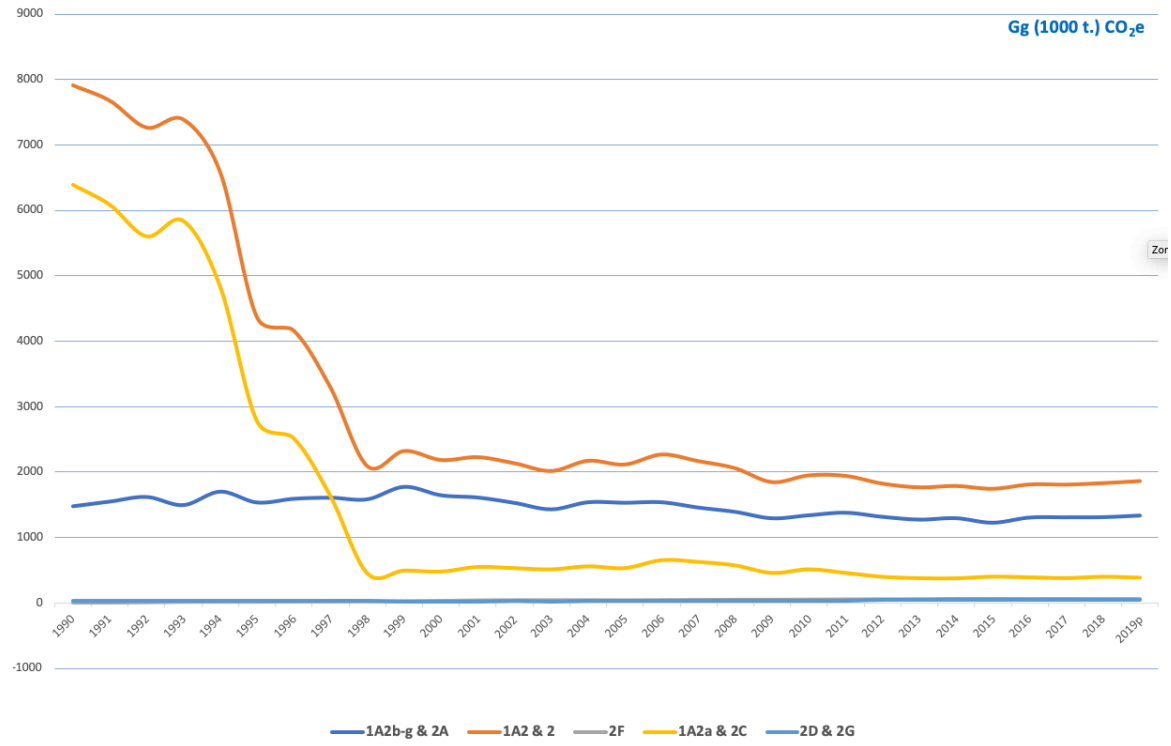
Effects on GHG emissions: iron & steel used to set the pace

61. Overall emissions related to fuel combustion and processes in the manufacturing industry and construction sector were dominated by emissions generated by the iron and steel production plants up to 1998: from 1990 to 1998, GHG emissions in Luxembourg were reduced by one third due to the move from blast furnaces to electric arc furnaces. 1998 is also the year with the lowest GHG emissions, excluding LULUCF, ever recorded for Luxembourg since 1990 *[→ Figure I.2-21]*.

62. When the move from blast furnaces to electric arc furnaces was completed, iron and steel was no longer the main emitter of GHG and the overall emissions trend started to fluctuate according to changes in the various manufacturing and construction sub-categories. Excluding iron and steel from the picture shows that, in some cases, emissions produced by the other manufacturing industries and construction activities did evolve in an erratic way. Such irregular developments may be explained by the small size of Luxembourg's industrial activities.[24]

63. The striking increase of F-gases emissions *[→ Figure I.2-21]* is the consequence of growing use in the country, notably due to an increasing use of air conditioning, but also of better estimating procedures and activity data.[25]

FIGURE I.2-21 – GHG EMISSIONS FOR SELECTED CRF INDUSTRIAL SUB-CATEGORIES: 1990-2019



Source: MECDD-AEV – Submission 2020v1 and "approximated inventory" 2019.
Note: F-gases emissions increased by 315.8 % since 1995 (base year for F-gases).

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24 A change in one unit might have important impact on an aggregated trend: see discussion in *Section I.2.9* below.

25 MDDI-DEV (2020), p. 394-408.

I.2.8. Road transportation

CRF sub-category covered		1A3b		
share in total GHG emissions, excl. LULUCF		***1990***	20.3% =	2590.54 Gg CO_2e
		2018	57.1% =	6019.93 Gg CO_2e
		2019p	57.5% =	6174.06 Gg CO_2e
	national fleet	***1990***	6.9% =	876.25 Gg CO_2e
		2018	16.4% =	1734,37 Gg CO_2e
		2019p	17.9% =	1927.06 Gg CO_2e
	"road fuel sales to	***1990***	13.5% =	1714.29 Gg CO_2e
	non-residents"	***2018***	40.4% =	4262.71 Gg CO_2e
		2019p	39.5% =	4247.00 Gg CO2e

Diverse inland and cross-border road transport flows

64. Luxembourg's location and its economic development have made it a **focal point for international road traffic**. Luxembourg is located at the heart of the main traffic axes for Western Europe *[→ Figure I.2-22]* and, therefore, has traditionally had a high volume of road transit traffic for both goods (freight transport) and passengers (tourists on their way to or back from southern Europe). The latter has increased even further by the **high number of commuter journeys** observed every working day. In comparison with international traffic, domestic traffic plays only a relatively small role since it responsible for only about 30 % of the total road fuels sold in Luxembourg.

65. Road traffic is also the largest source of emissions in Luxembourg's GHG balance. Fuel quantities sold at Luxembourg's petrol stations, after having been converted into GHG volumes, are, according to IPCC reporting rules, totally included in the GHG balance, although around 70 % of the emissions cannot be assigned to vehicles registered in Luxembourg and are actually emitted mostly abroad. This phenomenon is referred to as "**road fuel sales to non-residents**" whether they are in transit or commuting for work or leisure. Indeed, due to lower taxed fuel (gasoline and diesel), Luxembourg is an attractive "fuelling station" for daily commuters from neighbouring countries and cross-border shoppers, but, in first instance, for international road transit traffic crossing its territory (mainly freight transport). "Road fuel sales to non-residents" is briefly defined in *Box 3*.

66. With numerous trucks transiting through Luxembourg, as well as a passenger cars market dominated by diesel vehicles in at least two of its neighbouring countries – namely Belgium and France – it is not surprising that diesel oil is the first liquid fuel in terms of volumes sold *[→ Figure I.2-23]*.

67. The allocation of fuel sales between residents ("domestic") and non-residents ("exports") is not made on the basis of statistics or counting, but well using the NEMO model *[→ Section IV.3.4]*.

BOX 3 – "ROAD FUEL SALES TO NON-RESIDENTS" OR "ROAD FUEL EXPORTS"

It covers fuel sales to non-residents, i.e.:

1. road vehicles in transit: freight trucks, buses & coaches, passenger cars, whose an important share fills up in Luxembourg because of lower fuel prices;

2. cross-border commuters who are also benefiting of the cheaper fuel prices;

3. "fuel tourism", known as "Tanktourismus" in Luxembourg: people driving especially to Luxembourg for benefiting of lower fuel prices, as well as lower prices on other commodities such as non-alcoholic & alcoholic beverages, tobacco, etc. (Luxembourg applies rather law taxation rates, though always in the limits adopted at EU levels, e.g. VAT is set at 17 %).

Effects on GHG emissions: an untypical situation

68. Combining the size of the country and of its economy, on the one side, and lower road fuel prices that implies a disproportionate volume of road fuel sales compared to its resident population, on the other side, Luxembourg presents a completely untypical and unique structural feature in its GHG emissions balance. In 2018, 6.02 Mio. t CO_2eq were produced by the road transportation sector and out of these, 4.26 Mio. t CO_2eq, corresponding to 71 %, was the result of road fuels emitted abroad by commuting and transiting vehicles. That last amount represented around 40.4 % of the total 2018 GHG emissions for Luxembourg (excluding LULUCF) while the whole CRF sub-category 1A3b accounted for 57 % of the total 2018 GHG emissions for Luxembourg (excluding LULUCF) *[→ Figure I.2-24]*.

69. Both emissions generated by the national vehicles fleet and by the non-residents – "road fuel sales to non-residents" – showed dramatic increases over the period: +98 % and +149 % respectively.[26] For the national fleet, the evolution is correlated with both the population and economic activity growth. It is also explained by an increasing rate for passenger cars per inhabitants (from 499 to 670 passenger cars per 1000 inhabitants between 1990 and 2017, i.e. the highest rate within the EU).[27] Regarding "**road fuel sales to non-residents**", the rise is undoubtedly linked to the growing number of commuters crossing the borders every working day as well as to the general increase of road freight traffic in Europe.

70. However, an important decrease has been observed since 2005, which was the peak year for road fuel sales *[→ Figure I.2-23]*. Various reasons are being reported to explain this downward trend whilst overall road fuel prices were also falling:

    - probably the main reason is the "professional" diesel price applied in Belgium, i.e. transport companies can reclaim VAT paid on diesel sales. Taking this reimbursement into account the gap between diesel price in Luxembourg and in Belgium has become negligible;

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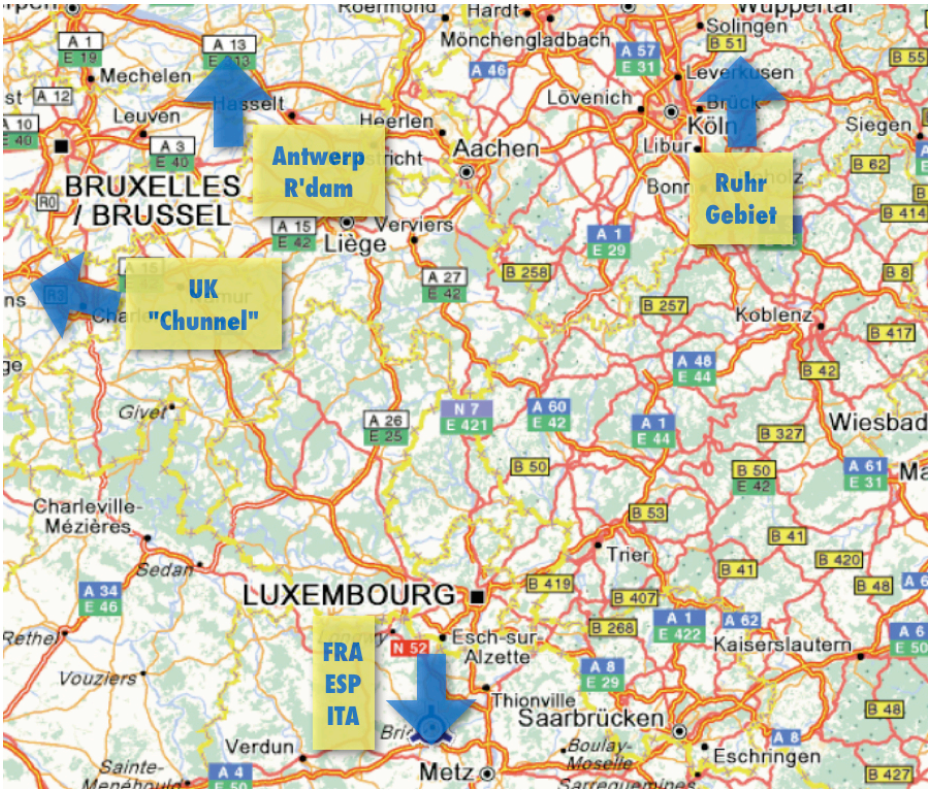
26 Corresponding percentages were +70 % and +232 % in 2005, the peak year with regard to road transportation related emissions.

27 Data extracted from European Commission (DG MOVE), *EU transport in figures – Statistical pocketbook*, 2019 edition, p.87. https://ec.europa.eu/transport/facts-fundings/statistics/pocketbook-2019_en.

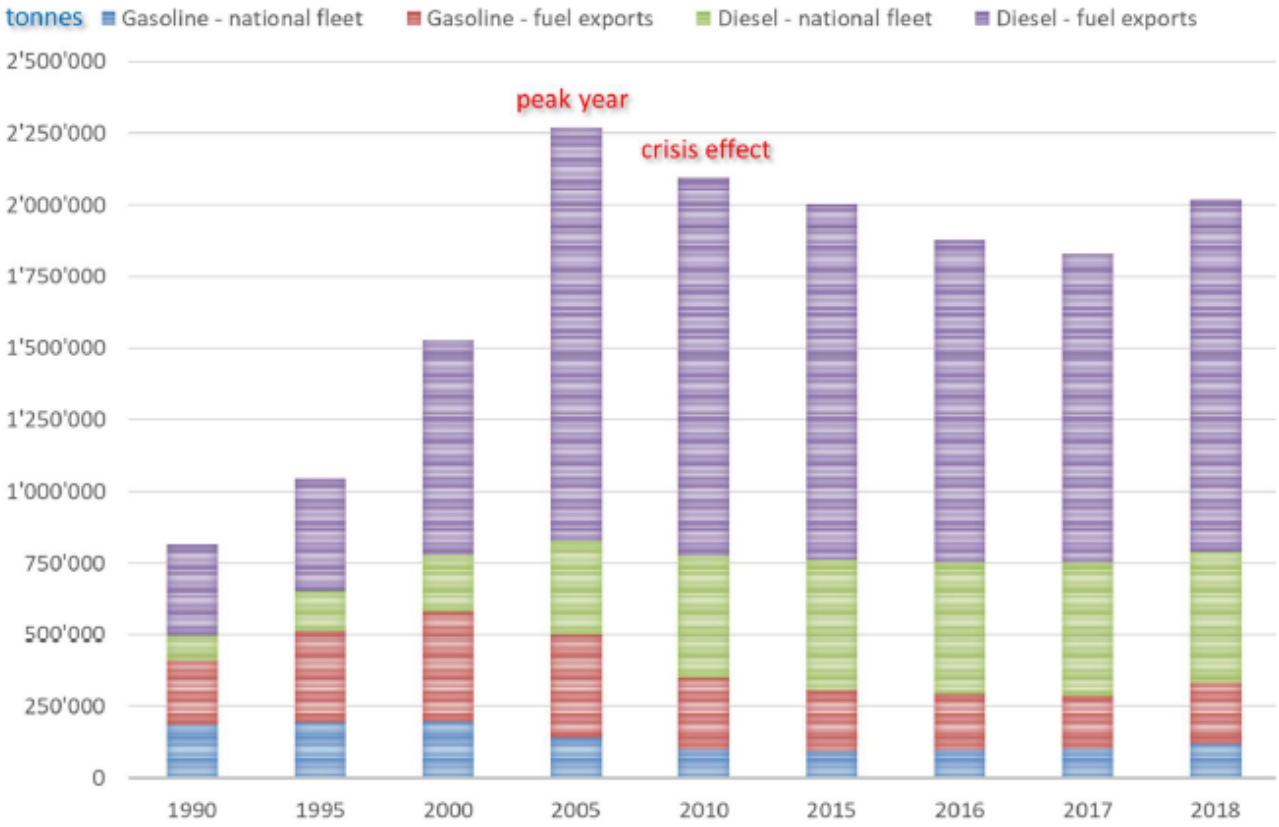
- from 1 January 2015 onward, Luxembourg is applying a VAT rate of 17 % instead of 15 %, which de facto narrowed the price gap;
- petrol stations on motorways have to pay a concession fee. This fee has been increased which limits now the opportunities for these stations to offer some rebates to frequent/important customers;
- finally, both gasoline and diesel are now cheaper than a few years ago. This might have led to less road fuel sales despite falling prices. This "law of offer and demand paradox" might be explained as follows: it is less attractive to make a detour to fuel in Luxembourg than when prices were higher. Indeed, the potential saving in euros of such a detour is now much smaller. Therefore, it is perhaps no longer worth the time and distance to do it (knowing also that other products attracting consumers such as alcohol and cigarettes have de facto experienced a price rise with the VAT change).

FIGURE I.2-22 – MAIN ROAD FREIGHT AXES CROSSING LUXEMBOURG



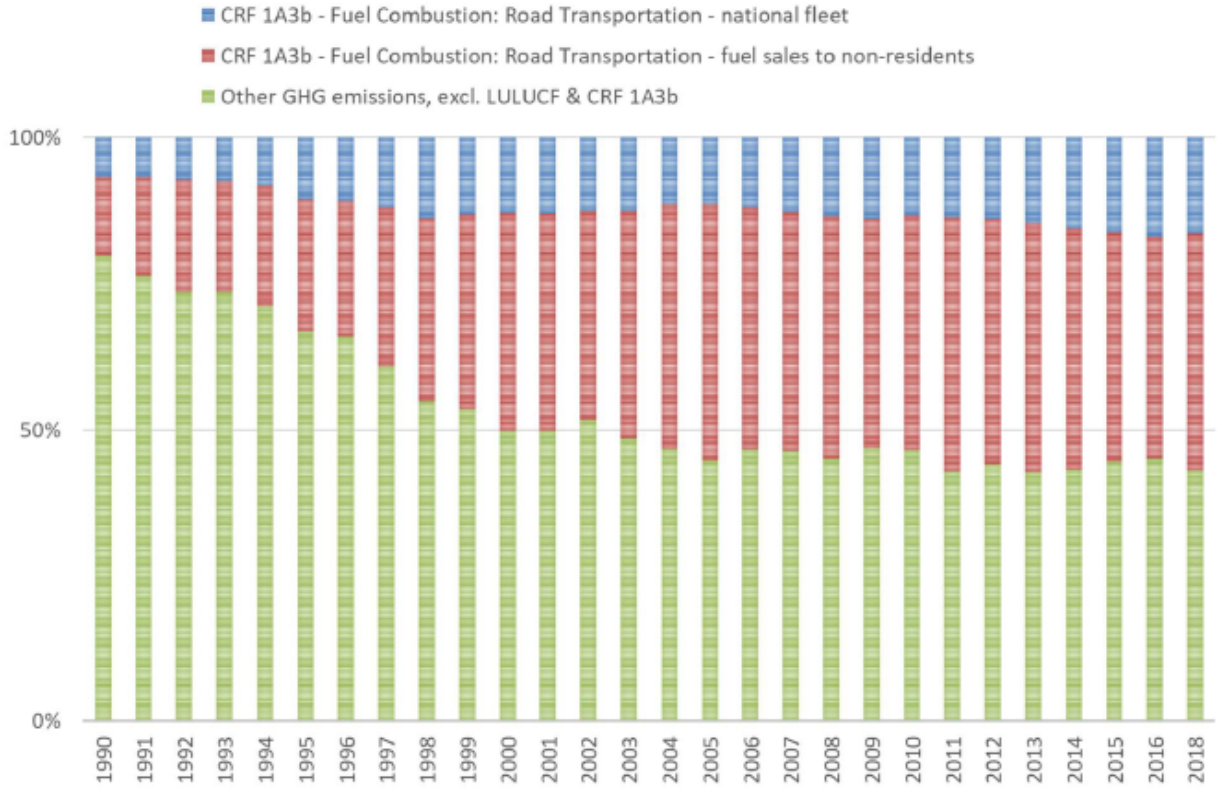
Source: ViaMichelin.

FIGURE I.2-23 – ROAD FUEL SALES: 1990-2018 IN TONNES



Source: MECDD-AEV (2020), based on table 3-51, section 3.2.8.3.

FIGURE I.2-24 – GHG EMISSIONS FOR ROAD TRANSPORTATION (CRF SUB-CATEGORY 1A3b): 1990-2018



Sources: MECDD-AEV – Submission 2020v1.
Note: CO_2 emissions from biofuels are excluded, and reported as "memo item".

I.2.9. UNFCCC and Kyoto Protocol: a demanding challenge for Luxembourg

The road transportation dilemma

71. Since Luxembourg is a small open economy integrated in the European internal market **where mobility of tax bases is likely to be high**, only marginal variations in the price differentials for petrol and diesel can be initiated by the authorities. Indeed, if Luxembourg's rates of taxation and prices were higher than those in the surrounding countries, it would be rather easy for any citizen of Luxembourg to avoid domestic taxation and to practise arbitrage: no location in Luxembourg is further than a maximum of 25-30 km away from a border with a neighbouring country. Lower taxation rates for certain goods – such as fuels, e.g. – have therefore always been part of Luxembourg fiscal policy and will remain crucial in the future, because of the country's geographical location and its small area. Whereas in larger neighbouring states, increasing certain tax rates would result in a slight shift in demand and in arbitrage deals at the outer fringes of their national territory – with a corresponding relatively slight reduction in tax revenues – this would not be the case for Luxembourg where such a policy may result in big losses in tax incomes. However, since road transportation, and more precisely "road fuel sales to non-residents", is the main contributor to GHG emissions in Luxembourg, as underlined in the second national "Action Plan for reducing CO_2 emissions" [MDDI-DEV (2013)], Luxembourg will use a policy mix of instruments with the aim of progressively reducing road transport related emissions *[→ Section III.3.2]*.

72. With regard to the instrument of excise duties, Luxembourg will gradually increase road fuels excise rates following a cautious approach based on a better knowledge of the factors determining road fuel sales in Luxembourg that also considers the impact on the public finances of the country. Furthermore, in its programme, the previous Government that took office in December 2013 underlined that a **feasibility study on the progressive way out of "fuel tourism"** – and more generally of "road fuel sales to non-residents" – should be realized so to evaluate the economic impacts of such a decision on the medium and long terms [Government of the Grand Duchy of Luxembourg (2013), p. 84]. This study has been released in November 2016.[28] Its outcomes led to the setting-up of an inter-ministerial working group with the aim to inform the Government on possible venues to reduce the weight of road fuel sales in the GHG balance of Luxembourg, as well as making public finances less dependent from that source of income. In parallel, STATEC is working on evaluating price-elasticities of road fuel sales. These activities are pursued under the actual governing coalition that took office in December 2018 and which is the same as the previous one.

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28 *Ermittlung und Bewertung der positiven und negativen Wirkungen des Treibstoffverkaufs unter besonderer Berücksichtigung negativer externer Umwelt-und Gesundheitseffekte – Status quo 2012 und maßnahmeninduzierte Veränderungen, Bericht für das Ministerium für Nachhaltige Entwicklung und Infrastrukturen des Großherzogtums Luxemburg*, Königswinter, 2016. (http://environnement.public.lu/fr/actualites/2016/11/etude_tt.html)

73. With regard to other instruments, the Luxembourg Government considers the organization of transport and the necessity to overcome existing problems linked to the traffic intensity as primary objectives. In this context, it promotes sustainable ways of transport consisting of public and non-motorized modes of transport. The re-organisation is intended to encompass both the national territory and the neighbouring regions of Germany, France and Belgium where many commuters come from, leading to a doubling of the workforce in Luxembourg during the day. All this is done in a conceptual way where new modes of transport such as electro-mobility and car sharing are promoted. In addition, Luxembourg has offered free access to its public transport system since the 29 February 2020. This measure ties in with earlier developments: starting in 2018, under-20s and students can already use the public transport network for free. By extending free access to the public transport network, the objective is to attract new users to public transport while minimizing GHG emissions, and other pollutants such as NOx, through the reduction of the number of vehicles on the roads.

Country and economy sizes

74. Special attention must also be made for the **small size of the country's economy** in a different context: it is a contributory factor to the fact that, in spite of the healthy economic situation, the courses of the overall development of the country, of the demand for energy and of the emissions balance are often affected by a single plant which is starting its activities, closing them down or changing its production processes. This became particularly clear when the steel industry switch from blast furnaces to electric arc furnaces was completed during the 1990s: from 1990 to 1998, GHG emissions in Luxembourg were reduced by one-third *[→ Section I.2.7]*.

75. Furthermore, the construction of a single power station, the TWINerg gas and steam plant, represents a further illustrative example as depicted in *Section I.2.6*. When TWINerg started its operation in mid-2002, Luxembourg, which did not have so far any substantial electricity generating capacity, saw, at once, its GHG emissions increasing by 0.9 to 1 Mio. t CO_2e per year. To give another illustration on how this project affected the GHG emissions pattern in Luxembourg, one can underline that it represents 35 % of the allocated emissions volume of the whole GHG EU Emissions Trading System sector (EU ETS) for the first commitment period under the Kyoto Protocol.

76. The impact that single industrial projects might have, plays also the other way round when a production unit or a plant is closed down. After a few years of reduced activity, the TWINerg power plant was finally shut down in 2016, which is having a high impact on Luxembourg's total GHG emissions. In addition, a sufficiently long breakdown in one of the main industrial unit of the country could have impacts on the total GHG emissions, such as the long maintenance operations of the TWINerg plant in 2008 and 2011 demonstrated *[→ Section I.2.6]*.

77. If these issues might not be a major concern for large economies, it is for Luxembourg, as shown by the examples discussed above.

Limited GHG emissions reduction potentials

78. As of today, Luxembourg **does not have those significant technical potentials** that exist in other countries where residual "old-technology" industrial and power plants still operate. In Luxembourg, there were almost none, and there still is none of those GHG reduction potentials stemming from the modernisation or the replacement of existing national industrial or power plants. In fact, with the move from blast to electric arc furnaces in the steel sector during the 1990s, Luxembourg very soon exhausted its only major technical potential for GHG emissions reduction. With the process change in the steel industry – an activity that accounted for 50 % of Luxembourg's total GHG emissions in 1990 (excluding LULUCF)[29] – total emissions from industry and electricity generation – i.e. largely the sectors covered by the EU ETS – decreased to 2 Mio. t CO_2e in 2018 – about 19 % of total GHG emissions (excluding LULUCF) – coming from slightly more than 7.9 Mio. t CO_2e in 1990 - or about 62 % of total GHG emissions (excluding LULUCF).[30]

79. In addition, any ultramodern fossil fuel-based electricity generating plant that Luxembourg might decide to construct will automatically lead to an increase of its national GHG emissions, since there are no existing power plants that can be stopped in return. Thus, those highly efficient CHP installations – as well as the gas and steam power station (TWINerg) when it was operating – that have been promoted and are operating in Luxembourg since 1998, and that use natural gas and, sometimes, gas oil as inputs, have led to an additional amount of approx. 1.2 Mio. t CO_2e in the GHG balance.[31] It is therefore clear that any new fossil-fuel power generating installation that might be constructed will inevitably lead to a deterioration of Luxembourg's GHG balance. This also implies that the implementation of the EU CHP installation guidelines, which in other countries may lead to CO_2 reductions thanks to increased efficiency, is counterproductive for Luxembourg. For this reason, Luxembourg's authorities only promote heat production from renewable energy sources, focusing mainly on biomass, wood and solar energy.[32] More precisely, CHP installations using renewable energies, biogas addition in distribution networks and the mobilization of wood resources are favoured.

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29 Sum of CRF sub-categories 1A2a and 2C1.

30 Sum of CRF sub-categories 1A1a, 1A2 and 2, excluding solvent use (2D) and F-gases (2F).

31 Maximum 1 Mio. t CO_2e for the TWINerg and about 0.2 Mio. t CO_2e for CHP installations.

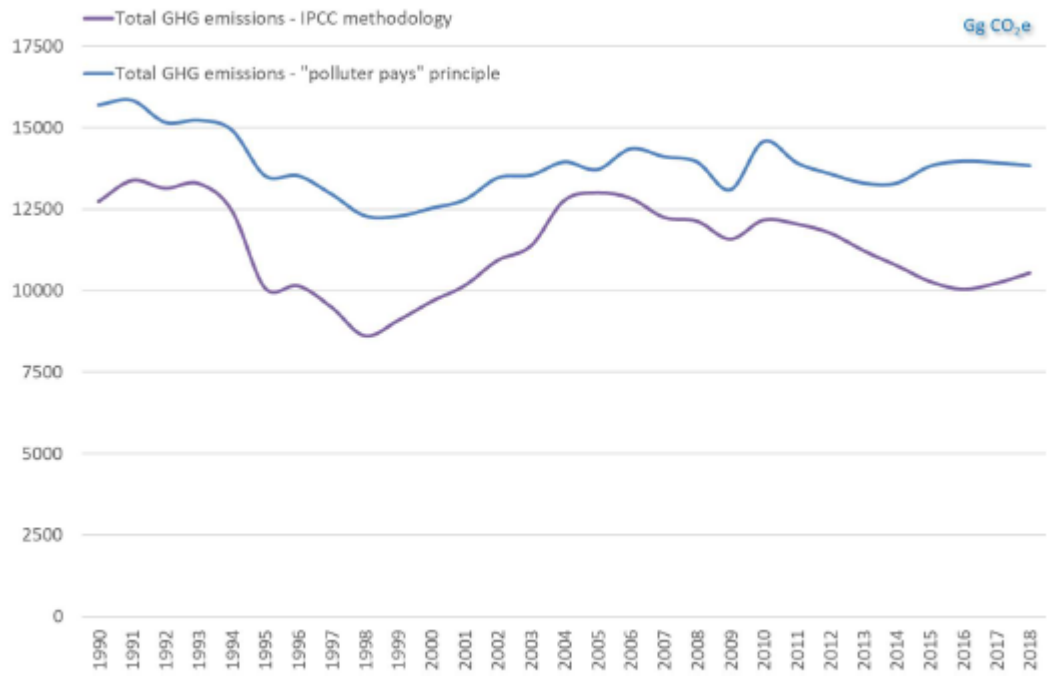
32 See the second national "Action Plan for reducing CO_2 emissions" [MDDI-DEV (2013)].

The "origin" principle of the IPCC reporting Guidelines vs. the "polluter pays" principle

80. The "origin" or "territorial" principle applied for reporting GHG emissions under the IPCC Guidelines generates a GHG balance for Luxembourg that looks significantly less favourable than would a "consumer" or "polluter pays" approach produce. The "origin" principle is in favour of Luxembourg in that its imports of electricity are excluded from its GHG emission balance: those emissions are attributed to the electricity producing countries. However, as indicated above, "road fuel sales to non-residents" related emissions are reported in Luxembourg's GHG balance *[→ Figure I.2-25]*.

81. Therefore, in terms of the GHG balance, the promotion of renewable energies in the electricity sector, which is associated with major investments, is of little interest. Moreover, additional capacities based upon renewable energies cannot actually be used to replace any electricity from inefficient existing fossil-fuel plants in Luxembourg. In reality, they will replace the imported electricity that does not appear in Luxembourg's GHG balance. In this sense, the existing system provides Luxembourg with the incentive not to earmark the generally scant subsidies for Europe's priority investments in renewable energies but, instead, to invest these in measures which might improve its GHG balance.

FIGURE I.2.25 – TOTAL GHG EMISSIONS, EXCLUDING LULUCF – IPCC AND "POLLUTER PAYS" APPROACHES: 1990-2018



Source: MECDD and MECDD-AEV.

Notes: The "polluter pays" principle figures have been obtained from the total GHG emission according to the IPCC methodology by excluding emissions from "road fuel sales to non-residents" and for electricity generated that is exported, and by adding an estimate for electricity production emissions generated abroad for satisfying Luxembourg consumption (i.e. emissions relating to electricity imports): Emissions "polluter pays" principle = emissions IPCC methodology – emissions "road fuel sales to non-residents" + emissions electricity net imports.

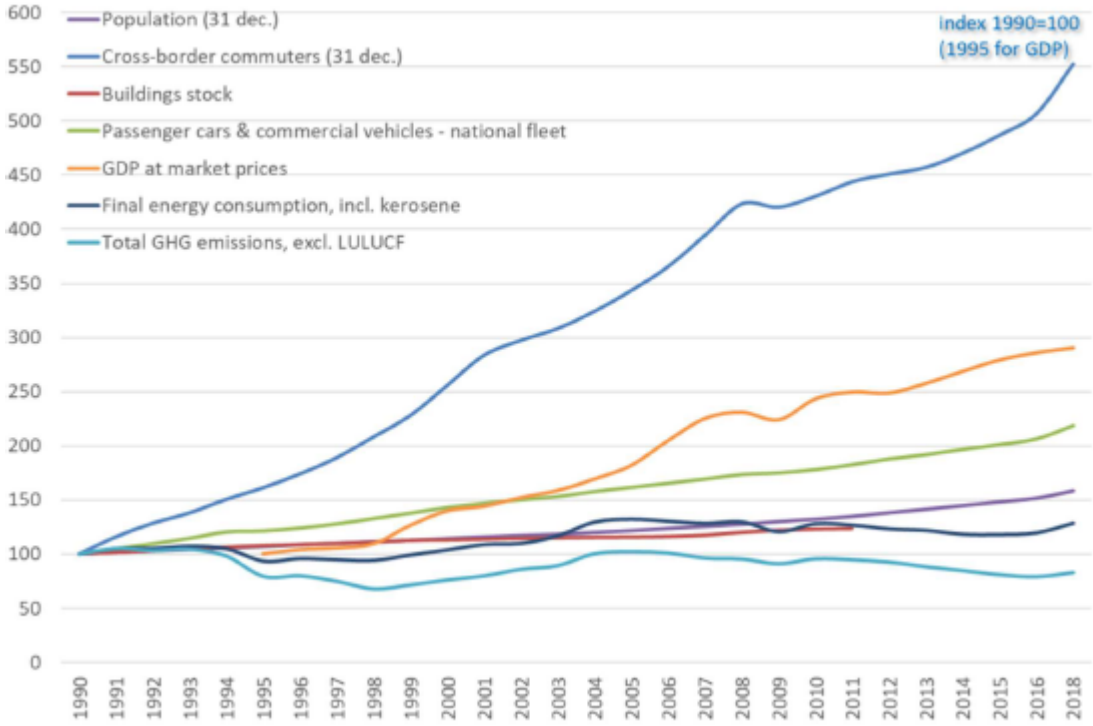
I.2.10. National circumstances: overview

82. Key points that plays a role on GHG emissions trends in the past and in the future are:

- a country characterized for most of the years covered by this Communication by both **high demographic** and **high economic growth** in a stagnating region, hence an **attractive economic destination**;
- **strong population growth** due to immigration and that is expected to go on;
- **even stronger cross-border commuters' growth** that is expected as well to go on;
- **increase of built-up areas** (housing, offices, services, infrastructures) as a consequence of the previous statements;
- location at the **heart** of the main Western Europe **transit routes** for both **goods and passengers**;
- **increase of transport flows** as a consequence of the previous statements;
- **small** size and open economy: a new industrial project, a technological change, a closure or a breakdown of a production unit might have significant impacts on the GHG emissions and increase the overall uncertainty of GHG projections;
- **limitations in taxation policies** due to short distances to neighbouring countries;
- a country that **needs to co-operate and to interact with its neighbours** since environmental issues quickly become cross-border issues;
- **limited national** GHG emissions reduction potential.

Figures I.2-26a/b & I.2-27 provide a quick overview of the trends of some key variables since 1990.

FIGURES I.2-26A – KEY VARIABLES TRENDS – 1: 1990-2018



FIGURES I.2-26b – KEY VARIABLES TRENDS – 1: 1990-2018 (EXCL. CROSS-BORDER COMMUTERS)

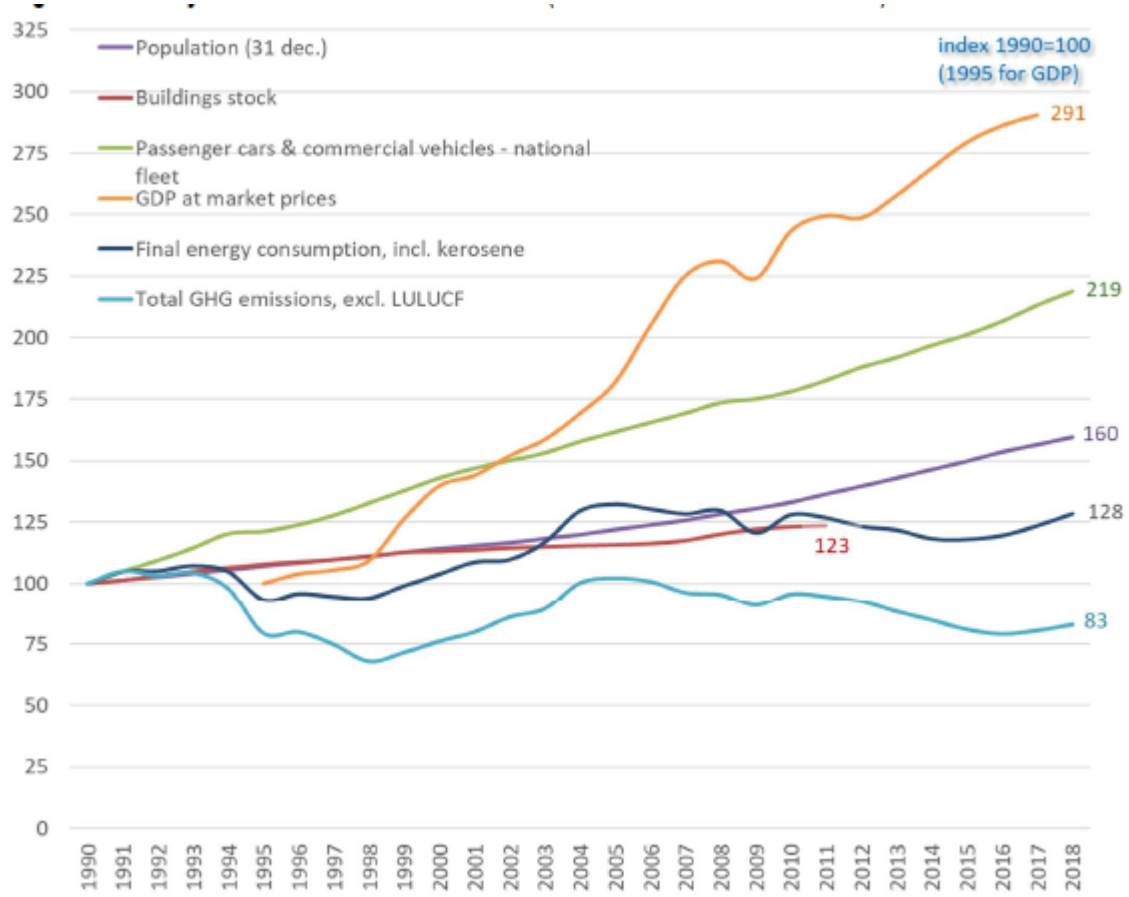
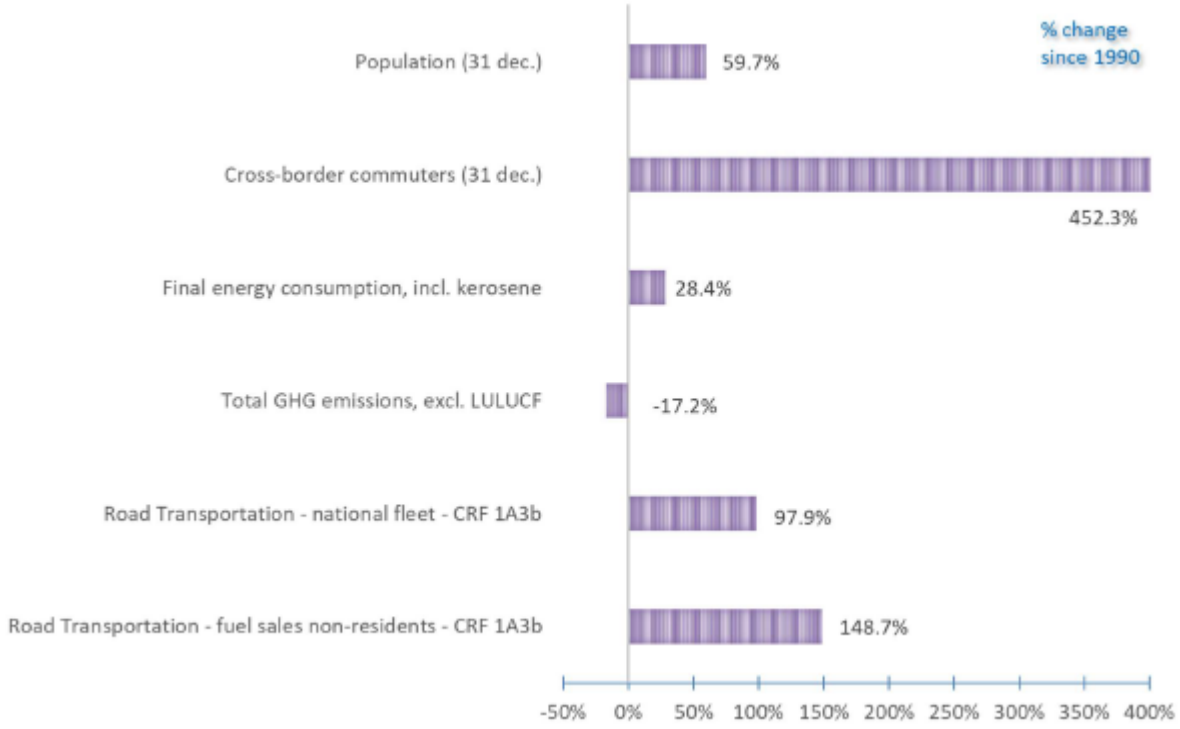


FIGURE I.2-27 – KEY VARIABLES TRENDS – 2: 1990 & 2018



Sources: Population: STATEC, Statistical Yearbook, Table B.1100 (updated 4 April 2020).
http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12856&IF_Language=fra&MainTheme=2&FldrName=1
Commuters: STATEC, Statistical Yearbook, Table B.3107 (updated 4 April 2020).
http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12928&IF_Language=fra&MainTheme=2&FldrName=3&RFPath=92
Buildings stock: MECDD estimates on the basis of STATEC, Statistical Yearbook, Table D.4200 & results from the 2011 population census.
http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=13443&IF_Language=fra&MainTheme=4&FldrName=4&RFPath=35
http://www.statistiques.public.lu/stat/tableviewer/document.aspx?ReportId=8624
Cars & vehicles: STATEC, Statistical Yearbook, Table D.6102 (updated 4 April 2020).
http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=13499&IF_Language=fra&MainTheme=4&FldrName=7&RFPath=7049%2c13898
GDP: STATEC, Statistical Yearbook, Table E.2101 (updated 4 April 2020).
http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=13147&IF_Language=fra&MainTheme=5&FldrName=2&RFPath=23
Energy: STATEC, Statistical Yearbook, Table A.4300 (updated 4 April 2020).
http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=12771&IF_Language=fra&MainTheme=1&FldrName=4&RFPath=51
GHG: MECDD-AEV – Submission 2020v1.

Notes: (1) Energy: there is a break in time series between 1999 & 2000.
(2) Buildings stocks = stock of permanently occupied dwellings.

I.3. SUMMARY OF NATIONAL EMISSION AND REMOVAL RELATED TRENDS

I.3.1. GHG Inventory

83. In 2018, Luxembourg's GHG emissions amounted to a total of 10.547 Mt CO_2e – excluding LULUCF. Carbon dioxide (CO_2) was the main source of GHG in Luxembourg. This source counted for 90.7 % of the total GHG emissions, excl. LULUCF. The second source of GHG was methane (CH_4) with 5.6 % of the total emissions, excl. LULUCF. Nitrous oxide (N_2O) was the third source with 3.0 %. Fluorinated gases (F-gases) only accounted for 0.7 % of the total emissions, excl. LULUCF, with hydrofluorocarbons (HFCs) representing 0.6 %, and sulphur hexafluoride (SF_6) representing 0.1 % of the national total, excl. LULUCF.

84. In 2018, total GHG emissions increased by 3.0 % compared to 2017 and are currently 17.2 % below their base year level.[33] For the different GHG, trends over the period 1990-2018 (and 2017-2018) were as follows (see also *Table I.3-1*):

- CO_2: -19.2 % (+3.4 %)
- CH_4: +1.0 % (+1.0 %)
- N_2O: +0.8 % (+0.3 %)
- F-gases: +360.5 %[34] (-2.1 %)

85. **Carbon dioxide emissions**, over the period 1990-2018, are characterised by a V-shape evolution driven by changes in the sources of emissions: declining emissions in industry due to technological changes in the iron and steel production, increasing emissions from transport and natural gas fired power plants. The last emission peak was attained in 2005 and, since then, the emissions seem to be continuously decreasing until 2009. This decrease was interrupted in 2010, where emissions increased by 5.3 % compared to 2009. However, since 2005 emissions have decreased by 21.0 %.

86. Total **methane emissions** have remained fairly stable over the period 1990-2018. In 2018, reduced methane emissions were observed in waste management (-27.4 %) as compared to 1990, and increasing emissions in agriculture (+6.7 %) and in energy use (+8.4 %), the latter being mainly due to an upward trend for fugitive emissions from natural gas distribution and use, and to a lesser extent to energy production industries and the commercial and residential sector.

87. **Nitrous oxide emissions** development between 1990 and 2018 is closely linked to an increase of liquid fuels related emissions from combustion activities (+81.9 % in the energy sector) and to emissions from the waste sector (+71.8 %) that could not be balanced by declining emissions

33 The base year for CO_2, CH_4 and N_2O is 1990. For the F-gases, the base year is 1995.

34 The trend indicated here corresponds to the period 1995 to 2018, as the base year for F-gases is 1995.

from the agriculture (-17.3 %) and industrial products and product use sectors (-51.7 %). Total N_2O emissions (excl. LULUCF) have increased by 0.8 % since 1990.

88. With regard to **F-gases**, HFCs emissions increased by 346 % in 2018 compared to the base year (1995), whereas SF_6 emissions showed a 483 % increase between 1995 and 2018.

89. Finally, when including emissions and removals from LULUCF, Luxembourg's GHG emissions amounted to a total of 10334 Mt CO_2e in 2018. Net removals from the LULUCF sector amounted to 213.3 Gg CO_2e. Since 1990, net emissions have decreased by 19.5 % (the sector was a source of net emissions in 1990 (120.6 Gg CO_2e) and a source of net removals from 1991 to 2018.

I.3.2. KP-LULUCF activities

90. In 2018, Art. 3.3 activities were a net sink in Luxembourg and net CO_2 removals amounted to 128 Gg CO_2e. Removals from afforestation/reforestation amounted to 164 Gg CO_2. About 2/3 of these gains were caused by the C stock increases in living biomass, 1/3 was due to increases in soil carbon and litter at the afforestation/reforestation (AR) areas. In the same year, emissions from deforestation amounted to 36 Gg CO_2. About 1/3 were due to biomass losses, and 2/3 due to C stock losses in litter and soil.

91. Under Art. 3.4, CO_2 removals from the activity forest management amounted to 94.9 Gg CO_2e. By considering the FMRL of 418 Gg CO_2e and a technical correction of 181.7 Gg CO_2e, the activity forest management becomes a net source of 141.4 Gg CO_2e. Due to a lack of reliable data, emissions or sinks due to HWP could not be estimated.

I.3.3. Overview of source and sink category emission estimates and trends

GHG Inventory

92. *Table I.3-2* splits the total GHG emissions of Luxembourg into the five CRF sectors included in the inventory. In 2018, the energy sector accounted for 83.4 % of the total GHG emissions, excl. LULUCF. Two sectors represented between 6 % and 7 % of the total emissions, excl. LULUCF: industrial processes and product use (6.3 %) and agriculture (6.6 %). The remaining sectors[35] – LULUCF (2.1 %), waste[36] (0.8 %) and other (not occurring) – were each below 5.0 % of the total GHG emitted in Luxembourg in 2018.

[35] The sector "other" is not reported for Luxembourg.

[36] The waste sector covers only landfilled waste, wastewater handling and composting activities. Waste incineration, which is the main treatment method for municipal waste in Luxembourg, is carried out in the sole incinerator of the country where energy is recovered. Consequently, waste incineration related emissions are accounted for in CRF sector 1 – Energy.

93. For the different sectors, trends over the period 1990-2018 (and 2017-2018) were as follows:

- Energy: -11.5 % (+3.6 %)
- IPPU: -59.6 % (+0.5 %)
- Agriculture: -0.7 % (-1.0 %)
- LULUCF: -310.7 % (-47.0 %)
- Waste: -22.1 % (-2.5 %)
- Other: NA (NA)

94. Since 1990, emission reductions were observed in all sectors except for agriculture, especially for **energy use and production** related emissions whose contribution to total GHG emissions, excl. LULUCF, ranged from 80.9 % to 88.8 % over the period 1990 to 2018. Within the energy sector, the fastest growing sub-sectors were energy industries (1A1) and transportation (1A3): +527.3 % and +130.4 %, respectively between 1990 and 2018 (-7.9 % and +6.7 % from 2017 to 2018). For the other sub-sectors, the observed trends between 1990 and 2018 are -81.4 % for manufacturing industries (1A2), +22.4 % for the other sectors (1A4), -96.2 % for Other (1A5), and +59.8 % for fugitive emissions from fuels (1B).[37]

95. Trends in **agriculture**, which was the second largest sector in 2018 in terms of GHG emissions, were overall stable between 1990 and 2018: declining GHG emissions were observed for agricultural soils (-17.4 %), whereas enteric fermentation increased by 4.0 %, liming by 4193.5 % and manure management by 10.5 %.

96. The third largest sector in Luxembourg with regard to 2018 GHG emissions, i.e. **industrial processes and product use** (IPPU), shows a declining trend between 1990 and 1998, then a relative stabilisation. This evolution was mainly driven by process changes that occurred in the steel industry (recorded under 2C1), which moved from blast to electric arc furnaces between 1994 and 1998. As a consequence, GHG emissions of the iron and steel industry decreased by 88.4 % since 1990. Compared to 2017, emissions from industrial processes and product use increased by 0.5 % in 2018, which is mainly due to an increase in the category 2.C.1- Metal industry.

97. In the **waste** sector, the main source of GHG was solid waste disposal on land (5A), but its weight decreased over the period 1990-2018 due to the combination of reduced amounts of landfilled waste and increased emissions arising from composting activities (5D). GHG emission reduction for solid waste disposal on land (-48.2 % between 1990 and 2018) still drove a reduction for the overall waste sector despite rising emissions from composting. Wastewater handling emissions (5D) decreased by 47.2 % over the same period.

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37 Fugitive emission growth is closely linked to natural gas use in Luxembourg.

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98. For **more details on the trends by gas and by sector**, see Sections 2.3 to 2.6 of Luxembourg's National Inventory Report 1990-2018 [MECDD-AEV (2020)].

99. EU Member States have to report an **"approximated" GHG inventory** for the year T by end July of the year T+1 - Art. 8 of Regulation No 525/2013. In ***Tables I.3-1 & I.3-2***, emissions recorded for the inventory year 2019 are therefore still "provisional".

100. Inventory years 2005, 2016, 2017 and 2018: the latest submission to the UNFCCC of 15 April 2020 has been **comprehensively reviewed** during the summer by the EU for the years 2005 and 2016 to 2018. This thorough review took place in order to determine the final emission levels for the years used either as base year (2005) or as starting year (average 2016 to 2018) for the trajectories EU Member States will have to follow between 2021 and 2030 **in the context of the Effort Sharing Regulation**, i.e. to fix the annual emission allocations for each Member State between 2021 and 2030 and to determine the level of emissions, excl. ETS, that each Member State has to cope with by 2030 (with 2005 as base year): *[→ Section III.2.3]*. For Luxembourg, there was **only one correction required: CRF sector 2.A.1 - cement production**. It is included in ***Tables I.3-1 & I.3-2***.

101. Therefore, ***Tables I.3-1 & I.3-2*** do not exactly match with CTF Tables 1.

TABLE I.3-1: LUXEMBOURG'S GHG EMISSIONS AND REMOVALS (EXCL. LULUCF) – OVERVIEW BY MAIN GAS: 1990-2019

GHG emissions in CO_2e (Gg/kt)	Base year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CO2 emissions without net CO_2 from LULUCF	11847.64	11847.64	12465.79	12232.16	12372.81	11563.93	9170.30	9219.91	8573.11	7695.07	8147.98	8731.57	9226.37	10003.05	10476.02	11844.31	12081.87	11936.28	11333.58	11195.25	10647.82	11219.29	11114.55	10851.40	10303.87	9825.22	9333.17	9076.81	9248.57	9566.33	*9757.24*
CO2 emissions with net CO_2 from LULUCF	11927.56	11927.56	12250.26	11666.24	11702.93	11093.71	8580.04	8583.54	7844.74	7083.78	7442.69	7993.03	8504.60	9283.43	9800.36	11147.62	11438.72	11388.07	10876.29	10726.95	10198.70	11083.11	10807.59	10454.33	9730.01	9339.10	8895.11	8558.65	8834.64	9342.26	*9504.60*
CH4 emissions without CH_4 from LULUCF	581.65	581.65	594.13	578.37	583.07	570.56	586.38	595.28	590.00	587.62	592.55	585.41	590.72	590.20	579.59	576.28	575.20	571.39	580.19	590.50	591.86	591.66	567.31	559.25	563.56	576.50	582.38	586.33	593.66	587.66	*590.44*
CH4 emissions with CH_4 from LULUCF	581.65	581.65	594.13	578.37	583.07	570.56	586.38	595.28	590.00	587.62	592.55	585.41	590.72	590.20	579.59	576.28	575.20	571.39	580.19	590.50	591.86	591.66	567.31	559.25	563.56	576.50	582.38	586.33	593.66	587.66	*590.44*
N2O emissions without N_2O from LULUCF	310.50	310.50	321.49	329.31	323.07	318.17	318.23	320.79	317.84	314.37	318.99	318.68	299.88	296.54	274.77	299.73	282.69	281.30	286.24	292.53	289.51	297.15	300.09	295.55	296.08	299.36	297.59	308.34	312.14	313.13	*316.25*
N2O emissions with N_2O from LULUCF	331.82	331.82	342.81	350.63	344.39	339.49	339.55	342.12	339.16	335.70	340.32	339.69	320.56	316.91	294.82	319.47	302.11	300.41	305.03	310.61	306.87	313.85	316.10	310.87	310.66	313.17	310.62	320.58	323.66	323.93	*324.43*
HFCs	0.00	0.00	0.00	5.49	12.94	14.19	15.15	17.33	20.10	22.96	26.21	31.08	38.25	41.51	41.75	41.93	40.47	43.37	47.76	50.25	51.40	53.67	56.55	58.91	62.45	66.86	67.60	66.04	69.58	67.64	*67.55*
PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF_6	1.28	1.28	1.37	1.47	1.57	1.68	1.75	1.94	2.10	2.16	2.24	2.36	2.97	3.58	4.17	4.73	5.31	5.73	6.17	6.58	6.99	7.29	7.75	8.14	8.51	8.91	9.37	9.72	9.90	10.20	10.56
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (without LULUCF)	12741.06	12741.06	13382.77	13146.78	13293.44	12468.53	10091.80	10155.25	9503.13	8622.17	9087.95	9669.11	10158.18	10934.88	11376.30	12766.97	12985.53	12838.07	12253.93	12135.10	11587.58	12169.06	12046.25	11773.25	11234.48	10776.85	10290.10	10047.25	10233.87	10544.97	*10742.04*
Total (with LULUCF)	12842.30	12842.30	13188.56	12602.18	12644.89	12019.63	9522.87	9540.20	8796.09	8032.20	8403.98	8951.57	9457.10	10235.63	10720.70	12090.03	12361.81	12308.96	11815.43	11684.88	11155.83	12049.58	11755.30	11391.50	10675.20	10304.55	9868.52	9537.88	9831.45	10331.69	*10497.58*
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*NA*
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*NA*
Alternative totals (EU Regulation)																															
Total non-ETS (ESD/ESR) emissions	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10381.57	10124.58	9686.15	10035.68	9405.35	9915.87	9993.47	9783.22	9386.89	8844.86	8628.66	8543.31	8741.24	9075.52	*9245.31*
Total verified ETS emissions	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2603.35	2712.97	2567.23	2098.90	2181.69	2252.66	2052.21	1989.54	1847.12	1931.49	1660.83	1503.32	1492.04	1468.88	*1496.24*

Source: MECDD-AEV – Submission 2020v1 and "approximated inventory" 2019.
Note: Non-ETS emissions (or ESD/ESR emissions, see *Chapters III & IV*) are total GHG emissions, excl. LULUCF minus verified EU ETS emissions minus CO_2 from domestic aviation (CRF 1.A.3.a).

TABLE I.3-2: LUXEMBOURG'S GHG EMISSIONS AND REMOVALS (EXCL. LULUCF) – OVERVIEW BY OVERVIEW BY MAIN CRF SECTOR: 1990-2019

GHG source & sink categories in CO_2e (Gg/kt)	Base year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019p
1. Energy	10300.98	10300.98	11005.60	10845.78	11010.42	10294.83	8259.92	8367.77	7830.49	7110.58	7529.10	8088.16	8644.21	9416.09	9945.22	11262.92	11549.32	11332.65	10736.92	10657.78	10180.03	10738.32	10615.41	10416.93	9884.09	9394.03	8906.86	8628.29	8794.37	9112.19	*9290.23*
2. Industrial processes and product use	1639.38	1639.38	1560.83	1495.00	1479.75	1388.05	1028.74	974.78	867.65	710.23	750.63	781.18	730.88	752.16	697.18	755.23	702.50	780.12	776.03	721.51	650.91	675.77	692.07	632.81	616.00	632.61	625.11	647.25	657.80	660.40	*679.38*
3. Agriculture	695.57	695.57	709.26	698.39	694.27	684.74	702.11	709.78	699.76	694.48	702.12	694.56	678.47	661.50	624.67	644.51	628.90	620.26	634.52	648.34	650.46	659.90	647.80	634.42	644.89	659.58	672.75	688.16	697.69	690.44	*689.13*
4. LULUCF	101.25	101.25	-194.21	-544.60	-648.55	-448.90	-568.93	-615.05	-707.04	-589.97	-683.97	-717.53	-701.08	-699.25	-655.60	-676.95	-623.72	-529.11	-438.50	-450.22	-431.75	-119.48	-290.95	-381.75	-559.28	-472.30	-421.57	-509.36	-402.41	-213.28	*-244.46*
5. Waste	105.14	105.14	107.09	107.62	109.02	100.92	101.03	102.92	105.24	106.88	106.13	105.21	104.63	105.13	109.24	104.32	104.82	105.04	106.46	107.47	106.17	95.07	90.97	89.10	89.50	90.64	85.38	83.55	84.00	81.93	*83.30*
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	*NO*
Total (including LULUCF)	12842.30	12842.30	13188.56	12602.18	12644.89	12019.63	9522.87	9540.20	8796.09	8032.20	8403.98	8951.57	9457.10	10235.63	10720.70	12090.03	12361.81	12308.96	11815.43	11684.88	11155.83	12049.58	11755.30	11391.50	10675.20	10304.55	9868.52	9537.88	9831.45	10331.69	*10497.58*
Memo Items																															
International Bunkers - aviation	389.45	389.45	407.06	393.54	389.21	493.77	559.71	608.18	727.59	882.03	995.17	948.48	1025.85	1111.46	1157.87	1259.86	1280.10	1197.98	1287.69	1296.20	1241.81	1274.44	1192.33	1100.10	1105.61	1199.20	1352.87	1501.21	1697.40	1816.53	*NE*
International Bunkers - navigation	0.09	0.09	0.09	0.09	0.12	0.10	0.10	0.10	0.09	0.09	0.10	0.11	0.11	0.12	0.12	0.12	0.16	0.16	0.13	0.14	0.11	0.11	0.13	0.13	0.11	0.12	0.12	0.13	0.17	0.14	*NE*
CO_2 from biomass	159.05	159.05	163.07	163.73	159.33	157.46	153.78	135.56	146.84	139.67	148.82	150.04	164.85	165.94	181.34	194.33	293.29	296.54	441.45	454.56	424.08	442.19	432.09	444.96	480.88	609.99	663.62	706.13	812.91	916.44	*NE*

Source: MECDD-AEV – Submission 2020v1 and "approximated inventory" 2019.

I.4. NATIONAL INVENTORY ARRANGEMENTS

102. An extensive description on the national inventory arrangements is provided in Luxembourg's National Inventory Report 1990-2018 [MECDD-AEV (2020)], Section I.2, p. 55 to 62. Other relevant information is available in Sections I.3, p. 63 to 65 and I.6, p. 76 to 86. **There is no change compared to the previous Biennial Report** (NC7/BR3).

103. Domestic **institutional arrangements**, including institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the **progress towards the economy-wide emission reduction target** are presented in *Section III.6*.

Annex 1 – Changes in reporting compared to the latest submission

The table below summarizes the main changes compared to the previous submission – NC7 and BR3 – for the sections of this chapter, as well as for CTF related Tables.

Section or CTF Table in NC7/BR3	Section in BR4 and revisions
II.1 to II.8	I.2.1 to I.2.8: updated.
II.9 to II.11	not retained for the BR4.
II.2 & II.13	I.2.9 & I.2.10: updated.
III.1	I.3, but a lighter version and link to the latest NIR [MECDD-AEV (2020)].
III.2	I.4: only a link to the latest NIR [MECDD-AEV (2020)].
III.3	Not applicable
CTF Tables 1	updated with the latest inventory submission – 2020v1.

Annex 2 – Implementation of recommendations and encouragements from the latest review

There was no recommendations and encouragements from the latest review – TRR.3 [UNFCCC (2019b)].

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LEGAL & ASSOCIATED TEXTS

Regulation No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC.

➔ http://data.europa.eu/eli/reg/2013/525/oj

Commission Implementing Regulation (EU) No 749/2014 of 30 June 2014 on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) No 525/2013 of the European Parliament and of the Council.

➔ http://data.europa.eu/eli/reg_impl/2014/749/oj

Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020

➔ http://data.europa.eu/eli/dec/2009/406/oj

Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013.

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Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council.

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UNFCCC (2014b), *Report of the technical review of the first biennial report of Luxembourg*, FCCC/TRR.1/LUX, Bonn.

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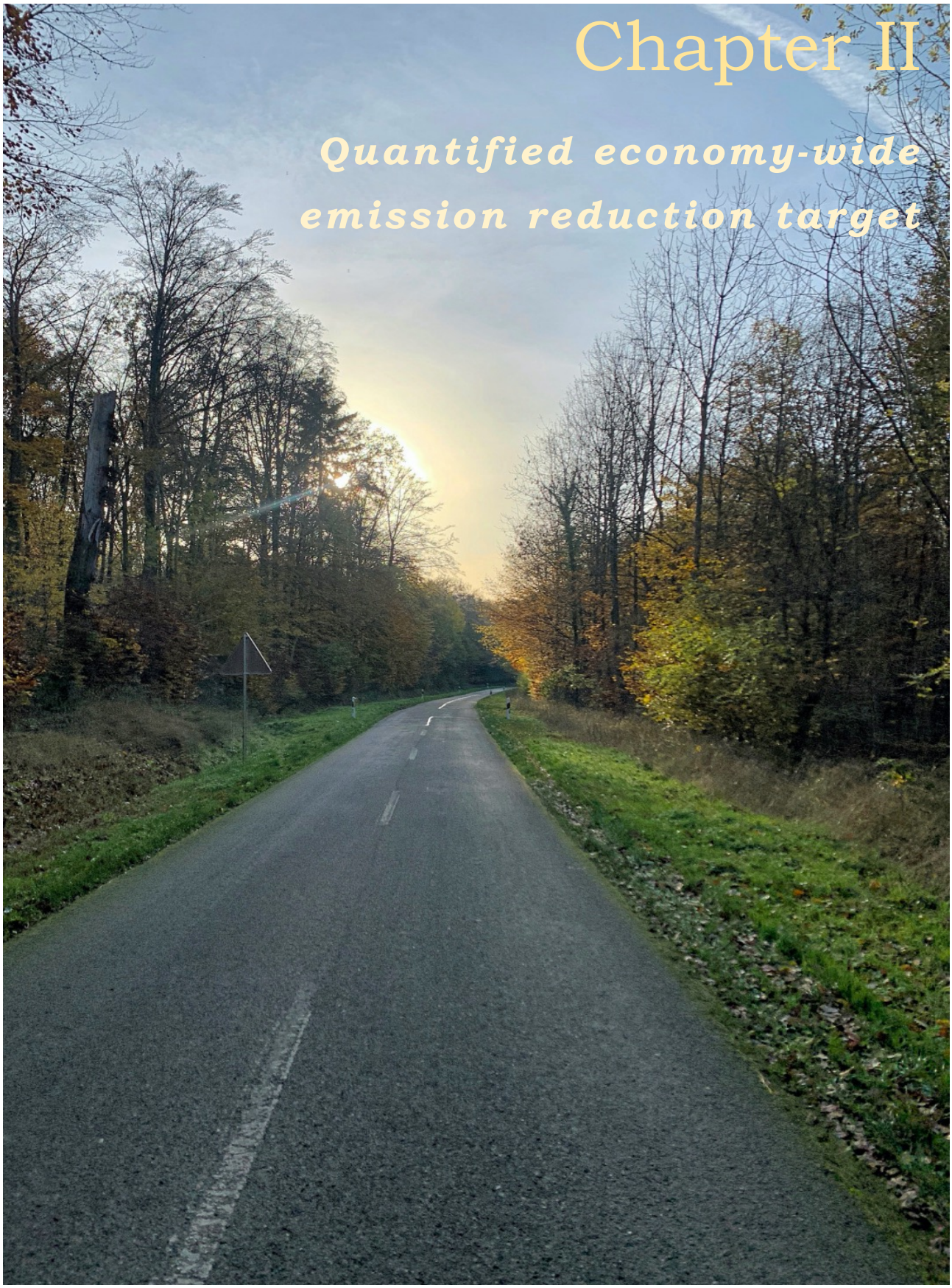

Chapter II

Quantified economy-wide emission reduction target

II.1. INTRODUCTION

1. **Paragraph 4 of the UNFCCC biennial reporting guidelines for developed countries Parties** (BR GL) [UNFCCC (2011)] requests that each Annex I Party shall describe its **quantified economy-wide emission reduction target**, including any **conditions or assumptions that are relevant to the attainment of that target**. The information that shall be included – **paragraph 5 of the BR GL** – is summarized in CTF Table 2. *Section II.2* provides this information. **Annex 1 summarizes changes between the BR4 and the NC7/BR3** and **Annex 2** indicates whether **recommendations and encouragements from the latest review** – TRR.3 [UNFCCC (2019b)] – have been implemented or not.

2. This chapter has been written by the MECDD.

II.2. LUXEMBOURG'S QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET

3. Luxembourg's 2020 target under the UNFCCC **fits into the legal and political framework put in place in the European Union** (hereafter EU). The EU set up a target compliance architecture: the "**2020 Climate and Energy package**" that is extensively described in *Section III.2.2*.

4. For a longer-term vision, a similar architecture has been put in place at the European level to cover the period from 2021 to 2030, the EU "**2030 Climate and Energy framework**", which is presented in *Section III.2.3*.

5. As:

   - the detailed information is provided in *Section III.2*, including an overview table for both commitment periods up to 2020 and up to 2030 *[→ Tables III.2-1]*;
   - CTF Table comes with numerous footnotes;

   this chapter only reproduces CTF Table 2 and its footnotes *[→ Tables II.2-1]*.

TABLE II.2-1 – DESCRIPTION OF THE ECONOMY-WIDE EMISSION REDUCTION TARGET FOR LUXEMBOURG

Emission reduction target: base year and target			
Base year/ base period (1)	1990		
Emission reductions target (% of base year/base period) (2)	20.00		
Emission reductions target (% of 1990) [b] (3)	20.00		
Period for reaching target (4)	BY-2020		
Gases and sectors covered. GWP values.			
Gases covered	Covered	Base Year	GWP[c] reference source
CO_2 (5)	Yes	1990	4th AR
CH_4 (6)	Yes	1990	4th AR
N_2O (7)	Yes	1990	4th AR
HFCs (8)	Yes	1990	4th AR
PFCs (9)	No	NA	
SF_6 (10)	Yes	1990	4th AR
NF_3 (11)	No	NA	
Other gases (specify) [d]			

Sectors covered [e]	Covered
Energy	Yes
Transport[f]	Yes
Industrial processes[g]	Yes
Agriculture	Yes
LULUCF	Yes
Waste	Yes
Other sectors (specify) [h]	
Aviation in the scope of the EU-ETS (12)	Yes
Role of LULUCF sector	
LULUCF in base year level and target (13)	Excluded
Contribution of LULUCF is calculated using	Other (NA)
Market-based mechanisms	
Possible scale of contributions of market-based mechanisms under the Convention (estimated kt CO_2 eq) (14)	NA
CERs (15)	NA
ERUs (16)	NA
AAUs[i] (17)	NA
Carry-over units[j] (18)	NA
Other mechanism units under the Convention (specify)[k] (19)	

No records to display.

Possible scale of contributions of other market-based mechanisms (estimated kt CO_2 eq) (20)	

No records to display.

Any other information	
Any other information:[l] (21)	See footnote 21.

(1) Legally binding target trajectories for the period 2013-2020 are enshrined in both the EU emissions trading system (EU-ETS) Directive (Directive 2003/87/EC and respective amendments) and the Effort-Sharing Decision (Decision No 406/2009/EC). These legally binding trajectories not only result in a 20% GHG reduction in 2020 compared to 1990 but also define the EU's annual target pathway to reduce EU GHG emissions from 2013 to 2020. The Effort-Sharing Decision sets annual national emission targets for all Member States for the period 2013-2020 for those sectors not covered by the EU-ETS, expressed as percentage changes from 2005 levels. In March 2013, the Commission formally adopted the national annual limits throughout the period for each Member State. By 2020, the national targets will collectively deliver a reduction of around 10% in total EU emissions from the sectors covered compared with 2005 levels. The emission reduction to be achieved from the sectors covered by the EU ETS will be 21% below 2005 emission levels.

(2) See first footnote.

(3) See first footnote.

(4) See first footnote.

(5) As adopted in UNFCCC reporting guidelines for national GHG inventories of Annex I Parties and as adopted under the EU Monitoring Mechanism Regulation.

(6) As adopted in UNFCCC reporting guidelines for national GHG inventories of Annex I Parties and as adopted under the EU Monitoring Mechanism Regulation.

(7) As adopted in UNFCCC reporting guidelines for national GHG inventories of Annex I Parties and as adopted under the EU Monitoring Mechanism Regulation.

(8) As adopted in UNFCCC reporting guidelines for national GHG inventories of Annex I Parties and as adopted under the EU Monitoring Mechanism Regulation.

(9) There are no reported PFCs emissions in the GHG inventory.

(10) As adopted in UNFCCC reporting guidelines for national GHG inventories of Annex I Parties and as adopted under the EU Monitoring Mechanism Regulation.

(11) There are no reported NF3 emissions in the GHG inventory.

(12) In principle, the EU-ETS should cover CO2 emissions from all flights falling within the aviation activities listed in Annex I of the EU-ETS Directive which depart from an aerodrome situated in the territory of a Member State, Norway, Iceland and Liechtenstein and closely related territories, and those which arrive in such an aerodrome from a third country, excluding small commercial emitters. Since 2012, flights to and from aerodromes from other countries have not been included in the EU-ETS. This exclusion was taken in order to facilitate negotiation of a global agreement to address aviation emissions in the forum of the International Civil Aviation Organisation (ICAO). The EU has decided on a reduced scope in the 2013–2016 period (Regulation (EU) No 421/2014 of the European Parliament and of the Council of 16 April 2014).

(13) The EU pledge does not include emissions/removals from Land Use, Land-Use Change and Forestry to deliver its firm independent commitment to reduce GHG emissions by at least 20% compared to 1990 by 2020. The EU LULUCF sector is however estimated to be a net sink over that period.

(14) The 2020 Climate and Energy Package allows Certified Emission Reductions (CERs) and Emission Reduction Units (ERUs) to be used for compliance purposes, subject to a number of restrictions in terms of origin and type of project and up to an established limit. In addition, the legislation foresees the possible recognition of units from new market mechanisms. Under the EU-ETS the limit does not exceed 50% of the required reduction below 2005 levels. In the sectors not covered by the ETS, annual use shall not exceed to 3 % of each Member States' non-ETS GHG emissions in 2005. A limited number of Member States may use an additional 1%, from projects in LDCs or SIDS subject to conditions, which is the case for Luxembourg due to its special circumstances (important share of emissions originating from the transport sector).

(15) The use of these units under the ETS Directive and the Effort Sharing Decision is subject to the limits specified above (footnote 14) which do not separate between CERs and ERUs, but include additional criteria for the use of CERs.

(16) The use of these units under the ETS Directive and the Effort Sharing Decision is subject to the limits specified above (footnote 14) which do not separate between CERs and ERUs, but include additional criteria for the use of CERs.

(17) AAUs for the period 2013-2020 have not yet been determined. The EU expects to achieve its 20% target for the period 2013-2020 with the implementation of the ETS Directive and the ESD Decision in the non-ETS sectors, which do not allow the use of AAUs from non-EU Parties.

(18) At CMP.9, the EU made a declaration, when adopting the Doha amendment to the Kyoto Protocol, that the European Union legislation on 2020 Climate and Energy Package for the implementation of its emission reduction objectives for the period 2013-2020 does not allow the use of surplus AAUs carried over from the first commitment period to meet these objectives.

(19) There are general provisions in place in the EU legislation that allow for the use of such units provided that the necessary legal arrangements for the creation of such units have been put in place in the EU, which is not the case at the point in time of the provision of this report.

(20) None. Luxembourg does not recognise the use of market-based mechanisms other than those under the Convention for the achievements of quantified economy wide emission reduction targets.

(21) In December 2009, the European Council reiterated the conditional offer of the EU to move to a 30% reduction by 2020 compared to 1990 levels as part of a global and comprehensive agreement for the period beyond 2012, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities. After the latest negotiations under the Convention it is clear that this conditional offer will not be met and that efforts and ambition are now focusing on the year 2030.

Annex 1 – Changes in reporting compared to the latest submission

The table below summarizes the main changes compared to the previous submission – NC7 and BR3 – for the sections of this chapter, as well as for CTF related Tables. In comparison with the NC7/BR3, this chapter has been completely restructured.

Section or CTF Table in NC7/BR3	Section in BR4 and revisions
II.1	not included anymore.
II.2	II.2; III.2 for 2020 and 2030 targets and IV.7.1 for the target assessment 2013-2020.
CTF Table 2	no revision.

Annex 2 – Implementation of recommendations and encouragements from the latest review

The table below indicates if the recommendation from the latest review – TRR.3, Table 3 [UNFCCC (2019b)] – has been included or not in this submission, and if not, why.

Reporting requirement	Issue type	Assessment	Description	Included Y/N
para. 4	Transparency	Recommendation	The ERT recommends that Luxembourg improve the transparency of its reporting in its next BR by presenting information on its quantified economy-wide emission reduction target under the Convention.	Done: see section II.2.

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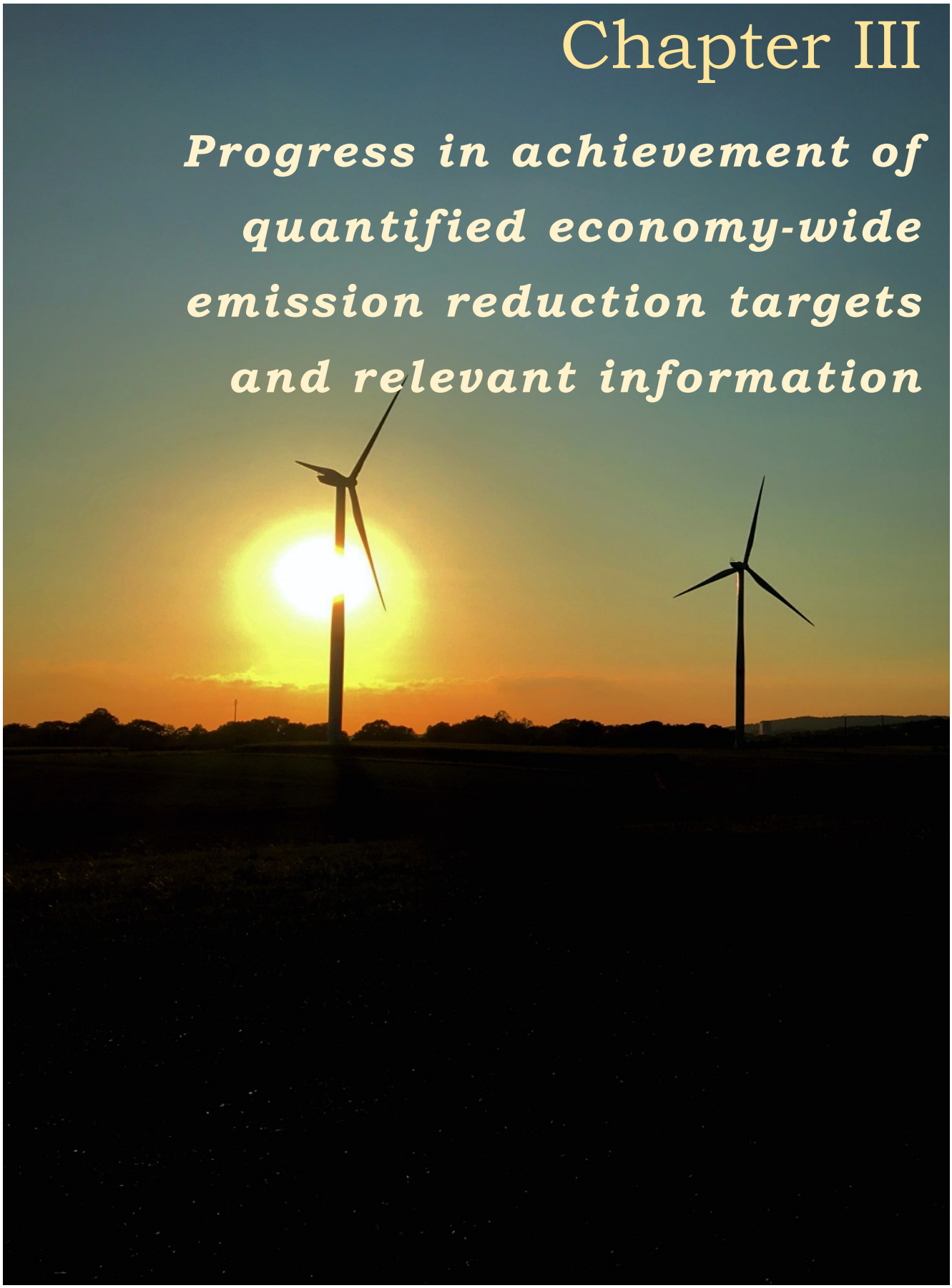
Chapter III

Progress in achievement of quantified economy-wide emission reduction targets and relevant information



III.1. INTRODUCTION

1. Chapter IV deals with **policies and measures** (hereafter PaMs) according to **paragraphs 6, 7, 8 and 24 of the UNFCCC biennial reporting guidelines for developed countries Parties** (BR GL) [UNFCCC (2011)]. It starts with the description of the **overall policy context** and of the **policy-making process** according to **paragraphs 20 and 21 of the UNFCCC Guidelines for the preparation of national communications by Parties included in Annex I to the Convention** (NC GL) [UNFCCC (1999)] *[→ Sections III.1 to III.3]*. The **domestic programmes** pursuant to the implementation of the Kyoto Protocol, as required by **paragraph 37 of the Kyoto Protocol reporting guidelines**, are presented in the subsequent section *[→ Section III.4]*, where information on **Art. 3.3 and 3.4 of the Kyoto Protocol** and their relation with the conservation of biodiversity and the sustainable use of resources could be found (paragraph 38). **PaMs and their effects**, as well as those which have expired or have been repealed, are then discussed in line with **paragraph 6 of the BR GL** and **paragraphs 13 to 17 and 23 to 26 of the NC GL**, as well as with **Kyoto Protocol reporting guidelines, paragraphs 34 to 36** *[→ Section III.5]*. *Section III.5* covers also requirements under **paragraphs 8 and 24 of the BR GL**. **Domestic institutional arrangements**, including institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards the economy-wide emission reduction target – **paragraph 7 of the BR GL** – are presented in *Section III.6*. Finally**, Annex 1 summarizes changes between the BR4 and the NC7/BR3** and **Annex 2** indicates whether **recommendations and encouragements from the latest review** – TRR.3 [UNFCCC (2019b)] – have been implemented or not.

2. The PaMs described in detail in this chapter are based on those **in force until the official publication** of the Luxembourg's National Energy and Climate Plan (hereafter NECP) [MECDD and MEA (2020)] at the end of May 2020, i.e. the **PaMs from the second "Action Plan to reduce CO_2 emissions"** *[→ Section III.3.2]*. However, **projections** presented in *Chapter V* **are based on the targets and measures presented in the NECP**. As a result, **the WAM projections are not consitent with the PaMs** described in this chapter. Instead, they are more in line with the main measures proposed in the NECP than those from the second Action Plan. Nevertheless, some of the measures of the Action Plan are still considered in the NECP, and some are even strengthened.

3. This chapter has been written by the MECDD.

III.2. POLICY-MAKING PROCESS – INTERNATIONAL CONTEXT

III.2.1. The Convention, the Kyoto Protocol and the Paris Agreement

4. Luxembourg signed the **UNFCCC** on 9 June 1992 and ratified it on 9 May 1994 so that the Convention **entered into force on 7 August 1994**. As for the **Kyoto Protocol**, it has been signed by Luxembourg on 29 April 1998, ratified on 31 May 2002 and **entered into force**, concomitantly with other European Union (hereafet EU) Annex I Member States, **on 16 February 2005**.[1] Pursuant to that Protocol and the terms of the European agreement distributing the burden among the, at the time, 15 Member States of the EU, Luxembourg undertook **to reduce its GHG emissions by 28 % below their 1990 levels over the period 2008-2012**. This was the deepest cut agreed by the (then) 15 Member States. In 2004, the Luxemburgish government committed that the bulk of its emission reductions under the Kyoto agreement would be achieved with limited reliance on the Protocol's "flexible mechanisms". However, this commitment had to cope with the specific circumstances of the country, e.g. its size and "road fuel sales to non-residents", along with the limited GHG reduction potentials within the country *[→ Section I.2.9]*.

5. With regard to the **"Doha Amendment" to the Kyoto Protocol** that establishes the second commitment period of this Protocol – CP2, which began on 1 January 2013 and will end on 31 December 2020 – Luxembourg submitted its **instrument of acceptance** to the United Nations Framework Convention on Climate Change **on 21 September 2017**.[2] As it was the case for the first commitment period, an European agreement distributing the burden among the Member States of the EU, but this time also among the sectors, has been put in place: a **target compliance architecture** was set up within the EU in order to meet the 2010 EU's pledge under the Convention, and indirectly under the Kyoto Protocol *[→ Table III.2-1* for the differences*]*; i.e. **to reduce, by 2020, its level of GHG emissions by 20 % compared to 1990**.[3]

6. The **Paris Agreement** was adopted on 12 December 2015 at the twenty-first session of the Conference of the Parties to the United Nations Framework Convention on Climate Change and entered into force on 4 November 2016.[4] The EU ratified the Agreement on 5 October 2016, whereas Luxembourg's ratification was completed on **4 November 2016**.[5]

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1 https://unfccc.int/process/the-kyoto-protocol/status-of-ratification.

2 https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-c&chapter=27&clang=_en.

3 The minus 20 % target was proposed to be raised up to minus 30 %, provided that other developed countries also commit to achieving comparable emission reductions, and that developing countries contribute adequately, according to their responsibilities and respective capabilities. Nevertheless, as these conditions have not been met, the target remains at minus 20 %.

4 https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement.

5 https://unfccc.int/process/the-paris-agreement/status-of-ratification.

III.2.2. The EU "2020 Climate and Energy package"

7. In 2009, the EU established internal rules under the target compliance architecture – the "**2020 Climate and Energy package**" – that distributes the mitigation burden among the Member States and the sectors. The package is intended **to combat climate change**, as well as **to contribute to a common energy policy after 2012**. Therefore, besides reducing the level of GHG emissions by 2020 by 20 % compared to 1990, it therefore also defines headline targets in the energy field for 2020: reaching 20 % of clean, renewable energy sources in the final energy consumption, increasing energy efficiency by 20 % and, as part of the renewable energy effort, reaching, in each Member State, a 10 % share for sustainably produced biofuels and other renewable fuels in final energy consumption of the transport sector.[6] Following controversial discussions on agricultural production dedicated to biofuels – fear of shortages and of increasing prices for food-related crops – the European Commission published, in October 2012, a proposal to limit global land conversion for biofuel production, and to raise the climate benefits of biofuels used in the EU. Accordingly, the use of food-based biofuels to meet the 10 % renewable energy target will be limited to 5 %.

8. The three objectives of the "2020 Climate and Energy package" are included in the "**Europe 2020 Strategy**", i.e. the EU's growth strategy for the 2010-2020 decade that aims the EU to become a smart, sustainable and inclusive economy.[7]

Climate component target compliance architecture

9. The package introduced a clear approach to **collectively deliver, under the Convention and by 2020, a 20 % reduction of the level of total GHG emissions compared to 1990**, which is equivalent to a 14 % reduction compared to 2005 – 2005 being the key year for the 2020 commitment at EU level. This 14 % reduction objective is **divided between sectors' emissions covered by or outside the EU Emissions Trading System** (EU ETS). These two sub-targets are:
   - **a 21 % reduction target compared to 2005** for emissions covered by the EU ETS (including domestic and international aviation);
   - **a 10 % reduction target compared to 2005** for emissions outside the EU ETS, shared between the 28 Member States through individual national GHG targets.

10. *Figure III.2-1* illustrates how the objective of the "2020 Climate and Energy package" is shared between the Member States and the ETS sectors (also referred to as "Effort Sharing Decision (ESD) sectors").

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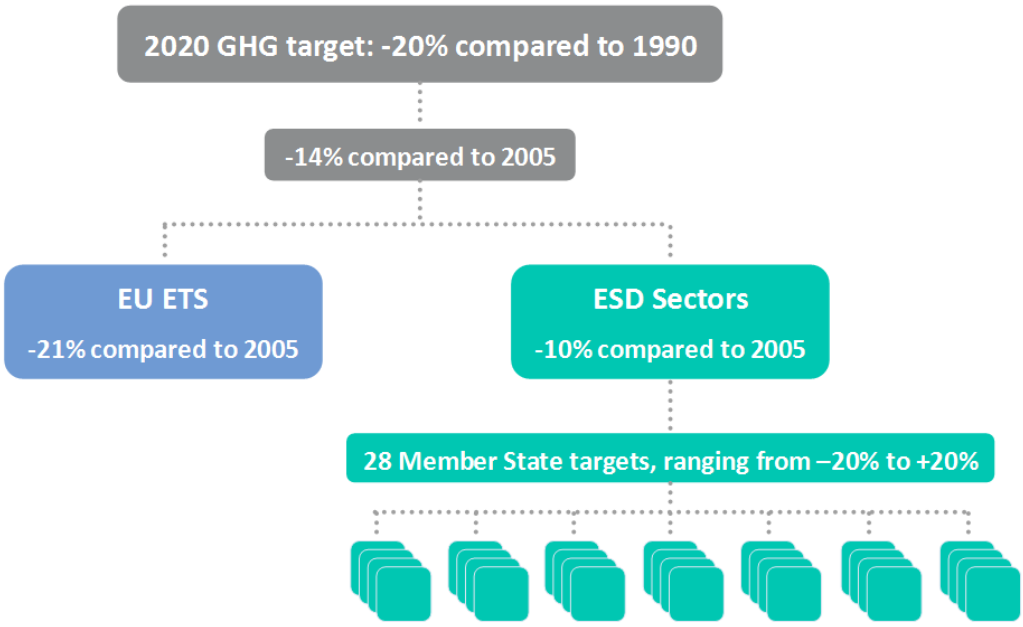
6 For more details on the "2020 Climate & Energy package", see https://ec.europa.eu/clima/policies/strategies/2020_en.

7 https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester_en.

FIGURE III.2-1 – "2020 CLIMATE AND ENERGY PACKAGE" – A SHARED EFFORT BETWEEN THE SECTORS AND THE MEMBER STATES



Source: European Commission, DG CLIMA.

11. As the "2020 Climate and Energy package" defines differentiated commitments and targets by 2020 for each EU countries, for **Luxembourg**, it calls to:
    - **reduce the level of GHG emissions by 20 % compared to 2005** for sectors outside the EU ETS – "ESD target";[8]
    - **achieve an 11 % share of energy from renewable sources** in all forms in final energy consumption;
    - **achieve a 10 % share of energy from renewable sources** in all forms in total transport.[9]

Non-ETS/ESD emissions

12. The Effort Sharing Decision (hereafter ESD)[10] establishes the **binding annual GHG targets for the EU Member States for the period 2013–2020**. These targets concern emissions from most **sectors not included in the EU ETS** and are expressed in percentage changes from 2005 levels. They range from a 20 % emissions reduction by 2020 (from 2005 levels) for the wealthiest

8 The targets regarding emissions are set in Decision 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 (https://eur-lex.europa.eu/eli/dec/2009/406/oj).

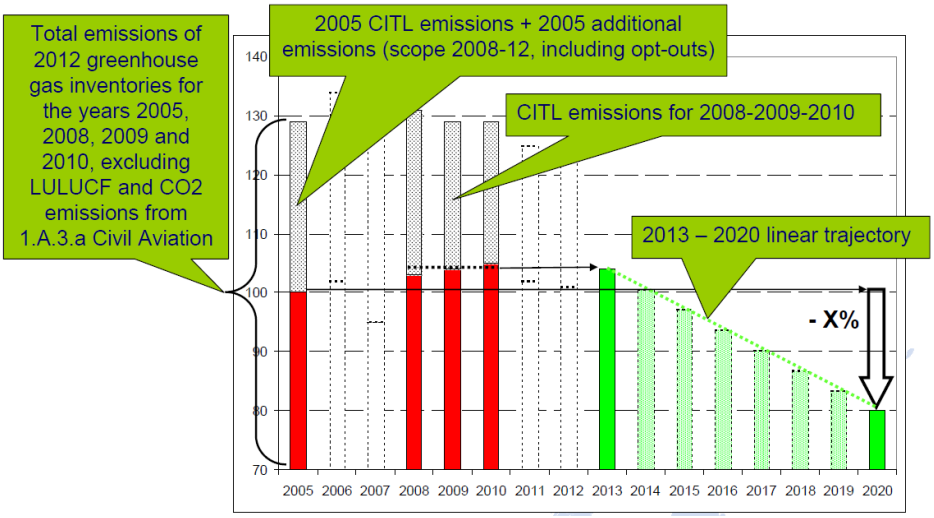
9 The targets regarding renewable energy are set in Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (http://data.europa.eu/eli/dir/2009/28/oj).

10 Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 (https://eur-lex.europa.eu/eli/dec/2009/406/oj).

Member States to a 20 % increase for the least wealthy one.[11] Luxembourg being the most prosperous Member State if GDP per capita is used as a benchmark, it has been assigned the highest reduction target, together with Denmark and Ireland. The non-ETS or ESD sectors include transport (road and rail, but not aviation or international maritime shipping), buildings (in particular heating), services, small industrial installations, agriculture and waste. Since the non-EU ETS emissions represented 83.5 % of Luxembourg's total GHG emissions (excl. LULUCF) in 2013, the "ESD target" set for Luxembourg is very challenging and has been driving the revision of the first national "Action Plan to reduce CO_2 emissions" *[→ Section III.3.2]*.

13. Concretely, each Member State has been assigned "**Annual Emissions Allocations**" (hereafter AEAs) for the years 2013 to 2020. These allocations constitute a linear trajectory between these two years with the 2020 level being the "ESD target" and the 2013 level corresponding to the average non-ETS emissions from the years 2008 to 2010 *[→ Figure III.2-2]*. The national AEAs have been set in a Commission Decision published on 26 March 2013.[12]

FIGURE III.2-2 – AEAS DEFINITION, INCL. THE "ESD TARGET"



Source: European Commission, DG CLIMA.
Note: the Community Independent Transaction Log (CITL) is a central transaction log, run by the EC, which checks and records all transactions taking place within the trading scheme. CITL emissions equals verified emissions, allowances and surrendered units under the EU ETS.

14. According to Art. 10 of the ESD, the **AEAs have subsequently been adjusted** to consider **changes in the EU ETS scope** between the periods 2008-2012 and 2013 onwards. This exercise was concluded during autumn 2013 and is set in a Commission Implementing Decision of 31 October 2013.[13]

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11 See this graphic for individual Member States' "ESD targets": http://climatepolicyinfohub.eu/sites/default/files/member_state_esd_targets2.png.

12 Commission Decision No 2013/162/EU of 26 March 2013 on determining Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/EC of the European Parliament and of the Council (notified under document C(2013) 1708) (http://data.europa.eu/eli/dec/2013/162(1)/oj).

13 Commission Implementing Decision No 2013/634/EU of 31 October 2013 on the adjustments to Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/EC of the European Parliament and of the Council (http://data.europa.eu/eli/dec_impl/2013/634/oj).

15. Finally, it was also considered a possible **revision of AEAs** following the **move to the 2006 IPCC Guidelines for reporting on GHG inventories** that occurred during the ESD period. The European Commission examined the impact of the use of the 2006 IPCC Guidelines, and the changes to UNFCCC methodologies used in Member State's GHG inventories. Noticing that the difference in the total GHG emissions relevant for the ESD exceeded 1 % for most Member States, all Member States' AEAs for the years 2017 to 2020 contained in the Commission Decision of 26 March 2013 have been revised in order to consider the updated inventory data reported.[14]

16. This process and its adjustments require that Luxembourg's **non-ETS emissions should reach 8 117 Gg CO_2e in 2020** in order to comply with the "ESD target" of minus 20 % *[→ Figure III.2-3]*. Moreover, from 2013 onwards, non-ETS emissions should remain below a linear trajectory, the red line in *Figure III.2-3*. If this is not the case, according to provisions in the ESD and in order to be compliant with the requirements of the ESD, Luxembourg:[15]

- may buy "unused" AEAs from other Member States. The ESD foresees two cases:
  - Member States with overachievement of AEAs in a year of the period 2013–2019 – i.e. with non-ETS emissions below their linear trajectory – may transfer their "surplus"[16] to other Member States, which may use this emission allocation until 2020. This is done after the ESD compliance of the "selling" Member State has been confirmed for a given year: ex-post transfer *(→ Art. 3(5) of the ESD)*;
  - Member States anticipating "surpluses" – i.e. overachievement of AEAs - in a year of or for the period 2013–2019 may transfer up to 5 % of their AEAs to other Member States. The "buying" Member State may use these transferred emission allocations until 2020: ex-ante transfer *(→ Art. 3(4) of the ESD)*.[17]

- may use JI/CDM credits according to the following provisions:
  - the use of project-based emission credits[18] is capped yearly up to 3 % of 2005 non-ETS emissions *(→ Art. 5(4) of the ESD)*;
  - may benefit from transfers from other Member States that do not use their 3 % limit for the use of project-based credits or save bank unused part of its project-based credits ("banking") for own use until 2020. The "buying" Member State acquires emission

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14 Commission Decision No 2017/1471/EU of 10 August 2017 amending Decision 2013/162/EU to revise Member States' annual emission allocations for the period from 2017 to 2020 (http://data.europa.eu/eli/dec/2017/1471/oj).
The revision of AEAs is limited to those that were allocated for the years 2017 to 2020, since for GHG emissions for the years 2013 to 2016, Member States could no longer change their policies and measures.

15 The three cases below are derived from European Environment Agency (2013), p. 102-103.

16 "Surplus" = AEAs minus verified non-ETS emissions for a given year.

17 Consequently, a "selling" Member State anticipates that it will not use all its AEAs for a given year, or over the period 2013-2019, and therefore decides to sell its AEAs in excess – with a limit of 5%of its total AEAs – to other Member States. Once these AEAs are transferred to the "buying" Member States, they cannot be reclaimed back by the "selling" Member State if it is finally missing its "ESD target".

18 CERs, ERUs, tCERs, lCERs and other units as defined in Art. 5(1), 5(2) and 5(3) of the ESD.

allowances, but project-related emission credits must be purchased subsequently *(→ Art. 5(6) of the ESD)*;

- may use credits from projects in Least Developed Countries and Small Island Developing States (LDCs and SIDS) up to an additional 1 % of its verified emissions in 2005 if it fulfils additional criteria considered in the ESD – which is the case of Luxembourg *(→ Art. 5(5)(c) of the ESD & Annex III)*. These credits are not bankable and transferable.

- could carry over any overachievement in a year of the period 2013–2019 to subsequent years, up to 2020. More precisely, an emission allocation of up to 5 % during 2013–2019 may be carried forward from the following year *(→ Art. 3(3)§1 of the ESD)*.

To date, Luxembourg **has only made use of the latest provision** – the carry over.

17. Actual GHG projections ***[→ Section IV.4]*** anticipate Luxembourg's non-ETS emissions to be below the linear trajectory for most of the 2013-2020 period, both with existing (WEM) or with additional (WAM) measures ***[→ Figure III.2-3 = IV.4-11]***. Since Luxembourg uses the ESD carry-over provision, it is anticipated that, despite an overachievement in 2020, **it would not be necessary to buy AEAs and/or project-based credits to comply with the "ESD target"**: see ***Sections IV.4.9 & IV.7.1*** for detailed explanations.

EU ETS emissions

18. The EU ETS is a cornerstone of the EU policy for reducing GHG emissions. The system works by putting a limit on overall emissions from covered installations – power stations and manufacturing plants – which is reduced each year. Within this limit, companies can buy and sell emission allowances as needed. This "**cap-and-trade**" approach is supposed to offer companies the flexibility they need to cut their emissions in the most cost-effective way.

19. Set up by Directive 2003/87/EC,[19] the system is now in its **3rd phase covering the period 2013-2020**. For this latest phase, major reform took effect (Directive 2009/29/EC[20]). The biggest changes have been the introduction of an EU-wide cap on emissions – reduced by 1.74 % each year so that in 2020, GHG emissions from the EU ETS sector will be 21 % lower than in 2005 – and a progressive shift towards auctioning of allowances in place of cost-free allocation that was the rule for the two previous phases. Concretely, a cap is set on the total amount of certain GHG that can be emitted by installations covered by the system. The cap is reduced over time so that total emissions fall. Within the cap, companies receive or buy emission allowances that they can trade with one another as needed. They can also buy limited amounts of international credits from emission-saving projects around the world. The limit on the total number of allowances

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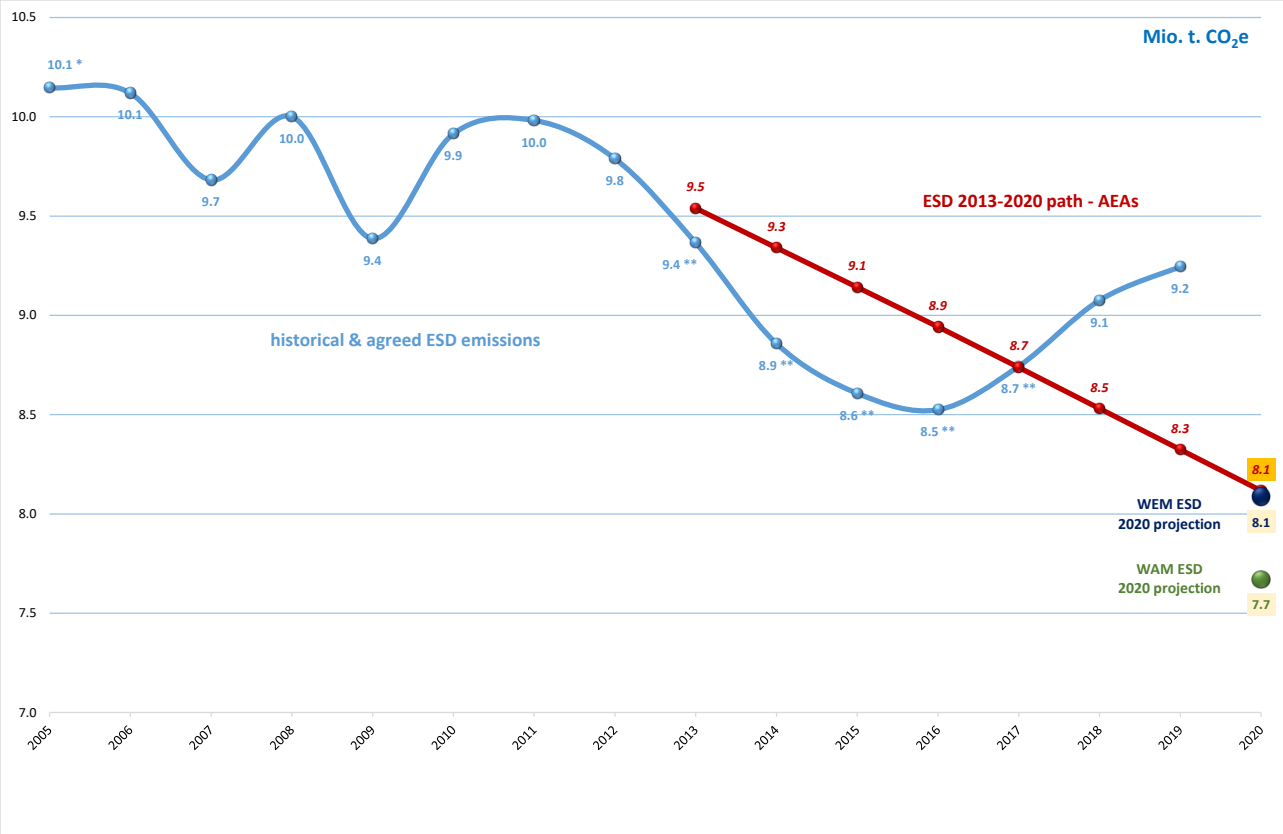
19 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC (http://data.europa.eu/eli/dir/2003/87/2020-01-01).

20 Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community (http://data.europa.eu/eli/dir/2009/29/oj).

available ensures that they have a value. After each year a company must surrender enough allowances to cover all its emissions, otherwise heavy fines are imposed. If a company reduces its emissions, it can keep the spare allowances to cover its future needs or else sell them to another company that is short of allowances.[21]

FIGURE III.2-3 – ESD IMPLICATION FOR LUXEMBOURG – 2013-2020 TRAJECTORY FOR ESD EMISSIONS AND 2020 PROJECTED WEM & WAM EMISSIONS



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

Note: "agreed" historical ESD/ESR emissions are those that have been fixed under the ESD compliance procedure and they slightly differ from the emissions that would be calculated using the latest inventory submission and the verified ETS emissions. In practice, each yearly inventory submission is reviewed at EU level. Once the outcomes of this exercise are agreed between a Member Country and the Commission, the ESD/ESR emission for the latest reported inventory year is "frozen" and serves as the basis for calculating the yearly surplus or gap with the corresponding AEA. At the end of the period – 2013-2020 in this case – the sum of surpluses and gaps will determine if a Member State has been compliant under the ESD.

Renewable energy sources

20. The Renewable Energy Directive No 2009/28/EC [22] (RED) establishes a common framework for the production and promotion of energy from renewable sources**.** Each Member State has a **target calculated according to the share of energy from renewable sources in its gross final consumption for 2020**. The RED states that Member States have to **establish national action plans** that set the share of energy from renewable sources consumed in transport, as well as in

[21] For more information, see [European Commission (2016)] as well as https://ec.europa.eu/clima/policies/ets_en.

[22] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (http://data.europa.eu/eli/dir/2009/28/oj).

the production of electricity and heating, for 2020 – the National Renewable Energy Action Plans (hereafter NREAPs). These action plans must consider the effects of other energy efficiency measures on final energy consumption and will establish procedures for the reform of planning and pricing schemes and access to electricity networks, promoting energy from renewable sources. Latest estimates of the share of renewable energy sources in the total final energy consumption of Luxembourg amounted to 9 % in 2018, i.e. below the 11 % goal to be reached by 2020.[23]

Energy efficiency

21. The Energy Efficiency Directive No 2012/27/EU[24] (EED) establishes a common framework of measures for the promotion of energy efficiency within the EU in order to ensure the achievement of the associated headline target of 20 % energy efficiency gains by 2020. The EED also covers the obligation on each Member State **to set an indicative national energy efficiency target in the form they prefer** (e.g. primary/final savings, intensity, and consumption) and to regularly report National Energy Efficiency Action Plans (hereafter NEEAPs) to the European Commission. Luxembourg's primary energy consumption target for 2020 under Art. 3(1) of the EED is 4.5 Mtoe.[25]

22. For the same reasons as under the Kyoto Protocol, a particular challenge will be the targets set for and by Luxembourg under the RED and EED.

Overview

23. *Figure III.2-4* summarizes the "Climate and Energy package" related objectives for Luxembourg.

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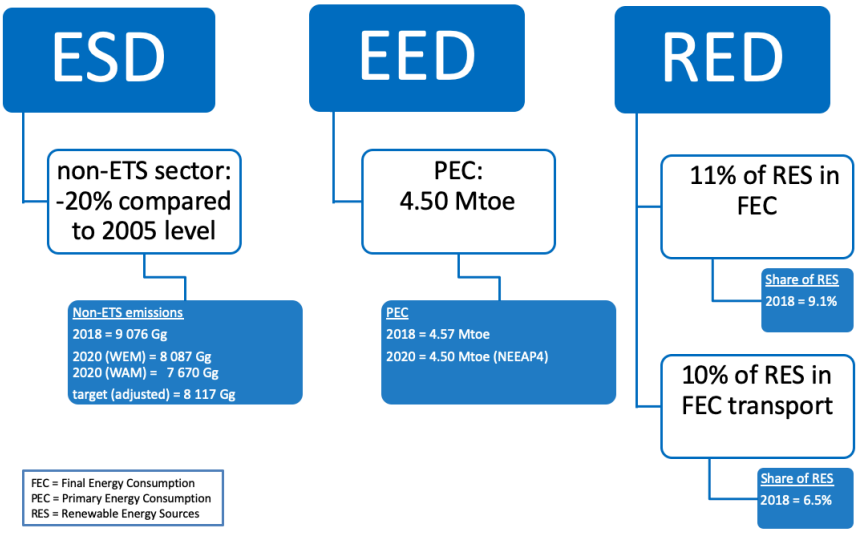
23 Source: Eurostat, energy statistics under Directive 2009/28/EC produced using the SHARES tool (updated 24.09.2020) (https://ec.europa.eu/eurostat/databrowser/view/t2020_31/default/table?lang=en).

24 Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (http://data.europa.eu/eli/dir/2012/27/oj).

25 See https://ec.europa.eu/energy/topics/energy-efficiency/targets-directive-and-rules/energy-efficiency-directive_en. Latest energy statistics report a volume of 4.57 Mtoe for the primary energy consumption in 2018 *[→ Table I.2-4 – TJ converted in Mtoe]*. Consequently, primary energy consumption is now slightly higher than Luxembourg's target under the EED (4.50 Mtoe) – that was not the case the previous years when consumption was lower. With the Covid-19, the forecast for 2020 would be that the primary energy consumption will again be lower than the target, whereas for 2019, provisional consumption is again higher than the target, mainly due to increasing road fuel sales.

FIGURE III.2-4 – "2020 CLIMATE AND ENERGY PACKAGE" – OVERVIEW OF LUXEMBOURG'S OBJECTIVES



Source: MECDD.

III.2.3. The EU "2030 Climate and Energy framework" and the Paris Agreement

24. Looking beyond 2020, a "**2030 Climate and Energy framework**" was adopted by EU leaders in October 2014 [European Commission (2014)]. This builds upon the "2020 Climate and Energy package", and is in line with the EU long-term goal of reducing Europe's GHG emissions by 80 % by 2050, compared with 1990 levels, as outlined in the EU long-term low-carbon economy and energy roadmaps [European Commission (2011a) & (2011b)].[26] The "2030 Climate and Energy framework" endorses a binding EU target of an **at least 40 % domestic reduction in GHG by 2030 compared to 1990**. This target was submitted to the UNFCCC on 6 March 2015 as **EU's joint intended nationally determined contribution** (INDC) for the **Paris Agreement**.

25. The 40 % domestic reduction in GHG correlates to at least **a collective 43 % reduction in EU ETS sectors and a shared burden 30 % reduction of non-ETS sectors compared to 2005 levels**. For the latter, the methodology for setting the national reduction targets is still based on Member States relative GDP per capita, as for the 2020 targets. Nevertheless, for Member States with a GDP per capita above the EU average, the targets were adjusted to reflect cost-effectiveness in a fair and balanced manner. All Member States will thus contribute to the overall EU reduction in 2030, with the targets ranging from 0 % to minus 40 %, compared with 2005 levels. According to these criteria, **Luxembourg**, together with Sweden, has again the highest reduction target

26 For more details see https://ec.europa.eu/clima/policies/strategies/2050_en. The "Roadmap for moving to a competitive low carbon economy in 2050" [European Commission (2011a)] is now replaced by the "Long-term low greenhouse gas emission development strategy of the EU and its Member States" submitted to the UNFCCC in March 2020 – https://unfccc.int/documents/210328. Overall frameworks cover the climate and energy initiatives: the "Clean Energy for All Europeans Package" adopted on 30 November 2016 – https://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition – and the November 2018 "Clean Planet for all A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy" Communication from the Commission – https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0773 and https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_analysis_in_support_en_0.pdf.

amongst Member States, i.e. **minus 40 %**. These country bindings targets are written in stone in the Effort Sharing Regulation (hereafter ESR), adopted in May 2018.[27]

26. While the ESR does not cover the LULUCF sector as such, it does allow Member States to use up to 280 million credits from the land-use sector over the entire period 2021-2030 to comply with their national targets. Nevertheless, emissions and removals from the **LULUCF sector are included for the first time in the EU climate target** through the so-called **LULUCF Regulation**.[28] Each Member State will have to ensure that the LULUCF sector does not create debits, once specific accounting rules are applied. This is known as the "no debit" rule.

27. The initial "2030 Climate and Energy framework" has been discussed several times at the European Council and amended. Today, besides the at least 40 % cuts in GHG emissions (from 1990 levels), it also includes revised binding 2030 energy targets at EU level: (i) to increase the **share of renewables to at least 32 % of EU energy consumption** and (ii) to improve **energy efficiency to at least 32.5 %**.[29] Neither the renewable energy target nor the energy efficiency target will be translated into nationally binding targets. Individual Member States are free to set their own higher national targets in their NECP.

28. *Figure III.2-5* illustrates how the objective of the "2030 Climate and Energy framework" is shared between Member States and the ETS sectors (also referred to as "Effort Sharing Regulation (ESR) sectors").

29. Concerning the **fourth phase of the EU ETS** (2021-2030), the pace of annual reductions in allowances goes from 1.74 % to 2.2 % as of 2021, and the "Market Stability Reserve" (the mechanism established by the EU in 2015 to reduce the surplus of emission allowances in the carbon market and to improve the EU ETS's resilience to future shocks) is reinforced.

30. Concerning the **ESR**, **linear reduction trajectories,** defining **AEAs** for the years 2021-2030, are currently being set between the European Commission and the Member States.[30] To ensure a fair and cost-effective achievement of targets, the ESR maintains existing flexibilities under the current ESD (e.g. banking, borrowing and buying and selling between Member States) but it provides two new flexibilities: one flexibility to access allowances from the EU ETS and another flexibility to access credits from the land use sector.[31]

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27 Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013(http://data.europa.eu/eli/reg/2018/842/oj). For more details see https://ec.europa.eu/clima/policies/effort/regulation_en.

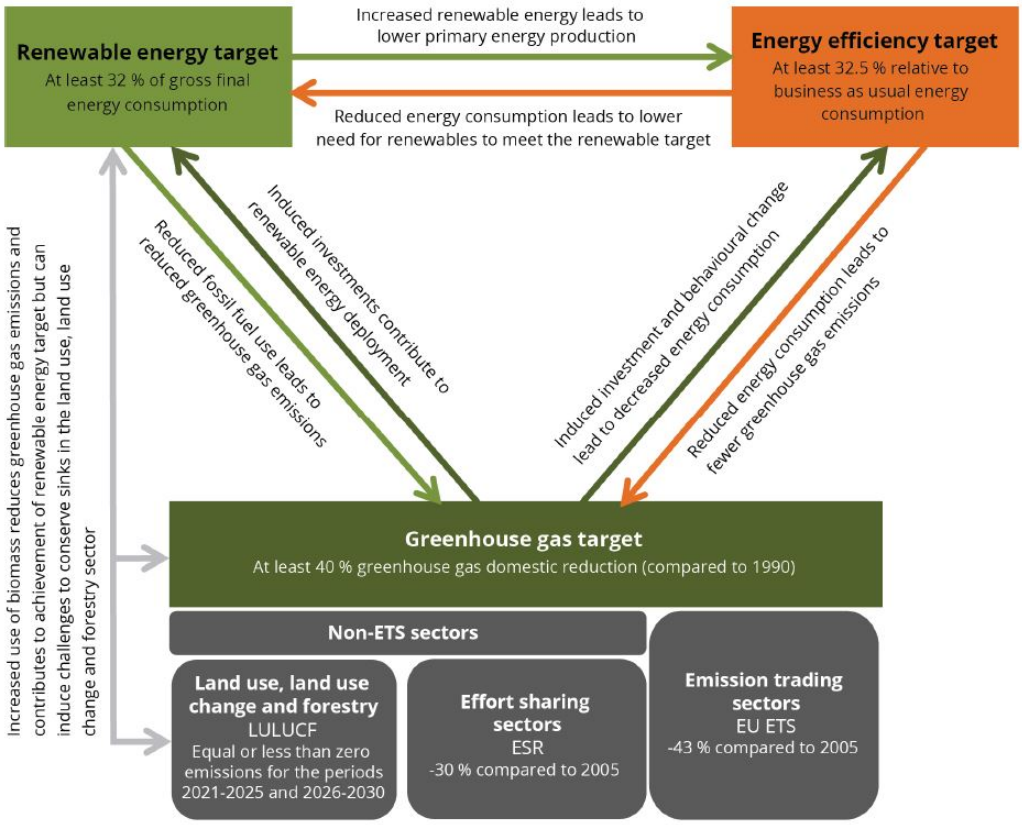
28 Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU (http://data.europa.eu/eli/reg/2018/841/oj).

29 For more details see https://ec.europa.eu/clima/policies/strategies/2030_en.

30 2021-2030 AEAs are actually known but not yet officially published. For Luxembourg they can be found in *Section IV.4.9*.

31 For details on these new flexibilities see https://ec.europa.eu/clima/policies/effort/regulation_en.

FIGURE III.2-5 – "2030 CLIMATE AND ENERGY FRAMEWORK" – INTERACTION BETWEEN CLIMATE AND ENERGY TARGETS



Source: European Environment Agency (2019a).

31. During the year **2020**, **the Commission has proposed to increase the EU's ambition** on the reduction of GHG and to set a more ambitious path for the next 10 years. The proposal is to **cut GHG emissions to at least 55 % below 1990 levels by 2030** in order to set Europe on a responsible and cost-effective **path to becoming climate neutral by 2050**. The new proposal delivers on the commitment made in the "**Communication on the European Green Deal**"[32] to put forward a comprehensive plan to increase the European Union's target for 2030 towards 55 % in a responsible way. This is also in line with the Paris Agreement objective to keep the global temperature increase to well below 2°C and pursue efforts to keep it to 1.5°C. The proposal is expected to stimulate the creation of green jobs and continue the EU's track record of cutting GHG emissions whilst growing its economy and, therefore, to encourage international partners to increase their ambition to limit the rise in global temperature to 1.5°C and avoid the most severe consequences of climate change. Detailed legislative proposals on how this target can be achieved are currently being prepared and, in this context, the Commission will review,

32 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1576150542719&uri=COM%3A2019%3A640%3AFIN. More on the Green Deal here: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en.

and where necessary propose to revise, **by June 2021**, all relevant policy instruments to achieve the additional emission reductions.[33]

32. Luxembourg anticipated the necessary move to minus 55 % and, already in **December 2019**, **unilaterally decided to cut the level of its non ETS/ESR GHG emissions by 55 % compared to 2005**. As for the Commission, this move was dictated:
    - by science in order to be consistent with holding the increase in the global average temperature to well below 2°C above pre-industrial levels;
    - by the willingness to attain "climate neutrality" or "net zero emissions" by 2050.

    This reduction is now included in Luxembourg's NECP officially submitted to the European Commission end of May 2020 [MECDD and MEA (2020)] *[→ Section III.3.3]*. It also contains national objectives for both renewable energy sources – **25 % of the primary energy consumption by 2030** – and **energy efficiency** – a **40 to 44 % gain** compared to the European Union 2007 PRIMES modelling scenario final energy consumption estimate for 2030. The NECP has been elaborated according to the "general framework for integrated national energy and climate plans" annexed to Regulation 2018/1999 of the European Parliament and of the Council of 11 December 2018 – the so-called "Governance Regulation" *[→ Section III.3.3]*.[34]

33. Actual GHG projections anticipate Luxembourg's non-ETS emissions with additional measures (WAM) to be below the linear trajectory for the 2021-2030 period. That would not be the case at all for the with the existing measures (WEM) *[→ Figure III.2-6 = IV.4-12]*: see *Sections IV.4.9* for detailed explanations.

Overview

34. *Figure III.2-7* summarizes the NECP related objectives for Luxembourg.

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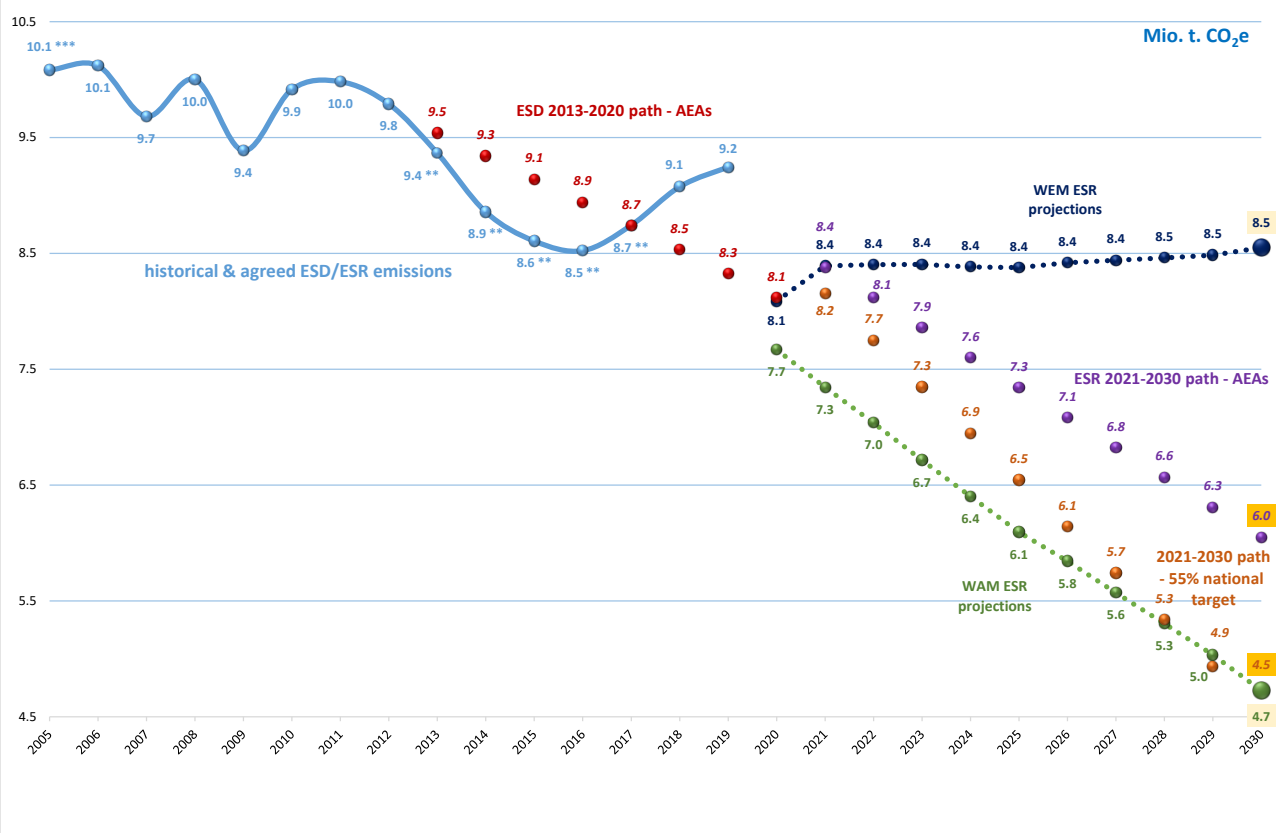
33 For more information on these developments, consult https://ec.europa.eu/clima/policies/eu-climate-action_en.

34 Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (http://data.europa.eu/eli/reg/2018/1999/oj).

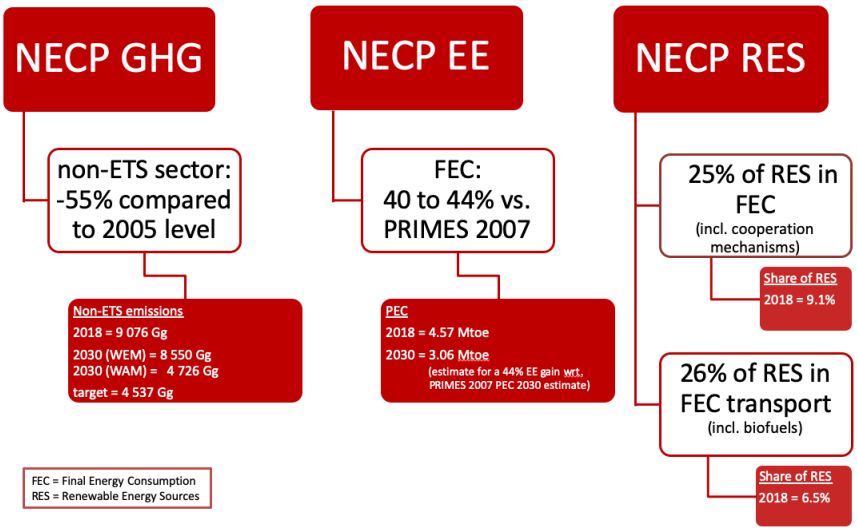
FIGURE III.2-6 – ESR IMPLICATION FOR LUXEMBOURG – 2021-2030 PROBABLE TRAJECTORY FOR NON-ETS EMISSIONS AND 2020 TO 2030 PROJECTED WEM& WAM EMISSIONS



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

Note: "agreed" historical ESD/ESR emissions are those that have been fixed under the ESD compliance procedure and they slightly differ from the emissions that would be calculated using the latest inventory submission and the verified ETS emissions. In practice, each yearly inventory submission is reviewed at EU level. Once the outcomes of this exercise are agreed between a Member Country and the Commission, the ESD/ESR emission for the latest reported inventory year is "frozen" and serves as the basis for calculating the yearly surplus or gap with the corresponding AEA. At the end of the period – 2013-2020 in this case – the sum of surpluses and gaps will determine if a Member State has been compliant under the ESD.

FIGURE III.2-7 – NECP – OVERVIEW OF LUXEMBOURG'S 2030 OBJECTIVES



Source: MECDD.

III.2.4. The EU 2020 and 2030 reduction targets under the Convention, under the Kyoto Protocol and under the Paris Agreement

35. As the EU systems in place drive its Member States policies, it is worth depicting the differences between the "package" and the "framework", as well as the EU commitments with regard to the Convention, the Kyoto Protocol, and the Paris Agreement. *Table III.2-1* depicts all relevant GHG reduction targets for the EU, and further its Member States, as well as their key-related facts.

TABLE III.2-1 – OVERVIEW OF THE EU 2020 & 2030 TARGETS UNDER THE CONVENTION, THE KYOTO PROTOCOL (CP2 AND THE PARIS AGREEMENT)

	International EU commitments				EU domestic legislation			
	Kyoto Protocol		UNFCCC	Paris Agreement	"2020 Climate & Energy Package"		"2030 Climate & Energy Framework"	
					EU ETS	ESD	EU ETS	ESR
Target year of period	First commitment period – CP1 (2008-2012).	Second commitment period – CP2 (2013-2020).	2020	Post 2020.	2013-2020	2013-2020	2021-2030	2021-2030
Emission reduction target	Minus 8%.	Minus 20%.	Minus 20%.	At least minus 40% in 2030.	Minus 21% compared to 2005 for ETS emissions.	Annual targets by MS 2020: minus 10% compared to 2005 for non-ETS/ESD emissions.	Minus 43% compared to 2005 for ETS emissions.	Annual targets by MS 2030: minus 30% compared to 2005 for non-ETS/ESR emissions.
					Overall target: 20% GHG emissions reduction compared to 1990.		Overall target: at least 40% GHG emissions reduction compared to 1990. 2020 Commission proposal: at least 55% GHG emissions reduction compared to 1990	
Further targets	-	-	Conditional target of -30% if other Parties take on adequate commitments: not the case.	Limiting global warming well below 2°C. Every 5 years to set more ambitious targets as required by science. Report on implementation/track progress towards the long-term goal through a robust transparency and accountability system. Balance between anthropogenic emissions by sources and removals by sinks of GHG in the second half of this century.	RED: 20% share of renewable energy of gross final energy consumption. EED: increase energy efficiency by 20%.		RES: at least 32% share of renewable energy in EU energy consumption (with an upward revision clause by 2023). Energy efficiency: increase energy efficiency by 32.5% (with an upward revision clause by 2023).	
Base year	1990 and KP flexibility rules. (Art 3(5)) regarding F-gases and economies in transition)	1990, but subject to flexibility rules. 1995 or 2000 may be used as the base year for NF_3.	1990	1990	2005		2005	
					1990 for overall emission reduction target.		1990 for overall emission reduction target.	

LULUCF	Includes ARD and other activities if elected.	Includes ARD and forest management, other activities if elected (new accounting rules).	Excluded.	Included: contributes to the commitment of decreasing emissions by at least 40%.	Excluded from target, but reported in inventories.		Included: contributes to the commitment of decreasing emissions by at least 40%.	
Aviation	Domestic aviation included. International aviation excluded.	Domestic aviation included. International aviation excluded.	Aviation in the scope of the EU ETS included. In practice total outgoing flight emissions considered.	Aviation in the scope of the EU ETS included. In practice total outgoing flight emissions considered.	Outgoing flights included.	Excluded.	Outgoing flights included.	Excluded.
Use of international credits	Use of KP flexible mechanisms subject to KP rules.	Use of KP flexible mechanisms subject to KP rules.	Subject to quantitative and qualitative limits	The EU will not use international credits (according to its NDC) – the same is envisaged by Luxembourg.	Subject to quantitative and qualitative limits *[→ Section III.2.2]*	Subject to quantitative and qualitative limits *[→ Section III.2.2]*	No.	No.
Carry-over of units from preceding periods	Not applicable.	Subject to KP rules including those agreed in the Doha Amendment.	Not applicable	Not applicable.	EU ETS allowances can be banked into subsequent ETS trading periods since the second trading period.	No carry-over from previous period.	Indefinite validity of allowances not limited to trading periods, no need to carry over.	No.
Gases covered	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3	CO_2, N_2O, CF_4, C_2F_6	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	CO_2, N_2O, CF_4, C_2F_6	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3
Sectors included	Annex A of KP (Energy, IPPU, agriculture, waste), LULUCF according to KP accounting rules for CP1.	Annex A of KP (Energy, IPPU, agriculture, waste), LULUCF according to KP accounting rules for CP2.	Energy, IPPU, agriculture, waste, aviation in the scope of the EU ETS.	Energy, IPPU, agriculture, waste, LULUCF.	Power & heat generation, energy-intensive industry sectors, aviation.	Transport (except aviation), buildings, non-ETS industry, agriculture (except forestry) and waste.	Power & heat generation, energy-intensive industry sectors, aviation.	Transport (except aviation), buildings, non-ETS industry, agriculture (except forestry) and waste.
GWPs used	IPCC SAR	IPCC AR4	IPCC AR4	IPCC AR4	IPCC AR4		IPCC AR4	
Applicable to number of MS	15 (additional KP targets for single MS).	EU-28 and Iceland.		EU-28 and possibly Iceland and Norway.	EU-28 (Iceland, Liechtenstein and Norway are also covered under the EU-ETS).		EU-27 – question mark for UK.	

Source: European Commission (2019a).

Note: LULUCF Regulation 2018/842 should be added to the "2030 Climate & Energy Framework". It covers the period 2021-2030 as well and calls for no-debit target based on accounting rules, i.e. a 0% emission reduction target. However, LULUCF sector contributes to the overall target of at least 40% - proposal 55% - GHG emissions reduction compared to 1990. Gas covered are CO_2, CH_4 & N_2O as there are no emissions of other GHG in this sector).

III.3. POLICY-MAKING PROCESS – NATIONAL CONTEXT

III.3.1. The national approach to climate change mitigation and adaptation – 30 years of action

36. Climate change has been a policy issue of the highest importance in Luxembourg for many years. *Figure III.3-1* on the next page recapitulates the main milestones in the development of strategies and action plans, for both climate change mitigation and adaptation.

37. For this 4th Biennial Report, the focus is on the **second "Action Plan to reduce CO_2 emissions"**, presented in **May 2013** [MDDI-DEV (2013b)] and on Luxembourg's **NECP**, adopted in May 2020 [MECDD and MEA (2020)].

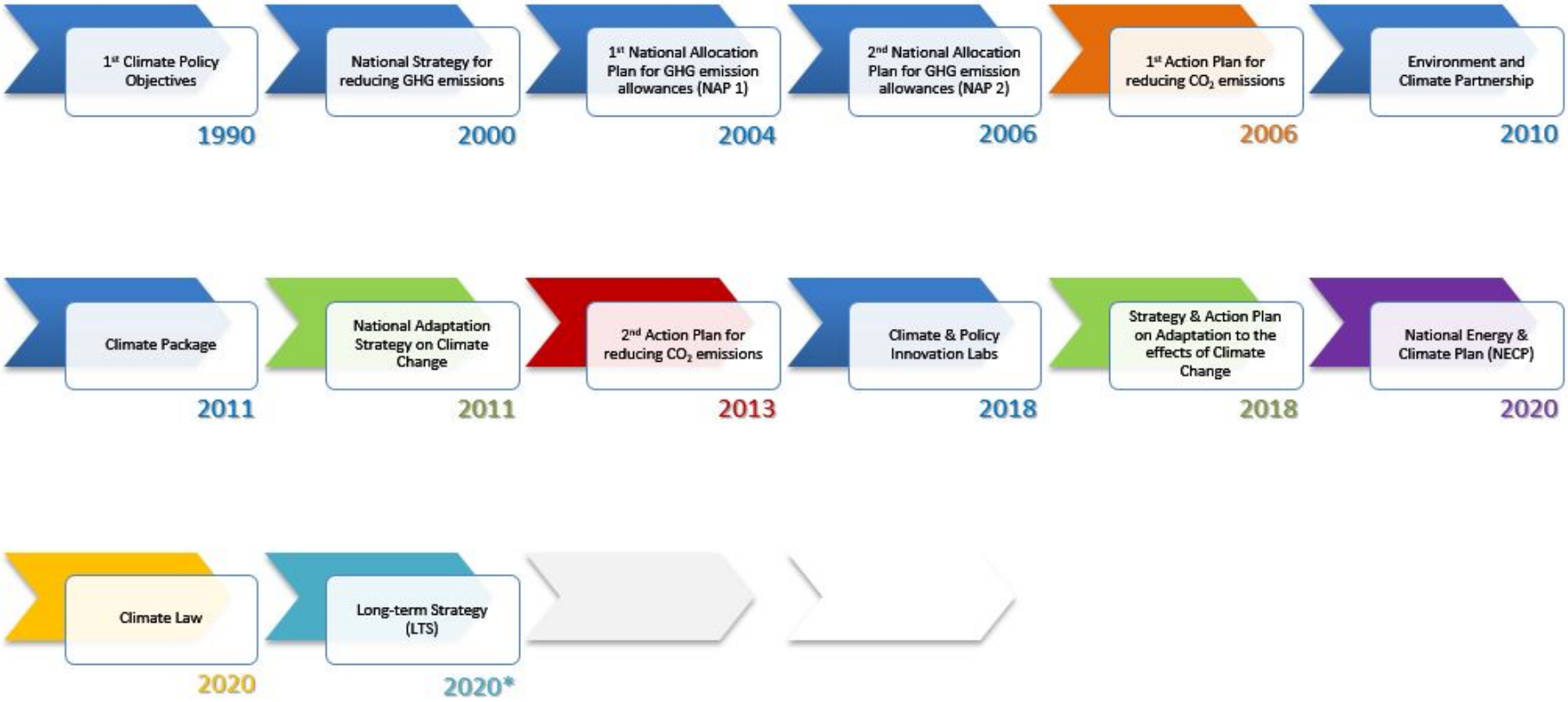
38. Descriptions of past actions, as well as of the stages that led to the second "Action Plan to reduce CO2 emissions", are available in the 7th National Communication of Luxembourg [MDDI-DEV (2018), p. 142-156].

III.3.2. 2013 to 2020 – the second "Action Plan to reduce CO_2 emissions"

39. The second "Action Plan to reduce CO_2 emissions" of May 2013 is the **main tool Luxembourg has at its disposal to comply with the EU "2020 Climate and Energy package" commitment** that was assigned to the country, the so-called "ESD target" *[→ Section III.2.2]*. In this second Plan, actions are mainly driven by increasing energy efficiency in all sectors as well as by promoting the use of renewable energy sources – in Luxembourg: biomass, solar energy, windmills, hydro-electricity, geothermic installations *[→ Box 1]*. These actions also take their place in the context of "green economy" and "green growth" that the Government of that time advocated in its Programme.

40. The **PaMs** listed in *Section III.5* are **closely related to the main measures and actions** of the second "Action Plan to reduce CO_2 emissions", and some of them have even been taken in the framework of this Action Plan.

FIGURE III.3-1 – OVERVIEW OF LUXEMBOURG'S ACTION PLANS AND STRATEGIES FOR CLIMATE CHANGE MITIGATION AND ADAPTATION – 1990-2020



Source: MECDD.

BOX 1 – SECOND "ACTION PLAN TO REDUCE CO_2 EMISSIONS" – MAIN MEASURES & ACTIONS

1.1 – Reinforce production and implementation of renewable energies

01 Review and adaptation of existing financial support systems (new financial support "*PRIMe House*",**(1)** achieving better visibility for subsidies directed to SMEs and industries).

02 Adaptation of compensation mechanisms for electricity supply from renewable energy sources through regulation, tariff adjustment and promotion of heat recovery.

03 Financial compensation for the supply of biogas in the natural gas grid through regulation.

04 Conception of a targeted promotion for the use of biomass.

1.2 – Increase energy efficiency and decrease energy consumption

05 Specification and implementation of a legal frame for the "Housing Sector Plan".

06 Redevelopment and simplification of the financial support system in case of old-building renovation and new constructions in the residential area, through fundamental assessment of measures for renovation and adjustment of financial support for new constructions.**(1)**

07 Encourage energy efficient renovation of public buildings by increasing financial means and transposing of the Energy Efficiency Directive No 2012/27/EU.

08 Monitoring energy consumption of public buildings through a measuring concept and data analysis.

09 Reinforce "construction standards" for new commercial and services buildings.

10 Implementing incentives to cover residual households' energy needs by renewable energy sources.

11 Standardisation of the provisions for deploying energy efficiency and the use of renewable energy sources in municipal buildings

12 Linking building construction and renovation to sustainable development criteria.**(1)**

13 Faster depreciation of the investments concerning energy efficient renovation through regulation.

14 Promoting and fostering electro-mobility through regulations, including financial support.

15 Promoting and fostering natural gas mobility.

16 Adjustment of "CAR-e" bonus for electro-cars.**(2)**

17 Increase energy efficiency in private companies through voluntary agreements, awareness rising, information and guidance, pilot projects.

18 Increase energy efficiency in companies under the EU ETS through a voluntary agreement scheme (FEDIL), and energy efficiency measures financed by EU ETS public revenues.

19 Application of sustainability criteria for public procurement and during the whole planning process through fixed guidelines and continuous monitoring.

2.1 – Focus on eco-technologies and R&D

20 Promoting eco-technologies in the fields of invention and innovation.

2.2 – Shape the mobility of tomorrow **(3)**

21 Integrative und structured spatial development through regulation, mobility strategy, sector roadmaps, Government-municipalities conventions.

22 Promotion of cycling and walking ("*mobilité douce*") through regulation and integration in regional planning.

23 Reorganisation of the public transport as part of the national mobility strategy.

24 Development and improvement of the public transport infrastructure.

25 Management of parking space in urban regions.

26 Promotion of intermodal transport (private-public transport).

27 Improvement of transboundary mobility.

28 Promotion of alternatives to passenger cars.

2-3 – Reform the tax system in a sustainable way

29 Analysis for a revision of car taxation.

30 Analysis for a revision of company car taxation.

31 Increase in excise duties considering impact on public finances.

2.4 – Development of efficient and socially equitable financial devices

32 New forms of promotion/appeal devices (e.g. by implementing a "zero rate eco-loan").

33 Improve renovation opportunities for rented apartments through regulation.**(1)**

34 Analysis of environmentally harmful subsidies and setting-up of a regulatory framework for those subsidies.

2.5 – Improvement of information, communication and decision-making

35 Capacity adaptation at My Energy **(4)** through higher financial framework and additional communal climate experts.

36 Support of municipal capacities through higher financial framework and secondment of climate experts to implement the Climate Agreement.**(5)**

37 Extend the "Environment and Climate Partnership" to a "Sustainability Commission" through regulation.

38 Improvement and systematisation of data collection concerning energy consumption and emissions development in diverse sectors.

39 Improvement and systematisation of data collection concerning energy consumption and emissions development in municipalities.

40 Evaluation of the second national "Action Plan to reduce CO_2 emissions".

41 Expansion of the offer for training and education on energy efficiency, renewable energies and ecological construction; in connection with additional specific possibilities for competencies certification (artisans, energy advisors).

42 Programmes on awareness rising and specific information for property owners and properties managers about the indirect advantages of energy efficient constructions and renovations (comfort, etc.) with the support of My Energy **(4)** and information campaigns.

43 Awareness rising for more energy efficient construction and renovation with support of My Energy.**(4)**

44 Pilot project targeting energy advisors who are supporting low-income households in order to reduce their energy and water bills.

45 Use of new communication tools to increase attractiveness for public transport.

46 Installation and development of a traffic telematics system for public transport.

47 Introduction of an "ecological mobility label for companies.

48 Development of advices and support to industry and SMEs concerning energy efficiency and the usage of renewable energies.

2.6 – Reach an arrangement with municipalities with regard to the Climate Agreement

49 Reach an arrangement with municipalities with regard to the Climate Agreement.**(5)**

2.7 – Develop a "National Adaptation Strategy on Climate Change"

50 (amongst other things) Development and application of a legal frame for the promotion of agro-forestry.

51 (amongst other things) Optimisation of forest carbon storage and optimisation of carbon storage in cultivated (grown) land, increase of organic carbon resulting in a structural improvement of soil stability and a reduction of the risk of erosion

(1) see *Section III.5.1* for the "*PRIMe House*" scheme.

(2) "CAR-e" scheme: see [MDDI-DEV (2014a), Box IV.3-2].

(3) measures 21 to 27: see also *Box 3* for the "MoDu" strategy.

(4) My Energy: see *Box 7*.

(5) "*Pacte Climat*": see *Section III.5.1,* §92 to §96.

III.3.3. Beyond 2020 – a set of plans and strategies to mitigate and adapt to climate change

Mitigating GHG emissions

41. About 2018, the Government had the intention to develop its **third national "Climate Plan"**, which would have been the continuation and the update of the second "Action Plan to reduce CO_2 emissions" and would have acted as the **main policy instrument with regard to the 2030 GHG related targets** assigned to Luxembourg *[→ Section III.2.3]*.

42. Nevertheless, with the setting up at EU level of an **Energy Union and Climate Action Governance**, which materialise into the "Governance Regulation" (→ §32), it did not make sense to go on drafting the third "Climate Plan". Indeed, the "Governance Regulation" requested Member States to prepare, by end 2019, an integrated national energy and climate plan covering the period 2021 to 2030 – a NECP – according to the "general framework for integrated national energy and climate plans" that is annexed to it.

43. Of course, Luxembourg took advantage of the preparatory work of the third "Climate Plan" and **incorporated the first results and opinions into the "decarbonisation" dimension of the future NECP**. The outcomes of this work had then to compose with the other 4 dimensions of the NECP, namely:

    - energy efficiency;
    - energy security;
    - internal energy market (electricity interconnectivity; energy transmission infrastructure; market integration; energy poverty);
    - research, innovation and competitiveness.

    Renewable energy supply and use, together with GHG emissions and removals, constitute the "decarbonisation" dimension of the NECP.

44. The preparatory work sought to define objectives for Luxembourg's GHG mitigation policy as well as to identify the social and economic opportunities of such a policy. Two points in time were immediately considered: 2030 of course, but also 2050, when major decarbonisation of the national economy is anticipated. It covered the following sectors:

    - housing/buildings (residential and non-residential);
    - transport;
    - economy (non-ETS industry, craft industries, retail, services);
    - energy supply;
    - agriculture and nutrition.

    and the following cross-cutting issues:

- public finance;
- land planning;
- the Climate Agreement with municipalities (→ §92 to §96).

45. In this context, **stakeholder consultations** took place during the **first quarter of 2018**. Firstly, a **two-day "co-creation" process called "Climate Innovation Lab"** aimed to come up with innovative ideas with regard to climate change mitigation and management policies in Luxembourg. For this event, along with citizens and representatives from the youth, a large number of selected stakeholders were invited according to their professional involvement in the different key sectors identified for the preparation of the strategic document. It was followed by a further co-creation event called **"Climate Policy Lab"** explicitly dedicated to climate policy governance.[35] Their respective outcomes were then presented to, and discussed with, other Ministries and Administrations, NGOs and professional chambers, as well as other stakeholders.

46. Later on, in **May 2019**, a draft version of the NECP was presented on the occasion of a **one-day workshop** "*Generatioun Klima - zesumme fir eise Planéit*" where it was the subject of discussions between a vast array of stakeholders: civil society, social partners, business, scientific community, local authorities, parliament, relevant ministries and administrations. Almost 200 people participated in the discussions. To draw up the final NECP, measures have been developed, prioritized and concretized in order to achieve the objectives for 2030, building on approaches already identified. The participatory process was led by experts and divided into **7 thematic areas**:
    - housing and sustainable buildings;
    - mobility;
    - industry and businesses;
    - agriculture;
    - energy;
    - changing lifestyles;
    - governance, sustainable finance and taxation.

47. Still in **May 2019**, and in response to the mobilization of students for climate protection, the Government decided to involve them in the consultations actively. In order to better understand their expectations, ideas and suggestions, **4 regional workshops were held in high schools** ("*ClimateXchange*"). Around 500 students participated in these workshops where the Minister of Education, Children and Youth, the Minister for the Environment, Climate and Sustainable Development and the Minister of Agriculture, Viticulture and Rural Development were present.

35 https://environnement.public.lu/fr/actualites/2018/01/11_wakeup.html.

The main topics covered were sustainable schools, mobility, waste, energy and agriculture (sustainable consumption and production).

48. In the **fall of 2019**, the MEA and the MECDD conducted **a series of bilateral discussions with civil society organizations and the social partners**. These discussions aimed to reach the broadest possible consensus on the planned strategies and measures of the NECP.

49. In 2015, the Government commissioned a study on a "**Third Industrial Revolution**" for Luxembourg (hereafter TIR) *[→ Box 2]*. The Government decided to continue the participatory approach through existing **platforms** put in place during the TIR process. "*Energiezukunft Lëtzebuerg*" is one of those platforms that made it possible to address important and concrete topics relating to the energy transition at several events. In **March 2018**, as part of the developments of the European Energy Union,[36] a **workshop on energy transition** was organized, during which discussions and reflections took place around the main pillars of the Energy Union, the NEEAP and the main component elements for a national energy strategy, covering both energy efficiency and the potential of renewable energies in Luxembourg. Questions on the security of supply and competitiveness in the fields of electricity, natural gas and oil were tackled too. During that workshop, a **"Konsortium" of research institutes** presented some first orientations based on a study aiming at identifying and defining the best energy options to comply with the proposed energy targets under the "2030 Climate and Energy framework", as well as with other implemented requirements under the Energy Union. This "Konsortium" actually helped on drafting the NECP and prepared energy combustion related GHG projections presented and discussed *in Section IV.3 & IV.4*.

50. Activities, processes, studies, consultations, workshops presented in the previous paragraphs all found their way in the final NECP for Luxembourg.[37]

BOX 2 – THE "THIRD INDUSTRIAL REVOLUTION LËTZEBUERG" – TIR

The "Third Industrial Revolution Strategy Study" – in brief TIR – is a joint project, launched in September 2015 by the Ministry of the Economy, the Chamber of Commerce of the Grand Duchy of Luxembourg and IMS Luxembourg (1) and realized in close collaboration with the American economist-publicist Jeremy Rifkin and his team of international experts (the Third Industrial Revolution Consulting Group LLC). The TIR is a process characterized by the transition to a new economic model defined in particular by the coupling of information technologies, renewable energies and intelligent transport networks. Luxembourg has evolved at all these levels in recent years, notably through its policy of economic diversification, its investments in digital infrastructure and its various action plans for energy efficiency or the promotion of renewable energies.

Taking into account the socio-economic specificities of the country, this major strategic study was thus intended to foster this momentum and to make the existing economic model more sustainable and interconnected for future generations. The main goal of the joint project was to provide ideas and tools to help Luxembourg, its society and its economy to integrate the "Third Industrial Revolution", which, within an intelligent network of information and communication technologies (ICT), is based on the convergence of opportunities related to digitization, energy transition and alternative mobility. It is essential to be prepared to face these new

36 https://ec.europa.eu/energy/topics/energy-strategy/energy-union_en.

37 For details, see https://environnement.public.lu/fr/actualites/2020/05/pnec.html.

technologies and disruptive models, to adapt to them, and to assimilate them into business models in order to turn perceived threats into real opportunities.

Spanning a year, the development of the strategic study constituted a real transverse work that was achieved through a "bottom-up" co-creation approach which was implemented in nine working groups operating in the framework of the nine thematic pillars of the TIR project, namely: "Energy", "Mobility", "Building", "Food", "Industry", "Finance", "Smart Economy", "Circular Economy" and "Prosumers and social model". This approach has enabled the various socio-economic actors' part of the TIR process to get involved in the development of the strategic study and in the drafting of its conclusions.

Thus, through a constructive and participatory approach, the strategic study identified the opportunities, priorities and challenges as well as the operational aspects that accompany the transition to a more sustainable and interconnected economy. Its main outcomes were presented in November 2016. They consist of:

1. a comprehensive and detailed 475 pages study considering the socio-economic characteristics of the country and proposing concrete actions and tools, including a range of strategic measures and projects, to prepare the country, its society and its economy to start the TIR process;
2. a 140 pages summary-synthesis of the study consisting of an introduction presenting the main challenges of the TIR and their economic implications for the country and society, as well as summaries for the nine thematic sections which are containing the quintessence of the identified strategic measures, in particular those that are seen as priorities (5 per theme).

Both reports are available here: http://www.troisiemerevolutionindustrielle.lu/etude-strategique/.

As a follow-up of the TIR, the Government put in place a mode of governance aiming at, on the one hand, discuss and further study possible strategic measures to be taken following the proposals made in the strategic study and, on the other hand, support projects already under way and transpose other recommendations presented in the final report.

The governance model provides thematic platforms, already existing or to be created, in which the study recommendations and projects corresponding to the nine thematic pillars, are analysed and discussed. These platforms allow an exchange and a common understanding of the measures and visions presented in the study. The regulatory, operational and technical aspects related to the transposition of these measures, as well as projects to be carried out, are discussed. Platforms' composition varies according to the themes addressed, the general orientation being a public-private partnership, without prejudice to particular cases that might require a different specific approach.

The nine thematic platforms are as follows: the National Council for Sustainable Construction, *Energiezukunft Lëtzebuerg*, the High Committee for Industry, Circular Economy, Intelligent Mobility, Luxembourg Sustainable Development Finance Platform, as well as Labour, Employment and Social Issues. The platforms are opened to actors from different sectors concerned, the social partners and experts (functional diagram available here: http://www.troisiemerevolutionindustrielle.lu/gouvernance/).

At the level of overall coordination of the process, a Strategic Monitoring Committee has been set up under the leadership of the Minister of the Economy. This structure centralises the work of the thematic platforms and discusses major orientations and major challenges related to future technological changes. In addition, the Strategic Monitoring Committee draws up regular progress reports submitted to the Government, which decides whether measures developed within the thematic platforms will or will not be undertaken.

Concretely, in these nine thematic platforms the work now concentrates on:

1. deploying a "national energy internet", i.e. smart grids and smart meters;
2. promoting electromobility and launching a program for the use of emission-free personal vehicles;
3. gradually introducing the concept introduction of "mobility as a service" i.e. a sustainable mobility ecosystem where citizens, according to a multimodal approach, choose a combination of modes of transport that best suits their daily needs;
4. implementing of a flagship project to demonstrate the socio-economic contribution of smart, sustainable and circular neighbourhoods/cities;
5. establishing a roadmap for sustainable food production based on transparency and trust;
6. developing co-located technology platforms for industry and the public research sector;
7. establishing a sustainable development financing intermediation platform called "Luxembourg Sustainable Development Finance Platform";

8. implementing an infrastructure offering the required capabilities in the field of "High Performance Computing" (HPC);
9. promoting the circular economy concept for public procurement.

A majority of these developments and reflections will affect the drafting of the strategic document that will lead to the third national "Climate Plan".

On 9 November 2017, the Minister of the Economy presented a first interim report of the work done so far within each of the platforms:

http://www.troisiemerevolutionindustrielle.lu/wp-content/uploads/2017/11/TIR-Rapport-interm%C3%A9diaire-de-suivi-2017.pdf.

Source: MECO.

(1) IMS - Inspiring More Sustainability - is the dedicated network that supports organizations in their commitment to Corporate Social Responsibility (CSR) by promoting dialogue with their stakeholders. IMS is an independent non-profit organisation.

Long-term Strategy

51. Luxembourg has **not yet a long-term low GHG emission development strategies, in brief a "Long-term Strategy"** (hereafter LTS). The MECDD is currently working on this document that is being developed in accordance with Art. 4, para. 19 of the Paris Agreement and Art. 15 of the "Governance Regulation". The LTS will identify the main fields of action and the strategic measures required to succeed in the transition to "climate neutrality" by 2050. The important conclusions that emerged from the above-mentioned workshops and consultations are, to the extent possible, considered in the drafting of the LTS.

52. However, in accordance with the requirements of the "Governance Regulation", the draft LTS will have to undergo public consultation. As a result, the submission to the Secretariat of the UNFCCC might be **postponed until early 2021**.

"Klimaschutzgesetz" – a climate law for Luxembourg

53. Luxembourg is in the process of finalizing its "*Klimaschutzgesetz*" or "**Climate Protection Law**". This piece of legislation will enshrine the minus 55 % non-ETS emissions reduction target by 2030, as well as the "net zero emissions" target by 2050, in a **legal and binding document**. A first proposal of that law was adopted by the Government end November 2019 and it is expected that the final text will be **adopted by the end of the year 2020**.

54. The law lays down provisions for **progressive and binding emission targets for 5 sectors** – namely:
    - energy & manufacturing industries, construction;
    - transports;
    - residential, commercial & institutional buildings;
    - agriculture & forestry;
    - waste & wastewater treatment.

These targets will be defined by a Regulation setting sectoral annual emission allocations with possible penalties in case of non-compliance that will contribute to the revenues of the "Climate and Energy Fund" *[→ Section IV.7.2]*.

55. The text also proposes the **creation of 3 bodies**: (i) a "climate action and energy transition platform"; (ii) an inter-ministerial coordinating committee and (iii) a "climate observatory", which is an independent "think tank" focused on the scientific, ethical and societal aspects of climate policy.

Adaptation to climate change

56. Whereas climate change is an inescapable truth, it is first a question of limiting the extent of these changes. Action plans such as those for reducing CO_2 emissions constitute the red wire of the national climate change policy. However, adaptation to climate change is an essential complement to prepare our societies for a changing climatic environment.

57. In Luxembourg, initial reflections on adaptation to climate change go back to **June 2011**, as Luxembourg's Council of Ministers adopted a "**National Adaptation Strategy to Climate Change**". This strategy prioritized (i) biodiversity, (ii) water, (iii) agriculture and (iv) forestry and provided a framework for adaptation to the impacts of climate change in Luxembourg. In **2012**, a report linked adaptation and spatial planning – "Adaptation to Climate Change – Strategies for Spatial Planning".[38]

58. In **2018**, **a revised and more comprehensive adaptation strategy to climate change**, building on the above-mentioned documents, has been finalized [MECDD (2018)]. It combines and updates the available information with the aim to allow Luxembourg to cope with climate change challenges and to take appropriate precautionary measures. The adaptation strategy itself will outline changes in temperature, precipitation and extreme events, as well as the expected outcomes with respect to the bio-, pedo- and hydrospheres.

59. A total of **42 measures** have been developed for **13 sectors or cross-cutting topics**, namely:
    1. construction & housing;
    2. energy;
    3. forestry;
    4. infrastructures;
    5. crisis & disaster management;
    6. land use planning;
    7. agriculture, incl. herbal and animal health;
    8. human health;

[38] http://amenagement-territoire.public.lu/content/dam/amenagement_territoire/fr/publications/documents/C-Change/CChange_conclusions.pdf.

9. ecosystems & biodiversity;
10. tourism;
11. urban areas;
12. water management;
13. economic activities.

Sustainable Development

60. In **December 2019**, the Government adopted the **3rd National Sustainable Development Plan** "*Luxembourg 2030*" (hereafter NSDP3) [MECDD (2019b)]. The NSDP3 built upon a national report regarding the implementation of the 2030 Agenda and its 17 Sustainable Development Goals (SDGs). SDG 13 – take urgent action to combat climate change and its impacts – is of course directly linked with GHG mitigation actions. However, when it comes to implementing the SDGs, a lot of them may have indirect impacts on GHG emissions.

61. **Ten priority areas** have been identified for the NSDP3:
    1. ensuring social inclusion and education for all;
    2. ensuring conditions for a healthy population;
    3. promoting sustainable consumption and production;
    4. diversifying and ensuring an inclusive economy with a promising future;
    5. planning and coordinating land use;
    6. ensuring sustainable mobility;
    7. halting environment degradation and respecting the capacities of natural resources;
    8. protecting the climate, adapting to climate change and ensuring sustainable energy;
    9. contributing, at the global level, to the eradication of poverty and the coherence of policies for sustainable development;
    10. ensuring sustainable finances.

    Certain of the key priority areas are directly linked to climate issues. This is obviously the case for priority area 8, but also, to a lesser extent, for areas 3 to 7.

III.3.4. Other plans and programmes

62. In addition to the plans, strategies and tools presented in the previous sections, other plans and programmes **may have co-benefits in terms of climate change mitigation though this is not their first concern**. They mostly deal with energy efficiency and the use of renewable energy sources, air pollutants emissions and concentrations, road transportation and mobility, agriculture, waste management, land planning and preservation of eco-systems. These are listed below (non-exhaustive):

- the "**National Renewable Energy Action Plan**" (hereafter NREAP) [MECO (2010)] provides detailed roadmaps of how Luxembourg expects to reach its legally binding 2020 target for the share of renewable energy in its final energy consumption. The plan provides a detailed road map of how Luxembourg expects to reach its legally binding 2020 target of 11 % for the share of renewable energy in its final energy consumption, as required by Art. 4 of the Renewable Energy Directive No 2009/28/EC (RED). The NREAP contains sectoral targets, the technology mix to use, the trajectory, and the measures and reforms to undertake to overcome the barriers to developing renewable energy (→ §20). For the 2030 horizon, the above-mentioned "Konsortium" proposed measures and options so to meet the renewable energy objectives for Luxembourg (→ §49).
  Responsible entity: MEA.
- the 4th "**National Energy Efficiency Action Plan**" (hereafter NEEAP4) [MECO (2017)] that sets out estimated energy consumption, planned energy efficiency measures, long-term renovation strategies, and the improvements that Luxembourg expects to achieve in order to reach the global EU 2020 target of 20 % energy efficiency gains (→ §21). Under the Energy Efficiency Directive No 2012/27/EU (EED), Luxembourg must draw up a NEEAP every three years, and it must report the progress achieved towards its national energy efficiency targets on an annual basis.[39] For the 2030 horizon, the above-mentioned "Konsortium" proposed measures and options so to meet the energy efficiency objectives for Luxembourg (→ §49).
  Responsible entity: MEA.
- the "**National Programme aiming at reducing air pollutants**" – "*Programme National de Réduction Progressive des Emissions de Polluants Atmosphériques (SO_2, NOx, COV, NH_3)*" – that could have some co-benefits with regard to GHG mitigation. This programme was issued in 2003 to implement the National Emission Ceilings (NEC) Directive (Directive No 2001/81/EC)[40] that has been revised by end 2016 to include more stringent emission reduction objectives for Member States. The new text (Directive No 2016/2284)[41] indicates that, as a minimum, Member States shall limit their annual anthropogenic emissions of sulphur dioxide (SO_2), nitrogen oxides (NOx), non-methane volatile organic compounds (NM-VOC), ammonia (NH_3) and fine particulate matter ($PM_{2.5}$) in accordance with compulsory national emission reduction commitments applicable from 2020 to 2029 and from 2030 onwards. The "**National Air Pollution Control Programme**" (hereafter NAPCP) under Art. 6 of Directive No 2016/2284 is the main governance instrument by which EU

39 Reports on progress are available at https://ec.europa.eu/energy/topics/energy-efficiency/targets-directive-and-rules/national-energy-efficiency-action-plans_en.

40 Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants (http://data.europa.eu/eli/dir/2001/81/oj).

41 Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (http://data.europa.eu/eli/dir/2016/2284/oj).

Member States must ensure that these emission reduction commitments.[42] The objectives for Luxembourg might be challenging to reach for some gases, particularly the NOx. Undoubtedly, reaching the NOx target is linked with fulfilling Luxembourg's commitments under the ESR *[→ Section III.2.3]*.

Responsible entities: MECDD and MECDD-AEV.

- the 2013 "**A Clean Air Programme for Europe**"[43] and its implementation at the national level through the "*Programme National de la Qualité de l'Air*" (hereafter PNQA) adopted in **2017**. This PNQA focuses mainly on two gases: nitrogen dioxide (NO_2) and fine particulate matter (PM_{10}). Measures presented in this programme are either EU wide – complying with Euro standards for private vehicles in real driving conditions e.g. – or national/local – lowering individual motorised transport and shifting it to alternative fuels (reducing the number of diesel vehicles), promoting (clean) public transports, facilitating traffic flows, considering air quality in urban planning development plans, information and awareness.[44] Clearly, these measures have some co-benefits with regard to GHG mitigation.

  Responsible entities: MECDD and MECDD-AEV.

- the "**Sustainable Mobility Strategy**" – "**MoDu**" for "*Mobilité Durable*" – that complements the "Transport Sector Plan"; the latter offering the legal framework on which the strategy could be built. More details in ***Box 3***.

  Responsible entity: MMTP.

- the "**Transport Sector Plan**" – "*Plan Sectoriel Transports* – PST" – which is one of the national "primary sector plans" linked to the general long-term planning concept of integrated spatial development and transports – the IVL for *Integratives Verkehrs-und Landesentwicklungskonzept* – that fixes objectives for the 2020 horizon and which is the regulatory counterpart of the "MoDu". More details in ***Box 4***.

  Responsible entity: MMTP.

- the "**National Waste and Resources Management Plan**" – "*Plan national de gestion des déchets et des ressources*" (hereafter PNGDR) – adopted in **2018**, which should lead to emission reductions from waste management activities by reducing waste generation, increasing waste recovery and reducing the negative impacts of waste disposal. It promotes the concept of "circular economy" and introduces long-term objectives such as resource preservation, climate protection and effects on future generations.[45]

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42 A presentation of Luxembourg's NAPCP can be found at https://environnement.public.lu/fr/loft/air/plans-air/NAPCP.html. See also https://ec.europa.eu/environment/air/reduction/NAPCP.htm. Luxembourg's NAPCP is under public consultation up to 1 December 2020.

43 A Clean Air Programme for Europe (Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions) (http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013DC0918&from=EN).

44 A presentation of the PNQA can be found at https://environnement.public.lu/fr/loft/air/plans-air/PNQA.html.

45 A presentation of the PNGDR can be found at https://environnement.public.lu/fr/offall-ressourcen/principes-gestion-dechets/Plan_national_de_gestion_des_dechets_PNGD.html.

Though the PNGDR has been recently adopted, its concretization took some 3 years from its kick-off to its adoption: there were several thematic workshops and a public consultation in-between. With European legal texts these last years on single-use plastics and on **circular economy**, the Government launched the "***Null Offall Lëtzebuerg***" ("Zero Waste Luxembourg") campaign and strategy in **2019**. The aim of this campaign is to bring together participants' ideas in order to prepare a draft waste management law. This law will transpose the circular economy and single-use plastics directives. However, above all, as for climate with the "Climate Protection Law" (→ §53), the law will enshrine the PNGDR and the "zero waste" objective into a **legal and binding document**.[46]

Responsible entities: MECDD and MECDD-AEV.

- the second "**National Plan for Nature Preservation**" - "*Plan National de Protection de la Nature*" (hereafter PNPN2) – 2017-2021 and the accompanying "**National Biodiversity Strategy**" that provides a framework for national and European nature protection areas. By preserving biodiversity and protecting ecosystems, or restoring them, there are co-benefits for climate mitigation – for instance, through restoring wetlands that offer bigger carbon absorption possibilities than other types of land uses.[47] One key policy in this framework, which also indirectly benefits to GHG absorption, is the "**ecological compensation**" scheme based on the obligation to repair ecological damage caused by private or public buildings or developments. A tax is levied on contracting authorities whose projects cause ecological damages - this is akin to the polluter-pays principle. Public national and local authorities then use the revenues of this tax for actions to restore or create biotopes or habitats that are concentrated in "compensatory pools". Thus, as a whole, the system pursues the objective of avoiding any net loss of biodiversity ("no net loss").[48]

  Responsible entities: MECDD and MECDD-ANF.

- the "**Landscapes Sector Plan**" – "*Plan Sectoriel Paysages*" – which is one of the national "primary sector plans" and that could contribute to climate change policies by preventing urban sprawling, for instance.[49]

  Responsible entity: MEA.

- the "**National Forests Programme**" – "*Programme Forestier National*" – which should aim at restoring good quality forests in Luxembourg: nowadays, forests are characterized by high fragmentation, old species and trees and, sometimes, carelessness.[50]

  Responsible entity: MECDD-ANF.

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46 For the presentation of the "*Null Offal Lëtzebuerg*" strategy, see https://environnement.public.lu/fr/actualites/2019/mai/null_offall.html.

47 A presentation of the PNPN2 can be found at https://environnement.public.lu/fr/natur/biodiversite/mesure_2_pnpn.html.

48 The principle of "ecological compensation" is explained at https://environnement.public.lu/fr/natur/biodiversite/compensation.html.

49 A presentation of this Plan can be found at https://amenagement-territoire.public.lu/fr/plans-caractere-reglementaire/plans-sectoriels-primaires/paysage.html.

50 Some explanations on this Programme can be found at https://environnement.public.lu/fr/natur/forets/nouveau_code_forestier.html.

- the "**Rural Development Programme**" – "*Programme de Développement Rural*" – **2014-2020** whose one of the four strategic axes is the improvement of the environmental conditions and of the rural space.[51] *Box 8* describes some actions led in the field of agricultural activities having possible co-benefits for climate mitigation.
  Responsible entity: MAVRD.
- **Environmental technologies** (eco-technologies) are one of the priorities of the economic diversification strategy of the country.[52] Through synergies with research centres and through logistic and financial support by the authorities, it is aiming at positioning Luxembourg in the "green economy" by stimulating the production of green products and services and to support research and development in the environmental technologies field. Innovation, business development and cross-sector cooperation in this area are fostered through the "CleanTech" cluster.[53] These activities could have spillover effects that would be beneficial to both climate change adaptation and mitigation.
  Responsible entity: MECO.

BOX 3 – "MODU"

"MoDu" is a global strategy for sustainable mobility ("MoDu" for "*mobilité durable*") of residents and cross-border commuters that was launched in 2012.

The planning approach developed in the framework of the "MoDu" strategy is directed to an optimal co-ordination between spatial development, environmental constraints and the future organisation of transport networks. The approach aims at reducing potential conflicts between transport planning and the environment, and seeks synergies between sustainable land planning and the development of transport infrastructures and offer.

The need for a sustainable mobility strategy was stemming from the following observations with regard to Luxembourg's territorial development: (1) demographics have been extremely dynamic compared to other European countries, but it is in rural communities that the largest growths have been noticed (diffuse urbanisation); and (2) domestic employment has grown much stronger than in neighbouring countries and, therefore, the redundancy of workplaces had to be compensated by labour coming from outside ("new" residents and cross-border commuters) *[→ Section I.2.4]*. Turning to mobility issues, it was observed that (3) in 2009, only 13 % of the daily trips were the fact of pedestrians or cyclists although 40 % of the daily trips in Luxembourg are made on a distance of less than 3 km; (4) two thirds of the journeys by private cars and public transports happen during peak hours, which results in an overload of the transport network (train/bus/road); and (5) these bottlenecks, especially the ones on the roads, harm the environment and the economy, lead to lower quality of life for residents and a growing risk of accidents.

To answer to these five findings, four political objectives have been defined:

1. improve the links between regional development and mobility;
2. reach 25 % of daily trips by non-motorized traffic ("mobilité douce") by 2020;
3. reach 25 % of motorized trips by public transport by 2020;
4. promote alternative use of the car: Park&Ride stations, car sharing, carpooling and electro-mobility.

It is anticipated that, together with actions on road fuel sales, the implementation of the "MoDu" strategy through the PST [→ Box 4] will grant the biggest GHG reduction potential in the coming years through a likely reduction of cars journeys within the country and

51 The "Rural Development Programme" is available at https://agriculture.public.lu/de/publications/politique/pdr2014-2020/pdr.html.

52 A presentation of this Action Plan can be found at

53 https://www.luxinnovation.lu/cluster/luxembourg-cleantech-cluster/.

from cross-border commuters. The modal split objective of 25/75 by 2020 – i.e. 25 % of the journeys by public transport and 75 % by private vehicles – is one of the cornerstones of "MoDu", which proposes substantial investments in national and cross-border public transport infrastructures (the actual modal split is estimated at 17/83 by DG MOVE – 2017 figures (1)). More precisely, "MoDu" lists the following measures and actions:

1. promote and favour urban development around the main railways' axes;
2. reduce congested roads and bottlenecks that create vehicles lines, hence unnecessary emissions of various pollutants;
3. realisation of large railway projects at national, regional and cross-border levels (new stations; new lines, improving existing lines);
4. develop "multimodal" platforms for both private journeys (park & ride sites next to train stations, e.g.) and for freight (such as the Bettembourg-Perpignan rail speedway for trailers – the "*autoroute ferroviaire*");
5. create a maximum of bus lanes and putting a strong emphasis on the extension of the bus network for cross-border commuters;
6. promote cycling and walking ("*mobilité douce*").

This first "MoDu" strategy has been repealed in 2018 by "MoDu 2.0 - *Mobilitéit zesummen erreechen*". While the fundamental principles of the 2012 "MoDu" strategy remain in force (multimodality and the strengthening of public transport and active modes), this revised strategy sets new targets for 2025. It also incorporates recent technological advances and ensures consistency with new global and national strategies (Paris Climate Agreement, TIR). Finally, MoDu 2.0" is aimed more explicitly at the four players in mobility: the citizens; the cities; employers and schools; the state. These new targets for 2025 concern several modal splits, as well as objectives for car occupancy rates. A brochure in English summarizes the main components and objectives of "MoDu 2.0".

→ first "MoDu" strategy: https://transports.public.lu/fr/contexte/strategie/modu1.html.
→ "MoDu 2.0 strategy": https://transports.public.lu/fr/contexte/strategie/modu2.html and the brochure in English: https://transports.public.lu/dam-assets/publications/contexte/strategie/Modu20-EN-final.pdf.

Source: MMTP.

(1) European Commission, DG MOVE, EU Transport in Figures – 2019 statistical pocketbook, Table 2.3.3, p. 49 (https://ec.europa.eu/transport/facts-fundings/statistics/pocketbook-2019_en).

BOX 4 – TRANSPORT SECTOR PLAN – PST

Whilst the "MoDu" strategy presented in *Box 3* describes the integrated approach for the future organization of transport network, the primary sectoral plan for transport (https://transports.public.lu/fr/contexte/strategie/plan-sectoriel-transports.html) describes the different transport policy projects and defines measures that require a regulatory framework. It is, in fact, the regulatory counterpart of the "MoDu".

The PST aims at optimizing coordination between spatial development, environmental restrictions and the future organization of transport networks. It allows responding to the forecasted increase in mobility needs by focusing on the development of resource-efficient means of transport, i.e. public transport and non-motorized traffic ("*mobilité douce*"). The PST also contains prescriptions and recommendations with regard to the communes and serves as a basic regulatory framework to integrate different measures of the "MoDu" strategy into communal general development plans.

More concretely, the PST defines legal instruments to introduce a parking management system for all urban areas and for the promotion of cycling and walking. It also reserves land corridors for new transport infrastructures and sets priorities for key infrastructural transport projects, with a special focus on public transport and non-motorized traffic.

For prioritizing the projects, three criteria are used:

1. the potential complementarity between transport means;
2. practical impacts at local, regional, national and transnational levels;

3. potential damaging effects on the environment and contribution to climate change mitigation.

Source: MMTP.

63. Next to public national action plans and programmes, there also exist **local projects as well as private/corporate initiatives**. Some of these are presented in *Boxes 5 & 6*.

BOX 5 – INITIATIVES AT THE LOCAL LEVEL

The Climate Alliance of European Cities with the Indigenous Rainforest Peoples / Alianza del Clima e. V. is Europe's largest city network for climate protection. It aims at reducing GHG emissions in the industrialised countries of the North, and conserving the rainforests in the South of the planet, more precisely in Amazonia. For achieving this goal, local climate strategies are developed and implemented, especially in the energy and transport sectors. Furthermore, there are measures to raise the public's awareness for the protection of the rainforest and to abstain in municipal procurement from tropical timber derived from destructive logging (http://www.climatealliance.org/home.html).

Luxembourg's branch of the Climate Alliance is *Klima-Bündnis Lëtzebuerg* (http://www.klimabuendnis.lu/fr/). It comprises 40 municipalities, out of 105 in Luxembourg (http://www.klimabuendnis.lu/fr/nous-connaitre/communes-membres/). These 40 municipalities represent around 75 % of the population of the country.

To reach the mitigation objectives they committed themselves to, municipalities can exchange experiences, as well as submitting projects and leading common actions with other municipalities.

Klima-Bündnis Lëtzebuerg also launched a project for helping its members to monitor their mitigation actions and to build PaMs scenarios. This project consists of using the ECORegion software tool developed by the Swiss company Ecospeed. The tool allows monitoring as well as to simulate the impact of policy measures on regional energy consumption and related CO_2 emissions (http://www.ecospeed.ch/welcome/en/). The tool has been implemented during the 2011 summer, making Luxembourg the fourth country, after Germany, Italy and Switzerland, to put it in place.

Though the ECORegion tool certainly suffers from its limitation to energy related CO_2 emissions only and from some methodological drawbacks in the eyes of GHG inventory specialists and compilers, it might be a very useful way to further mobilize municipalities in their actions for limiting GHG emissions, as well as for informing and involving their inhabitants and local businesses.

In 2016, the Ministry of Sustainable Development and Infrastructure commissioned *Klima-Bündnis Lëtzebuerg* to draw up a carbon footprint for all municipalities part of the "*Pacte Climat*" *[→ Section III.5.1,* §92 to §96*]*; a work done in close cooperation with My Energy *[→ Box 7]*. The calculations for all the "*Pacte Climat*" participating municipalities was finalized during the course of 2017.

Five municipalities of the Grand Duchy of Luxembourg – Beckerich, Dudelange, Luxembourg, Remich and Naturpark Our – are signatories to the new integrated Covenant of Mayors for Climate & Energy that was launched by the European Commission on 15 October 2015 (https://www.eumayors.eu/). The three pillars of the strengthened Covenant – mitigation, adaptation, and secure, sustainable and affordable energy – were symbolically endorsed on this occasion. Signatories endorse a shared vision for 2050: accelerating the decarbonisation of their territories, strengthening their capacity to adapt to unavoidable climate change impact, and allowing their citizens to access secure, sustainable and affordable energy.
For more details, see http://www.klimabuendnis.lu/fr/la-nouvelle-convention-des-maires-integree/.

BOX 6 – INITIATIVES AT CORPORATE AND BUSINESS LEVEL

The Voluntary Agreement of the Business Federation of Luxembourg – FEDIL addresses the energy consumption of the industrial sector, including enterprises participating in the European Union Emissions Trading System (EU ETS) – see PaM EC42 in *Table III.5-3* below. All FEDIL member companies having a significant energy consumption – defined on certain criteria – can participate in the agreement. The common objective is to annually increase energy efficiency by 1 %, calculated for all the participating enterprises (global objective, not an individual one). In order to reach this 1 % goal, each participating company prepares a technical evaluation – or an energy audit – that will allow it to define and put in practice an action plan. The counterpart for the company is that it can benefit from several advantages, such as the support of My Energy (1) through a convention between the consultancy agency and the participating company (http://entreprises.myenergy.lu/grandes-entreprises-et-industries/accord-volontaire-fedil/). Nowadays, the majority of the country's large industrial energy consumers participate in this voluntary agreement (54 enterprises end 2019).

The first version of the agreement came in force in 1996, when the members of the FEDIL (http://www.fedil.lu/) agreed upon a voluntary agreement promoting the improvement of energy efficiency in the industrial sector. It has been several times extended and amended until 2010. For the 2011-2016 period, the voluntary agreement aimed to improve energy efficiency by a general objective of 7 % (i.e. 1 % per year). The average for 2009 and 2010 was used as a reference. The development of energy efficiency is measured using a general efficiency characteristic value, which corresponds to the arithmetic mean of the company-specific efficiency characteristics. If the general objective is not met and the company-specific improvement is below the 7 % target, the relevant participating enterprises must pay a proportion of the tax on the purchasing of electricity and gas, from which they are otherwise exempt. In addition to improving their energy efficiency, the participating industrial companies undertook to introduce an energy management system, by identifying the potential for improvement and drawing up an action plan to implement at least some of this potential. Enterprises that fail to meet their obligations – including annual reporting requirements – may be excluded from the agreement.

The actual Voluntary Agreement is running from 1 March 2017 up to 31 December 2020. In this latest agreement, training in energy efficiency management requirements has been included, as well as an exchange of good practices between participating companies. The general objective of 7 % over the period is however maintained. The average for 2014 and 2015 is used as a reference. The participating enterprises are required to finance the energy efficiency improvements themselves. In return, they are exempted from a proportion of the tax on electricity and gas.

The NECP suggests to prolong and expand further the Agreement beyond 2020, notably by including SMEs.

However, there are also initiatives in other economic domains. For instance, the national railway company *Chemins de Fer Luxembourgeois* – CFL, took a series of environmental commitments (https://groupe.cfl.lu/fr-fr/page/37322b44-3b7c-4700-a4e1-d4a7eda765a5). One of the most important decisions is that now trains are moved by "green electricity" only (all the network is electrified in Luxembourg): https://gouvernement.lu/fr/actualites/toutes_actualites/articles/2007/11/15-lux-cfl.html.

Another example is the energy efficiency and energy reduction actions led by the postal and telephone company Post Luxembourg. The enterprise took the commitment to buy only "green electricity", to promote sustainable low-energy buildings, to reduce fossil fuel consumption of the vehicle fleet ("eco-driving" guides for the staff, natural gas driven vehicles, etc.): http://www.postgroup.lu/fr/70.

These two cases cover public owned companies. However, they set an example and are in line with the actual Government views expressed in the second "Action Plans to reduce CO_2 emissions".

Note:
With regard to electricity, all the providers in Luxembourg propose "green electricity" to their clients:
a) the main provider is Enovos with its Naturstroum and Nova Naturstroum offers: https://www.enovos.lu/en/Individuals/Electricity;
b) the other (smaller) providers also offer different "green electricity" mixes: EIDA (https://www.eida.lu/en/), Electris (http://www.electris.lu/fr/42/electris/presentation-et-engagements/) and Sudstroum (http://www.sudstroum.lu/fr/Produits-et-tarifs/Sudstroum-TERRA).

Most of the electricity produced from renewable sources is imported, i.e. bought abroad since the capacities – especially in hydro-electricity – are limited in Luxembourg.

A similar scheme is in place for natural gas:

a) the main provider is Enovos with its Naturgas and Nova Naturgas offers: https://www.enovos.lu/en/Individuals/Natural-gas;
b) the other (smaller) provider is Sudgaz that also offers a "green" alternative with an extra-cost: http://sudgaz.lu/wp-content/uploads/2016/07/Flyer-biogaz.pdf.

(1) My Energy: see *Box 7*.

64. In the implementation of energy-related policies and measures, ***My Energy G.I.E.*** is a key player: *Box 7*.

65. As stressed above, some measures and actions could have positive effects on GHG emissions reduction, though their primary aim is not GHG mitigation or adaptation. This is the case in **agriculture**, for instance: *Box 8*.

BOX 7 – MY ENERGY G.I.E.

In 1991, an Energy Agency was created to promote energy efficiency and the use of renewable energy sources in the commercial, financial and housing areas. During the course of 2008, this Agency was reformed and split into two different structures. The first one named "Energieagence" continued its commercial activity on the energy advice market as a corporation – http://www.energieagence.lu/ – whereas a second structure, an Economic Interest Group (EIG), named My Energy was as created as an Economic Interest Group (EIG) in order to provide a national and neutral contact point for information and advice on energy matters – http://www.myenergy.lu/.

My Energy missions consist in the information, the support and the education of private persons, municipalities, companies and experts towards the development of sustainable and energy efficient constructions and the use of renewable energy sources.

My Energy main activity is the free and neutral energy advice offered to private consumers by telephone or by appointment in its various regional "infopoints", operated in cooperation with municipalities. The basic energy advice is meant:

1. to offer targeted guidance on the numerous products and services available on the market;
2. to clarify the advantages and disadvantages of measures;
3. to optimize the energy efficiency, the sustainability and the costs of a project;
4. to encourage the housebuilder to use renewable energies;
5. to offer information on the state subsidy programs.

My Energy has also introduced a voluntary certification programme ("myenergy certified") for the experts working in the area of energy efficiency and renewable energies. The professionals meeting the criteria defined by My Energy and demonstrating consolidated skills obtain a quality label and are added to a list, which is actively distributed by My Energy to guide the consumers searching for an expert.

In addition to general advice and information activities destined to the municipalities and companies, My Energy has assisted the Government with the implementation of the "*Pacte Climat*" and is now in charge of the project management *[→ Section III.5.1,* §92 to §96*]*.

My Energy also develops and manages national and European projects in the fields of energy efficiency, renewable energy sources and sustainable constructions and supports the Government for the national implementation of European Directives in the area of energy efficiency and renewable energies – for instance, My Energy contributed to the third and fourth NEEAP, as well as to the NECP drafting.

My Energy is supported by the Luxembourg Government, represented by the Ministry of the Economy, the Ministry of the Environment, Climate and Sustainable Development and the Ministry of Housing.

BOX 8 – AGRICULTURE

Though the agricultural sector represented only 6.5 % of the national total GHG emissions, excl. LULUCF (2018), it might contribute to climate change mitigation by putting in place a number of practices, such as, for instance:

1. maintaining and enhancing permanent grassland and promoting reduced or zero tillage practices – mulch-till or direct seeding – which will both favour carbon sequestration;
2. developing several agro-environmental schemes for arable land and pasture in protected areas – extensive farming;
3. promoting organic production measures, as well as measures to reduce livestock density – extensive farming;
4. favouring renewable energy sources production through slurry bonus for biogas production and the combustion of biomass;
5. improving agricultural production methods, for instance by encouraging better application techniques for liquid manure.

[→ Section III.5.1, §104*]*.

III.3.5. Inter-ministerial decision-making process/bodies

66. The overall coordination and implementation of:
    - the overall climate change policy;
    - the second "Climate Action Plans for reducing CO2 emissions";
    - the national adaptation strategy on climate change;
    - the future LTS;
    - the future "Climate Protection Law";
    - the NSDP3;

    lies with the MECDD.

67. The overall coordination and implementation of the NECP lies with both the MECDD and the MEA.

68. The implementation of measures at the sector level is, in general, the responsibility of the relevant Government departments and agencies.

III.3.6. Monitoring and evaluating PaMs

69. Achieving reduced emissions of GHG requires the implementation of a number of different measures, both technical measures and behavioural changes. Various policy instruments can be used to achieve this. The strategy followed by Luxembourg includes taxes, grants, regulations, information and a market-based system that mainly influence emissions within the energy and transport sectors *[→ Sections III.3.2 & III.3.3]*. Policy instruments introduced in the waste and agricultural sectors, as well as to improve and transform mobility, also influence developments *[→ Section III.3.4]*. There are also linkages between national PaMs and the "Common and Coordinated Policies and Measures" (CCPM's) of the EU. CCPM's have a different kind of impacts in Luxembourg, some are reducing emissions beyond what is achieved by or possible

with purely national policies (such as the agreement with car manufacturers at EU level and the biofuels Directive), others, however, will probably not lead to additional emission reductions beyond those generated by national policies.

70. Though it remains difficult to distinguish the effects of individual policy instruments from each other and other driving forces in society, a capacity building work programme was initiated in 2017 to develop Luxembourg's reporting of climate PaMs required under the EU Regulation No 525/2013 (hereafter MMR).[54] This programme involved improving the completeness of climate PaMs across economy-wide sectors. A total of **75 PaMs are now listed in the database** *[→ Section III.5, Table III.5-1]*. They are structured in **9 categories**, namely:

    AG – agriculture – 10 PaMs;

    EC – energy consumption – 25 PaMs;

    ES – energy supply – 3 PaMs;

    FO – forestry – 6 PaMs;

    GO – good governance – 4 PaMs;

    IP – industrial processes – 1 PaM;

    IR – innovation & research / R&D – 1 PaM;

    TR – transport & mobility – 12 PaMs;

    WM – waste management – 16 PaMs.

71. The **mitigation impact potential of 10 PaMs** was quantified for the years 2020, 2025 and 2030, aligned with the MMR requirements. Ex-ante savings of **two additional PaMs** for 2020 coming from work undertaken during the production of Luxembourg's NEEAP4 are included.

72. It is **not planned to quantify more PaMs of that list of 75** as they are in the process of being amended, revised and completed by the PaMs described in the NECP. For some measures, which should allow Luxembourg to reach its 55 % reduction in non-ETS/ESR emissions by 2030 compared to 2005, the NECP only broadly describes them. That means that certain PaMs still need to be discussed and specified further with the concerned Ministries and that a list, similar to the one related to the second "Action Plan to reduce CO_2 emissions" does not exist yet.

73. Consequently, **it is not possible to present mitigation potentials for all of the individual or groups of PaMs** in this 4th Biennial Report.

74. In *Section IV.4* on WEM and WAM projections, most of the PaMs from the NECP are briefly described as they underpin the GHG projections. *Box 9* (below §86) summarizes these NECP PaMs, some of them revising or repealing existing PaMs. Hence:

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54 Regulation No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC (http://data.europa.eu/eli/reg/2013/525/oj).

- PaMs presented and discussed in *Section III.5* are **not in line with those of the NECP** which, in turn, are not considered in that section. They are the PaMs linked to the second "Action Plan to reduce CO_2 emissions";
- PaMs presented and discussed in *Section III.5* are **not those considered for the GHG projections**; in other words, **PaMs and projections are not in line and comparable**.

For the next Biennial Report submission, this discrepancy would not exist anymore as the NECP list of PaMs and their ex-ante evaluation should be available.

III.4. DOMESTIC PROGRAMMES PURSUANT TO THE IMPLEMENTATION OF THE KYOTO PROTOCOL[55]

75. In previous chapters and sections, the various institutions playing a role in climate change reporting and management in the context of the UNFCCC and the Kyoto Protocol have been pointed out. *Table III.4-1* recapitulates the situation.

76. The description of any institutional arrangements and decision-making procedures that are in place in Luxembourg to coordinate activities relating to participation in the mechanisms under Art. 6, 12 and 17 of the Kyoto Protocol, including the participation of legal entities, are provided in *Section IV.7*, where the use of "Kyoto Protocol Units" (KPUs) is presented in *Section IV.7.1* and the "Climate and Energy Fund" is presented in detail in *Section IV.7.2*. **CTF Tables 4** (partly) – report on progress – and **4(b)** – reporting on progress – **are linked to this section**.

77. With regard to **Art. 3.3 of the Kyoto Protocol,** actual calculations – submission 2020v1 – show that related activities could be carbon sinks. With regard to **Art. 3.4 of the Kyoto Protocol**, Luxembourg has decided, during the first commitment period, not to elect any of the activities. Hence, according to this Art. 3.4, Luxembourg has to carry out accounting for its forestry activities (forest management) in the second commitment period. Due to a lack of reliable data, emissions from harvested wood products are reported as instantaneous oxidation. Furthermore, Luxembourg has elected the option "natural disturbances" but not the "provision for carbon equivalent forests" [MECDD-AEV (2020), Chapter 11]. **CTF Table 4(a)II** – progress in the achievement of the quantified economy-wide emission reduction targets - further information on mitigation actions relevant to the counting of emissions and removals from the LULUCF sector in relation to activities under Art. 3.3 and 3.4 of the Kyoto Protocol – depicts the situation up to 2018 – in the CTF Reporter it is not possible to include the year 2018, which is available. This CTF Table, incl. 2018, is therefore reproduced in this report *[→ Table III.4-2]*.

55 Due to its size, there are no regional programmes or legislative arrangements and enforcement in Luxembourg.

78. **CTF Table 4(a)I** – progress in achieving the quantified economy-wide emission reduction targets - further information on mitigation actions relevant to the contribution of the LULUCF sector **is not applicable** as **this sector is not included under the Convention target for Luxembourg**.

TABLE III.4-1 – UNFCCC AND KYOTO PROTOCOL – RESPONSIBLE AUTHORITIES

Topic	Responsible or co-ordinating authority(ies)	Corresponding legal act or decision
UNFCCC National Focal Point	MECDD (responsibility)	Officially notified to the Convention Secretariat Not defined as such in a national act, only mentioned in Art. 5, Regulation of 24 April 2017 *[→ Section I.4]*.
National Registry	MECDD-AEV (responsibility)	Law of 23 December 2004
National Strategy and Action Plans, incl. NAP and Adaptation Strategy	MECDD (responsibility + co-ordination)	Government Programme & declaration.
Kyoto Protocol "flexible mechanisms"	MECDD (responsibility + co-ordination)	Law of 23 December 2004 *[→ Section IV.7.2]*
"Climate and Energy Fund"	MECDD (responsibility + authority)	Law of 23 December 2004 *[→ Section IV.7.2]*
GHG inventories ***Single National Entity (SNE)*** ***National GHG Inventory Focal Point*** ***National Inventory Compiler*** ***official submission***	 The Minister having environment in his or her attributions – for the moment it is the MECDD-AEV that has been designated (co-ordination) Nominated by the SNE – for the moment it is the MECDD-AEV (responsibility + co-ordination) MECDD-AEV (responsibility + co-ordination) The Minister having environment in his or her attributions – for the moment it is the MECDD ("political" responsibility)	Regulation of 24 April 2017 *[→ Section I.4]*.
GHG projections and definition of PaMs ***Single National Entity (SNE)*** ***National GHG Projections Focal Point*** ***official submission***	 The Minister having environment in his or her attributions – for the moment it is the MECDD (responsibility + co-ordination) Nominated by the SNE – for the moment it is the MECDD (responsibility + co-ordination) The Minister having environment in his or her attributions – for the moment it is the MECDD ("political" responsibility)	Regulation of 24 April 2017 *[→ Section III.6]*.
Kyoto Protocol, Art. 3.3 (& 3.4)	MECDD-AEV (coordination) MECDD-ANF ("technical" responsibility)	Government internal decision.
Awareness raising, information	MECDD (responsibility)	Government internal decision.

TABLE III.4-2 – CTF TABLE 4(A)II EXTENDED TO 2018

INFORMATION TABLE ON ACCOUNTING FOR ACTIVITIES UNDER ARTICLES 3.3 AND 3.4 OF THE KYOTO PROTOCOL (1)

LUXEMBOURG
Inventory 2018
Submission 2020 v1

Commitment period accounting:Yes
Annual accounting:No

Number of the reported year in the commitment period: 6

GREENHOUSE GAS SOURCE AND SINK ACTIVITIES	Base Year(2)	NET EMISSIONS/REMOVALS									Accounting parameters	Accounting quantity (4)
		2013	2014	2015	2016	2017	2018	2019	2020	Total(3)		
	(kt CO_2 eq)											
A. Article 3.3 activities												
A1. Afforestation/reforestation		-179.71	-176.68	-173.63	-170.55	-167.45	-164.33			-1032.36		-1032.36
Excluded emissions from natural disturbances(4)		NA	NA	NA	NA	NA	NA			NA		NA
Excluded subsequent removals from land subject to natural disturbances(4)		NO	NO	NO	NO	NO	NO			NO		NO
A2. Deforestation		46.94	44.74	42.53	40.33	38.13	35.92			248.59		248.59
B. Article 3.4 activities												
B1. Forest management										-1842.77		-424.85
Net emissions/removals		-433.83	-352.82	-296.86	-386.94	-277.37	-94.94			-1842.77		
Excluded emissions from natural disturbances(4)		NA	NA	NA	NA	NA	NA			NA		NA
Excluded subsequent removals from land subject to natural disturbances(4)		NA	NA	NA	NA	NA	NA			NA		NA
Any debits from newly established forest (CEF-for)(5),(6)		NO	NO	NO	NO	NO	NO			NO		NO
Forest management reference level (FMRL)(7)											-418.00	
Technical corrections to FMRL(7),(8)											181.68	
Forest management cap(11)											3571.87	-424.85
B2. Cropland management (if elected)	NA	NA	NA	NA	NA	NA	NA			NA		NA
B3. Grazing land management (if elected)	NA	NA	NA	NA	NA	NA	NA			NA		NA
B4. Revegetation (if elected)	NA	NA	NA	NA	NA	NA	NA			NA		NA
B5. Wetland drainage and rewetting (if elected)	NA	NA	NA	NA	NA	NA	NA			NA		NA

Source: MECDD-AEV – Submission 2020v1.

III.5. SECTORAL AND CROSS-SECTORAL PAMS[56]

79. This section describes PaMs with the primary aim is GHG mitigation, i.e. which might have a significant impact on GHG emissions and removals as emphasized in section IV.C of the Outline and General Structure of the NC5 [UNFCCC (2009)] and in line with paragraph 6 of the UNFCCC biennial reporting guidelines for developed country Parties [UNFCCC (2011)]. The **PaMs are those from the second "Action Plan to reduce CO_2 emissions"** and, if not expired, **they are all either adopted or implemented** – i.e. PaMs for a WEM scenario.[57]

80. As explained in *Section III.3.6* above, **it is not possible to present complete mitigation potentials for those individual or groups of PaMs presented here as** requested by paragraph 17 of the UNFCCC guidelines for the preparation of National Communications by Parties included in Annex I to the Convention, part II [UNFCCC (1999)].

81. In *Sections III.5.1 & III.5.2* **descriptions of the key policies and measures** in each sector, as well as cross-sectoral measures, are presented, along with **summary tables**, one by sector and one by gas. Defining which gases are affected – column (3) "GHG affected" in *Tables III.5-3 to III.5-9* – is not a straightforward task since many measures, though addressing primarily CO_2, can also reduce emissions of other GHG such as CH_4 and N_2O. In the table, the column provides the main gas targeted, which is in most of the case CO_2.

82. Those **PaMs that expired or were repealed** during the reporting period between the 3rd and the 4th Biennial Report are discussed in *Section III.5.4*, whereas the aggregated effects of implemented and adopted PaMs are actually presented in *Section IV.6*.

83. Some plans and policies, which could have the effect to increase GHG emissions, are indicated in *Section III.5.5* and actions undertaken to **minimize adverse effects of PaMs** – both national and according to Art. 6, 12 and 17 of the Kyoto Protocol – are briefly described in *Section III.5.6*. It is also in this section that Luxembourg would like to share its commitment and actions with regard to **Gender Equality and Human Rights in the context of climate change**.

84. Steps taken to promote and/or implement any decisions by the **International Civil Aviation Organization** and the **International Maritime Organization** in order to limit or reduce emissions of GHG not controlled by the Montreal Protocol from aviation and marine bunker fuels are presented in *Section III.5.7*.

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56 This section of the BR4 actually covers sections IV.C and IV.D of the Outline and General Structure of the NC5 according to IPCC reporting guidelines (para. 5).

57 During the review of Luxembourg's BR3, the expert review team (ERT) noted that the WAM scenario was not in accordance with the UNFCCC reporting guidelines on NCs and on BRs (the WAM scenario was assuming a 2 % linear decrease in emissions per year from sales of fuel to non-residents, reflecting a possible narrowing of the road fuel price differential between Luxembourg and its neighbouring countries, which was not a measure planned by the Luxembourg Government, while the UNFCCC reporting guidelines on NCs and on BRs define the WAM scenario as encompassing planned PaMs) [UNFCCC (2019b), §49 and encouragement 2 in Table 10]. Since that hypothesis has been withdrawn for the BR4 and as the PaMs come from the same Action Plan as for the BR3, there are only "WEM PaMs".

85. *Table III.5-1* lists the 75 PaMs presented and discussed in *Sections III.5.1 to III.5.4* and indicated whether they could be estimated or not with regard to their respective mitigation impact potential, as well as their implementation status. *Table III.5-2* lists the 75 PaMs by GHG affected.

TABLE III.5-1 – LIST OF PAMS FROM THE SECOND "ACTION PLAN TO REDUCE CO_2 EMISSIONS" – BY SECTOR

PaM number	Name of the PaM	Status of implementation	Mitigation potential estimated?
AG01	Agriculture - Rural Development Programme - livestock management	Implemented	NE
AG02	Agriculture - Rural Development Programme - livestock management - climate-smart agriculture investments	Implemented	NE
AG03	Agriculture - Rural Development Programme - livestock management - promoting research and knowledge transfer for climate-smart agriculture	Implemented	NE
AG04	Agriculture - Rural Development Programme - livestock management - practices to reduce GHG emissions and ammonia	Implemented	NE
AG09	Agriculture - Rural Development Programme - development and application of a legal frame for the promotion of agro-forestry	Expired	NA
AG11	Agriculture - Common Agricultural Policy - greening - crop diversification	Implemented	NE
AG12	Agriculture - Common Agricultural Policy - greening - permanent grassland	Implemented	NE
AG13	Agriculture - Common Agricultural Policy - greening - ecological focus area	Implemented	NE
AG21	Agriculture - practices - organic farming	Implemented	NE
AG22	Agriculture - practices - conservation tillage or zero-tillage	Implemented	NE
EC01	Energy consumption - residential buildings - new constructions - intensification of energy efficiency requirements - heating and hot water	Expired	NA
EC02	Energy consumption - residential buildings - new constructions - promotion of low-energy and passive houses	Expired	NA
EC03	Energy consumption - residential buildings - new and existing constructions - increasing energy efficiency - heating and hot water	Expired	NA
EC04	Energy consumption - residential buildings - existing constructions - increasing energy efficiency - insulation and ventilation	Expired	NA
EC05	Energy consumption - residential buildings - new constructions - increasing energy efficiency - heating and hot water	Implemented	NE
EC06	Energy consumption - residential buildings - existing constructions - increasing energy efficiency - heating and hot water	Implemented	NE
EC07	Energy consumption - residential buildings - existing constructions - increasing energy efficiency - heating and hot water - "climate bank"	Implemented	Yes
EC08	Energy consumption - residential buildings - existing constructions - increasing energy efficiency - insulation and ventilation - VAT rate	Implemented	NE

EC10	Energy consumption - residential buildings - new and existing constructions - increasing energy efficiency - training and education	Implemented	NA
EC11	Energy consumption - residential buildings - new and existing constructions - increasing energy efficiency - information and awareness	Implemented	NA
EC21	Energy consumption - non-residential buildings - new constructions - intensification of energy efficiency requirements - heating and hot water	Implemented	Yes
EC22	Energy consumption - non-residential buildings - existing constructions - increasing energy efficiency - heating and hot water	Implemented	Yes
EC23	Energy consumption - non-residential buildings - new constructions - increasing energy efficiency - electricity consumption for lighting	Implemented	NE
EC24	Energy consumption - non-residential buildings - public buildings - new and existing constructions - increasing energy efficiency – "*Pacte Climat*"	Implemented	NE
EC25	Energy consumption - non-residential buildings - public buildings - new and existing constructions - increasing energy efficiency – "*Pacte Climat*" - support	Implemented	NA
EC26	Energy consumption - non-residential buildings - public buildings - new and existing constructions - increasing energy efficiency – "*Pacte Climat*" - monitoring	Implemented	NA
EC27	Energy consumption - non-residential buildings - public buildings - new and existing constructions - increasing energy efficiency - public procurement	Adopted	NA
EC28	Energy consumption - non-residential buildings - public buildings - new and existing constructions - increasing energy efficiency - monitoring	Adopted	NA
EC41	Energy consumption - industries - increasing energy efficiency - EU ETS	Implemented	NE
EC42	Energy consumption - industries - increasing energy efficiency - FEDIL Voluntary Agreement	Implemented	NE
EC43	Energy consumption - industries - increasing energy efficiency - training and education	Adopted	NA
EC51	Energy consumption - residential and non-residential buildings - increasing energy efficiency - training and education	Implemented	NA
EC52	Energy consumption - all sectors - increasing energy efficiency - training and education ; information and awareness	Implemented	NA
EC53	Energy consumption - all sectors - increasing energy efficiency - monitoring	Implemented	NA
ES01	Energy supply - renewable energy and cogeneration - electricity and heat supply - feed-in tariffs	Implemented	Yes
ES02	Energy supply - renewable energy and cogeneration - biogas supply - feed-in tariffs	Implemented	Yes
FO01	Forestry - forest management - establishment of forest management plans in public forests	Implemented	NE
FO02	Forestry - forest management - protection of existing forests	Implemented	NE
FO03	Forestry - forest management - increase of the size of forest nature reserves	Implemented	NE
FO04	Forestry - forest management - increase of the amount of dead wood in forests	Implemented	NE
FO11	Forestry - logging - Wood Cluster	Implemented	NE
FO12	Forestry - forest management - private forest nature reserve subsidy	Implemented	NE

GO02	Good governance - evaluation of the second national "Action Plan to reduce CO_2 emissions"	Expired	NA
GO12	Good governance - Housing Sector Plan	Expired	NA
IP01	Industrial processes - F-gas related emissions regulation	Implemented	Yes
IR01	R and D - promoting eco-technologies in the fields of invention and innovation – "CleanTech" Cluster	Implemented	NE
TR01	Transport - alternative fuels - framework and infrastructure	Implemented	Yes (2020)
TR02	Transport - alternative fuels - public transportation	Implemented	NE
TR03	Transport - alternative fuels - biofuels	Implemented	NE
TR04	Transport - alternative fuels - tax incentives	Implemented	NE
TR11	Transport - taxation - excise duties on fuel for transport purposes	Implemented	Yes (2020)
TR12	Transport - taxation - vehicle tax reform - private cars	Implemented	NE
TR13	Transport - taxation - vehicle tax reform - company cars	Implemented	NE
TR21	Transport - mobility - integrated strategy for a sustainable mobility (MoDu)	Implemented	NA
TR22	Transport - mobility - promotion of car-pooling and car-sharing	Implemented	NE
TR23	Transport - mobility - information - new communication tools	Implemented	NA
TR24	Transport - mobility - information - traffic telematics systems for public transport	Expired	NA
TR25	Transport - mobility - enterprises mobility plans	Implemented	NE
WM01	Waste - overall management - National Waste & Ressources Management Plan	Implemented	NA
WM02	Waste - overall management - Environmental Protection Fund	Implemented	NA
WM03	Waste - overall management – polluter-pays principle	Implemented	NE
WM04	Waste - overall management – waste transfer fees	Expired	NA
WM05	Waste - overall management - reduced consumption of plastic bags	Implemented	NA
WM11	Waste - energy - incineration and burning - energy recovery from waste incineration	Implemented	NO
WM12	Waste - energy - anaerobic digestion at biogas facilities	Implemented	IE
WM13	Waste - incineration and burning - prohibition of open air burning of waste	Implemented	NA
WM21	Waste - landfills - overall management - advanced waste collection system	Implemented	NA
WM22	Waste - landfills - overall management - reduced landfilling of municipal solid waste	Implemented	Yes
WM23	Waste - landfills - overall management - biological pre-treatment of solid waste	Implemented	IE
WM24	Waste - landfills - methane recovery systems	Implemented	Yes

WM25	Waste - landfills - verification of closed unmanaged landfills	Implemented	NA
WM31	Waste - recycling - SuperDrecksKescht	Implemented	NE
WM32	Waste - recycling - packaging waste	Implemented	NO
WM33	Waste - overall management - biowaste	Implemented	Yes
WM35	Waste - recycling - valorisation of sewage sludge	Implemented	NE
Summary			
AG - 10 EC - 24 ES - 2 FO - 6 GO - 2 IP - 1 IR - 1 TR - 12 WM - 17 **Total - 75**	-	adopted - 3 implemented - 63 planned - 0 expired - 9 **Total - 75**	estimated - 12 NA - 26 NE - 33 NO - 2 IE - 2 **Total - 75**

Notes: AG01, TR21 & WM01 are groups of PaMs.
AG01 = AG02 + AG03 + AG04
TR21 = TR01 + TR02 + TR22 + TR23 + TR24 + TR25
WM01 = WM03 + WM21 + WM25

NA = not applicable
NE = not estimated
NO = not occurring
IE = indicated elsewhere

TABLE III.5-2 – LIST OF PAMS FROM THE SECOND "ACTION PLAN TO REDUCE CO_2 EMISSIONS" – BY GAS

GHG	PaM number
CO_2 – 61 PaMs	AG01 / AG02 / AG03 / AG04 / AG11 / AG12 / AG13 / AG21 / AG22 / EC01 / EC02 / EC03 / EC04 / EC05 / EC06 / EC07 / EC08 / EC10 / EC11 / EC21 / EC22 / EC23 / EC24 / EC25 / EC26 / EC27 / EC28 / EC41 / EC42 / EC43 / EC51 / EC52 / EC53 / ES01 / ES02 / FO01 / FO02 / FO03 / FO04 / FO11 / FO12 / IR01 / TR01 / TR02 / TR03 / TR04 / TR11 / TR12 / TR13 / TR21 /TR22 / TR23 / TR24 / TR25 / WM01 / WM02 / WM05 / WM11 / WM13 / WM21 / WM32
CH_4 – 20 PaMs	AG01 / AG02 / AG03 / AG04 / EC41 / EC53 / WM01 / WM02 / WM03 / WM11 / WM12 / WM21 / WM22 / WM23 / WM24 / WM25 / WM31 / WM32 / WM33 / WM35
N_2O – 16 PaMs	AG01 / AG02 / AG03 / AG04 / AG12 / AG13 / AG21 / AG22 / EC53 / IR01 / WM01 / WM02 / WM21 / WM23 / WM33 / WM35
F-gases – 2 PaMs	IP01 / IR01

86. Affected by the **Covid-19 health crisis**, Luxembourg took, in April 2020, measures to stabilise the economy and cope with the immediate consequences of the pandemic[58], followed by a "*Neistart Lëtzebuerg*" stimulus package (a "new start for Luxembourg") for a sustainable and inclusive economic recovery, which took effect at the end of May. Some of the measures taken have an impact on GHG emissions and reinforce or extend the measures of the second "Action Plan to reduce CO_2 emissions" and/or from the NECP. ***Box 10*** gives some information on "*Neistart Lëtzebuerg*".

58 https://meco.gouvernement.lu/dam-assets/dossiers/Tableau-stab-9avril-EN.pdf.

BOX 9 – MAIN PAMS SUGGESTED IN LUXEMBOURG'S NECP

The list of PaMs below synthesizes the various measures proposed by Luxembourg in chapter 3 of its NECP [MECDD and MEA (2020)]:

1. **Horizontal measure – "Climate Protection Law"** *[→ Section III.3.3]*.
2. **Horizontal measure – carbon pricing**: introduce a minimum carbon price in 2021, which will be continuously adapted to the objectives of the Paris Agreement. The starting price will be set based on the average value of carbon pricing in the neighbouring countries (for the year 2021, the price of carbon would be around 20 euros per tonne of carbon). A respective increase of 5 euros per tonne is planned for 2022 and 2023. The expected revenue of the pricing will be distributed equitably between concrete measures to combat climate change and to finance fiscal and social measures (such as tax credit) targeted for low-income households in a concern for social equity.
3. **Horizontal measure – "*Pacte Climat*"**: develop further the current Climate Agreement with the municipalities *[→ Section III.5.1,* §92 to §96*]*, which will expire in 2020. The "*Pacte Climat 2.0*" will act as a central instrument for the implementation of the national energy and climate policy at the municipal level.
4. **Horizontal measure – circular economy**: embed circular economy throughout the economy so to reduce the use of materials and the associated pollution. The deployment of the circular economy concept could reduce the emissions of GHG in the country, as well as abroad if imports of carbon embedded products are reduced. This transition is automatically accompanied by a social change which distances itself from pure consumption behaviour and relies more on social contacts. The promotion of the regional aspect is another important point in the context of the evolution towards a circular economy.
5. **Horizontal measure – land planning – housing**: develop larger-scale sustainable housing projects with the relevant public and municipal players. Planning is geared towards zero carbon, zero waste, car-free objectives and promoting social inclusion. In this regard, national criteria for sustainable and circular construction will be defined and developed. In addition, sustainable lifestyles, the ecological spirit and the circular economy will be encouraged within neighbourhoods through the promotion of the sharing economy and urban farming projects. Thanks to these projects, the forecast population growth expected for Luxembourg will have less impact on the climate.
6. **Agriculture – practices – organic farming**: reach 20 % of the utilised agricultural land (UAL) under organic farming by 2025, and 100 % by 2050. This measure contributes to the "extensification" of crops (see also "sustainable and extensive agriculture" below).
7. **Agriculture – practices – methane reduction strategy**: elaborate a methane reduction strategy.
8. **Agriculture – practices – fertilizers**: reach a reduction of nitrogen fertilization on arable land and grass areas. The first set of measures is intended to encourage farmers to use less fertilizer (containing nitrogen), or even no fertilizer (containing nitrogen) at all. This set also includes agro-environmental measures, defined within the framework of the EU's common agricultural policy (CAP), which include programs to reduce nitrogen fertilization on arable land and grassland, but also to renounce the fertilization of flower strips and poundage for example. The second set of measures intends to promote environmentally friendly techniques regarding the spreading of organic livestock effluents and nitrogenous mineral fertilizers. These will be implemented within the framework of agro-environmental measures and the NEC Directive and aim to promote the spreading of slurry using an environmentally friendly technology, to prohibit new open pits slurry (for biogas) and deflectors, the latter from 2025 on, as well as encouraging the covering of existing open pits.
9. **Agriculture – practices – sustainable and extensive agriculture**: implement sustainable cultivation methods to save resources. Part of the agro-environmental measures - those of the action plan for agricultural biodiversity - as well as those developed within the framework of the Water Protection Act, will not only lead to an "extensification" of crops, particularly in sensitive areas, but will also favour the grazing of dairy cows. The measures relating to the creation of green spaces and the premium for the preservation of sites/landscapes will also help to reduce GHG emissions (see also "organic farming").
10. **Agriculture – carbon storage**: diversify crops in the context of agro-environmental measures and agriculture "greening" so to contribute to carbon sinks. Mention should be made here of the current ban on plowing permanent meadows in sensitive areas and the promotion of conservation plowing and cover crops.
11. **Agriculture – practices – training and education**: set-up more efficient advisory services, alongside the diversification of the advisory modules offered, to support climate and resilient, ecological and economic plant and animal production. Each major state-funded agricultural investment project will be subject to economic, social, environmental and energy analyses. In addition, a "sustainable development" impact sheet for farms will be introduced.
12. **Energy consumption – residential and non-residential buildings – existing constructions – increasing energy efficiency – national long-term renovation strategy**: draw up, in 2020-2021, a strategy that will contain innovative aid

schemes to encourage the renovation of old residential and non-residential buildings, which will be defined in collaboration with all the stakeholders. Social aspects, but also aspects such as protection of monuments and “multi-apartment houses”, will be studied deeper with a view to implement the appropriate specific measures, e.g. special bonuses for the renovation of protected buildings.
For residential buildings, the strategy foresees an annual 3 % renovation rate for a renovation depth of at least 72 %, as well as to provide more housing opportunities for socially disadvantaged citizens. Indeed, the important rise in housing prices in Luxembourg represents a major social challenge nowadays. The neediest segments of the population often have only the means to rent poorly maintained, energy-efficient housing in old buildings. Therefore, the government will especially encourage the construction of affordable housing.
For non-residential buildings, the strategy will be pushing for the emergence of an energy efficiency market for the renovation of large functional buildings (“de-risking”, “Energy Efficiency Obligation Scheme” (EEOS), transparency platform for audits).
For all types of buildings, the long-term renovation strategy comprises a bonus program for the replacement of fossil fuelled boilers and the installation of low-temperature heating networks, supplied with residual heat from the industrial sector and data centres, or working with renewable energy sources (deep geothermal energy, heat pumps, sustainable wood).

13. **Energy consumption – residential and non-residential buildings – new constructions – increasing energy efficiency – heating and hot water**: increase energy efficiency of the residential buildings regarding heating and hot water by establishing "Nearly Zero Energy” energy standards: introduction of a new A+ energy class.
For non-residential buildings, establishing a new standard based on the successful regulations and norms introduced in the residential sector. Therefore, as for the residential buildings, "Nearly Zero Energy” standards will be introduced.

14. **Energy consumption – non-residential buildings – public buildings – existing constructions – increasing energy efficiency – monitoring**: make the use of the environmental management and audit system EMAS (Environment Management and Audit Scheme) compulsory for the management of existing public buildings. This will minimize the environmental impact of the buildings and continuously improve their performance.

15. **Energy consumption – non-residential buildings – public buildings – new and existing constructions – increasing energy efficiency – sustainable and low-energy public buildings strategy**: draw up a strategy to improve sustainability, energy efficiency and the use of renewable energies in public buildings. The strategy will integrate the principles of the circular economy and the relevant health aspects. In particular, it will provide for the introduction of an obligation to integrate photovoltaic systems on the roofs of public buildings, both for new constructions and for renovations. This will also translate into an improvement in the existing photovoltaic supply from the Public Buildings Administration. The objective is to equip all adequate public buildings with photovoltaic systems by 2025. Moreover, for school buildings, it will not only be necessary to ensure that more renewable energies (electricity and heat) are used, but also to integrate the concepts of sustainable mobility and sustainable transport, as well as elements making it possible to reduce water consumption.

16. **Energy consumption – industries – increasing energy efficiency – FEDIL Voluntary Agreement**: prolong and expand the Agreement, notably by involving SMEs *[→ Box 6]*.

17. **Energy consumption – industries – increasing energy efficiency – support scheme for energy efficiency in industry and SMEs**: elaborate new tools such as a "de-risking" instrument and a transparency platform for audits to support energy efficiency efforts by industry and SMEs. These tools should both overcome financial obstacles and help to better analyse and identify possible energy efficiency measures. The creation of an integrated support instrument for SMEs, which will complement the Voluntary Agreement and the “de-risking” instrument, and will provide a support framework for the companies concerned with their energy policy is equally foreseen. Finally, the possibility of introducing a "Climate Agreement" targeted to SMEs which would be similar to the "*Pacte Climat*" with municipalities is envisaged.

18. **Energy consumption – industries – increasing energy efficiency – use of renewable energy**: promote the construction of industrial buildings "photovoltaic (PV) ready".

19. **Energy consumption – public sector – increasing energy efficiency – lighting**: replace all existing lighting on roads, public squares, buildings, stations and monuments with low-energy LED lighting.

20. **Energy supply – renewable energy and cogeneration – electricity and heat supply**: continue existing policies aiming at a constant expansion of renewable energies in electricity and heating. For electricity: (1) going-on with feed-in tariffs for wind and solar sources and biomass ; (2) call for tenders for large PV ; (3) expansion of wind turbines with the participation of municipalities and citizens ; (4) going-on with "citizen solar cooperatives” and encouraging municipalities to make their roofs available to these cooperatives ; (5) biomass development ; (6) obligation to integrate solar energy into new constructions, if necessary and (7) promotion of self-consumption. For heating: (1) deployment of heat pumps and (2) shallow geothermal research and necessary developments, if any.

21. **Energy supply – renewable energy and cogeneration – gas supply**: reduce the share of fossil natural gas in the heating network by using residual heat and renewable energies, as well as biogas generated from agricultural practices. Subsidies for fossil natural gas will be stopped.

22. **Forestry – forest management**: introduce new incentives for forest management that are closer to nature and more resilient to climate change. Develop afforestation measures to increase carbon sinks.

23. **R&D – promoting eco-technologies in the fields of invention and innovation – energy and land planning**: increase the continuous investments in energy research and development, focusing in particular on the following areas: (1) sustainable buildings and construction materials; (2) energy efficiency and circular economy; (3) decentralized renewable energies; (4) indoor pollution; (5) "*Eco-Quartier made in Luxembourg*" (more climate friendly energy systems, mobility without cars, town planning encouraging social integration); (6) integration of renewable energies and electro-mobility in digital electrical networks, the "energy internet" and sector coupling; (7) territorial and cross-border transformation processes in the field of mobility and regional planning; (8) social transition process and social innovation towards "positive climate lifestyles".

24. **Transport – alternative fuels – e-mobility & hydrogen mobility**: draw up a detailed roadmap with a view to greater deployment of electro-mobility for reaching the objective of 49 % of electric cars in the car fleet by 2030. Therefore, the "*cleverfueren*" bonus scheme that encourages the purchase of electric vehicles, electric motorcycles and bicycles via direct subsidies will continue and be enhanced: https://www.myenergy.lu/fr/cleverfueren. It is also foreseen that the buses operating throughout the country will all be electrical by 2030 and that "green e-mobility", i.e. the use of renewable sources for the production of electricity used by e-vehicles, will be fostered. At the European level, the drafting of a new legislation on "green batteries" is proactively encouraged. For hydrogen to play its role in decarbonisation, the production of "green hydrogen", produced by electrolysis from renewable energies such as photovoltaics or wind power, will also have to be a priority in many areas such as transport, industry and energy storage. The construction of a hydrogen station is planned.

25. **Transport – alternative fuels – biofuels**: elaborate a global strategy for the use of second generation biofuels considered to be more sustainable. The use of second-generation biofuels will be favoured by introducing a blending obligation and by cooperating with Benelux partners. The use of first generation biofuels will be limited to a maximum of 5 %.

26. **Transport – taxation – excise duties on fuel for transport purposes**: gradual increase of road fuel excise, to reduce the "price gap" with neighbouring countries.

27. **Transport – taxation – vehicle tax reform – private cars**: review of the private car tax scheme by taking the polluter-pays principle into account. Further review of the corporate vehicle benefit in kind - 40 % of all new vehicles sold in Luxembourg - to promote electro-mobility. In addition, employees who choose a means of transportation other than the car should no longer be penalized. There are therefore plans to introduce a "mobility budget" equivalent to that of company cars.

28. **Transport – mobility – integrated strategy for sustainable mobility ("MoDu 2.0")**: reinforce the new "MoDu 2.0", notably by defining new modal shift targets up to 2035 (actually 2025: see Box 3).

29. **Transport – mobility – free public transport**: promote public transport and reduce the use of private cars generating CO_2 and NOx emissions, as well as particulate matters, and reduce nuisances such as road congestion, air pollution and noise. Public transport became free on the whole national territory since 1 March 2020.

30. **Waste – overall management – Zero Waste Luxembourg Strategy**: Elaborate a new waste strategy called "*Null Offall Lëtzebuerg*" (zero waste strategy) that would complement the current PNGDR of 2018, which already sets targets in terms of reduction, recycling and different waste fractions. Better embed the principles of circular economy. The "*Null Offall Lëtzebuerg*" strategy elaboration process has already started and is being accompanied by public inquiries *[→ Section III.3.4]*.

31. **Waste – recycling – valorisation of sewage sludge**: elaborate a national strategy to offer sustainable solutions for the recirculation of sludge (energy recovery, recovery of phosphorus, etc.) or the elimination of sludge.

BOX 10 – "*NEISTART LËTZEBUERG*"

This programme runs until the end of the first quarter of 2021. Its measures **(1)** aim to encourage employment and provide additional cyclical support to the economic sectors most affected by the crisis, notably through the creation of a new "recovery and solidarity fund" for businesses.**(2)** A new structural aid scheme has also been introduced to stimulate sustainable business investment. It encourages businesses, through higher investment aid than in normal times (up to 50 % of eligible costs), to carry out economic development, digitalisation or environmental protection projects. Emphasis is placed on projects relating to the circular economy, process and organisational innovation, energy efficiency or that allow standards to be exceeded.

Seven of the 23 measures in the "*Neistart*" package specifically aim to accelerate the green transition of the economy by further supporting soft mobility, energy efficiency and responsible consumption. They are set out in a specific package entitled "*Gréng Relance fir Lëtzebuerg - E Plus fir d'Klima, d'Handwierk an d'Bierger*" (A green recovery for Luxembourg - A plus for the climate, crafts and citizens).(3)

"***Gréng Relance fir Lëtzebuerg***"

The green stimulus package encourages energy-efficient housing renovation, investment in renewable energy and the transition to soft and sustainable mobility. Aimed primarily at citizens and the craft sector, some of them enhance the measures presented in the NECP.

Two measures are presented under the label "*Clever Wunnen*" (Live Smart) and are associated with the "*PRIMe House*" programme:

- a 50 % increase in subsidies for the energy renovation of buildings and energy advice;
- a 25 % increase in subsidies for solar thermal systems, heat pumps, wood-fired boilers and heat network connections, with an additional bonus when replacing a fossil fuel boiler with a wood boiler or a geothermal heat pump, or when connecting to a heat network.

Three measures relate to mobility:

- a 60 % increase in subsidies for electric cars and vans (8 000 EUR instead of 5 000 EUR) ordered by the end of the first quarter of 2021;
- doubling of the allowances for electric quadricycles, motorbikes and mopeds, and pedal assisted bicycles and cycles ordered or purchased by the end of the 1st quarter of 2021 (i.e. an allowance of 50 % of the purchase price excluding VAT);
- a new financial aid scheme for the installation of "smart" electric charging stations in the home.

(1) https://gouvernement.lu/dam-assets/documents/actualites/2020/05-mai/Neistart-Letzebuerg-Tableau-Mesures.pdf

(2) https://gouvernement.lu/dam-assets/documents/actualites/2020/05-mai/Neistart-Letzebuerg-Fonds-de-relance-et-solidarite.pdf

(3) https://gouvernement.lu/fr/actualites/toutes_actualites/communiques/2020/05-mai/29-greng-relance.html

III.5.1. Sectoral policies and measures

Energy consumption and production (excluding transport)

87. PaMs within the energy sector (excluding transport) are outlined in ***Table III.5.3*** at the end of this section. 21 PaMs concerning energy consumption are presented, as well as 2 PaMs related to energy supply. This split reflects the special circumstances of Luxembourg's energy supply sector and high import dependency (see below).

Energy: the keyword in Luxembourg's set of policies and measures

88. National PaMs implemented or planned cover a rather large number of domains, from the overall policy regarding mobility to very specific grant schemes. However, actions are **mainly driven by increasing energy efficiency in all sectors as well as by promoting the use of renewable energy sources**. They take the form of **direct allowances and payments** for the installation of devices that offer the possibility to use renewable energy sources – such as solar energy equipment – or for the renovation or the construction of low-energy ("passive") houses. The direct subsidies also cover cash-back schemes, or financial incentives, such as refunding the purchase of a low-energy electrical appliance partially. Actions also correspond to **subsidy schemes** for the production of "green" energy, such as a bonus – feed-in tariffs – offered for electricity production from windmills, hydraulic installations, biomass or biogas.

Promoting electricity generation from renewable energy sources is not a PaM

89. Only a relatively small fraction of overall electricity consumption in Luxembourg is generated by installations in Luxembourg – especially since the generation from blast furnace gas was stopped. The natural gas fired TWINerg power plant, which was set into service in 2002 but which shut down in 2016, led to an increase of the share of domestically produced electricity, as did the numerous small combined heat and power (CHP) installations. Despite the increase in generation capacity, since 2002 the import dependency –measured as net imports divided by national consumption – remains on a high level of about 50 to 70 %, compared to 94.3 % in 1990. With the subsequent slowdown and shut down of the TWINerg, this ratio is again close to 90 %. The import dependency – mainly from the German network – has one major impact on the quantitative assessment of effects of PaMs in the field of electricity generation from renewable energy sources: while most EU Member States – and by extension, most countries – own a "double dividend" from the encouragement of electricity generation from renewable ("carbon neutral") sources – by increasing the share of renewable energy in accordance with the RED (Directive No 2009/28/EC) and, in addition, by lowering GHG emissions from electricity generation – Luxembourg only benefits from the increase in the share of renewable energy. Electricity generated in Luxembourg from renewable sources does not substitute generation from fossil fuels, as it is the case in most other Member States as it replaces electricity imports, which are "carbon neutral" according to IPCC allocation rule of GHG emissions based on the territorial principle. Therefore the **promotion of electricity generation from renewable energy sources or from CHP to replace electricity imports does not have an impact on the GHG emissions,** and are consequently **not considered as measures in this report** and are, **de facto**, **included in the baseline – or BAU - scenario**.

90. Other renewable energy sources, which **substitute fossil fuel consumption** within Luxembourg (e.g. biomass or biogas for heating purposes or solar thermal installations), **do have**, instead, **a lowering effect on the GHG balance and are, therefore, considered as PaMs** – e.g. ES01 and ES02 – as described later in this section.

91. The legislative package, "Climate Bank and subsidies for sustainable housing" ("*KlimaBank a Prime fir nohaltegt Wunnen*") took effect on 1 January 2017. It aims at promoting the sustainable construction of residential buildings, sustainable and energetic renovations/sanitation and a stronger reliance on renewable energy sources. The package comes with several novel elements but also a revision of existing grants and subsidies such as the "*PRIMe House*" regime. The key elements of the package are:

    - **Climate Bank**, offering either a reduced-rate loan or a zero-rate loan (depending on socio-economic factors) for energy efficient and ecologic sanitation or renovation of residential buildings. This new financing mechanism targets the promotion of sustainable and energy

efficient residential building renovation/sanitation and the prevention of energy insecurity (EC07);

- **LENOZ** ("*Lëtzebuerger Nohaltegkeets-Zertifikat fir Wunngebaier*"), a certification system for new and sustainable residential buildings. The system relies on three sustainability-oriented pillars: protection of the environment, economic efficiency and social justice (EC05).
- **PRIMe House**, (a revision of the existing grant regime) will focus on the sustainable construction of residential buildings, energy-efficient and sustainable renovations/sanitations and the promotion of renewable energy sources (repealed EC02 & EC04 PaMs).

Climate Agreement with the municipalities: an innovative tool to engage stakeholders at the local level

92. One of the main outcomes of the "Environment and Energy Partnership" [MDDI-DEV (2018), p. 144-150] is the Climate Agreement with the municipalities – the "*Pacte Climat*" that was presented in October 2012 and entered into operation on 1 January 2013.[59]

93. This Agreement reinforces the role of municipalities in the fight against climate change through a legislative, technical and financial framework set up in order to promote action against climate change by the municipalities. The "*Pacte Climat*" is an agreement (contract) between the State and the municipalities. As of 31 December 2017, the whole 105 municipalities of the country were engaged in the Agreement: see ***Figure III.5-1***.

94. Under the Agreement, a municipality commits itself to implement a quality management system relating to its energy and climate policy. The State provides financial and technical assistance, which increases according to the certification level reached by the municipalities. This certification level is defined under the "European Energy Award" (EEA) which consists of a catalogue of measures with currently around 79 measures from 6 areas: (i) development planning and regional planning, (ii) municipal buildings and facilities, (iii) supply and disposal, (iv) mobility, (v) internal organization, and (vi) communication and cooperation.

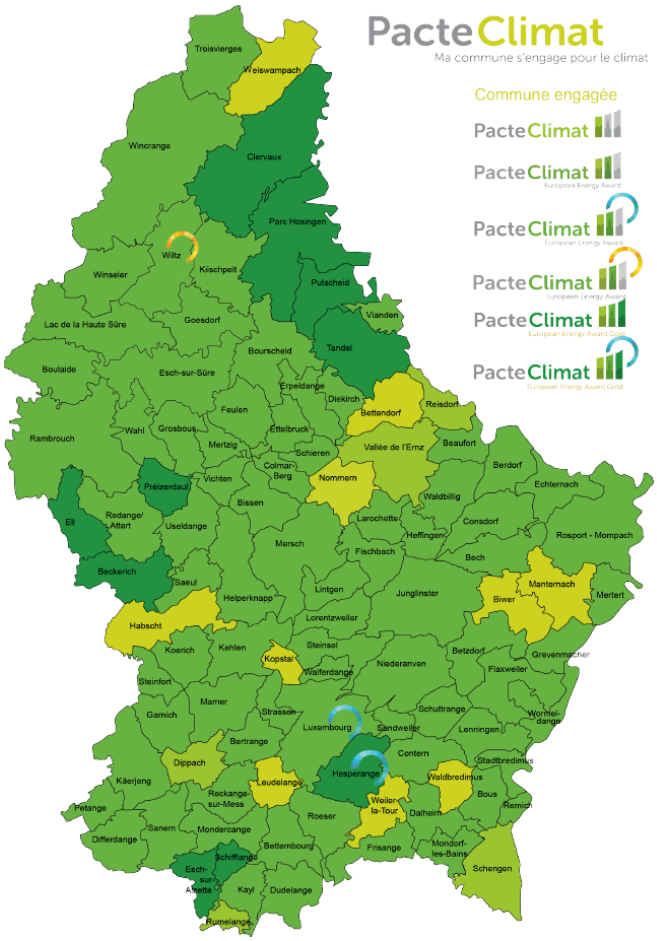
95. More precisely, the "European Energy Award" is the main tool of the "*Pacte Climat*". It:
    1. supports communities that want to contribute to a sustainable energy policy and urban development through the rational use of energy and the increased use of renewable energies;
    2. is a qualified instrument for steering and controlling communal energy policy in order to review all energy-related activities systematically;

[59] http://www.pacteclimat.lu/.

3. allows municipalities to identify strengths, weaknesses and potential for improvement and implement energy efficient measures effectively. The success of a municipality's efforts is made visible by an award;
4. allows municipalities to share their experiences and expertise.

96. In 2016, air quality criteria were included in the "*Pacte Climat*". From 1 January 2018, it was the turn of the "circular economy" to be included.

FIGURE III.5-1 – "*PACTE CLIMAT*" – CERTIFICATION LEVEL REACHED BY THE MUNICIPALITIES



Source: "*Pacte Climat*" website: http://www.pacteclimat.lu/.
Note: The darker the colour, the highest the level reached: engaged (yellow), certified up to 40%, 50% and 75%.

Quantified mitigation potentials

97. The mitigation potential of EC07, EC21, EC22, ES01 and ES02 have been quantified for the years 2020, 2025 and 2030:

- the mitigation potential of **EC07** is derived from the renovation of existing residential buildings implementing energy efficiency measures, decreasing energy consumption. Emission reductions stay constant after the policy expires, as renovations will be unlikely to continue unless there is a commitment or update of the policy.

- the mitigation potential of **EC21** is derived from new non-residential buildings complying with higher energy efficiency standards. Since 1 January 2011 (date of building application), non-residential buildings have been obliged to meet efficiency class D. Compared to buildings before the introduction of this regulation, savings of around 30 % were expected. Then, with effect from 1 July 2015 (date of building application), non-residential buildings have had to meet efficiency class C. Compared to the previous standards, this intensification corresponds to extra savings of 15 %. Emission reductions increase across the projected timeline as the number of buildings functioning at the improved energy efficiency standards increase.
- the mitigation potential of **EC22** is derived from the renovation of existing non-residential buildings to meet minimum energy efficiency requirements. This assumes an average renovation rate of 0.5 % per year, resulting in final energy savings of 26 GWh in 2020. Emission reductions stay constant after 2020 as after the policy expires renovations will be unlikely to continue unless there is a commitment or update of the policy post 2020.
- the mitigation potential of **ES01** is derived from the feed-in tariff (FIT) increasing electricity production from renewable energy sources and heat cogeneration. Quantities of waste wood and sewage gas consumed for energy generation increase due to the FIT, and the heat produced by sewage gas, pellets and waste wood replaces heat produced by natural gas plants. Electricity produced from sewage gas, pellets and waste wood replaces imported electricity with an emission factor of zero, whereas heat produced by sewage gas, pellets and waste wood replaces heat produced by natural gas plants. Emission saving allocated to heat production was calculated dividing the fuel use for cogeneration according to the production of heat and electricity. The main assumptions are that (i) energy efficiency of electricity and heat production from sewage gas is estimated to be the same as for natural gas and therefore the input of natural gas in energy units is estimated to be equal to the input of sewage gas, (ii) production rates for sewage gas plants for years 2016-2030 have been estimated to stay at the level reported for the year 2015, and (iii) the need for wastewater treatment remains, and thus the plants to be decommissioned would either be renewed or replaced so that the production in future years would be the same as in 2015. Consequently, emission reductions remain stable across the projected timeline as the inputs from the alternative sources of sewage gas, pellets, and waste wood remain constant post 2020.
- the mitigation potential of **ES02** is derived from the feed-in tariff increasing the supply of biogas in the natural gas grid. Electricity produced from biogas replaces imported electricity with an emission factor of zero. The heat produced with biogas is assumed to replace heat produced with natural gas. Emission reductions remain stable across the projected timeline as the biogas input remains constant post 2020.

For detailed assumptions and methodology, see [Aether / Benviroc (2017)].

TABLE III.5-3 – PAMS IN THE ENERGY SECTOR (EXCLUDING TRANSPORT)

Number & name of the PaM	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact, by gas (for a particular year, not cumulative, in CO_2e)		
								2020	2025	2030
EC05 - Energy consumption - residential buildings - new constructions - increasing energy efficiency - heating and hot water	Efficiency improvements of buildings; Ensuring more sustainable housing through the delivery of a certificate: LENOZ - *Letzebuerger Nohaltegkeets-Zertifikat fir Wunngebaier*.	CO_2	Economic	Implemented	Increase energy efficiency standards for new residential buildings regarding heating and hot water through better insulation, ventilation and the use of renewable energy sources. A durability demand is added that comes on top of energy efficiency and use of renewable energy sources requirements: LENOZ. This certificate combines 3 criteria for defining a sustainable construction: (i) environment protection, (ii) economic efficiency, and (iii) a fair social organization. A new construction should at least reach 60% for the 3 LENOZ criteria to be eligible for subsidies.	2017	MECDD MFIN MLOG	NE	NE	NE
EC06 - Energy consumption - residential buildings - existing constructions - increasing energy efficiency - heating and hot water	Efficiency improvements of buildings; Ensuring more sustainable housing using sustainable materials during energy renovation.	CO_2	Economic	Implemented	Increase energy efficiency standards for existing residential buildings regarding heating and hot water through better insulation, ventilation and the use of renewable energy sources. Subsidies are increased if sustainable materials are used.	2017	MECDD MFIN	NE	NE	NE
EC07 - Energy consumption - residential buildings - existing constructions - increasing energy efficiency - heating and hot water - "climate bank"	Efficiency improvements of buildings. The objective of the "Climate bank" is to increase the number of energy efficient and sustainable renovations of residential buildings through the pre-financing of energy-efficient renovation projects.	CO_2	Economic	Implemented	The so-called "Climate bank" ("*Klimabank*"/"banque climatique") for private persons and legal entities came in to force in January 2017. The applicants are offered financial support in the form of a low-interest loan, or for low-income households an interest-free loan. Measures supported by the "Climate bank" include renovation projects, replacement of technical installations and, in the case of interest-free loans prior to energy consultation on residential buildings. Corresponds to measure HOR_2 in NEEAP4.	2017	MECDD MFIN MLOG	10.62	10.62	10.62

EC08 - Energy consumption - residential buildings - existing constructions - increasing energy efficiency - insulation and ventilation - VAT rate	Efficiency improvements of buildings; Support housing construction and renovation in Luxembourg (high population growth pushing housing prices upwards) through the application of a reduced VAT rate of 3%.	CO_2	Fiscal Regulatory	Implemented	The reduced VAT rate of 3% instead of 17% applies to new constructions but also to existing buildings being renovated, that will or are used as a primary residence. That would ensure a quicker depreciation of energy efficient investments when renovating residential buildings.	2002	MFIN-ADA MLOG	NE	NE	NE
EC10 - Energy consumption - residential buildings - new and existing constructions - increasing energy efficiency - training and education	Efficiency improvements of buildings.	CO_2	Education	Implemented	Educating advisors for giving energy consumption advices primarily to families with low revenues so that they can reduce their expenses with regard to energy and water consumption.	2013	MEA MECDD MFIGR MTEES My Energy	NA	NA	NA
EC11 - Energy consumption - residential buildings - new and existing constructions - increasing energy efficiency - information and awareness	Efficiency improvements of buildings.	CO_2	Information	Implemented	Strengthening awareness campaigns at regional or local level aiming at promoting and diffusing information on energy efficient construction and renovation and their advantages. This is realised through the My Energy "infopoints" and other My Energy information activities such as participation at fairs, organising special events and publishing various documents on energy savings and the use of renewable energy sources.	nd	MEA MECDD MLOG My Energy	NA	NA	NA
EC21 - Energy consumption - non-residential buildings - new constructions - intensification of energy efficiency requirements - heating and hot water	Efficiency improvement in services/ tertiary sector.	CO_2	Regulatory	Implemented	Increase energy efficiency standards for new non-residential buildings regarding heating and hot water. Since 1 January 2011 (date of building application), non-residential buildings have been obliged to meet efficiency class D. Compared to buildings before the introduction of this regulation, savings of around 30% was expected. Then, with effect from 1 July 2015 (date of building application), non-residential buildings have to meet efficiency class C. Corresponds to measure GHD_1 & GHD3 in NEEAP4.	2011	MEA MECDD	20.06	32.67	44.55

EC22 - Energy consumption - non-residential buildings - existing constructions - increasing energy efficiency - heating and hot water	Efficiency improvement in services/ tertiary sector.	CO_2	Regulatory	Implemented	Increase energy efficiency standards for existing non-residential buildings regarding heating and hot water. Since 1 January 2011, non-residential buildings have been obliged to meet minimum requirements for selected parameters such as U-values, thermal insulation of distribution pipes, control systems etc. Corresponds to measure GHD_2 in NEEAP4.	2011	MEA MECDD	4.61	4.61	4.61
EC23 - Energy consumption - non-residential buildings - new constructions - increasing energy efficiency - electricity consumption for lighting	Efficiency improvement in services/ tertiary sector.	CO_2	Regulatory	Implemented	Increase energy efficiency standards for new non-residential buildings regarding lightning related electricity consumption. Since 1 January 2011 (date of building application), non-residential buildings have been obliged to meet efficiency class D (see EC21). Corresponds to measure GHD_4 in NEEAP4.	2011	MEA MECDD	NE	NE	NE
EC24 - Energy consumption - non-residential buildings - public buildings - new and existing constructions - increasing energy efficiency – "*Pacte Climat*"	Efficiency improvement in services/ tertiary sector.	CO_2	Regulatory	Implemented	The Climate Agreement with the municipalities ("*Pacte Climat*") was presented in October 2012 and entered into force on 1 January 2013. It reinforces, inter alia, the role of municipalities in the fight against climate change through a legislative, technical and financial framework set up in order to promote action against climate change. The "*Pacte Climat*" means that municipalities commit to implement a quality management system relating to their energy and climate policy as well as an energy management tool for their infrastructures and their equipment. In return, and according to their "certification level" under the European Energy Award scheme, they benefit from technical and financial support given by the Government.	2013	MECDD MFIN MINT	NE	NE	NE
EC25 - Energy consumption - non-residential buildings - public buildings - new and existing constructions - increasing energy efficiency – "*Pacte Climat*" - support	Efficiency improvement in services/ tertiary sector.	CO_2	Regulatory	Implemented	Support of municipal capacities through higher financial framework and the secondment of climate experts to implement the Climate Agreement ("*Pacte Climat*"). This PaM aims at ensuring that the municipalities have the human means and expertise to implement the Climate Agreement.	2013	MECDD MFIN MINT My Energy	NA	NA	NA

EC26 - Energy consumption - non-residential buildings - public buildings - new and existing constructions - increasing energy efficiency – "*Pacte Climat*" - monitoring	Efficiency improvement in services/ tertiary sector; Making data collection compulsory with regard to energy consumption and related emissions covered by the Climate Agreement ("*Pacte Climat*").	CO_2	Regulatory	Implemented	The Climate Agreement ("*Pacte Climat*") requires municipalities to monitor the effects of energy efficiency and other energy related measures taken. For helping them, a software called "EnerCoach" is provided to the municipalities.	2013	MECDD MFIN MINT My Energy	NA	NA	NA
EC27 - Energy consumption - non-residential buildings - public buildings - new and existing constructions - increasing energy efficiency - public procurement	Efficiency improvement in services/ tertiary sector; Efficiency improvement of appliance; Promoting sustainable and environment-friendly public purchases and procurements, as well as in public planning.	CO_2	Information Education Planning	Adopted	Application of sustainability criteria for public procurement and during the whole planning process through fixed guidelines and continuous monitoring. This should lead to the acquisition of less energy intensive appliances.	nd	MEA MECDD	NA	NA	NA
EC28 - Energy consumption - non-residential buildings - public buildings - new and existing constructions - increasing energy efficiency - monitoring	Efficiency improvement in services/ tertiary sector.	CO_2	Other	Adopted	Reducing final energy consumption of public buildings through the monitoring of energy consumption of public buildings using a measuring concept and data analysis, notably based on smart meters.	nd	MECDD MMTP-ABP	NA	NA	NA
EC41 - Energy consumption - industries - increasing energy efficiency - EU ETS	Efficiency improvement in industrial end-use sectors.	CO_2 CH_4	Regulatory	Implemented	Application of the EU ETS Regulation.	2005	MECDD	NE	NE	NE

EC42 - Energy consumption - industries - increasing energy efficiency - FEDIL Voluntary Agreement	Efficiency improvement in industrial end-use sectors.	CO_2	Voluntary/ negotiated agreements	Implemented	Voluntary agreement between the Luxembourg Government and FEDIL: see Box 6. Corresponds to measure IND1_1 in NEEAP4.	1996	MECO My Energy	NE	NE	NE
EC43 - Energy consumption - industries - increasing energy efficiency - training and education	Efficiency improvement in industrial end-use sectors.	CO_2	Education	Adopted	This PaM covers various projects aiming at a better deployment of energy efficiency and renewable energy projects in industries and SMEs through training and education. It covers the "learning factory" initiative, which is a national structure of lifelong training.	nd	MEA MECDD	NA	NA	NA
EC51 - Energy consumption - residential and non-residential buildings - increasing energy efficiency - training and education	Efficiency improvements of buildings; Efficiency improvement in services/tertiary sector.	CO_2	Education	Implemented	Offering training schemes and certificates of competence to various actors potentially involved in energy efficiency, the use of renewable energy sources and ecological reconstruction in buildings (residential, commercial, institutions). One of the programmes is "build-up skills Luxembourg" that is initiated in the context of the EU project "Build up skills, energy training for builders" that is coordinated in Luxembourg by My Energy.	2014	MECDD MECO-DCM My Energy Chamber of Trade FDA IFSB	NA	NA	NA
EC52 - Energy consumption - all sectors - increasing energy efficiency - training and education ; information and awareness	Efficiency improvements of buildings. Efficiency improvement in services/ tertiary sector; Efficiency improvement in industrial end-use sectors.	CO_2	Regulatory Information Education	Implemented	This PaM aims at guaranteeing sufficient human and financial means to My Energy so that it can fulfil all its missions, notably with regard to the Climate Agreement ("*Pacte Climat*") with municipalities.	nd	MEA MECDD	NA	NA	NA

EC53 - Energy consumption - all sectors - increasing energy efficiency - monitoring	Efficiency improvements in energy consumption sector.	CO_2 CH_4 N_2O	Information Other	Implemented	Improvement and systematisation of data collection on energy consumption and related emissions in various sectors: buildings, industries, transportation, etc. This PaM covers the development of statistical and econometric work on energy consumption and related emissions: projections, ex ante and ex post evaluations of PaMs (emissions, abatement costs), etc. This is a "good governance" action.	2015	MECDD MEA STATEC	NA	NA	NA
ES01 - Energy supply - renewable energy and cogeneration - electricity and heat supply - feed-in tariffs	Increase in renewable energy.	CO_2	Fiscal	Implemented	This PaM aims at increasing the share of renewable energy sources (RES) in the electricity networks; whether households or enterprises produce it. It aims also at developing heat generation (cogeneration) alongside electricity production from RES. This PaM is linked to a 2014 Regulation that outlines method of calculating feed-in tariff (FIT) levels for renewable energy electricity. FIT levels vary depending on the renewable energy source and generation capacity of the plant. FITs are being guaranteed for 15 years for all types of renewable plants (except geothermal installations) counting from the year when the plant was connected to the national grid. An additional bonus for commercialized heat generated by combined heat and power based on biomass and wood waste is introduced by the Regulation. Bonus is paid on top of the feed-in tariff. In order to benefit from this additional premium certain conditions must be met.	2014	MEA	23.18	23.18	23.18
ES02 - Energy supply - renewable energy and cogeneration - biogas supply - feed-in tariffs	Increase in renewable energy.	CO_2	Fiscal	Implemented	This PaM aims at developing the production of biogas and its addition in distribution networks. This PaM is linked to a 2014 Regulation that outlines method of calculating feed-in tariff (FIT) levels for the supply of biogas in the natural gas grid. Biogas plants are eligible for the tariff if they were commissioned on or after 1 January 2007 and that they were renewed or extended from then in order to increase their capacity. An additional bonus for commercialized heat generated by combined heat and power based on biogas is also introduced by the Regulation. Bonus is paid on top of the feed-in tariff. In order to benefit from this additional premium certain conditions must be met.	2014	MEA	9.50	9.50	9.50

Notes: NA = not applicable / NE = not estimated

FDA – Federation of Craftsmen (*Fédération des Artisans*): https://www.fda.lu/
IFSB – Training Institute for the building sector (*Institut de Formation Sectoriel du Bâtiment*): https://www.ifsb.lu/

Transport and mobility

98. PaMs within the transport sector are outlined in ***Table III.5-4*** at the end of this section. Eleven transport PaMs are presented, with a mix of fiscal tax incentives, regulatory obligations, and information/awareness policies. One PaM (TR21) is a group of PaMs that cannot currently be estimated with regard to its mitigation impact potential.

99. As underlined in ***Section I.2.9***, the impact from "road fuel sales to non-residents" can hardly be controlled by unilateral adaptations in national tax-policy: as fuel sales attributed to "road fuel sales to non-residents" are mainly triggered by fuel price differentials (which are determined by differentials in excise rates *[→ Section I.2.8]*), Luxembourg would need to permanently coordinate its tax policy with the policy of all neighbouring states (Belgium, France and Germany). This would mean to accept a limitation of the scope of national tax design options. However, the current Government intends to assign additional revenues from road fuel sales to measures aiming at an active transition to a more sustainable economic model (instead of using them to cover current expenses), in order to step away from the "road fuel sales to non-residents" dependency [Government of the Grand Duchy of Luxembourg (2018), p. 121 & p. 173]. Hence, the Government decided to set up an **inter-ministerial working group** composed of representatives of the MFIN, the MEA, the MECDD, the MECO, the Customs and Excise Administration and STATEC [Government of the Grand Duchy of Luxembourg (2018), p. 121]. This group, chaired by the MFIN, is responsible for:

- carrying out detailed and regular monitoring of the evolution of road fuel sales, analysing the factors underlying the evolutions observed, monitoring the impacts of the new measures proposed by the Government within the framework of an overall tax reform in Luxembourg, and comparing the results of the feasibility study with STATEC's ongoing work on road fuel sales forecasts and their price elasticities;
- analysing the desirability of introducing a tax segmentation between professional use and private use of diesel – similar to the systems put in place in Belgium and France – coupled with an increase in the "Kyoto-cent" (see below);
- thinking about alternative models, including the possibilities of introducing an excise duty on electromobility, knowing that long-term planning is imperative to anticipate the gradual reduction of budget revenues from fossil road fuel sales.

The "Kyoto-cent"

100. Increasing excise rates on road fuels lead to increases of the retail price of these fuels. Higher prices set an incentive for consumers to lower demand. By 1 January 2007, the excise rate on gasoline was increased by 2 euro-cents/litre. For diesel, the excise rate was increased in two stages: 1.25 euro-cents/litre on 1 January 2007 and another 1.25 euro-cents/litre on 1 January 2008. An additional increase happened in May 2019 so that now the "Kyoto-cent" is 2.5 euro-

cents/litre for gasoline and 3.5 euro-cents/litre for diesel. Actually, this autonomous addition to the existing excise rates was introduced to finance the "Kyoto Fund" – renamed "Climate and Energy Fund" since January 2011 – set up in Luxembourg to deal with the Kyoto "flexible mechanisms" *[→ Section IV.7.2]* and it is labelled "climate change contribution" or "Kyoto-cent".

Quantified mitigation potentials

101. The mitigation potentials for TR01 and TR11 for 2020 are included in ***Table III.5-4*** below. These were quantified in the preparation of NEEAP4:

- the mitigation potential of **TR01** is derived from the increase in vehicle tax based on their CO_2 emissions. An annual fuel consumption reduction rate of 2 % is applied annually until 2020 for new diesel, and petrol vehicles, based on STATEC modelled consumption of new diesel and gasoline road vehicles. This leads to a saving of 17 kt CO_2 in 2020.
- the mitigation potential of **TR11** is derived from an increase in tax on diesel vehicles. A price elasticity rate of 0.6 % for the years 2013, 2014, 2015 and 2016 and 1.6 % for the years 2017, 2018, 2019 and 2020 is applied. From the final energy consumption of road transport for diesel modelled by STATEC, this leads to a saving of 74.8 GWh and 19.7 kt CO_2 in 2020.

For detailed assumptions and methodology, see [Aether / Benviroc (2017)].

TABLE III.5-4 – PAMS IN THE TRANSPORT SECTOR

Number & name of the PaM	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact, by gas (for a particular year, not cumulative, in CO_2e)		
								2020	2025	2030
TR01 – Transport – alternative fuels – framework and infrastructure	Low carbon fuels & electric cars.	CO_2	Fiscal Regulatory	Implemented	This PaM aims at promoting and fostering the transition to alternative fuels: electro-mobility (battery electric vehicles (BEV) and plug-in hybrid electric vehicles (PHEV)) and natural gas mobility (CNG and LNG). All member states of the EU established national policy frameworks outlining their national targets and objectives and supporting actions for the development of the market as regards alternative fuels, including the deployment of the necessary infrastructure to be put into place, in close cooperation with regional and local authorities and with the industry concerned, while taking into account the needs of small and medium-sized enterprises. Besides infrastructure developments, tax cuts (on annual private person's tax declaration) are offered for the purchase of an electric vehicle (BEV).	2016	MMTP	17.05	NE	NE
TR02 – Transport – alternative fuels – public transportation	Efficiency improvements of vehicles; Low carbon fuels/electric cars.	CO_2	Voluntary/ negotiated agreements	Implemented	Use of plugin hybrid and full electric buses, which are being charged by opportunity charging stations.	2017	MMTP Municipalities	NE	NE	NE
TR03 – Transport – alternative fuels – biofuels	Low carbon fuels & electric cars.	CO_2	Regulatory	Implemented	Obligation to blend biofuels in transport related fuels. The budget law 2007 sets the mandatory part of biofuel to be blended in diesel and gasoline in transport to 2%. The law of 17 December 2010 defining the excises taxes takes over this percentage and additionally sets sustainable criteria for the blended biofuels. Each subsequent budget laws increases the level of incorporated biofuels up to 7.70% in the last budget law. These percentages are calculated in relation to the energy content of the fuels.	2007	MEA MFIN-ADA	NE	NE	NE

TR04 – Transport – alternative fuels – tax incentives	Efficiency improvements of vehicles; Low carbon fuels & electric cars.	CO_2	Fiscal	Implemented	New fiscal incentives for zero and low emission vehicle were introduced in 2017. A return of tax of 5 000 euro for zero-emissions vehicles; - battery electric vehicles (BEV) and fuel cell-electric vehicles (FCEV) – on the annual tax declaration for private car owners has been created. For company cars the deductibility from the corporate income of expenses related to the use of company cars will be calculated based on CO_2 emissions. Zero emission vehicles benefit to the highest degree.	2017	MFIN MMTP	NE	NE	NE
TR11 – Transport – taxation – excise duties on fuel for transport purposes	Low carbon fuels & electric cars; Improved behaviour.	CO_2	Fiscal	Implemented	Taxes on fuel (petrol and diesel) are raised on a regular basis. By 1 January 2007, the excise rate on gasoline was increased by 2 ct€/litre. For diesel, the excise rate was increased in two stages: 1.25 ct€/litre on 1 January 2007 and another 1.25 ct€/litre on 1 January 2008. An additional increase happened in May 2019 so that now the "Kyoto-cent" is 2.5 ct€/litre for gasoline and 3.5ct€/litre for diesel. In the short term, this will encourage driving behaviour that aims to achieve lower fuel consumption, and in the longer term, this will influence motorists to purchase vehicles that are more economical. Corresponds to measure TRA_1 in NEEAP4.	2007	MECDD MFIN-ADA	19.75	NE	NE
TR12 – Transport – taxation – vehicle tax reform – private cars	Low carbon fuels & electric cars.	CO_2	Fiscal	Implemented	In December 2006, a Regulation introduced a vehicle tax reform based on CO_2 emissions. It entered into force on 1 January 2007. On average, this change in approach led to an increase in tax. In the longer term, this will influence purchasing decisions in favour of more economical vehicles. Corresponds to measure TRA_2 in NEEAP4.	2007	MFIN-ADA	NE	NE	NE
TR13 – Transport – taxation – vehicle tax reform – company cars	Low carbon fuels & electric cars; Improved behaviour.	CO_2	Fiscal	Implemented	Fiscal benefits in kind for company car is no longer a flat rate but is now determined according to CO_2 emissions per km and propulsion means (gasoline, diesel, hybrid, natural gas, etc.).	2017	MECDD MFIN-ACD	NE	NE	NE

TR21 – Transport – mobility – integrated strategy for a sustainable mobility (MoDu)	Improved behaviour; Improved transport infrastructure; Modal shift to public transport or non-motorized transport; Reducing conflicts between land planning and transport; Promotion of alternatives to cars (P and R stations, car sharing, carpooling and electro-mobility).	CO_2	Regulatory; Planning	Implemented	The "MoDu" is presented in Box 3. This PaM is a group of PaMs. It covers PaMs TR01 + TR02 + TR22 + TR23 + TR25.	2012	MEA MINT MMTP CdT CFL Municipalities Foreign neighbouring regions	NA	NA	NA
TR22 – Transport – mobility – promotion of car-pooling and car-sharing	Demand management/ reduction. Improved behaviour.	CO_2	Information Education Planning	Implemented	Setting up of a national car-pooling portal in order to promote this alternative form of transportation and to increase the car occupancy rate, which is as of now at 1.2 passengers per car. Setting up of car-sharing facilities in order to reduce the number of cars per household. It is evaluated that one shared car through a car-sharing scheme and infrastructure could replace 7 to 10 private cars. Car-sharing would also allow promoting the use of public transport by offering flexibility when reaching a journey destination.	2017	MMTP	NE	NE	NE
TR23 – Transport – mobility – information – new communication tools	Improved behaviour; Modal shift to public transport or non-motorized transport; Realising information and awareness campaigns for promoting an environment-friendly transport.	CO_2	Information Education	Implemented	This PaM aims at promoting environment-friendly transportation related behaviours through information and awareness campaigns at the national and regional level using new communication tools such as social networks, etc.	2012	MMTP CdT	NA	NA	NA

TR25 – Transport – mobility – enterprises mobility plans	Low carbon fuels & electric cars; Launching an "ecological mobility" label for enterprises using low consumption and emissions vehicles.	CO_2	Voluntary/ negotiated agreements	Implemented	This PaM aims at modifying behaviours of employees and paid workers in administrations and private companies. It consists of a mobility management tool provided by the *Verkéiersverbond*: "mConcept". mConcept is offering solutions to promote the use of sustainable transport means and to reduce the use of individual cars. These mobility management solutions are mostly based on awareness raising through information and communication on alternative transport means. They also integrate "soft" measures, which are essentially based on a reorganisation of the activities and partnerships. As an example, enterprises and administrations could finance a "mPass" for their workers so that they can use the public transportation network free of charge.	2009	CdT	NE	NE	NE

Notes: NA = not applicable / NE = not estimated

CdT – Transport Community (*Communauté des Transports – Verkéiersverbond*): https://www.mobiliteit.lu/fr/a-propos/verkeiersverbond/
CFL – Luxembourg Railways (*Société Nationale des Chemins de Fer Luxembourgeois*): https://groupe.cfl.lu/

Industry

102. The policy within the industrial sector is outlined in ***Table III.5-5***. The most significant CO_2 emissions from the industry sector are covered in the EU ETS, which is under EC41 presented in ***Table III.5-3***. No specific policies or measures have been identified that target any remaining small levels of CO_2 sources. Thus, the only policy included in the industry sector (IP01) concerns the implementation of the F-gas Regulation (2014/517/EC)[60] to limit emissions from F-gases (HFC, PFC, SF_6). This phases down HFCs on the EU market and bans HFCs in certain applications, which will lead to a replacement of HFCs with lower global warming potentials (GWP) in some applications.

Quantified mitigation potentials

103. The mitigation potential of **IP01** was quantified for the years 2020, 2025 and 2030. This was derived from the quantity of F-gas releases avoided, and the difference in global warming potentials of the replaced F-gases. There were three parts to the calculation:

- 2F excluding mobile air conditioning (MAC) in passenger vehicles;
- 2F mobile air conditioning (MAC) in passenger vehicles;
- 2G electrical switchgear.

2F excluding MAC in passenger vehicles includes fridge production, commercial and industrial refrigeration, stationary air-conditioning, refrigerated transport, and MAC in non-passenger vehicles. In the business as usual (BAU) scenario, projections are extrapolated based on data from 1990-2016. To estimate the effects of the policies emerging from the F-gas Regulation, the projections from the BAU scenario were coupled with the HFC reduction plan of the aforementioned regulation. In this case, placements on the EU market of HFC are directly impacted by the phase down that is planned in the F-gas Regulation. As such, the following reductions, as given by the F-gas Regulation, have been directly applied to the emissions of the category F. A 7 % reduction for the year 2017, a 37 % for the years 2018-2020, a 55 % for the years 2021-2023, a 69 % reduction for the years 2024-2026, a 76 % reduction for the years 2027-2029, a 79 %reduction for the year 2030. Except for emission from mobile air conditions systems of passenger vehicles, which are regulated by another directive and therefore estimated separately, all subsectors were assumed to be equally affected the progressive phasedown.

Calculating savings from **MAC in passenger vehicles** used the main assumption based on the Directive 2006/40/EC[61] relating to emissions from air-conditioning systems in motor. This directive dictates that starting the year 2017, the use of cooling refrigerants possessing a GWP of

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60 Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006 (http://data.europa.eu/eli/reg/2014/517/oj).

61 Directive 2006/40/EC of the European Parliament and of the Council of 17 May 2006 relating to emissions from air conditioning systems in motor vehicles and amending Council Directive 70/156/EEC (http://data.europa.eu/eli/dir/2006/40/oj).

150 in new passengers is forbidden. Previously, R134a, which has a GWP of 1430, was mainly used in this type of vehicles. Two alternatives are currently used, R1234yf (GWP=4) and CO_2 (GWP=1), in which case the coolant R1234yf is used by the majority of car manufactures. To determine the proportions of R1234yf and CO_2 usage on the Luxembourgish market, data corresponding to the share of the each car brand on the Luxembourgish market was obtained from STATEC. The corresponding usage of R1234yf or CO_2 by each car manufacture was obtained from manufacture databases. This led to the estimation that newly registered cars in Luxembourg are using R1234yf in 85 % of the cases and CO_2 in 15 % of the cases. Due to a lack of information on future developments, this distribution was kept constant for the years 2017-2030. The average amount of coolant contained in passenger vehicles was determined using technical data sheets from various car models.

The F-gas Regulation does not directly affect **SF_6 in switchgears** as none of the restrictions is directly aimed at these components. Instead, the general reduction over the years of the SF_6 quantities, which are placed on the EU market via the quota system, has been considered to affect the emissions of SF_6 containing switchgears. This was estimated to be a 7 % reduction for the year 2017, a 37 % for the years 2018-2020, a 55 % for the years 2021-2023, a 69 % reduction for the years 2024-2026, a 76 % reduction for the years 2027-2029, and a 79 % reduction for the year 2030.

See also [Aether / Benviroc (2017)].

Agriculture

104. PaMs within the agriculture sector are outlined in ***Table III.5-6***. Eight agricultural PaMs have been identified, as well as a 9th grouped PaM (AG01) that groups AG02, AG03 and AG04 together. The main agriculture PaMs in Luxembourg focus on the implementation of the EU Common Agricultural Policy (CAP) and the Rural Development Programme (RDP). AG21 and AG22 are economic national PaMs on the farming practices that increase carbon stocks in soils.

105. As of today, no mitigation potentials have been quantified for agriculture PaMs.

TABLE III.5-5 – PAM IN THE INDUSTRIAL SECTOR

Number & name of the PaM	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact, by gas (for a particular year, not cumulative, in CO_2e)		
								2020	2025	2030
IP01 - Industrial processes - F-gas related emissions regulation	Reduction of emissions of fluorinated gases.	HFCs SF_6	Regulatory	Implemented	Maximum annual rate for F-gas emissions from refrigeration and air-conditioning equipment.	2015	MECDD-AEV	9.87	59.64	87.86

TABLE III.5-6 – PAMS IN THE AGRICULTURE SECTOR

Number & name of the PaM	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact, by gas (for a particular year, not cumulative, in CO_2e)		
								2020	2025	2030
AG01 - Agriculture - Rural Development Programme - livestock management	Improved animal waste management systems; Improved livestock management.	CO_2 CH_4 N_2O	Regulatory	Implemented	This PaM covers priority 5 of the Rural Development Programme, i.e. promoting resource efficiency and supporting the shift towards a low CO_2 emission and climate resilient economy.	2014	MAVDR-SER	NE	NE	NE
AG02 - Agriculture - Rural Development Programme - livestock management - climate-smart agriculture investments	Improved animal waste management systems.	CO_2 CH_4 N_2O	Fiscal	Implemented	This PaM covers priority 5.D.1 of the Rural Development Programme, i.e. climate-friendly investment. Agricultural investments can contribute significantly to the reduction of GHG emissions. By taking into account the energy aspects during construction but also, in the case of heated stables, by adequate insulation. When storing and processing livestock waste, precautions may be taken to avoid ammonia losses (e.g. covering tanks). These considerations should be taken into account when developing new agriculture areas.	2014	MAVDR-SER	NE	NE	NE

AG03 - Agriculture - Rural Development Programme - livestock management - promoting research and knowledge transfer for climate-smart agriculture	Improved animal waste management systems; Further identification of needs at the practical agricultural sector; Coordinating activities at the research level with the needs of the field; Ensuring an effective transfer of research results to practice.	CO_2 CH_4 N_2O	Information Education Research	Implemented	This PaM covers priority 5.D.2 of the Rural Development Programme (RDP), i.e. promoting research and knowledge transfer for climate-smart agriculture. The current transfer of knowledge between the research and practice is insufficient and too slow. The exchange of information at these levels needs to be improved. The achievement of these objectives requires a reorganization of agricultural research and advisory structures, as well as communication between the different actors. The RDP management authority will ensure the implementation of these objectives at national level.	2014	MAVDR-SER	NE	NE	NE
AG04 - Agriculture - Rural Development Programme - livestock management - practices to reduce GHG emissions and ammonia	Improved animal waste management systems; Improved livestock management.	CO_2 CH_4 N_2O	Economic Voluntary/ negotiated agreements Regulatory Education	Implemented	This PaM covers priority 5.D.3. of the Rural Development Programme, i.e. livestock management practices to reduce GHG emissions and ammonia. Reduced tillage reduces overall fuel consumption and thus reduces CO_2 emissions. Modern slurry spreading techniques can significantly reduce ammonia losses. Reduction of nitrogen fertilization helps to reduce NO_2 emissions. It is therefore a question of promoting methods that help to limit the emission of GHG.	2014	MAVDR-SER	NE	NE	NE
AG11 - Agriculture - Common Agricultural Policy - greening - crop diversification	Other activities improving cropland management.	CO_2	Economic	Implemented	This PaM pushes towards a more careful choice of crop rotation, which should lead to increase in soil carbon stock. It is based on green direct payments, which are linked to certain crop diversification conditions.	2013	MAVDR-SER	NE	NE	NE
AG12 - Agriculture - Common Agricultural Policy - greening - permanent grassland	Activities improving grazing land or grassland management.	CO_2 N_2O	Economic	Implemented	The aim of this PaM is to conserve soil carbon and grassland habitats associated with permanent grassland. It is based on green direct payments linked to the conditions that permanent grasslands are protected. Hence, they cannot be ploughed or converted.	2013	MAVDR-SER	NE	NE	NE
AG13 - Agriculture - Common Agricultural Policy - greening - ecological focus area	Other activities improving cropland management; Activities improving grazing land or grassland management.	CO_2 N_2O	Regulatory	Implemented	This PaM aims at protecting existing hedges and trees and at encouraging the plantation of new ones if they are not yet present. Farmers with arable areas exceeding 15 ha must ensure that at least 5% of such areas is an 'ecological focus area' dedicated to ecologically beneficial elements. Ecological focus areas cover a broad range of features, including ones that affect biodiversity: directly, such as fallow land, field margins, hedges and trees, buffer strips.	2013	MAVDR-SER	NE	NE	NE

AG21 - Agriculture - practices - organic farming	Other activities improving cropland management.	CO_2 N_2O	Economic	Implemented	The conversion of conventional agriculture to organic agriculture is supported financially by the government. This measure is believed to increase carbon stocks in soils due to reduced tillage and improved organic fertilisation techniques.	2009	MAVDR-SER	NE	NE	NE
AG22 - Agriculture - practices - conservation tillage or zero-tillage	Other activities improving cropland management.	CO_2 N_2O	Economic	Implemented	This PaM is believed to increase carbon stock in soils. In order to be eligible for a government grant for reduced tillage (or conservation tillage), farmers have to guarantee, over a 5-year period, that a certain amount of their fields will not undergo full tillage.	2013	MAVDR-SER	NE	NE	NE

Note: NE = not estimated

TABLE III.5-7 – PAMS IN THE FORESTRY SECTOR

Number & name of the PaM	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact, by gas (for a particular year, not cumulative, in CO_2e)		
								2020	2025	2030
FO01 - Forestry - forest management - establishment of forest management plans in public forests	Conservation of carbon in existing forests; Enhanced forest management.	CO_2	Regulatory	Implemented	Forest officials have to establish forest management plans for all public forest. Those plans have established harvest rates for the next 10 years. The harvest strategy is predefined and aims to smooth out age class structure. Clear-cut felling is prohibited, and instead, forests having reached their maturity are harvested over a period of 30 years for deciduous and 10 years for coniferous forests. Those long harvest times stabilise the existing carbon stocks in forests. The forest management plans also include the choice of tree species for future planting. Overall, those measures also aim to make forests more resilient towards extreme weather events.	2000	MECDD-ANF	NE	NE	NE
FO02 - Forestry - forest management - protection of existing forests	Afforestation and reforestation; Conservation of carbon in existing forests.	CO_2	Regulatory	Implemented	This PaM aims to protect existing carbon stocks in forests. Current legislation (Art. 13 of 19 January 2004 law on nature and natural resources protection) prohibits deforestation without previous authorisation and without compensation through afforestation of new forest areas.	2004	MECDD-ANF	NE	NE	NE

FO03 - Forestry - forest management - increase of the size of forest nature reserves	Afforestation and reforestation; Conservation of carbon in existing forests; Enhancing production in existing forests.	CO_2	Voluntary/ negotiated agreements	Implemented	This PaM aims at increasing forest areas, which are left undisturbed with no harvesting taking place. In the short term, this will lead to an increase in dead wood and hence an increase in carbon stock in the forest sector. On the other hand, this measure lessens the total wood harvest potential and the potential for substitution effect for building materials or energy sources.	nd	MECDD-ANF	NE	NE	NE
FO04 - Forestry - forest management - increase of the amount of dead wood in forests	Conservation of carbon in existing forests.	CO_2	Regulatory	Implemented	Harvest of wood in public forests is limited to tree trunks with a diameter greater than 10 cm. All other wood remains as dead wood in forests. This has already lead to an increase of carbon in the dead wood pool over the last years.	2005	MECDD-ANF	NE	NE	NE
FO11 - Forestry - logging - Wood Cluster	Increasing the harvested wood products pool.	CO_2	Voluntary/ negotiated agreements	Implemented	The aim of the Wood Cluster is to assemble all actors of the wood sector in order to improve the utilisation of wood from forests. The aim is to use wood in a cascade from high value product to lower value product and finally as an energy source. This is in line with the objectives of the circular economy and will lead to maximise the use of this primary resource. It also means that new outlet markets have to be found for beech wood that, now, is primarily used as an energy source or exported. In the long term, this should lead to an increase in the HWP pool and reduce the use of higher energy consuming cement-based building products.	2017	MECDD-ANF Luxinnovation	NE	NE	NE
FO12 - Forestry - forest management - private forest nature reserve subsidy	Conservation of carbon in existing forests; Enhanced forest management; Prevention of deforestation; Strengthening protection against natural disturbances.	CO_2	Economic	Implemented	Subsidies paid to private forest owners and forests owned by communes to leave forests in their natural state.	2017	MECDD-ANF	NE	NE	NE

Notes: NE = not estimated

Luxinnovation: https://www.luxinnovation.lu/

Forestry

106. Policies and measures within the forestry sector are outlined in ***Table III.5.7*** above. Six forestry PaMs have been identified, which are a mix of regulatory, economic and voluntary agreements instruments. These include subsidies to private and commune forest owners to leave forests in their natural state (FO12), limiting the minimum diameter of wood being harvested to increase carbon stocks in deadwood pool (FO04), and the creation of the "Wood Cluster" to bring all actors of the forestry sector together to move to a circular economy approach (FO11).

107. As of today, no mitigation potentials have been quantified for forestry PaMs.

Waste management

108. Policies and measures within the waste sector are outlined in ***Table III.5-8*** at the end of this section. 15 waste PaMs are presented, as well as a 16th grouped PaM - WM01, the "National Waste and Ressources Management Plan", which groups WM03, WM21 and WM25 together and that is not estimated at that level. The majority of the waste PaMs are regulatory instruments, some of which relate to the implementation of EU legislation such as the Waste Framework Directive 2008/98/EC[62] and the Waste Incineration Directive 2000/76/EC[63] (WM11), the Landfill Directive 1999/31/EC [64] (WM22 and WM23), the Waste Packaging Directive 2015/720/EU[65] (WM32). Luxembourg has several national regulatory policies concerning waste, for example, the *SuperDrecksKescht* (SDK),[66] which manages problematic waste from households and improves waste management systems in the private and public sectors.

Quantified mitigation potentials

109. The mitigation potential of three waste PaMs (WM22, WM24 and WM33) have been quantified for the years 2020, 2025 and 2030:

- **WM22** – since 2014, no direct landfilling of waste has occurred in Luxembourg. Due to agreements between the syndicates, only one controlled landfill site in Muertendall, managed by SIGRE, is used since 1 January 2015. To further reduce CH_4 emissions, pre-treatment of all residual waste prior to its disposal has been reinforced (since 1993 at SIGRE, since 2007 at SIDEC) so that only composted waste is landfilled (see also WM23). This is estimated to save 65.6 kt CO_2e in 2020.

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62 Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (http://data.europa.eu/eli/dir/2008/98/oj).

63 Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste (http://data.europa.eu/eli/dir/2000/76/2008-12-11).

64 Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (http://data.europa.eu/eli/dir/1999/31/2018-07-04).

65 Directive (EU) 2015/720 of the European Parliament and of the Council of 29 April 2015 amending Directive 94/62/EC as regards reducing the consumption of lightweight plastic carrier bags (http://data.europa.eu/eli/dir/2015/720/oj).

66 https://www.sdk.lu/index.php/en/.

- **WM24** covers the methane recovery systems that have been installed at the individual landfills Muertendall (managed by SIGRE) and Fridhaff (managed by SIDEC) in the years 2000 and 2002, respectively. While the recovered CH_4 is used for the production of electricity at the SIGRE landfill Muertendall, recovered gas is flared at the SIDEC landfill Fridhaff. The underlying assumption for quantifying PaM WM24 is that if methane recovery systems would not have been installed at landfills (Muertendall and Fridhaff) methane would escape directly to the atmosphere. This is estimated to save 6.66 kt CO_2e in 2020.
- **WM33** – a study by IGLUX[67] included an estimate of the potential of wood waste energy use due to this PaM and how much CO_2 its use would save in comparison to the use of natural gas or oil. In this ex-ante estimate, it was assumed that 70 % of the wood waste potential replaces natural gas while 30 % is consumed in existing biomass plants thus replacing other wood fuels. This is estimated to save 3.78 kt CO_2e in 2020.

110. The quantification of several other waste PaMs has been considered:

- **WM03** – notation key "NE. By 2017, 25 communes had implemented the waste tax, but no clear trend of municipal solid waste (MSW) generation since the implementation of the PaM was observed. As the implementation timeframe by the rest of the municipalities is also unknown, it was concluded that the quantification of the PaM is not feasible at this stage.
- **WM11** – notation key "NO". The effect of this PaM would be the energy production related emissions avoided by incinerating waste, as well as avoided emissions from the alternative treatment of waste (e.g. landfilling). The plant was built in 1976 and no energy efficiency improvements were identified because of the implementation of 2000/76/EC or 2008/98/EC. Thus decided not to quantify the impact of this PaM as any impact does not seem to be a result of a recent PaM.
- **WM12** – notation key "IE". Impact overlaps with WM22, WM33 and ES02 and the remaining emission reduction impact (on manure management) is minor.
- **WM23** – notation key "IE". This PaM is to be considered together with WM22.
- **WM31** – notation key "NE". It might be possible to estimate avoided emissions thanks to the *SuperDrecksKescht* (SDK) programme.
- **WM32** – notation key "NO". All recycling targets were reached already before 2005 (with one exception year for wood in 2009 being below target), thus it has been decided not to calculate the mitigation impact.
- **WM35** – notation key "NE". The effect of this PaM would be the production related emissions avoided by using sewage sludge instead of other fuels. However, the use of sewage sludge was smaller in 2014-2016 than in the earlier years, and therefore the available data did not

67 *Landesweite Potentialstudie Zur Energetischen Nutzung Holziger Biomasse* (https://environnement.public.lu/fr/offall-ressourcen/types-de-dechets/Biodechets/Dechets_de_verdure/etude-biomasse.html).

allow estimation of the impact of the PaM. In the future years, if sewage sludge use starts to increase again, the impact could be estimated by assuming that sewage sludge replaces other fuels.

For detailed assumptions and methodology, see [Aether / Benviroc (2017)].

III.5.2. Cross-sectoral policies and measures

111. Cross-sectoral policies and measures are outlined in *Table III.5-9* below. Only one cross-cutting PaM has been identified. It concerns the diversification of Luxembourg's economy and the use of public funds for the promotion of eco-technologies in the context of the development of the "CleanTech" Cluster in Luxembourg.[68] It has been considered that a quantified mitigation potential estimate is not feasible for this PaM.

[68] https://www.luxinnovation.lu/cluster/luxembourg-cleantech-cluster/.

TABLE III.5-8 – PAMS IN THE WASTE SECTOR

Number & name of the PaM	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact, by gas (for a particular year, not cumulative, in CO_2e)		
								2020	2025	2030
WM01 - Waste - overall management - National Waste & Ressources Management Plan	Demand management / reduction; Enhanced recycling; Enhanced CH_4 collection and use; Improved treatment technologies; Improved landfill management; Waste incineration with energy use; Improved wastewater management systems; Reduced landfilling.	CO_2 CH_4 N_2O	Planning	Implemented	According to Art. 36 of the law of 21 March 2012 concerning the management of waste, the next national waste management plan is currently being elaborated. Luxembourg's national waste plan is a fundamental instrument that drives the waste management policy. Except for radioactive waste and waste from extractive operations, it covers all waste types (municipal solid waste, food and organic waste, packaging waste, electrical and electronic equipment/batteries). It has the goal to promote measures related to prevention and management of waste. The national waste plan does not include any quantitative targets.	2012	MECDD-AEV	NA	NA	NA
WM02 - Waste - overall management - Environmental Protection Fund	Demand management / reduction; Enhanced recycling; Improved treatment technologies.	CO_2 CH_4 N_2O	Economic	Implemented	The modified law of 31 May 1999 on the establishment of a fund for the protection of the environment defines the manner in which, through the funds of the Environmental Protection Fund, the State may contribute financially to certain projects, including (A) water protection and sanitation;(B) prevention and control of air pollution, noise and climate change:(C) waste prevention and management;(D) the protection of nature and natural resources;(E) the remediation and rehabilitation of waste disposal sites and contaminated sites.	1999	MECDD-AEV MECDD	NA	NA	NA

WM03 - Waste - overall management – polluter-pays principle	Demand management / reduction.	CH_4	Regulatory	Implemented	In the application of Art. 17(3) of the law of 21 March 2012, municipal charges must cover all costs incurred by municipalities in relation to waste management. The taxes charged to the various households and, where applicable, of establishments, must take into account the quantities of waste produced. For these purposes, the taxes must include at least one variable component calculated as a function of the weight and / or the volume of the residual household waste in a mixture produced as well as a variable component calculated according to the weight and / or volume of bulky waste produced.	2012	MECDD-AEV	NE	NE	NE
WM05 - Waste - overall management - reduced consumption of plastic bags	Demand management / reduction.	CO_2	Regulatory	Implemented	According to Art. 5 of the law of 21 March 2017 on the reduced consumption of plastic bags on a long-term basis, (1) the level of annual consumption shall not exceed ninety light plastic bags per person in December 31, 2019 and forty light plastic bags per person on December 31, 2025.	2017	MECDD-AEV	NA	NA	NA
WM11 - Waste - energy - incineration and burning - energy recovery from waste incineration	Waste incineration with energy use.	CO_2 CH_4	Regulatory	Implemented	The aim of the Directive 2000/76/EC is to prevent or to reduce emissions caused by the incineration of waste. This is to be achieved through the application of operational conditions, technical requirements, and emission limit values for incineration plants within the EU. With regard to the incineration of mixed municipal waste, the Waste Framework Directive 2008/98/EC defines the minimum energy efficiency to be met by an incineration plant so that this operation can be considered as a recovery operation. Luxembourg has a single waste incineration plant (SIDOR), in operation since 1976. It deals with municipal solid waste generated in the communes of the cantons of Luxembourg, Esch and Capellen.	1976	MECDD-AEV	NO	NO	NO

WM12 - Waste - energy - anaerobic digestion at biogas facilities	Enhanced CH4 collection and use.	CH_4	Economic Regulatory	Implemented	In the interest of maximizing the renewable energy source constituted by organic waste, organic waste is used for the production of biogas. CH_4 generation is used to produce heat and/or electricity. The network of biogas plants has increased to 21 installations during the period 2010-2015. In addition, several facilities, including Minett-Kompost, have been connected to the natural gas distribution network according to the regulation of 15 December 2011. Further, the Grand-Ducal Regulation of 3 August 2005 introduces an environmental incentive payment for electricity production from wind, hydro, solar, biomass and biogas.	2005	MEA ILR	IE	IE	IE
WM13 - Waste - incineration and burning - prohibition of open air burning of waste	Demand management / reduction.	CO_2	Regulatory	Implemented	Art. 42 of the modified law of 21 March 2012 states that the abandonment, dumping or uncontrolled management of waste is prohibited. This statement includes the prohibition of open burning of waste, which is considered as uncontrolled management of waste. This includes the ban on cremation of green waste, household and non-domestic waste in the open air. Waste fines imposed for non-compliance with this provision are fixed in the Grand-Ducal Regulation of 18 December 2015. Indeed, a fine of 145 euros is imposed for open burning of waste and even 250 euros for open burning of non-domestic waste. Many municipalities have also implemented this prohibition in their respective municipal regulations.	1994	MECDD-AEV	NA	NA	NA
WM21 - Waste - landfills - overall management - advanced waste collection system	Demand management / reduction; Improved landfill management; Reduced landfilling.	CO_2 CH_4 N_2O	Regulatory	Implemented	According to the Grand-Ducal Regulation of 1 December 1993 concerning the collective management of waste, it is mandatory to collect separately waste categories for which different treatment is required. Hence, an advanced waste collection system has been implemented, often with waste collection charges, allowing the evaluation of annual quantities of municipal waste.	1993	MECDD-AEV	NA	NA	NA

WM22 - Waste - landfills - overall management - reduced landfilling of municipal solid waste	Reduced landfilling.	CH_4	Regulatory	Implemented	The modern requirements for disposal sites of the Landfill Directive 1999/31/EC aiming at preventing or reducing environmental damage by landfilling waste have been transposed into national legislation through the Grand-Ducal Regulation of 24 February 2003, subsequently amended and rectified by the Grand-Ducal Regulation of 17 February 2006. In order to reduce methane generation, Luxembourg has decided to minimise quantities of waste dumped into landfills as much as possible.	1993	MECDD-AEV	65.50	78.75	89.75
WM23 - Waste - landfills - overall management - biological pre-treatment of solid waste	Improved treatment technologies; Improved landfill management; Reduced landfilling.	CH_4 N_2O	Regulatory	Implemented	According to the national implementation of the Landfill Directive 1999/31/EC, large streams of waste undergo aerobic treatment procedures prior landfilling. Biological pre-treatment of solid waste prior landfilling, during which air is forcedly blown through the bulk waste to speed up its decomposition, has been systematically performed since SIGRE had first introduced aerobic treatment processes for the managed waste in 1993. At SIDEC, a mechanical-biological treatment plant has been installed treating mixed waste since 2007. According to Art. 7(a) of the modified Grand-Ducal Regulation of 24 February 2003 on landfilling waste, only pre-treated waste is landfilled.	1993	MECDD-AEV	IE	IE	IE
WM24 - Waste - landfills - methane recovery systems	Enhanced CH_4 collection and use.	CH_4	Regulatory	Implemented	Methane recovery systems have been installed at the individual landfills Muertendall (managed by SIGRE) and Fridhaff (managed by SIDEC) in the years 2000 and 2002, respectively.	2000	MECDD-AEV	6.66	6.66	6.66
WM25 - Waste - landfills - verification of closed unmanaged landfills	Improved landfill management.	CH_4	Regulatory	Implemented	When the national waste legislation came into force in 1994, all private and municipal unmanaged landfills had to be closed. These areas were cleaned, planted and designed to fit into the landscape. A cadastre was set up, with all landfill sites that could be contaminated. Since 1994, inspections were systematically performed by the Environment Agency at a total of 616 former landfills, according to the procedure under Art. 14 of the modified Grand-Ducal Regulation of 24 February 2003. The environmental management oversaw the work that lasted until 2005. No abnormal behaviour of these closed sites has been detected and no corrective actions have been required.	1994	MECDD-AEV	NA	NA	NA

WM31 - Waste - recycling - SuperDrecksKescht	Demand management / reduction; Enhanced recycling; Improved landfill management.	CH_4	Regulatory	Implemented	The 'SuperDrecksKescht' (SDK) is a programme for managing problematic waste from households and to implement waste management in the business sector based on the principles of prevention, reduction and recovery of waste and promotes a new commercial model based on the 'consumption-reconsumption' philosophy. It covers: the management of problematic waste from households;- the assistance and advice of companies and establishments in public and private sectors with a view to the certification of ecological management of waste by these enterprises and establishments; promoting the ecological management of waste through publicity and awareness-raising activities; organization of the collection of small quantities of waste from enterprises and establishments in the public and private sectors; the proper storage, treatment and packaging of problem waste and the management of the warehouse in question. Different initiatives, such as "clever akafen" (buy smart) for residents and consulting for companies serve to prevent waste.	1985	MECDD-AEV	NE	NE	NE
WM32 - Waste - recycling - packaging waste	Enhanced recycling.	CO_2 CH_4	Regulatory	Implemented	Pursuant to Directive 2015/720/UE, Art. 6. of the law of 21 March 2017 on packaging waste defines that, (1) Packaging managers are required to achieve, on an individual or collective basis, the following minimum targets for recovery and recycling: 1) 65% by weight of packaging waste shall be recovered or incinerated in incineration plants of waste with energy recovery; (2) 60% by weight of packaging waste shall be recycled with the following minimum recycling for the materials contained in the packaging waste: 60 per cent by weight for glass, 60 per cent by weight for paper and cardboard, 50 per cent by weight for metals, 22.5 per cent by weight for plastics, considering exclusively materials that are recycled as plastics and 15 percent by weight for wood.	2006	MECDD-AEV	NO	NO	NO

WM33 - Waste - overall management - biowaste	Demand management / reduction; Reduced landfilling.	CH_4 N_2O	Regulatory Planning	Implemented	According to Art. 25 of the modified law of 21 March 2012, (1) Bio-waste must be separately collected in order to subject it to a composting operation or digestion or, if due to the nature of the material this is not possible, to any other recovery operation. (2) The treatment of bio-waste must be carried out in a manner compatible with a high level of environmental protection. The use of materials produced from bio-waste must be carried out without risk to the environment and human health.	2017	MECDD-AEV	3.18	3.18	3.18
WM35 - Waste - recycling - valorisation of sewage sludge	Improved treatment technologies.	CH_4 N_2O	Regulatory	Implemented	The Grand-Ducal Regulation of 23 December 2014 on sewage sludge outlines: - long-term reduction of valorisation in agriculture;- definition of additional prohibition zones for agricultural valorisation; reduction of the concentration limits for heavy metals;- widening of analytical parameters on certain organic pollutants (PAHs, PCBs, PCDDs / PCDFs). Valorisation of sewage sludge by energy recovery exists in Luxembourg at a clinker production facility in Rumelange. This facility has the necessary authorizations to accept maximum quantities of 15,000 Mg of dried sewage sludge.	2014	MECDD-AEV	NE	NE	NE

Notes: NA = not applicable / NE = not estimated / NO = not occurring / IE = indicated elsewhere

ILR – Luxembourg Institute of Regulation (Institut Luxembourgeois de Régulation): https://web.ilr.lu/FR/ILR

TABLE III.5-9 – CROSS-SECTORAL PAM

Number & name of the PaM	Objective and/or activity affected	GHG(s) affected	Type of instrument	Status of implementation	Brief description	Start year of implementation	Implementing entity or entities	Estimate of mitigation impact, by gas (for a particular year, not cumulative, in CO_2e)		
								2020	2025	2030
IR01 - R and D - promoting eco-technologies in the fields of invention and innovation – "CleanTech" Cluster	Efficiency improvement in industrial end-use sectors; Measure that is part of the general policy aiming at diversifying Luxembourg's economy though the development of several clusters: Luxembourg Cluster Initiative.	CO_2 CH_4 N_2O HFCs PFCs SF_6	Research Other	Implemented	This PaM aims at a better use of public financial supports for the promotion and the use of eco-technologies, as well as supporting sectors and businesses operating in eco-technologies (fostering research projects and international developments) in the context of the "CleanTech" Cluster in Luxembourg.	2012	MEA MECDD MESR LIST Luxinnovation	NA	NA	NA

Notes: NA = not applicable

LIST – Luxembourg Institute of Science and Technology: https://www.list.lu/fr/
Luxinnovation: https://www.luxinnovation.lu/

III.5.3. Assessment of the aggregate effects of policies and measures

112. This assessment is presented in *Section IV.6*.

III.5.4. Policies and measures no longer in place

113. Since the submission of the 7th National Communication and 3rd Biennial Report of Luxembourg, the following PaMs are no longer in place:

- **EC01 & EC03** – increase energy efficiency standards for new and existing residential buildings regarding heating and hot water through the use of renewable energy sources based on a support mechanism consisting of financial incentives accompanied by a timetable suggesting to move from class D before 1 July 2012 to call A from 1 January 2017 (where A corresponds to a "passive house"). Subsidies were granted up to end 2016 for the use of solar thermal systems and heat pumps and these PaMs have been repealed by the revised scheme put in place from 2017 onwards: see PaMs EC05 & EC06.
- **TR24** – the development of near-real time information on the situation on the roads, in public transport, on parking availabilities, etc. so that users can optimize their choices through an on-line service is terminated and the systems are in place.
- **WM04** – this PaM was related to fees collected on national waste transfer notification documents according. It has been considered that this measure is not relevant for mitigating GHG emissions.

114. In addition to the above-mentioned ones, other PaMs have also been adapted over time, in order to better achieve their goals. This is especially the case for the PaMs dealing with energy use in buildings.

115. Furthermore, some PaMs are renewed on an annual basis, such as the one dealing with excise duties on fuels for road transport. These PaMs are repealed and replaced by new ones every year fixing the various rates for the next period. However, strictly speaking, one cannot consider these revisions as a repeal of the PaMs.

116. Finally, for the next submission, the entire list of PaMs will be revised to reflect measures and actions proposed in the NECP *[→ Box 9]*.

III.5.5. Plans and policies that could lead to increasing GHG emissions

117. Luxembourg has identified policies that may result in increased GHG emissions, as explained below. However, further work would be needed to record the main programmes and plans, as well as fiscal and tax arrangements, not directly connected to climate change or energy issues but that could lead to increasing GHG or other air pollutants emissions.

118. For instance, the overall strategy for Luxembourg's economic development calls for the diversification of the economy. One of the diversification "clusters" pushed forward is on logistics, and more precisely, air and rail freight-based logistics activities with a focus on value-added logistics. This might lead to some extra road or air transportation activities that might increase GHG emissions.

119. The development of cogeneration plants in Luxembourg *[→ Section I.2.6]* though increasing energy security and offering a less polluting electricity than the one imported, led to increasing GHG emissions in Luxembourg. The response to this is now the development of cogeneration plants using biogenic fuels (biomass) that is considered as neutral with regard to CO_2 emissions (but not for the other GHG).

120. Various harmful subsidies act as incentives for GHG emitting activities. This is the case of the tax abatement in the income tax return offered for home-work journeys exceeding a given threshold. However, Luxembourg has now put in place several measures – such as TR25 – which aim at promoting the use of alternative modes of propulsion for cars (such as electric vehicles) as well as increasing the use of public transport for the commuting journeys.

III.5.6. Minimizing the adverse effects of policies and measures in other countries[69]

121. Paragraph 8 of the UNFCCC biennial reporting guidelines for developed country Parties [UNFCCC (2011)] encourages Annex I Parties to provide, to the extent possible, detailed information on the assessment of the economic and social consequences of response measures. Some information is provided in the following paragraphs.

122. A small economy such as Luxembourg is unlikely to generate significant negative impacts abroad via its policy choices. As already shown in the chapters before, Luxembourg has identified a broad diversification of measures to reduce national GHG emissions via its second national "Action Plan to reduce CO_2 emissions". Most of the identified measures have no direct or indirect negative effects on developing countries (hereafter DCs).

123. However, where potential adverse impacts are identified, Luxembourg strives to implement its PaMs in such a way as to minimize adverse impacts on other Parties, especially developing country Parties (DCs).

124. Furthermore, in order to minimize the adverse impacts of the use of flexible mechanisms, Luxembourg ensures that the choice of project-based mechanisms is in line with sustainability criteria. Luxembourg also supports developing countries in addressing adverse impacts of climate change: Luxembourg's cooperation aid is focused on least developed countries (LDC's)

69 See also the latest National Inventory Report [AEV (2020), p. 732-734].

and climate finance is additional to Official Development Aid (ODA) *[→ Section V.3.1]*. The country's cooperation is focused on several programmes of international financial institutions *[→ Section V.4]*.

125. Luxembourg has identified some of the potentially harmful subsidies and adverse incentives in the tax system, but these adverse impacts occur within Luxembourg. Potential carbon leakage to DCs has been addressed in emissions trading.

126. Finally, Luxembourg now engages on key topics such as human rights and gender equality in the context of climate change.

Flexible mechanisms

127. The projects under the Clean Development Mechanism (hereafter CDM) and the Joint Implementation (hereafter JI) should comply with **the ecological and social criteria established in the framework of the approval procedures of the UNFCCC**. In this context, Luxembourg has established procedures in order to evaluate the environmental, social and economic matters on the one hand, as well as the sustainability and cost-effectiveness of the projects on the other hand. In addition, projects must not involve nuclear and LULUCF activities, large hydro projects have to demonstrate compliance with the recommendations of the World Commission on Dams and projects shall not be located in a prohibited host country. The list of prohibited host countries is provided by the MFIN or the MAEE. **Funding does not come from development-cooperation aid**.

128. The 2013-2018 governmental programme stated that: "*The Government intends to review the governance of the "Climate and Energy Fund" as well as the foreign emission rights acquisition policy in order to avoid bad quality certificates ("hot air") or the finance of environmentally harmful practices (e.g. coal extraction and production of HFCF-22)*" [Government of the Grand Duchy of Luxembourg (2013), p. 84]. In this context, the Government decided that, from 2014 onwards, only "high quality credits" will be considered for the conclusion of any new emission reduction purchase agreement (hereafter ERPA). Therefore, since 2014, every newly established ERPA only consists in "**Gold Standard certified CERs**", except for one carried out with the Adaptation Fund.

129. The Adaptation Fund portfolio is merely composed of **high quality CDM projects** – renewable energy (solar, geothermal, biomass, wind [mainly <60 MW], small hydro [<15 MW]), transport, landfill gas and methane avoidance – located in some 34 host countries and includes a share of 9 % of Gold Standard CERs.

130. Since July 2016, no new ERPA has been concluded.

131. Funding for the purchase of carbon credits comes from the "Climate and Energy Fund" *[→ Section IV.7.2]* and is additional to ODA funding.

Biofuels

132. The promotion of biofuels is one policy having potential negative indirect effects on DCs as it could lead to the destruction of (or adverse shifts in) resources. EU legislation ensures that biofuels imported from such countries are **produced in accordance with the principles of sustainable development.** The conditions are set out in such a way that biofuels do not compete with food production and are not causing degradation of valuable ecosystems. Luxembourg supports relevant EU activities, such as the Directive on the Promotion of the Use of Energy from Renewable Sources and the Directive on Fuel Quality.

133. The 2018-2023 governmental programme states that: "the use of first generation biofuels should be limited to a maximum threshold of 5 % in order to favour the use of second generation biofuels, which are considered as more sustainable." [Government of the Grand Duchy of Luxembourg (2018), p. 171].

Harmful subsidies and adverse incentives in tax system

134. Environmentally harmful subsidies and adverse incentives in the tax system are partially identified. The objective is a **gradual elimination of such negative incentives**. Fiscal deductions for commuting to work and the fiscal benefits for company cars are two of such negative incentives. Tax exemptions for some "occupational" fuels, such as in agriculture, are another example of potential field of action.

135. The 2013-2018 governmental programme foresees the progressive decoupling of budgetary revenues from road fuel sales and ordinary expenses of the State [Government of the Grand Duchy of Luxembourg (2018), p. 121 & p. 173]. To the extent that the budget permits it, revenues will progressively be assigned to the financing of measures aiming at an active transition to a more sustainable model. To do so, an inter-ministerial working group has been set up (→ §99).

Emission Trading

136. Companies under the EU ETS Directive are faced with legal requirements that can bear additional costs (e.g. reduction of GHG emissions through investments, purchase of CO_2 quotas). In order to prevent industries from "carbon leakage" and to avoid the associated negative effects on countries underlying a less constraining regulation, free allocations have been delivered to companies falling under EU ETS regulation (e.g. cement, glass, steel and chemical industries). During the first Kyoto Commitment Period (2008-2012) about 14 installations were concerned (total of 12.44 million tonnes CO_2e of free allocations), whereas in the second period (2013-2020), 21 installations are beneficiating from approx. 10.06 million tonnes CO_2e.

Gender equality and Human Rights in the context of Climate Change

137. The European Convention on Human Rights is an international treaty under which the 47 Member States of the Council of Europe ensure fundamental, civil and political rights not only

to their nationals but also to all the people under their jurisdiction. Signed in Rome on 1 November 1950, this text came into force on 3 September 1953. In accordance with Art. 66 of the Convention, it is the deposit, in Strasbourg, of the 10th instrument of ratification by the Grand Duchy of Luxembourg that triggered the entry into force of the Convention. From 2012 to 2015, the Luxembourgish judge Dean Spielmann held the Presidency of the European Court of Human Rights.

138. Since 2015, Luxembourg is a proud signatory of the "Geneva Pledge for Human Rights in Climate Action". **The protection and the promotion of human rights, gender equality and the fight against climate change figure among the top policy priorities of the Luxembourg government**. Luxembourg is firm of the view that it is important to take the stance to defend the universal agendas in the international fight against climate change in the context of human rights and gender equality.

139. Luxembourg is in various ways actively involved in the promotion and protection of human rights and gender equality, e.g.:

- focus on gender equality in the programming cycles of international cooperation activities;
- during the selection process of projects applying for international climate finance support a sustainable development assessment is performed, which includes social criteria (e.g. health and safety, quality of employment, access to clean drinking water) and gender criteria looking at aspects of women empowerment and equality and gender sensitive development impacts;
- financial support to the Gold Standard Foundation for the development of "Gender Equality Guidelines and Requirements" and application of the guidelines and requirements in a pilot climate project;
- financial support to the "Energy Sector Management Assistance Program" (ESMAP) of the World Bank with focus on project preparation activities related to the creation of a climate, health and gender results-based finance structure for distributing high efficient and clean cookstoves and helping women adopting new technologies;
- in May 2015, establishment of an Inter-ministerial Committee for Human Rights (CIDH) in order to improve the national coordination as well as the close cooperation with civil society, which forms an integral part of the work of the committee;
- support of the United Nations Office of the High Commissioner for Human Rights.

140. Today, clear political statements and commitments are necessary in order to move to a fair and sustainable climate framework for the years to come. However, political commitment on its own is not enough. Acutely aware that complex challenges, like climate change and human rights, cannot be taken up effectively by one actor alone, but call for coordinated, multidisciplinary and multi-stakeholder responses, Luxembourg has associated itself with

partners from like-minded countries, international organizations and civil society to carry on the ongoing works in this regard. In order to stress its engagement in this cause, Luxembourg, together with its partners, hosted a side event dedicated to human rights and climate during COP23 in Bonn in 2017.

III.5.7. Steps relating to aviation and marine bunker fuels

141. Each Party included in Annex I shall, in pursuit of Art. 2, paragraph 2, of the Kyoto Protocol, identify the steps it has taken to promote and/or implement any decisions by the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) in order to limit or reduce emissions of GHG not controlled by the Montreal Protocol from aviation and marine bunker fuels.

142. Luxembourg is of the view that there is an urgent need to agree on global emission reduction targets for both international aviation and maritime transport, consistent with the 2°C objective, and believes that work should be continued through the ICAO and the IMO to implement a global policy framework ensuring a level playing field.

143. Luxembourg is actively participating in the ICAO work, mainly through the Abis group, representing the civil aviation authorities of eight European States (Austria, Belgium, Croatia, the Netherlands, Luxembourg, Ireland, Portugal and Switzerland) to the ICAO.

144. Luxembourg is of the view that the resolution for a global market-based measure to address CO_2 emissions from international aviation as of 2021, agreed upon by the ICAO Assembly in October 2016, is a significant step forward.

145. All aircraft operators administered by Luxembourg under the EU ETS are obliged to monitor their annual emissions and to submit a verified annual emission report. Revenues regenerated through the auctioning of the allowances (15 % will be auctioned) will be added to the "Climate and Energy Fund" *[→ Section V.7.2]*.

146. Furthermore, Cargolux, one of the leading cargo airlines worldwide based in Luxembourg, was the launch customer for the latest-generation of Boeing 747-8F, which is even more fuel-efficient and produces lower noise disturbances than the widely used Boeing 747-400F, one of the most fuel-efficient and quietest long-range wide-body aircraft available. The airline, in 2016, concluded its fleet rollover program with the delivery of its 14th and final 747-8 freighter. In June 2016, the company's environmental efforts were validated, as Cargolux became the first airline worldwide to be honoured with the "Lean & Green" award. The airline was recognized for its commitment to improve its carbon efficiency by 10 % within five years.

147. Luxembourg is also participating in the work undertaken by the IMO, and in particular the work of the Marine Environment Protection Committee. Luxembourg shares the general concern

within the EU that the IMO needs to further accelerate its efforts to reduce GHG emissions from the maritime sector and to adopt in April 2018 an ambitious initial IMO Strategy on reduction of greenhouse gas emissions from ships.

III.5.8. Modification of longer-term trends in GHG emissions

148. Paragraph 24 of the UNFCCC biennial reporting guidelines for developed country Parties [UNFCCC (2011)] encourages Annex I Parties to report, to the extent possible, on the domestic arrangements established for the process of the self-assessment of compliance with emission reductions in comparison with emission reduction commitments or the level of emission reduction that is required by science. Annex I Parties are equally encouraged to report, to the extent possible, on the progress made in the establishment of national rules for taking local action against domestic non-compliance with emission reduction targets.

149. Luxembourg's climate and sustainable development policies aim at modifying longer-term trends in anthropogenic GHG emissions and removals consistent with the objective of the Convention, but also with the latest developments in science. The **unilateral move made by Luxembourg in December 2019 for reducing its non ETS/ESR emissions by 55 % in 2030 compared to 2005** was **based on the scientific evidence** that the European Commission proposal in the "Climate and Energy framework" 2030 – a domestic reduction in GHG emissions of 40 % compared to 1990 – **would not be sufficient to limit the increase in the global average temperature to well below 2°C above pre-industrial levels**, **neither sufficient to reach a carbon neutral society by 2050**. Already in 2010, the second NSDP of Luxembourg identified 14 non-sustainable trends, including "GHG emissions that do not slow down due to an increased energy use" and "continuous growth of transport flows with adverse consequences on energy consumption, land use and road safety". The identified non-sustainable trends were tackled with 18 long-term objectives to be reached by 2050. Nowadays, as discussed in *Box 2* and §60, longer-term national objectives will be framed through the "Third Industrial Revolution Strategy Study" (TIR), as well as through the implementation of the Agenda 2030 in Luxembourg and the associated NSDP3 [MECDD (2019b)], which covers the 17 Sustainable Development Goals (SDGs), incl. SDG 13 – take urgent action to combat climate change and its impacts. Synergies and consistency between the TIR, the NDSP3 and the NECP are clearly sought.

150. A large share of the current PaMs of Luxembourg contribute to reducing GHG emissions in the longer-term. This is in particular the case for PaMs that have an impact on investments with long lifetimes such as the construction of low-energy and passive houses and investments in energy supply by renewable fuels. In addition, the promotion of electric vehicles is expected to have a long-term impact as it contributes to the long-term infrastructure development.

151. To ensure **taking effective local action against domestic non-compliance** with emission reduction targets, Luxembourg is currently finalising its "**Climate Protection Law**" that lays down provisions for **progressive and binding emission targets for 5 sectors** (→ §53 to §55).

152. Finally, together with the other EU member States, **Luxembourg will collectively contribute to the EU emission reduction target**. In case of non-compliance with its targets, the provisions set out in the Effort Sharing Decision (ESD° and Regulation (ESR) would be applied to Luxembourg.

III.6. INSTITUTIONAL ARRANGEMENTS FOR EVALUATING PAMS AND PERFORMING GHG PROJECTIONS

153. Paragraph 7 of the UNFCCC biennial reporting guidelines for developed country Parties [UNFCCC (2011)] requests that Annex I Parties shall provide information on changes in its domestic institutional arrangements, including institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards its economy-wide emission reduction target. This information was missing in Luxembourg's BR3.

154. A Grand-Ducal Regulation - hereafter the "GDR 04.2017" – of 24 April 2017 designates roles for the preparation and submission of GHG inventories. It also defines and allocates specific responsibilities for the realization of these GHG inventories both within the "Single National Entity"[70] and within the other administrations and/or services that will be involved in the inventory preparation in the future *[→ Section I.4]*. The GDR 04.2017 also proposes a **national system for reporting on policies and measures and for reporting on projections of anthropogenic GHG emissions by sources and removals by sinks**.[71]

155. The **projections**, as well as the **ex-ante and ex-post evaluation of PaMs**, including the **related costs**, should be carried out as appropriate by **sector experts** or the **competent institutions**, as determined in annex 2 to the GDR 04.2017.[72] The **sector experts** are responsible for:

- choosing appropriate methods for the calculation of projections as well as for the ex-ante and ex-post evaluation of PaMs, including the related costs;
- establishing, if necessary in consultation with the institutions referred to in annex 2 to the GDR 04.2017, the activity data, parameters and emission factors necessary for the

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70 The "Single National Entity" is a service or person located in the MECDD that coordinates the work and officially submit the information to the international institutions (see Art. 4 of the GDR 04.2017).

71 http://legilux.public.lu/eli/etat/leg/rgd/2017/04/24/a446/jo.

72 For each GHG source category or sub-category, responsible entities are defined, whether Ministries, Agencies or the STATEC. This list contains basically the same implementing entities than those identified in Tables III.5.3 to III.5.9.

calculations of the projections as well as for the ex-ante evaluation and ex-post of PaMs, including associated costs;

- calculating the projections as well as carry out the ex-ante and ex-post evaluation of PaMs, including the related costs, within the framework defined respectively by the UNFCCC, CLRTAP and the European Union;
- estimating the projections for the categories that fall within their sector(s), when the institution referred to in annex 2 to the GDR 04.2017 does not provide them with the data necessary for the calculation of these projections;
- calculating past projections and reassessing the costs and effects of PaMs when necessary, in particular for the following reasons: refinements or changes in methods, considering new sources of information, bug fixes, among others;
- estimating and calculating uncertainties relating to projections as well as to the ex-ante and ex-post evaluation of PaMs, including the related costs, in particular through sensitivity analyses;
- ensuring the quality assurance of projections and ex-ante and ex-post evaluation of PaMs, including related costs, as well as the control of this quality;
- preparing the necessary information for drafting methodological reports relating to their sector(s) for projections and for the ex-ante and ex-post evaluation of PaMs, including the related costs;
- actively participating in audits, preparing answers to auditors' questions and transmitting them to the "projections focal point" within the deadlines established by the latter;
- informing the "projections focal point", as well as the quality assurance manager of any problem encountered during the execution of their mission(s).

156. The "**projections focal point**" acts as the projections and PaMs coordinator and is located in the MECDD. There is one focal; point for the UNFCCC and GHG related reporting and one for the CLRTAP and associated reporting. He/she has the following missions:

- ensuring timeliness, transparency, accuracy, consistency, comparability and completeness of projections and ex-ante and ex-post evaluation of PaMs, including related costs;
- informing sector experts, as well as the institutions referred to in annex II to the GDR 04.2017, of any changes in the requirements, methods and assumptions and assessing, with the sector experts, the impact of these changes on the projections or on the ex-ante and ex-post evaluation of PaMs, including the related costs;
- assisting sectoral experts in their mission;
- taking into account the required deadlines, defining a timetable for the transmission of the various elements necessary for the calculation of projections and of the ex-ante and ex-post evaluation of PaMs, including the related costs, and ensuring that this deadline is respected;

- setting up a coherent system of documentation and archiving of the various information in relation to the projections and the ex-ante and ex-post evaluation of PaMs, including the related costs, and ensuring the compilation of related data;
- developing appropriate methods for collecting baseline data, validating the calculation of projections and the ex-ante and ex-post evaluation of PaMs, including related costs, evaluating the analysis of sensitivity to projections and performing, in collaboration with the manager of quality assurance, control and quality assurance of the aforementioned elements;
- estimating projections and ex-ante and ex-post evaluation of PaMs, including related costs, for a given sector when the expert or institution do not transmit the data necessary to establish these calculations within the period established by the schedule mentioned above;
- analysing projections and carrying out ex-ante and ex-post analysis of PaMs, including related costs;
- compiling all the data and information required for the projections, the ex-ante and ex-post evaluation of PaMs, including the related costs, and the related methodological reports using national, European Commission and UNFCCC IT tools;
- managing the external audit as carried out under the auspices of the European Commission and the UNFCCC. Establishing a plan to improve the calculation of projections and of the ex-ante and ex-post evaluation of PaMs, including the related costs that includes the recommendations and encouragements given. Ensuring their proper execution, in close collaboration with the quality assurance manager;
- providing the "Single National Entity" with information relating to the carrying out of projections and ex-ante and ex-post evaluation of PaMs, including the related costs as well as the possibilities and means of improving them;
- reporting to the "Single National Entity" any problem that could affect the proper functioning of the national system, in particular when the focal point has had to resort to the estimation of projections and ex-ante and ex-post evaluations of PaMs, including the related costs for a given sector, due to the fact that the expert or the institution referred to annex 2 to the GDR 04.2017 did not provide the data necessary to establish these calculations within the time limit established by the timetable.

Annex 1 – Changes in reporting compared to the latest submission

The table below summarizes the main changes compared to the previous submission – NC7 and BR3 – for the sections of this chapter, as well as for CTF related Tables.

Section or CTF Table in NC7/BR3	Section in BR4 and revisions
IV.1.1	III.2.1 to III.2.4 – more information on the post-2020 international context (III.2.3 & III.2.4).
IV.1.2	III.3.1 – shortened & III.3.2.
IV.1.3	III.3.3 – updated.
IV.1.4	III.3.4 – minor updates.
IV.1.5	III.3.5 – minor updates.
IV.1.6	III.3.6 – updated.
IV.2	III.4 – minor updates.
IV.3	III.5 – updates: from 78 to 75 PaMs, presentation of the PaMs by gas (Table III.5.2), inclusion of a preliminary list of NECP related PaMs (Box 9), discussion on the post Covid-19 recovery (Box 10).
IV.3.1	III.5.1 – minor updates & revisions.
IV.3.2	III.5.2 – minor updates & revisions.
IV.3.3	III.5.3 – no revision.
IV.3.4	III.5.4 – updated.
IV.3.5	III.5.5 – no revision.
IV.3.6	III.5.6 – minor updates.
IV.3.7	III.5.7 – no revision.
IV.3.8	III.5.8 – revised.
-	III.6 – new section.
CTF Table 3	updated.
CTF Tables 4, 4(a)I, 4(a)II, 4b	updated for 2017 & 2018.

Annex 2 – Implementation of recommendations and encouragements from the latest review

The table below indicates if recommendations and encouragements from the latest review – TRR.3, Table 5 [UNFCCC (2019b)] – have been included or not in this submission, and if not, why.

Reporting requirement	Issue type	Assessment	Description	Included Y/N
para. 7	Completeness	Recommendation	The ERT reiterates the recommendation made in the previous review report that Luxembourg include in its next BR information on changes in its domestic institutional arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress made towards its target.	Done: see section III.6.
para. 8	Completeness	Encouragement	The ERT reiterates the encouragement made in the previous review report that Luxembourg include in its next BR information on the assessment of the economic and social consequences of its response measures.	Done: see section III.5.6.
CTF Table 3	Transparency	Recommendation	The ERT reiterates the recommendation that Luxembourg provide the estimated effect of each mitigation action, or a clear explanation as to why this may not be possible due to its national circumstances.	As the BR4 reproduces almost entirely the PaMs presented in the BR3 there are no new estimates for the mitigation effect of the listed PaMs. Some explanations of why it has not be improved since the last submission is given in section III.3.6.

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Chapter IV

National Projections of GHG Emissions

IV.1. INTRODUCTION

1. Chapter IV discusses **GHG projections up to 2040** for two scenarios: "**with existing measures**" (WEM scenario), and "**with additional measures**" (WAM scenario). After short preliminary comments *[→ Section IV.2]*, this chapter touches on the methodology underpinning the projections *[→ Section IV.3]*, as requested by **paragraph 12 of the UNFCCC biennial reporting guidelines for developed country Parties** (BR GL) [UNFCCC (2011)] and by **paragraphs 42, 43 and 48 of the UNFCCC Guidelines for the preparation of national communications by Parties included in Annex I to the Convention** (NC GL) [UNFCCC (1999)]. Results of the projections exercise are presented for a series of source categories, as well as by gas *[→ Section IV.4]*. The projections are in line with most of the recommendations of **paragraphs 27 to 32 and 34 to 41 of the NC GL**. After a brief discussion of **possible improvements** in the GHG projections methodology *[→ Section IV.5]*, the **estimated and expected effects of individual policies and measures** are reported *[→ Section IV.6]*. The final section of this chapter discusses **supplementarity relating to the "flexible mechanisms" under Article 6, 12 and 17 of the Kyoto Protocol** *[→ Section IV.7]*. Finally, **Annex 1 summarizes changes between the BR4 and the NC7/BR3** and **Annex 2** indicates whether **recommendations and encouragements from the latest review** – TRR.3 [UNFCCC (2019b)] – have been implemented or not.

2. This chapter has been written by the MECDD.

IV.2. PRELIMINARY REMARKS: PROJECTIONS ASSOCIATED WITH HIGH UNCERTAINTY

3. This report has already emphasized specific national circumstances of Luxembourg, e.g. in *Section I.2.9*, which are setting the limits of a GHG projections exercise for Luxembourg. The main limits are described below.

IV.2.1. Economy size increases the uncertainty of GHG projections

4. Luxembourg's economy size yield uncertainties as even single decisions at the company level – either the opening, the closure or the breakdown of an industrial installation – could have a major impact on the overall national emissions development. National examples illustrating the difficulty of making reliable long-term forecasts include the power generation sector – with the TWINerg gas-fired power plant, which started operating in 2002, then faced long maintenance periods in 2008 and 2011 before it was finally shut down in 2016 – and the iron and steel sector which switched from blast furnaces to electric arc furnaces between 1994 and 1998. **As decisions at the company level can hardly be anticipated appropriately**, **emissions projections** for both the power generation and the industrial sectors **need to be evaluated with care**.

IV.2.2. Road transportation: "road fuel sales to non-residents" share complicates the projection exercise

5. With 57.1 % of total greenhouse gases (hereafter GHG) emissions (excl. LULUCF) in 2018 stemming from road transport, and 39.2 % allocated to "road fuel sales to non-residents",[1] emissions structure is dominated by one sub-category – namely CRF 1A3b – for which the future evolution will not only depend on national policies and measures (hereafter PaMs), but also:
   - on the international context, such as road fuel prices and taxation in the neighbouring countries (e.g. the willingness of the French and Belgian governments to raise excises rates on diesel so that its price is equal to or higher than the price of gasoline);
   - on options chosen with regard to mobility at European Union (hereafter EU) level and, especially, in the neighbouring countries or regions (limitation of trucks circulation, the introduction of road use fees or changes in the toll policy, etc.);
   - on technological developments (electric or hybrid cars, fuel cells vehicles, higher energy-efficient engines, etc.).

   There is, therefore, a **high uncertainty** for the projected emissions due to road transport. Nevertheless, projections **consider national PaMs implemented, adopted or planned and, to the extent possible, overall transport and traffic developments as appraised in European models**.

6. More precisely, the dominant influence of tax policy, but also other factors such as the expansion of road networks in neighbouring countries, which would allow a by-pass of the territory of Luxembourg, or the institution or increase of road use taxes in these countries,[2] make projection of fuel sales – and corresponding GHG emissions – a challenging task. The impact from "road fuel sales to non-residents" can hardly be controlled by unilateral adaptations in national **tax policy**. Fuel sales attributed to "road fuel sales to non-residents" being mainly triggered by fuel price differentials, Luxembourg would need to permanently coordinate its tax policy with the policy of all neighbouring states (Belgium, France and Germany). This would mean to accept a limitation of the scope of national tax design options. Another difficulty arises when trying to take account of the impact of **technological developments**. On the one hand, economic modelling of technological developments in general shows considerable deficits and thus the analysis is limited to the representation of the effects of the diffusion of new technologies within existing systems. On the other hand, there are limits to the extent to which the analysis can be

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1 Percentages compared to the ESD emissions are 66.3 % and 45.6 % respectively. For a definition of "road fuel sales to non-residents", see *Section I.2.8*.

2 Road use taxes could be tolls to be paid on certain sections of motorways or other infrastructures, such as it is the case in France or specific taxes levied on specific vehicles categories, such as the "Eurovignette".
Like Belgium up to 2016, and as well as the Netherlands, Denmark and Sweden, Luxembourg has, since 2001, been charging the "Eurovignette" on trucks using its highways following the so-called "Eurovignette Directive": https://eur-lex.europa.eu/eli/dir/2011/76/oj.
In Luxembourg, this tax (or user fee) is based on pollutant emissions (EURO standards) and the truck's number of axles. It can be paid on a yearly, monthly, weekly or daily basis: see https://douanes.public.lu/fr/commerce-international/Transport_marchandise/eurovignette.html.

built up. For example, the effects of more energy-efficient engines on fuel sales in road transport in 5 to 10 years are not clear. EU legislation and planned EURO standards could help to set the framework. However, this underlines the influence of various economic factors that can be controlled by the state and the complexity of making a sound forecast. This is expressed not least in the lack of an empirical understanding of the determinants of technical progress, such as the timing of market introduction of new types of vehicles, the energy source used – e.g. electricity, fuel cells or compressed air – or public acceptance of the new technology.

IV.3. MODEL AND METHODOLOGY

IV.3.1. Overall approach

7. GHG projections **for the years 2020, 2025, 2030, 2035 and 2040** have been estimated in February 2020 for the final version of Luxembourg's National Energy and Climate Plan (hereafter NECP: see *Section III.3.3*). They have been revised end October 2020 to consider the "approximated GHG inventory" for the year 2019 and the consequences of the first lockdown due to the Covid-19 pandemic during springtime. Projections are classified by gas, except PFCs and NF_3, for which no emissions are reported by Luxembourg, and have been performed at CRF source category or sub-category levels – the only sectors that were not estimated being CRF 3.H (urea application), CRF 4.G (harvested wood products) and some memo items. Projected emissions are reported for both the WEM and WAM scenarios. They are also distributed between ETS and non-ETS (ESD/ESR)[3] when relevant, since this is of high significance for EU member countries *[→ Section III.2.2 & III.2.3]*. Often, in-between years (2021 to 2024, 2026 to 2029, etc.) are the result of linear interpolation.

8. The latest inventory submitted to the UNFCCC is the reference for the reported (or "historical") years **1990 to 2018**, i.e. **submission 2020v1**.[4] GHG emissions for the year **2019** are those from the "**approximated GHG inventory**" submitted to the European Commission end July 2020.[5] Some of the former projections – based on past submissions – have been adjusted applying a "rule of three", i.e. the projected trend has been kept but the level revised so that projections are in line with the latest "historical" and/or "approximated" data.

9. Except for the major energy-related CRF source categories, the projections are the result of **a "bottom-up"** or **"case-by-case" approach** *[→ Section IV.3.2]*. *Table IV.3-1* on the following pages summarizes the various methods, assumptions and data sources used for this exercise.

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3 ESD = Effort Sharing Decision: https://eur-lex.europa.eu/eli/dec/2009/406/oj.
ESR = Effort Sharing Regulation: https://eur-lex.europa.eu/eli/reg/2018/842/oj.

4 https://unfccc.int/documents/225456.

5 https://cdr.eionet.europa.eu/lu/eu/mmr/art08_proxy/envxyjjbg/.

TABLE IV.3-1 – MAIN ASSUMPTIONS FOR GHG PROJECTIONS FOR WEM & WAM SCENARIOS

Sector (aggregated)	Projection method A	Projection method B	Other assumptions	ESD vs. ETS emissions	GHG evaluation
Total excluding LULUCF					
Total including LULUCF					
1 Energy					
1.A Fuel combustion					
1.A.1 Energy industries					
1.A.1.a Public electricity and heat production	All years – WEM: unadjusted "Konsortium" Baseline Scenario projections prepared for the NECP.	All years – WAM: derived from "Konsortium" Target Scenario projections prepared for the NECP.	- the TWINerg is not re-activated. - no new CHP plant similar to the TWINerg is starting operations. - new power plants are mostly using biomass (wood, biogas, etc.). - WAM scenario: existing co-generation power plants will progressively phase-out fossil fuels such as natural gas and oil and only operate with biomass. The transition is completed by 2033 (hypothesis MEA). - no Covid-19 adjusted estimates for 2020.	ETS: WEM: it is anticipated that the ETS installations will continue operating with the same energy-mix and power deliveries as in both 2018 & 2019 (average). Hence, the average 2018 & 2019 ETS emissions rounded value is extended to 2040. WAM: the anticipated growth rate of electricity production as in the "Konsortium" Target Scenario is applied to the verified 2019 ETS emissions. ESR: WEM: difference between constant total GHG estimates (unadjusted "Konsortium" Baseline Scenario constant projections) & ETS constant estimates. WAM: difference between total GHG estimates & ETS estimates so that the total WAM emissions excl. SIDOR equal the "Konsortium" Target Scenario projections (SIDOR projections estimated separately by the MECDD).	All gases: derived from "Konsortium" Baseline or Target Scenario projections: application of the respective average weights of CO_2, CH_4 & N_2O in total emissions for the years 2016-2018 only - since the sector experienced dramatic changes with the slow down and then the closing of the TWINerg during the year 2016 - to the "Konsortium" projected emissions so that the total CO_2 + CH_4 + N_2O equals: - the "Konsortium" Baseline Scenario projections for the WEM scenario; - the "Konsortium" Target Scenario projections for the WAM scenario, excl. SIDOR. For the WAM scenario, the total projected GHG emissions by SIDOR have been estimated by the MECDD under the following hypotheses: in 2030, at SIDOR facility the quantity of paper/cardboard, food waste & plastics incinerated will be the half of their 2017 level. The subsequent years are kept constant at the 2030 level. For the WEM scenario, SIDOR estimates are based on population growth (but not directly used in the projections: see WEM explanation in the previous column).
1.A.1.b Petroleum refining	NO	NO	NO	NO	NO
1.A.1.c Manufacture of solid fuels and other energy industries	NO	NO	NO	NO	NO

1.A.2 Manufacturing industries and construction	All years – WEM & WAM: unadjusted "Konsortium" Baseline or Target Scenario projections prepared for the NECP.	-	- WEM & WAM: no closings of or new operating plants are considered. - 2020 - Covid-19 adjusted estimates: according to the latest STATEC's monthly production index for the industry as a whole (NACE Rev2 B to D), published 200929, for the first 7 months of 2020, the production index is down 15.2% compared to the first 7 months of 2019. Considering that for the 5 remaining months of 2020, the activity level will be similar to 2019 - MECDD hypothesis excluding a second lockdown in 2020 - the production index would be down 9% in 2020 compared to 2019. As this decrease is lower than those calculated based on the 2020 projections by the "Konsortium" compared to the 2019 proxy estimates (minus 10.8% for the WEM & minus 12.1% for the WAM scenarios), no adjustments have been performed (comment valid also for ETS & ESR estimates).	ESR & ETS: unadjusted "Konsortium" Baseline or Target Scenario projections.	All gases: derived from "Konsortium" Baseline or Target Scenario projections: application of the respective average weights of CO_2, CH_4 & N_2O in total emissions for the last five inventory years (2014-2018) to the "Konsortium" projected emissions so that the total CO_2 + CH_4 + N_2O equals the "Konsortium" Baseline or Target Scenario projections.
1.A.3 Transport					
1.A.3.a Domestic aviation	All years – WEM = WAM: MECDD basic projections: 2020-2040 = average of the last 5 historical years (2015-2019) emissions.	-	No Covid-19 adjusted estimates for 2020.	NA, however 1A3a CO_2 related emissions are not part of the non-ETS/ESR emissions.	All gases: MECDD basic projections: 2020-2040 = average of the last 5 historical years (2015-2019) emissions.
1.A.3.b Road transportation	All years – WEM & WAM: derived from "Konsortium" Baseline or Target Scenario projections prepared for the NECP.	-	- based on "Konsortium" Baseline or Target Scenario projected emissions from which 1A3a/c/d estimated emissions have been subtracted so that 1A3 projected emissions = unadjusted "Konsortium" Baseline or Target Scenario projections. - 2020 - Covid-19 adjusted estimates: the estimated emission reductions between 2019 & 2020 is minus 11.8% for the WEM scenario & minus 17.9% in the WAM scenario. The anticipated emission reduction in 2020 compared to 2019 is 16.6% - using STATEC table A3207 on quarterly energy-related CO_2 emissions where 2020Q3 &	NA	All gases: derived from "Konsortium" Baseline or Target Scenario projections. Due to a dramatic revision of both CH_4 & N_2O emissions in the 2020 inventory compared to the previous inventories, the estimates from the adjusted 2017 Komobile S4 E-mobility scenario projections [Komobile & FVT (2017a)] could not be used anymore. Instead: WEM: application of the annual growth rates from the adjusted Komobile S4 E-mobility scenario projections to the latest historical values of CH_4 or N_2O. CO_2 estimates are then the difference between the

			2020Q4 have been estimated by the MECDD. As a consequence, this reduction has been applied for 2020 for the WEM scenario only (as the WAM projections yield a higher decrease than the 16.6%); the subsequent estimates remaining identical.		total "Konsortium" Baseline Scenario projected emissions from which 1A3a/c/d estimated emissions have been subtracted and the sum of both CH_4 & N_2O estimates expressed in CO_2e. WAM: application of the respective weights of CH_4 & N_2O in total emissions from the WEM scenario to the "Konsortium" Target Scenario projected emissions from which 1A3a/c/d estimated emissions have been subtracted. CO_2 estimates are then the difference between that total and the sum of both CH_4 & N_2O estimates expressed in CO_2e.
1.A.3.c Railways	All years – WEM & WAM: based on activity data prepared by the MECDD-AEV for the 2020 NAPCP BAU & WAM scenarios, which are derived from the 2020 revised Komobile projections that considers the "Konsortium" Baseline or Target Scenario projections prepared for the NECP.	-	- the WAM projected emissions are higher than the WEM ones because for the former, it is anticipated that rail transportation for goods and rail movements in logistics centres will increase more than in the BAU scenario. For details, see Komobile report (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	All gases: based on activity data prepared by the MECDD-AEV for the 2020 NAPCP BAU & WAM scenarios, which are derived from the 2020 revised Komobile projections that considers the "Konsortium" Baseline or Target Scenario projections.
1.A.3.d Domestic navigation	All years – WEM & WAM: based on activity data prepared by the MECDD-AEV for the 2020 NAPCP BAU & WAM scenarios, which are derived from the 2020 revised Komobile projections that considers the "Konsortium" Baseline or Target Scenario projections prepared for the NECP.	-	- for details, see Komobile report (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	All gases: based on activity data prepared by the MECDD-AEV for the 2020 NAPCP BAU & WAM scenarios, which are derived from the 2020 revised Komobile projections that considers the "Konsortium" Baseline or Target Scenario projections.
1.A.3.e Other transportation	NO	NO	NO	NO	NO

1.A.4 Other sectors					
1.A.4.a Commercial/Institutional	All years – WEM & WAM: unadjusted "Konsortium" Baseline or Target Scenario projections prepared for the NECP.	-	No Covid-19 adjusted estimates for 2020. The latest STATEC's monthly energy gross delivery by product (table A4101) shows a dramatic increase in both March and April 2020 compared to the same months in 2019. However, in June and July 2020, deliveries are much lower than for the same months in 2019. Hence, no obvious conclusions can be taken yet on whether or not the Covid-19 crisis has affected heating-related energy demand.	NA	All gases: derived from "Konsortium" Baseline or Target Scenario projections: application of the respective weights of CO_2, CH_4 & N_2O from the 2017 projections to the "Konsortium" projected emissions so that the total $CO_2 + CH_4 + N_2O$ equals the "Konsortium" Baseline or Target Scenario projections.
1.A.4.b Residential	All years – WEM & WAM: unadjusted "Konsortium" Baseline or Target Scenario projections prepared for the NECP.	-	No Covid-19 adjusted estimates for 2020. The latest STATEC's monthly energy gross delivery by product (table A4101) shows a dramatic increase in both March and April 2020 compared to the same months in 2019. However, in June and July 2020, deliveries are much lower than for the same months in 2019. Hence, no obvious conclusions can be taken yet on whether or not the Covid-19 crisis has affected heating-related energy demand.	NA	All gases: derived from "Konsortium" Baseline or Target Scenario projections: application of the respective weights of CO_2, CH_4 & N_2O from the 2017 projections to the "Konsortium" projected emissions so that the total $CO_2 + CH_4 + N_2O$ equals the "Konsortium" Baseline or Target Scenario projections.
1.A.4.c Agriculture/Forestry/ Fishing	All years – WEM: based on activity data prepared by the MECDD-AEV for the 2020 NAPCP BAU scenario, which is derived from the 2020 revised Komobile projections that consider the "Konsortium" Baseline or Target Scenario projections prepared for the NECP.	All years – WAM: - based on activity data prepared by the MECDD-AEV for the 2020 NAPCP WAM scenario. - MECDD hypotheses: by 2030 the diesel used by tractors, harvesters, etc. (1.A.4.c.ii) is only 50% of the diesel consumption reported for 2017 (i.e. the fraction of biodiesel increases consequently). The years 2021 to 2029 are interpolated, the years 2031 to 2040 kept at the 2030 level and the year 2020 = the former adjusted 2017 Komobile projection [Komobile & FVT (2017a)].	No Covid-19 adjusted estimates for 2020.	NA	All gases: WEM: based on activity data prepared by the MECDD-AEV for the 2020 NAPCP BAU & WAM scenarios, which are derived from the 2020 revised Komobile projections that consider the "Konsortium" Baseline or Target Scenario projections. WAM: MECDD hypotheses.

1.A.5 Other	All years – WEM = WAM: based on activity data prepared by the MECDD-AEV for the 2020 NAPCP BAU = WAM scenarios, which are derived from the 2020 revised Komobile projections that consider the "Konsortium" Baseline or Target Scenario projections.	-	No Covid-19 adjusted estimates for 2020.	NA	All gases: based on activity data prepared by the MECDD-AEV for the 2020 NAPCP BAU & WAM scenarios, which are derived from the 2020 revised Komobile projections that consider the "Konsortium" Baseline or Target Scenario projections.
1.B Fugitive emissions from fuels					
1.B.1 Solid fuels	NO	NO	NO	NO	NO
1.B.2 Oil and natural gas and other emissions from energy production	All years – WEM & WAM: based on activity data (fugitive emissions of motor gasoline & gas distribution) prepared by the MECDD-AEV for the 2020 NAPCP BAU & WAM scenarios.	-	2020 - Covid-19 adjusted estimates: the anticipated emission reduction in 2020 compared to 2019 is 16.9% - using STATEC table A4101 on monthly energy gross delivery by product where 2020-08 to 2020-12 have been estimated by the MECDD. This reduction has been applied for 2020 for both the WEM & WAM scenarios; the subsequent estimates remaining identical.	NA	CO_2 & CH_4: based on activity data (fugitive emissions of motor gasoline & gas distribution) prepared by the MECDD-AEV for the 2020 NAPCP BAU & WAM scenarios.
1.C CO_2 transport and storage	NO	NO	NO	NO	NO
2 Industrial processes					
2.A Mineral Industry					
2.A.1 of which cement production	2020/25/30/35 – WEM = WAM: MECDD-AEV projections.	Other years – WEM = WAM: interpolation & MECDD basic projections.	- no updated 2017 projections were transmitted by the MECDD-AEV for the 2020 reporting. For these projections, the projected emissions estimate decrease/increase by the same amount between two points in time ending by 0 or 5 when the year 2015 is taken as the reference year (2015 was the latest inventory year at that time). As 4 new inventory years are now available (incl. the proxy 2019 inventory), the MECDD decided to apply the same approach on the average value of the last 5 inventory years, i.e. 2014-2019, which, in this case, equals the 5 last ETS Registry verified values. - 2020 - Covid-19 adjusted estimates: according to the latest STATEC's monthly production index for the manufacture of construction materials and abrasive products (NACE Rev2 23.5 to 23.9), published 200929, for the first 7	All CO_2 projected emissions are supposed to be ETS emissions.	CO_2: projections prepared by the MECDD-AEV. MECDD has adapted them (as described in the 'Other assumptions' column). The MECDD has also prolonged the emissions to 2040 using the constant amount.

			months of 2020, the production index is down 6.9% compared to the first 7 months of 2019. Considering that for the 5 remaining months of 2020, the activity level will be similar to 2019 - MECDD hypothesis excluding a second lockdown in 2020 - the production index would be down 4% in 2020 compared to 2019. As this decrease is lower than the one calculated on the basis of the MECDD-AEV method for the WEM = WAM scenario, no adjustments have been performed.		
2.A.3 of which other non-cement production	2020/25/30/35 – WEM = WAM: MECDD-AEV projections.	Other years – WEM = WAM: interpolation & MECDD basic projections.	- no updated 2017 projections were transmitted by the MECDD-AEV for the 2020 reporting. For these projections, the projected emissions estimate decrease/increase by the same amount between two points in time ending by 0 or 5 when the year 2015 is taken as the reference year (2015 was the latest inventory year at that time). As 4 new inventory years are now available (incl. the proxy 2019 inventory), the MECDD decided to apply the same approach on the average value of the last 5 inventory years, i.e. 2014-2019, which, in this case, equals the 5 last ETS Registry verified values. - 2020 - Covid-19 adjusted estimates: according to the latest STATEC's monthly production index for the manufacture of glass, refractory and ceramic products (NACE Rev2 23.1 to 23.4), published 200929, for the first 7 months of 2020, the production index is down 22.6% compared to the first 7 months of 2019. Considering that for the 5 remaining months of 2020, the activity level will be similar to 2019 - MECDD hypothesis excluding a second lockdown in 2020 - the production index would be down 13.2% in 2020 compared to 2019. As this decrease is higher than the one calculated on the basis of the MECDD-AEV method for the WEM = WAM	All CO_2 projected emissions are supposed to be ETS emissions.	CO_2: projections prepared by the MECDD-AEV. MECDD has adapted them (as described in the 'Other assumptions' column). The MECDD has also prolonged the emissions to 2040 using the constant amount.

			scenario, it has been applied for 2020; the subsequent estimates remaining identical.		
2.B Chemical industry	NO	NO	NO	NO	NO
2.C Metal industry					
2.C.1 of which Iron and steel production	2020/25/30/35 – WEM = WAM: MECDD-AEV projections.	Other years – WEM = WAM: interpolation & MECDD basic projections.	- no updated 2017 projections were transmitted by the MECDD-AEV for the 2020 reporting. For these projections, the projected emissions estimate decrease/increase by the same amount between two points in time ending by 0 or 5 when the year 2015 is taken as the reference year (2015 was the latest inventory year at that time). As 4 new inventory years are now available (incl. the proxy 2019 inventory), the MECDD decided to apply the same approach on the average value of the last 5 inventory years, i.e. 2014-2019, which, in this case, equals the 5 last ETS Registry verified values. - 2020 - Covid-19 adjusted estimates: according to the latest STATEC's monthly production index for the manufacture of steel products (NACE Rev2 24.1 & 24.2), published 200929, for the first 7 months of 2020, the production index is down 18.5% compared to the first 7 months of 2019. Considering that for the 5 remaining months of 2020, the activity level will be similar to 2019 - MECDD hypothesis excluding a second lockdown in 2020 - the production index would be down 11.8% in 2020 compared to 2019. As this decrease is higher than the one calculated on the basis of the MECDD-AEV method for the WEM = WAM scenario, it has been applied for 2020; the subsequent estimates remaining identical.	All CO_2 projected emissions are supposed to be ETS emissions.	CO_2: projections prepared by the MECDD-AEV. MECDD has adapted them (as described in the 'Other assumptions' column). The MECDD has also prolonged the emissions to 2040 using the constant amount.

2.C.7 of which other non-iron and steel production	All years – WEM = WAM: MECDD basic projections.	-	- no projections were transmitted by the MECDD-AEV for the 2020 reporting. - 2020 - Covid-19 adjusted estimates: according to the latest STATEC's monthly production index for the first processing of steel, manufacture of non-ferrous metals, casting (NACE Rev2 24.3 to 24.5), published 200929, for the first 7 months of 2020, the production index is down 9.6% compared to the first 7 months of 2019. Considering that for the 5 remaining months of 2020, the activity level will be similar to 2019 - MECDD hypothesis excluding a second lockdown in 2020 - the production index would be down 6% in 2020 compared to 2019. As this decrease is higher than the one calculated on the basis of the MECDD-AEV method for the WEM = WAM scenario, it has been applied for 2020; the subsequent estimates remaining identical.	All CO_2 projected emissions are supposed to be ETS emissions.	CO_2: the projections correspond to the average of the 4 years for which emissions are reported, i.e. 2016 to 2019.
2.D Non-energy products from fuels and solvent use	All years – WEM = WAM: based on activity data (solvents used & asphalt produced) prepared by the MECDD-AEV for the 2020 NAPCP BAU = WAM scenarios.	-	No Covid-19 adjusted estimates for 2020.	NA	CO_2: based on activity data (solvents used & asphalt produced) prepared by the MECDD-AEV for the 2020 NAPCP BAU & WAM scenarios.
2.E Electronics industry	NO	NO	NO	NO	NO
2.F Product uses as substitutes for ODS	2020/25/30/35 – WEM = WAM: MECDD-AEV projections.	Other years – WEM = WAM: interpolation & MECDD basic projections.	- no updated 2017 projections were transmitted by the MECDD-AEV for the 2020 reporting. Therefore, the growth rates/trend for the projected years that was applied on the reference year 2015 by the MECDD-AEV is now applied on the average value of the last 5 inventory years (incl. the proxy inventory), i.e. 2015-2019. - no Covid-19 adjusted estimates for 2020.	NA	HFCs: MECDD has adapted the MECDD-AEV projections (as described in the 'Other assumptions' column). The MECDD has also prolonged the emissions to 2040 using the growth rate/trend of the MECDD-AEV projections up to 2035.

2.G Other product manufacture and use	2020/25/30/35 – WEM = WAM: MECDD-AEV projections.	Other years – WEM = WAM: interpolation & MECDD basic projections.	- no updated 2017 projections were transmitted by the MECDD-AEV for the 2020 reporting. N_2O & SF_6: the growth rates/trend for the projected years that was applied on the reference year 2015 by the MECDD-AEV is now applied on the average value of the last 5 inventory years (incl. the proxy inventory), i.e. 2015-2019. HFCs: the MECDD-AEV provided a flat projection that was well below the level that is now reached in the latest inventory 2020v1 for which a sharp increase is recorded for HFCs in 2017. The MECDD decided to keep the flat projection but to adjust it so to reflect the latest inventory emission level. - no Covid-19 adjusted estimates for 2020.	NA	N_2O & SF_6: MECDD has adapted the MECDD-AEV projections (as described in the 'Other assumptions' column). The MECDD has also prolonged the emissions to 2040 keeping them to their 2035 level. HFCs: projections prepared by the MECDD-AEV adjusted by the MECDD so to consider the sharp increase in HFCs emissions that occurred in 2017.
2.H Other	NO	NO	NO	NO	NO
3 Agriculture					
3.A Enteric fermentation	All years – WEM & WAM: SER projections.	-	- for dairy cows and suckler cows, projections based on the continuation of the observed trend since 2015 (the year when the milk quota ended). - all other cattle categories were calculated based on estimated cow numbers, and the correlation observed in previous years (bottom-up approach). - continuing observed trend for laying hens. - swine and all other livestock numbers remain constant (simple hypothesis). - for the WAM scenario, various measures and developments are considered (climate friendly measures promoted in the agricultural sector, reduction of the number of dairy & suckler cows as well as pigs, milk yield cap, etc.). - for details, see SER reports (unpublished).	NA	CH_4: projections prepared by the SER.

			- no Covid-19 adjusted estimates for 2020.		
3.B Manure management	All years – WEM & WAM: SER projections.	-	- livestock activity data (see 3A) are driving those emissions. - manure management systems are assumed to remain unchanged. - for the WAM scenario, various measures and developments are considered (climate-friendly measures promoted in the agricultural sector, reduction of the number of dairy & suckler cows as well as pigs, measures and systems to reduce Nex, a more environment-friendly slurry management, incl. the use of slurry to produce biogas, etc.). - for details, see SER reports (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	CH_4 & N_2O: projections prepared by the SER.
3.C Rice cultivation	NO	NO	NO	NO	NO
3.D Agricultural soils	All years – WEM & WAM: SER projections.	-	- for synthetic N fertilizer, sewage sludge and compost, projections were made using trends from the recent years. - for organic manure from livestock, manure management systems were hold constant, but, for the WAM scenario, it is anticipated an increasing trend of environmentally friendly slurry application, organic farming, etc. - estimation of the development w.r.t. cultivation of arable crops and grassland, as well as harvests, is based on trend estimations and simple hypotheses. - for details, see SER reports (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	N_2O: projections prepared by the SER.
3.E Prescribed burning of savannahs	NO	NO	NO	NO	NO
3.F Field burning of agricultural residues	NO	NO	NO	NO	NO

3.G Liming	All years – WEM = WAM: SER projections.	-	- the use of liming has increased since 1990 until today. Given the hypothesis that the current used quantities are close to the maximum considered as being good agriculture practice and having no other satisfactory projections method on possible developments of liming, a "flat" projection replicating the latest available historical year (2019) has been applied. - no Covid-19 adjusted estimates for 2020.	NA	CO_2: SER hypothesis: 2020-2040 = 2019 proxy emissions.
3.H Urea application	NE	NE	NE	NE	NE
3.I Other carbon-containing fertilizers	NO	NO	NO	NO	NO
3.J Other	NO	NO	NO	NO	NO
4 Land Use, Land-Use Change and Forestry					
4.A Forest land	2020/25/30/35/40 – WEM = WAM: MECDD-AEV projections.	Other years – WEM = WAM: interpolation by MECDD.	- land use changes from and to forestland are assumed to be zero. Future harvest rates are assumed similar to harvest rates calculated according to the hypothesis used to determine the Forest Management Reference Level. For details, see MECDD-AEV report (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	CO_2: MECDD-AEV projections.
4.B Cropland	2020/25/30/35/40 – WEM = WAM: MECDD-AEV projections.	Other years – WEM = WAM: interpolation by MECDD.	- agricultural practices remain unchanged and hence the carbon stock change within the category cropland remaining cropland is zero. The land use changes from grassland to cropland are assumed to be zero. For details, see MECDD-AEV report (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	CO_2 & N_2O: MECDD-AEV projections.
4.C Grassland	2020/25/30/35/40 – WEM = WAM: MECDD-AEV projections.	Other years – WEM = WAM: interpolation by MECDD.	- agricultural practices remain unchanged and hence the carbon stock change within the category grassland remaining grassland is zero. The land use changes from cropland to grassland are assumed to be zero. For details, see MECDD-AEV report (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	CO_2 & N_2O: MECDD-AEV projections.

4.D Wetlands	2020/25/30/35/40 – WEM = WAM: CO_2: MECDD-AEV projections.	Other years – WEM = WAM: CO_2 emissions interpolated by MECDD up to 2035.	- see MECDD-AEV report (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	CO_2: projections prepared by the MECDD-AEV. For 2035/40, a zero value is provided. The 2035 projected value has been estimated by the MECDD and prolonged up to 2040. N_2O: no projections provided by MECDD-AEV. MECDD hypothesis is to continue the trend observed since 1990, which reach 0 by 2025-2026. Hence a "0.00001" projected value from 2026 onwards (not NO since there still might be some emissions).
4.E Settlements	2020/25/30/35/40 – WEM = WAM: MECDD-AEV projections.	Other years – WEM = WAM: interpolation by MECDD.	- land use is based on the business as usual scenario of population growth provided by STATEC. For details, see MECDD-AEV report (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	CO_2 & N_2O: MECDD-AEV projections.
4.F Other Land	2020/25/30/35/40 – WEM = WAM: CO_2: MECDD-AEV projections.	Other years – WEM = WAM: CO_2 emissions interpolated by MECDD up to 2035.	- see MECDD-AEV report (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	CO_2: projections prepared by the MECDD-AEV. For 2035/40, a zero value is provided. The 2035 projected value has been estimated by the MECDD and prolonged up to 2040. N_2O: no projections provided by MECDD-AEV. MECDD hypothesis is to continue the trend observed since 1990, which reach 0 by 2020-2021. Hence a "0.000001" projected value from 2021 onwards (not NO since there still might be some emissions).
4.G Harvested wood products	NE	NE	NE	NE	NE
4.H Other	NO	NO	NO	NO	NO
5 Waste					
5.A Solid Waste Disposal	2020/25/30/35/40 – WEM: MECDD-AEV projections	- other years – WEM interpolation by MECDD. - all years – WAM: MECDD hypothesis: 2030 emissions and subsequent years = 0 since waste disposal will progressively be phase out by 2030. 2021 to 2029 are interpolated.	- see MECDD-AEV report (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	CH_4: WEM: MECDD-AEV projections. WAM: MECDD hypothesis: 2030 emissions and subsequent years = 0 and years 2021 to 2029 are interpolated.

5.B Biological treatment of solid waste	All years – WEM = WAM: based on activity data (organic domestic waste) prepared by the MECDD-AEV for the 2020 NAPCP BAU = WAM scenarios.	-	No Covid-19 adjusted estimates for 2020.	NA	CH_4 & N_2O: based on activity data (organic domestic waste) prepared by the MECDD-AEV for the 2020 NAPCP BAU & WAM scenarios.
5.C Incineration and open burning of waste	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE
5.D Wastewater treatment and discharge	2020/25/30/35 – WEM = WAM: MECDD-AGE projections.	Other years – WEM = WAM: interpolation & MECDD basic projections.	- see MECDD-AGE worksheet (unpublished). - no Covid-19 adjusted estimates for 2020.	NA	CH_4: MECDD-AGE projections. From 2030 onwards, MECDD-AGE reports NO. Between 2025 & 2030, the interpolation is a decreasing trend towards 0 suggested by MECDD; N_2O: MECDD-AGE projections. MECDD has prolonged the emissions to 2040, keeping them to their 2035 level.
5.E Other	NO	NO	NO	NO	NO
Memo items					
International bunkers					
Aviation	All years – WEM = WAM: - adjusted POTEnCIA DCS v2 2018 projections for CO_2 emissions for aviation; - projections made at CO_2 level.	-	- POTEnCIA CO_2 emissions are calculated on the basis of kerosene demand for conventional engines. - 2020 - Covid-19 adjusted estimates: the estimated emission reductions between 2019 & 2020 is minus 11.8% for the WEM scenario & minus 17.9% in the WAM scenario. The anticipated emission reduction in 2020 compared to 2019 is 19.5% - using STATEC table A3207 on quarterly energy-related CO2 emissions where 2020Q3 & 2020Q4 have been estimated by the MECDD. As this decrease is higher than the one calculated on the basis of the POTEnCIA data for the WEM = WAM scenario, it has been applied for 2020; the subsequent estimates remaining identical.	NA	CO_2: adjusted POTEnCIA DCS v2 2018 projections for CO_2 emissions for aviation. CH_4: 2018 ratio (CH_4/ CO_2) applied to CO_2 estimates 2019-2040 – a downward trend for the ratio. N_2O: average 2014-2018 ratio (N_2O/ CO_2) applied to CO_2 estimates 2019-2040 – no clear trend for the ratio.

Navigation	All years - WEM = WAM: MECDD basic projections: 2019-2040 = average of the last 5 historical years (2014-2018) emissions.	-	No Covid-19 adjusted estimates for 2020.	NE	CO_2: MECDD basic projections: 2019-2040 = average of the last 5 historical years (2014-2018) emissions. CH_4 & N_2O: 2018 ratio (CH_4/CO_2) or (N_2O/CO_2) applied to CO_2 estimates 2019-2040 – a downward trend for the ratio.
CO_2 emissions from biomass	NE	NE	NE	NE	NE
CO_2 captured	NO	NO	NO	NO	NO
Long-term storage of C in waste disposal sites	NE	NE	NE	NE	NE
Indirect N_2O	NO	NO	NO	NO	NO
International aviation in the EU ETS	All years – WEM = WAM: MECDD projections based on the 2018 value for the ratio (intl. aviation ETS CO_2 emissions / intl. aviation total GHG emissions).	-	2020 - Covid-19 adjusted estimates: see "Aviation" above.	ETS: MECDD projections based on the 2018 value for the ratio (intl. aviation ETS CO_2 emissions / intl. aviation total GHG emissions) – a downward trend for the ratio up to 2018.	NA
1.A.3.a Domestic aviation *(CO_2 only - for ESR calculation)*	All years – WEM = WAM: MECDD basic projections: 2020-2040 = average of the last 5 historical years (2015-2019) emissions.	-	No Covid-19 adjusted estimates for 2020.	NA, however 1A3a CO_2 related emissions are not part of the non-ETS/ESR emissions.	CO_2: MECDD basic projections: 2020-2040 = average of the last 5 historical years (2015-2019) emissions.

Abbreviations used in Table IV.3-1:
NAPCP – National Air Pollution Control Programme - https://ec.europa.eu/environment/air/reduction/NAPCP.htm

"Konsortium" – a group of consultants that helped Luxembourg in the preparation of its NECP and its energy strategy up to 2030. It consists of Consentec GmbH, Fraunhofer Institut für System- und Innovationsforschung (Fh-ISI), Institut für Ressourceneffizienz und Energiestrategien (IREES) & Energy Economics Group Technische Universität Wien (EEG).

Notes:
1. submitted inventory data up to 2018; approximated inventory data for 2019; ETS data up to 2019.
2. when projections are only calculated for the "0" or "5" years, in-between years are linear interpolations.
3. adjusted & unadjusted: "adjusted" means that the emission trend reported by the data source used for the calculation of the projected emissions has been kept (annual growth rates) but adjusted to take into account the latest inventory data ("rule of three"). This option is chosen if the historical data considered for the data source are too different from the latest GHG inventory data (i.e. submission 2020v1).
4. for two CRF source categories that have recently be estimated in the inventory – i.e. 3.H – urea application & 4.G – harvested wood products – it is not yet possible to share projections.

NA = not applicable NE = not estimated NO = not occurring IE = indicated elsewhere

IV.3.2. WEM vs WAM scenario

10. Whereas the **WEM scenario** consists of a "business as usual" (BAU) or "reference" projection that includes the effects of the adopted and implemented PaMs **up to 31 December 2015 or 2018** according to the models used, the **WAM scenario** includes some of the second "Action Plan for reducing CO_2 emissions" planned measures *[→ Section III.3.2]*, as well as the NECP measures, with the exception of some of the horizontal ones *[→ Section III.3.3]*. These planned measures should allow Luxembourg to reach its ESR target of minus 40 % in 2030 and, beyond, its nationally determined target of minus 55 % by 2030 – compared to the 2005 level of ESR emissions *[→ Section III.2.3]*. Finally, **there are no optional "without measures" (WOM) projections** produced yet for Luxembourg due to a lack of internal capabilities (planned improvement for the coming years).

11. Consequently, **the WAM projections are not in line with the PaMs described in *Section III.5***. They reflect the main measures proposed in the NECP rather than those from the second "Action Plan to reduce CO_2 emissions". However, several measures of the Action Plan are still considered under the NECP, and certain are reinforced, revisited or adapted.

12. *Table IV.3-2* lists the CRF source categories for which WEM and WAM projections differ or are identical. It also indicates which CRF categories are not occurring in Luxembourg and which ones are not estimated due to missing basic information to do so (see also *Table IV.3-1*).

TABLE IV.3-2 – WEM AND WAM PROJECTIONS BY CRF SOURCE CATEGORIES

Scenarios	CRF source categories
WEM >< WAM	1.A.1.a / 1.A.2 / 1.A.3.b / 1.A.3.c / 1.A.3.d / 1.A.4.a / 1.A.4.b / 1.A.4.c / 1.B.2 / 3.A / 3.B / 3.D / 5.A
WEM = WAM	1.A.3.a / 1.A.5 / 2.A.1 / 2.A.3 / 2.C.1 / 2.C.7 / 2.D / 2.F / 2.G / 3.G / 4.A / 4.B / 4.C / 4.D / 4.E / 4.F / 5.B / 5.D / IB. aviation / IB. navigation / international aviation in the EU ETS
NO	1.A.1.b / 1.A.1.c / 1.A.3.e / 1.B.1 / 1.C / 2.A.x except 2.A.1&3 / 2.B / 2.C.x except 2.C.1&7 / 2.E / 2.H / 3.C / 3.E / 3.F / 3.I / 3.J / 4.H / 5.E / CO_2 captured / indirect N_2O emissions
NE	3.H / 4.G / CO_2 emissions from biomass / long-term storage of C in waste disposal sites

Source: MECDD.

13. Concerning the **main energy-related sources of emissions** – namely 1.A.1.a, 1.A.2, 1.A.3.b, 1.A.4.a & 1.A.4.b – projections derived from a modelling exercise led by the "Konsortium" for the drafting of Luxembourg's NECP *[→ Section III.3.3]*. The WAM projections consider some of the planned PaMs *[→ Section III.5]*, as well as other NECP planned measures in order to reach a substantial decrease of GHG emissions by 2030 [Konsortium (2019a), (2019b), (2019c) & (2019d)]: see *Section IV.3.4* for details.

14. For some **various source categories** – 1.A.3.c, 1.A.3.d, 1.A.4.c, 1.A.5, 1.B.2, 2.D & 5.B – GHG emissions projections have been calculated using the activity data considered for the construction of the revised BAU and WAM scenarios for Luxembourg's National Air Pollution

Control Programme – NAPCP *[→ Section III.3.4]*.[6] Estimates of air pollutants such as SO_2, NOx, NMVOC, NH_3, $PM_{2.5}$ had to be revised in 2020 in order to be consistent with the NECP related projections: see also ***Sections IV.3.4 & IV.3.5***.

15. For the **agriculture sector** – 3.A, 3.B, 3.D & 3.G – both WEM and WAM projections come from the Rural Economy Department (*Service d'Economie Rurale*) of the MAVDR (hereafter MAVDR-SER). The forecasts are the result of trend estimations, inputs from published literature, ad-hoc information and expert judgements [MAVDR-SER (2019a), (2019b) & (2020)]: see also ***Section IV.3.5***.

16. Finally, for the remaining source categories – 1.A.3.a, 2.A.1, 2.A.3, 2.C.1, 2.C.7, 2.F, 2.G, 4.A to 4.F, 5.A, 5.D & memo items – ad-hoc information, expert judgements and, sometimes, simple assumptions helped to estimate projections up to 2040: see ***Section IV.3.5*** for details.

IV.3.3. Detailed assumptions for emissions projections

17. Key parameters assumptions used to calculate both WEM and WAM projected GHG emissions up to 2040 are listed in CTF Table 5. The list being quite long – 197 entries – it is not reproduced in this report. These parameters come from two main sources according to which institution or service performed the projections:
    - the "Konsortium" that performed energy related projections in the framework of the NECP;
    - the SER that performed agriculture practices related projections.

18. According to the models and methods used for emissions projections, the base year varies *[→ Section IV.3-4]*. Consequently, for CTF Table 5, **projected parameters** are presented for the **years 2020, 2025, 2030, 2035 and 2040**, whereas **historical values** coming from official statistics **cover the year 1990 up to 2018**. This way of doing is justified by the fact that WEM and WAM projections are only presented for the years 2020 to 2040 – the previous years reproducing the latest inventory (1990-2018) and approximated inventory (2019) submissions – and because some projections are "adjusted" (→ §8).

19. **GDP growth has not been considered while preparing the projections**. There are obvious reasons for not considering GDP implicitly in the projections exercise: firstly, the GDP of Luxembourg is mainly driven by service activities and, more precisely, finance related activities. Moreover, a great share of the industrial production in Luxembourg is exported (small internal market, most of the largest industrial installations are subsidiaries of foreign business concerns). Finally, the correlation shown between road freight transport and GDP indicates a stronger correlation with an aggregated GDP for the various EU Member States than with the GDP of Luxembourg on its own, as the associated emissions are mainly caused by transit traffic.

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6 https://ec.europa.eu/environment/air/reduction/NAPCP.htm.

IV.3.4. Models used for emissions projections

20. As *Tables IV.3-1* shows, different models or tools have been used for performing the projections up to 2040:

    - the model used by the NECP consortium of consultants – "Konsortium";
    - the GEORG and NEMO models used by Komobile and FVT (*Forschungsgesellschaft für Verbrennungskraft-maschinen und Thermodynamik*) and developed in collaboration with the Technische Universität Graz (TU Graz);
    - the 2018 POTEnCIA DCS v2 scenario.

    They are described below.

"Konsortium" – ISI-DELUX energy demand model

CRF (sub-)categories covered by this model	1.A.1.a, 1.A.2, 1.A.3.b, 1.A.4.a & 1.A.4.b
Gas(es) covered	CO_2-eq.
Reference/base year	2015
Projected years	2017 to 2040
Interface with other models/approaches	PRIMES 2016
Input from other models	Green-X, HiREPS and DEPV decentralised generation model
Reference document for the calculations	[Konsortium (2019a), (2019b), (2019c) & (2019d)]

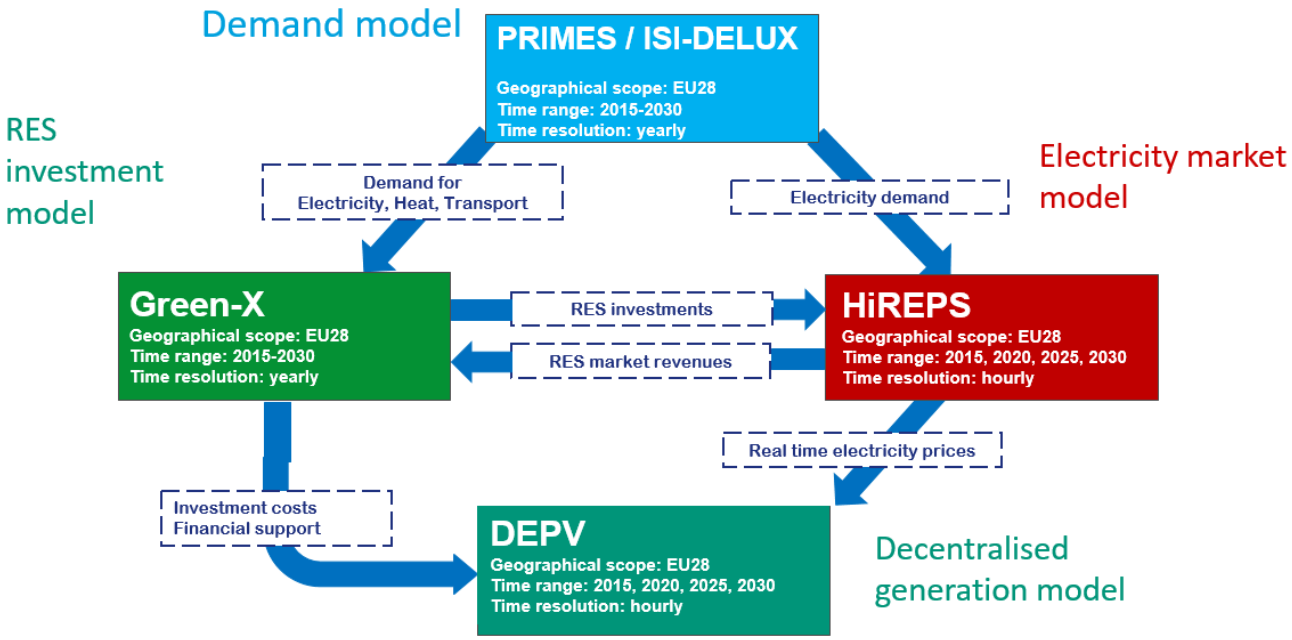
21. As indicated in §13, projections of the **main sources of GHG emissions in Luxembourg** have been estimated using **a modelling approach** by a "Konsortium" of research institutes: Consentec GmbH, Fraunhofer Institut für System- und Innovationsforschung (Fh-ISI), Institut für Ressourceneffizienz und Energiestrategien (IREES) and Energy Economics Group Technische Universität Wien (EEG).[7] The sources covered represented 85.8 % of the total GHG emissions (excl. LULUCF) in 2018.

22. The Fh-ISI developed **a tailor-made energy demand model for Luxembourg**, the ISI-DELUX that is linked with the EU PRIMES modelling suite *[→ Box 1]*. Around this energy demand model, **3 other tools interact** *[→ Figure IV.3-1]*.[8]

[7] Consentec Gmbh: https://www.en.consentec.de/;
Fh-ISI: https://www.isi.fraunhofer.de/en.html;
IREES: https://irees.de/en/home-en/;
EEG: https://eeg.tuwien.ac.at/.

[8] More information on 2 of these 3 other tools can be found here:
Green-X: https://green-x.at/;
HiREPS: https://eeg.tuwien.ac.at/research/projects/hireps.

FIGURE IV.3-1 – "KONSORTIUM" MODELLING APPROACH



Source: Fh-ISI, IREES & EEG.

23. The exercise main objective was to elaborate various scenarios for a 2030 energy strategy for Luxembourg covering both energy efficiency, and the supply and use of renewable energy sources (RES). Anticipated energy generation and consumption levels estimated under these scenarios served as activity data to estimate GHG emissions using emission factors to convert calorific values into CO_2 equivalents.

24. A **baseline scenario** (or **WEM scenario**) based on "business as usual" developments in both energy supply and demand was used as reference. It considers **PaMs in place up to 2015**. The various scenarios proposing different strategies to reach certain energy efficiency and RES targets by 2030 (**target or WAM scenarios**) have been identified and discussed with Luxembourg's authorities, mainly the MEA – the main sponsor of this modelling exercise – and the MECDD. One of these scenarios, offering **options for a substantial reduction of the level of GHG emissions by around 55 % by 2030 compared to 2005** *[→ Section III.2.3 & Section IV.4-9]*, has been used for the NECP, as well as for the 4th Biennial Report (→ §10). The projections have finally been extended up to 2040 in order to respond to requirements under EU Regulation No 525/2013 and the NECP guidelines.

BOX 1 – EUROPEAN COMMISSION – PRIMES MODELLING SUITE

The 2016 PRIMES modelling suite is the core element of the modelling framework for transport, energy and CO_2 emission projections. It simulates a market equilibrium solution for energy supply and demand in the (at that time) EU28 and its Member States and is central to a suite of framework or sectoral interlinked models, some being "computable general equilibrium" (CGE) models. It works by determining an equilibrium by finding the prices of each energy form such that the quantity produced matches the quantity consumers wish to use. The market equilibrium is achieved for each period and the simulation is dynamic over time. The model is behavioural but also represents, in an explicit and detailed way, the available energy demand and supply technologies and pollution abatement

technologies. The system reflects considerations about market economics, industry structure, energy/ environmental policies and regulation, which are conceived to influence market behaviour of energy system agents. The modular structure of PRIMES reflects a distribution of decision making among agents that act individually about their supply, demand, combined supply and demand, and prices. The market integrating part of PRIMES subsequently simulates market clearing.

As a general-purpose energy model, PRIMES is conceived for designing production and consumption projections, scenario building and policy impact analysis. It covers a medium to long-term horizon. Its modular structure allows either for integrated model use or for partial use. More details are available in [European Commission (2016a), Introduction chapter].

Komobile and FVT – GEORG & NEMO – "bottom-up" models for the transportation sector

CRF (sub-)categories covered by this model	indirectly 1.A.3.c, 1.A.3.d, 1.A.4.c & 1.A.5
Gas(es) covered	CO_2, NOx, $PM_{2.5}$ & PM_{10}
Reference/base year	2015
Projected years	all years from 2016 up to 2050
Interface with other models/approaches	NAPCP BAU & WAM scenarios
Input from other models	adapted ISI-DELUX scenario trends have been used as input for the possible development of road fuel exports related emissions
Reference document for the calculations	[Komobile & FVT (2017a) & (2017b)]

25. As indicated in §14, some projections have been calculated using the activity data considered for the construction of the revised BAU and WAM scenarios for Luxembourg's National Air Pollution Control Programme – NAPCP. Certain activity data are **derived from the 2020 revised Komobile projections** that consider the "Konsortium" baseline or target scenario projections prepared for the NECP. This concerns the following source categories: railways; inland navigation; stationary, off-road vehicles and other machinery related to agriculture and forestry activities; military vehicles. These sectors represented 0.3 % of the total GHG emissions (excl. LULUCF) in 2018. In the past, the 2017 Komobile projections were also used for the main source of emissions, i.e. road transportation. Though the revised 2020 projections by Komobile have not been used strictly speaking for this 4th Biennial Report, they will be considered for the future updates of the projections.

26. GEORG & NEMO *[→ Box 2]* allow computing energy demand and related air pollutants emissions projections for the **road and off-road transportation sector**. Both models are "**bottom-up**". For the actual projections, only the GEORG model is of relevance, as road transportation projections come from the ISI-DELUX energy demand model.

27. The **GEORG model** (*Grazer Emissionsmodell für Off-Road Geräte*) was developed at the Graz University of Technology (TU Graz). It has a fleet model part which simulates the actual age and size distribution of **non-road mobile machinery** (NRMM) stock via age- and size-dependent dropout rates (i.e. the probability that a vehicle will have been scrapped by the following year). With this approach, the number of vehicles in each mobile source category is calculated according to the year of the vehicles' first registration and propulsion systems (gasoline 4-stroke,

gasoline 2-stroke, diesel > 80 kW, diesel < 80 kW). For the projections, assumptions on emission factors and fleet are included in the model that can then derives air pollutants emissions.[9]

THE NEMO MODEL ("NETWORK EMISSION MODEL") **

This model was developed at the Institute for Internal Combustion Engines and Thermodynamics (IVT) at the Graz University of Technology (TU Graz) as a tool for the simulation of traffic related emissions in road networks. It combines a detailed calculation of the fleet composition with a simulation of energy consumption and emission output on a vehicle level. It is fully capable of depicting the upcoming variety of possible combinations of propulsion systems (internal combustion engine, hybrid, plug-in hybrid, electric propulsion, fuel cell, …) and alternative fuels (CNG, biogas, FAME, ethanol, GTL, BTL, H2, …). In addition, NEMO has been designed in such a way as to be suitable for all the main application fields for the simulation of energy consumption and emission output using a road-section based model approach. For the projections, assumptions on emission factors and fleet are included in the model that can then derives air pollutants emissions. For more details, see Umweltbundesamt (2017), *GHG Projections and Assessment of Policies and Measures in Austria, reporting under Regulation (EU) 525/2013*, Wien, p. 34 and MECDD-AEV (2020), section 3.2.8.3.2.2, p. 256-259.

** https://www.fvt.at/em/en/simulation/nemo.html

European Commission – POTEnCIA

CRF (sub-)categories covered by this model	international aviation (CO_2)
Gas(es) covered	CO_2
Reference/base year	2015
Projected years	2016 to 2050
Interface with other models/approaches	none
Input from other models	none
Reference document for the calculations	https://ec.europa.eu/jrc/en/potencia

28. POTEnCIA (Policy Oriented Tool for Energy and Climate Change Impact Assessment) is a new modelling tool for the EU energy system developed by the European Commission Joint Research Centre. The model follows a hybrid partial equilibrium approach combining behavioural decision with detailed techno-economic data. Special features are introduced in order to appropriately reflect the implications of an uptake of novel energy technologies and of evolving market structures. The model runs in annual time steps with a typical projection timeline to 2050. For the projections, the second version of the Draft Central Scenario of POTEnCIA has been used.

IV.3.5. Non-modelling methods for the projections

29. For a series of CRF source categories, projections are not coming or derived from modelling exercises, but are **the result of "bottom-up" approaches, ad-hoc information and/or expert judgments**.

30. The MECDD-AEV had to prepare projections of several air pollutants under the **National Air Pollution Control Programme** – NAPCP (→ §14). Activity data determined for these projections

9 Source: Umweltbundesamt (2017), *GHG Projections and Assessment of Policies and Measures in Austria, reporting under Regulation (EU) 525/2013*, Wien, p. 35.

for either the BAU (WEM) or the WAM scenario have been used to extend the emissions trends of various source categories: those presented under §25 to §27 (Komobile), as well as CRF 1.B.2, 2.D and 5.B that represented 0.9 % of the total GHG emissions (excl. LULUCF) in 2018.

31. For the 2017 projections exercise, two agencies of the MECDD – the **MECDD-AEV** and the **MECDD-AGE** – estimated GHG emissions for the coming years using ad-hoc information, expert judgements and, sometimes, simple assumptions. No distinction was made between a BAU (WEM) and a WAM scenario.[10] Since then, no new calculations have been made. The MECDD has, therefore, kept the trends of these projections and applied them to the latest inventory data. The MECDD has also completed some of these projections. This concerns CRF sources 2.A.1, 2.A.3, 2.C.1, 2.F, 2.G, 5.A & 5.D – that represented 6.5 % of the total GHG emissions (excl. LULUCF) in 2018. The same applies to the LULUCF projections.

32. Finally, for the agriculture sector (CRF 3.A, 3.B, 3.D and 3.G), which represented 6.5 % of the total GHG emissions (excl. LULUCF) in 2018, the **SER** provided **new projections** end October 2020 (→ §15) [MAVDR-SER (2019a), (2019b) & (2020)].

IV.3.6. A synthesis for emissions projections

33. *Table IV.3-3* summarizes the emissions projections methods presented in *Sections IV.3.4 & IV.3.5* (see also *Table IV.3-1*).

TABLE IV.3-3 – SUMMARY OF THE EMISSIONS PROJECTIONS METHODS

Methods	Scenarios	CRF source categories	In line with PaMs in chapter III ?	Share in 2018 total GHG (excl. LULUCF)
"Konsortium" – ISI-DELUX	WEM >< WAM	1.A.1.a / 1.A.2 / 1.A.3.b / 1.A.4.a / 1.A.4.b	partly	85.80 %
NAPCP & Komobile	WEM >< WAM	1.A.3.c / 1.A.3.d / 1.A.4.c (WEM) / 1.A.5*	partly	0.31 %
NAPCP – MECDD-AEV	WEM >< WAM	1.B.2 / 2.D* / 5.B*	partly	0.85 %
POTEnCIA	WEM = WAM	IB. aviation	NA	NA
Environment/Water Agencies	WEM = WAM	2.A.1 / 2.A.3 / 2.C.1 / 2.C.7 / 2.F / 2.G / 5.A (WEM) / 5.D 4.A / 4.B / 4.C / 4.D / 4.E / 4.F	yes	6.46 % NA
SER	WEM >< WAM	3.A / 3.B / 3.D / 3.G*	partly	6.55 %
MECDD	WEM = WAM	1.A.3.a / 1.A.4.c (WAM) / 2.C.7 / 5.A (WAM) / IB. navigation / international aviation in the EU ETS	yes	0.03 %
NE	-	3.H / 4.G / CO_2 emissions from biomass / long-term storage of C in waste disposal sites	NA	NA

Source: MECDD.

Note: * WEM = WAM

10 This is actually not totally true, as the MECDD made a specific assumption for the WAM scenario with regard to waste landfilling (CRF 5.A) . This assumption does not come from the MECDD-AEV directly but was discussed with them.

IV.4. WEM AND WAM PROJECTIONS

34. This chapter presents the WEM and WAM projections in an aggregated way and in CO_2e. Nevertheless, where relevant, ESD/ESR and ETS projections are shown. In addition, a table and its associated graph display the projections by gas. Detailed WEM and WAM projections results are available in CTF Tables 6(a) and 6(b).

35. For the 4th Biennial Report, the following CRF sectors, categories and sub-categories are distinguished:
    - public electricity and heat production (1.A.1.a) – includes waste incineration;
    - industries and construction (incl. product use) (1.A.2 & 2);
    - road transportation (1.A.3.b) – includes lubricants to be reported under 1.A.3.b;
    - commercial and institutional buildings (1.A.4.a);
    - residential buildings (1.A.4.b);
    - agriculture (incl. combustion) (1.A.4.c & 3);
    - LULUCF (4) – includes indirect N_2O emissions;
    - other source categories (1.A.3.a/c/d, 1.A.5, 1.B.2 & 5).

36. Historical data in the following tables and graphs (2005 to 2019) are extracted from the GHG inventory, submission 2020v1 of 15 April 2020 to the UNFCCC[11] and from the "approximated GHG inventory", submission of end July 2020 to the EC.[12] Data prior to 2005 are not shown here for readability reasons, but also because 2005 is the key year for the 2020 and 2030 commitments at EU level.

37. In *Tables IV.4-1 to IV.4-9* and *IV.4-12*, data are presented both in 1000 tonnes of CO_2e (kt or Gg) and in indices (with 2005 being equal to 100), whereas *Figures IV.4-1 to IV.4-8* and *IV.4-13* are limited to emissions in kt or Gg. The explanatory text below should be read together with the descriptions provided in *Table IV.3-1* on the main assumptions for GHG projections.

11 https://unfccc.int/documents/225456.

12 https://cdr.eionet.europa.eu/lu/eu/mmr/art08_proxy/envxyjjbg/.

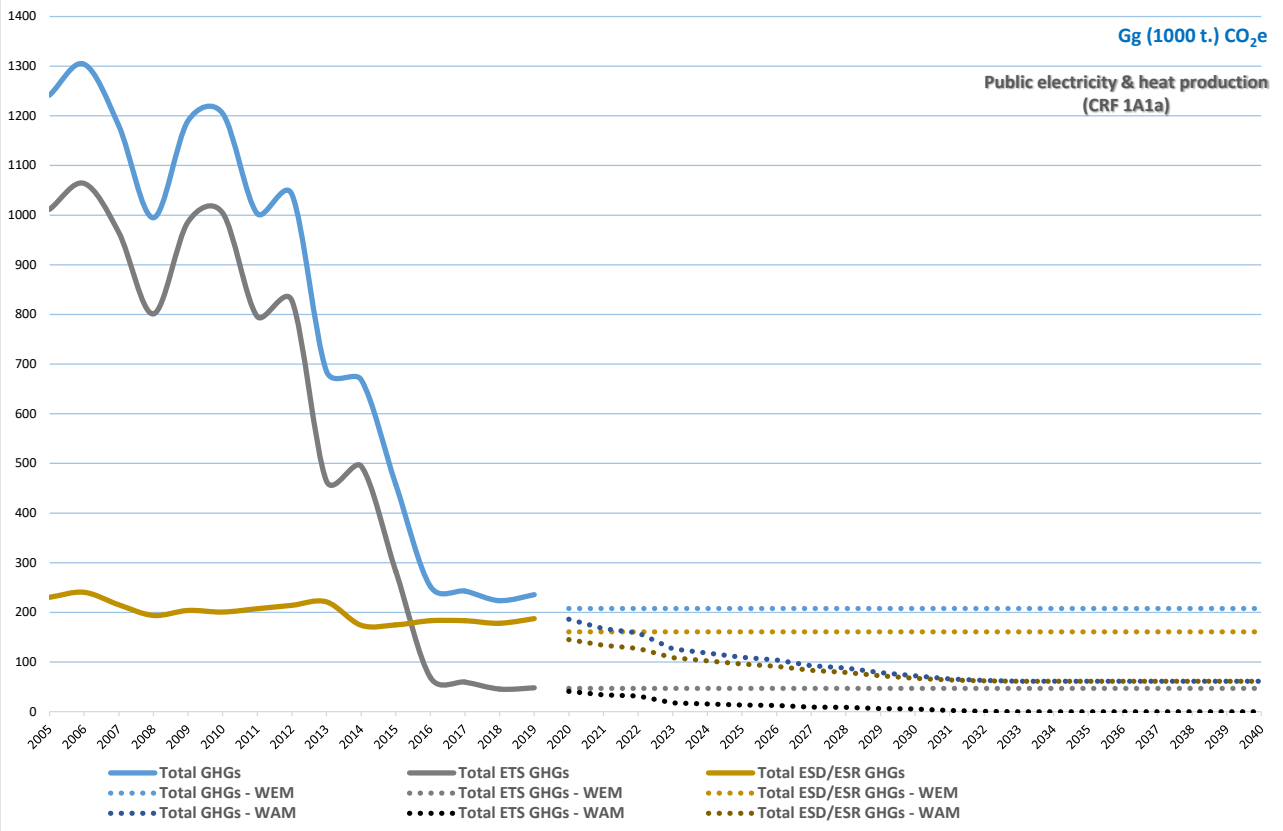
IV.4.1. Public electricity and heat production (1.A.1.a)

TABLE IV.4-1 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR PUBLIC ELECTRICITY & HEAT PRODUCTION

Sector	CRF	GHG	2005	2010	2015	2020	2025	2030	2035	2040	
Public electricity and heat production	1.A.1.a	Total GHGs	1 241.80	1 204.97	457.37	208.00	208.00	208.00	208.00	208.00	WEM
		Total ETS GHGs	1 011.63	1 004.50	282.65	47.00	47.00	47.00	47.00	47.00	
		Total ESD/ESR GHGs	230.17	200.47	174.71	161.00	161.00	161.00	161.00	161.00	
		Total GHGs	1 241.80	1 204.97	457.37	186.04	109.64	72.27	61.50	61.50	WAM
		Total ETS GHGs	1 011.63	1 004.50	282.65	40.91	13.56	5.26	NO	NO	
		Total ESD/ESR GHGs	230.17	200.47	174.71	145.13	96.09	67.01	61.50	61.50	
		Total GHGs	100.00	97.03	36.83	16.75	16.75	16.75	16.75	16.75	WEM
		Total ETS GHGs	100.00	99.29	27.94	4.65	4.65	4.65	4.65	4.65	
		Total ESD/ESR GHGs	100.00	87.10	75.91	69.95	69.95	69.95	69.95	69.95	
		Total GHGs	100.00	97.03	36.83	14.98	8.83	5.82	4.95	4.95	WAM
		Total ETS GHGs	100.00	99.29	27.94	4.04	1.34	0.52	0.00	0.00	
		Total ESD/ESR GHGs	100.00	87.10	75.91	63.06	41.75	29.11	26.72	26.72	

Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

FIGURE IV.4-1 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR PUBLIC ELECTRICITY & HEAT PRODUCTION



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

38. For public electricity and heat production, projected emissions are taken or derived from the baseline and target projections made by the "Konsortium" during the preparation of the NECP for Luxembourg, complemented by specific assumptions on existing co-generation power plants by the MEA (→ §40) and waste incineration by the MECDD (→ §39) *[→ Table IV.3-1]*.

39. The dramatic fall for ETS emissions between 2010 and 2016, and in conjunction for total emissions, is principally explained by the slowdown of the TWINerg power plant leading to its

closing in 2016 *[→ Section I.2.6]*. The other emitting sources remained rather constant with the exception of waste incineration that grew slowly through time as the quantity of waste treated increased with population and economic activity growth.[13] Under the WEM scenario, non-organic waste incineration emissions continue to grow with the anticipated population growth, whereas under the WAM scenario, they would decrease over time despite an increase in both population and waste diverted from the sole waste landfill site of the country *[→ Section IV.4.8]*. The reason is that the quantity of paper/cardboard, food waste and plastics incinerated is expected to reach half of their 2017 level by 2030, driving de facto emissions down.

40. The WEM and WAM projections do not consider any possible start-up of new fossil-fuelled power plants in Luxembourg. The rationale behind this assumption is that the development of further combined heat and power (CHP) installations, which use fossil fuels or natural gas is not favourable to Luxembourg concerning the accounting of its GHG emissions since that would not replace more polluting installations, but only imported electricity. However, building new power plants based on biomass is an option for the future years, whether they operate using wood, green and organic waste or biogas generated from agriculture practices, etc.

41. The NECP also proposes that existing co-generation power plants – whether ETS or non-ETS – will progressively phase-out fossil fuels, such as natural gas and oil, and only operate with biomass. This transition would be completed by 2033 and is considered in the WAM scenario.

IV.4.2. Industries and construction (incl. product use) (1.A.2 & 2)

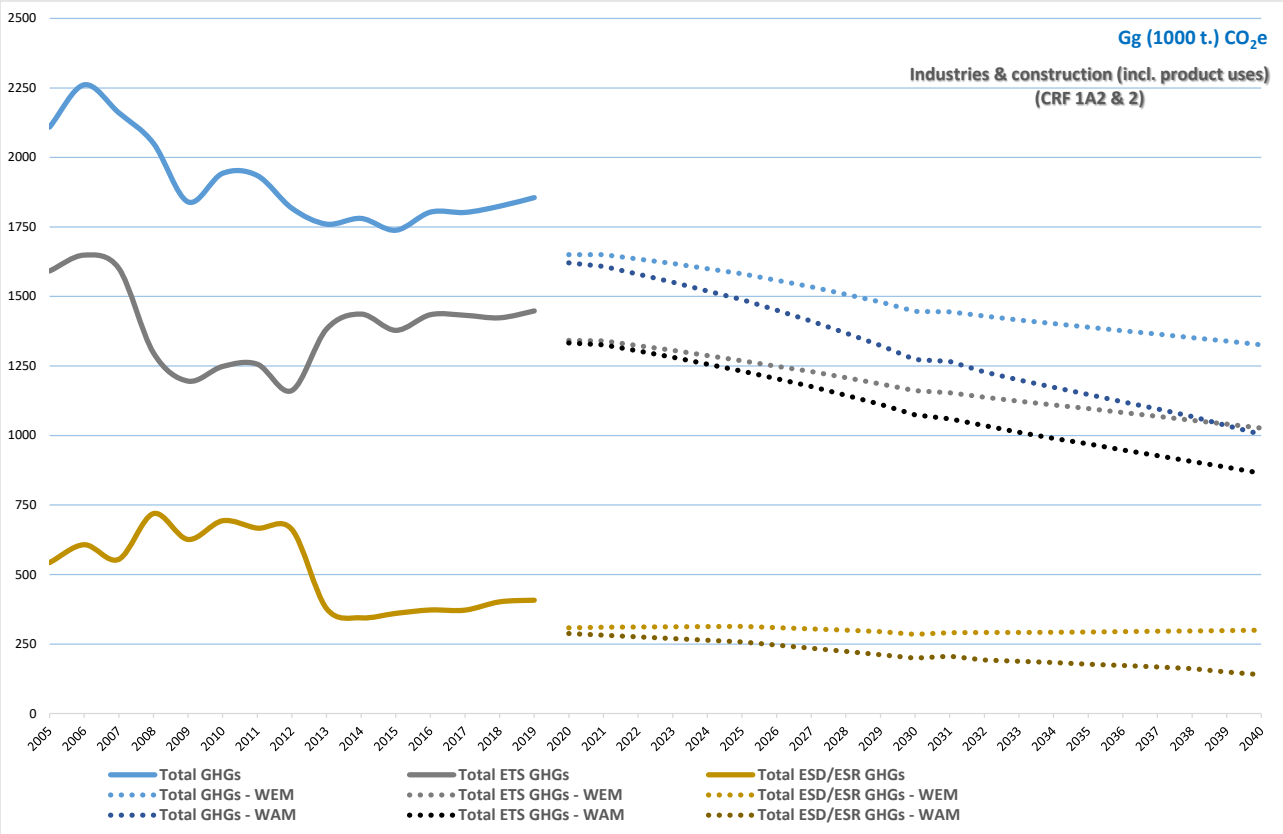
TABLE IV.4-2 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR INDUSTRIES & CONSTRUCTION

Sector	CRF	GHG	2005	2010	2015	2020	2025	2030	2035	2040	
Industries & construction	1.A.2	Total GHGs	2 109.20	1 943.05	1 738.31	1 650.23	1 581.97	1 446.51	1 389.85	1 326.45	WEM
(incl. product uses)	2	Total ETS GHGs	1 591.72	1 248.17	1 378.18	1 341.85	1 268.60	1 161.46	1 096.75	1 026.66	
		Total ESD/ESR GHGs	542.67	693.50	360.13	308.38	313.37	285.05	293.11	299.79	
		Total GHGs	2 109.20	1 943.05	1 738.31	1 620.96	1 488.62	1 273.15	1 147.43	1 003.82	WAM
		Total ETS GHGs	1 591.72	1 248.17	1 378.18	1 333.16	1 231.24	1 074.07	969.61	864.39	
		Total ESD/ESR GHGs	542.67	693.50	360.13	287.80	257.38	199.08	177.82	139.43	
		Total GHGs	100.00	92.12	82.42	78.24	75.00	68.58	65.89	62.89	WEM
		Total ETS GHGs	100.00	78.42	86.58	84.30	79.70	72.97	68.90	64.50	
		Total ESD/ESR GHGs	100.00	127.79	66.36	56.83	57.74	52.53	54.01	55.24	
		Total GHGs	100.00	92.12	82.42	76.85	70.58	60.36	54.40	47.59	WAM
		Total ETS GHGs	100.00	78.42	86.58	83.76	77.35	67.48	60.92	54.31	
		Total ESD/ESR GHGs	100.00	127.79	66.36	53.03	47.43	36.69	32.77	25.69	

Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

13 There is only one waste incineration installation with energy recovery in Luxembourg. Therefore, related non-organic GHG emissions are reported under CRF category 1.A.1.a.

FIGURE IV.4-2 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR INDUSTRIES & CONSTRUCTION



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

42. For manufacturing industries and construction (CRF 1.A.2), projected emissions are taken from the baseline and target projections made by the "Konsortium" during the preparation of the NECP for Luxembourg. To determine the share of CO_2, CH_4 and N_2O, the respective weights of these three gases for the last five inventory years (2014-2018) have been applied to the "Konsortium" CO_2e projected emissions. For industrial processes and product uses (CRF 2), projected CO_2-equivalent emissions are essentially the result of expert judgments and ad-hoc methods developed by the MECDD-AEV and the MECDD. For CRF sectors 2.A & 2.C, the hypothesis is that all CO_2 projected emissions are supposed to be ETS emissions (no ETS emissions for 2.D to 2.G) *[→ Table IV.3-1]*.

43. The main existing measures in this sector are the European Union Emissions Trading System (EU ETS) and the voluntary energy efficiency agreement between the Luxembourg Government, My Energy G.I.E. [14] and the Business Federation of Luxembourg – FEDIL.[15] This agreement addresses the energy consumption of the industrial sector, including enterprises participating to the EU ETS. All FEDIL member companies having a significant energy consumption – defined on certain criteria – can participate in the agreement. The common objective is to increase energy

14 https://www.myenergy.lu/fr/accueil.

15 This voluntary agreement could be considered as an "Energy Efficiency Obligation Scheme" (EEOS).

efficiency by 1 % annually, calculated for all the participating enterprises (global objective, not an individual one). In order to reach this 1 % goal, each participating company prepares a technical evaluation – or an energy audit – that will allow to define an action plan and put it in practice. Nowadays, the majority of the country's large industrial energy consumers participate in this voluntary agreement (54 enterprises end 2019).[16] The NECP suggests to prolong and expand further the agreement, notably by including SMEs.

44. Additional measures included in the NECP aims at reducing specific energy demand for the production of glass, cement, steel and other basic materials, i.e. the largest industrial emitters of the country. For these industries, several tools are suggested, such as the increased use of ISO 50001 on energy management,[17] setting up a transparency platform for audits to support energy efficiency efforts and the introduction of a "de-risking" instrument.[18]

45. These tools should also help SMEs to overcome financial obstacles and help them to better analyse and identify possible energy efficiency measures. Moreover, some actions are specially targeted towards SMEs: the creation of an integrated support instrument to provide a support framework for the companies concerned with their energy policy and the possibility of introducing a "Climate Agreement", which would be similar to the "*Pacte Climat*" with the municipalities *[→ Section III.5.1]*.

46. The use of renewable heat sources in industrial processes, but also for heating industrial and SMEs plants, is also promoted by the NECP. Deep geothermal energy, heat pumps, residual heat from industry and data centres, sustainable wood and wind energy are encouraged, as well as "photovoltaic (PV) ready" new industrial buildings. These measures are all considered under the WAM scenario.

47. For non-energy products from fuels and solvent use (CRF 2.D) the projections are based on activity data projections under the NAPCP. For F-gases – reported under CRF 2.F and 2.G – projections are the results of expert judgments by the MECDD-AEV.

48. In ***Figure IV.4-2***, the level of emissions for the first estimated year (i.e. 2020) is quite below the latest historical ETS and non-ETS emissions recorded. What happens is that in the modelling exercise, which uses 2015 as the reference year, 2017 is the first estimated year *[→ Section IV.3.4]*. Therefore, in the model, planned measures are considered from that year onwards despite the fact that they were not yet entirely implemented or even adopted.

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16 For more information see *Box 6, Chapter III*.

17 https://www.iso.org/iso-50001-energy-management.html.

18 A "de-risking" instrument is a pre-financing and risk management instrument for projects related to energy transition for the industrial sector and the SMEs.

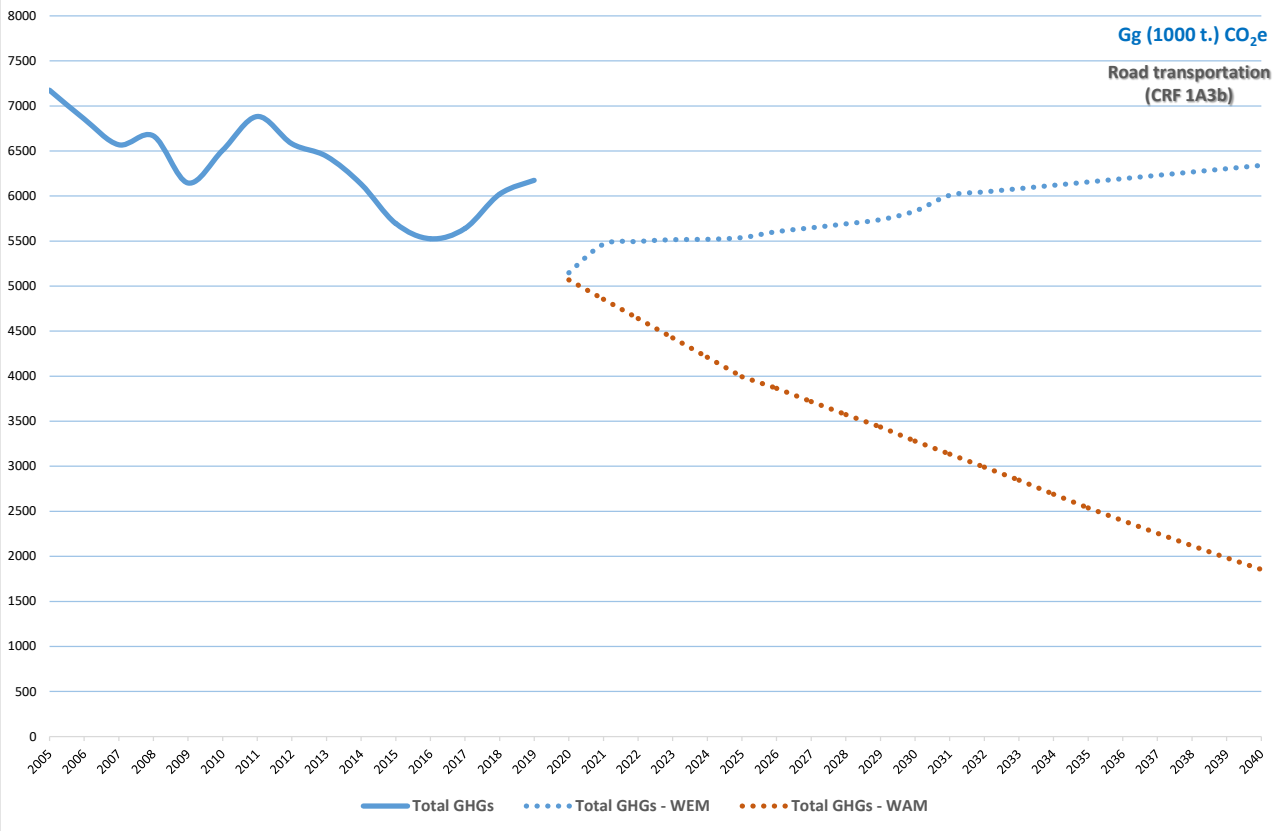
IV.4.3. Road transportation (1.A.3.b)

TABLE IV.4-3 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR THE ROAD TRANSPORTATION SECTOR

Sector	CRF	GHG	2005	2010	2015	2020	2025	2030	2035	2040	
Road transportation	1.A.3.b	Total GHGs	7 175.99	6 856.95	6 569.69	5 149.17	5 539.44	5 834.28	6 156.39	6 340.69	WEM
		Total GHGs	7 175.99	6 856.95	6 569.69	5 068.92	3 994.72	3 279.78	2 538.32	1 854.25	WAM
		Total GHGs	100.00	95.55	91.55	71.76	77.19	81.30	85.79	88.36	WEM
		Total GHGs	100.00	95.55	91.55	70.64	55.67	45.70	35.37	25.84	WAM

Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

FIGURE IV.4-3 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR THE ROAD TRANSPORTATION SECTOR



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

49. For road transportation, projected emissions are derived from the baseline and target projections made by the "Konsortium" during the preparation of the NECP for Luxembourg. To determine the share of CO_2, CH_4 and N_2O, a rather complex method was used *[→ Table IV.3-1]*.

50. WEM projections do not consider a possible narrowing of road fuel price differentials between Luxembourg and its neighbouring countries. On the one side, GHG emissions development is driven by technological changes, with expected more energy efficient and less carbon-emitting vehicles, and on the other side, it is also driven by anticipated growing road traffic, either due to national socio-economic factors – increase of resident population and increase of cross-border commuters with the continuation of the economic development – or due to increasing overall traffic flows anticipated by European and other traffic models – Luxembourg being located on

main transit axes in Europe. In the WEM scenario, the latter is more than offsetting the former, resulting in an augmentation of road transportation GHG emissions in the coming years.

51. WAM projections, however, considers four major NECP measures: fuel taxes increase, changes in the vehicles fleet characteristics, E-mobility and sustainable biofuels.

52. Firstly, for reaching the objectives enunciated in the NECP, it is planned that excise duties on gasoline and diesel will be gradually augmented to arrive at a total increase of 18 euro-cents per litre over the period 2019 to 2030. This should typically reduce the incentive for foreign drivers to refuel in Luxembourg and, therefore, cause a very significant decrease in the demand. In May 2019, Luxembourg increased its excise duty rates by 1 (gasoline) & 2 (diesel) euro cents, but so far no impact on the sale of road fuel has been noted, as shown in ***Figure IV.4-3***. One explanation for this is that a "reverse elasticity" is observed for Luxembourg, i.e. if the price of petrol climbs on the markets, and is then reflected in the consumer prices at petrol stations, the demand for road fuels increases. Indeed, at higher prices, this makes the price differential even more attractive. It is possible, however, that a "cap" price exists, beyond which the "reverse elasticity" ceases to apply.

53. Replacing old vehicles with more energy-efficient new vehicles generally leads to a reduction in fuel consumption. In the NECP, this measure is supported by stricter EU standards for vehicles (EURO norms) and by certain national measures, such as a reform of the actual CO_2 emissions based annual vehicle tax, the incentive effect of which is currently limited, and the introduction of a vehicle registration tax for newly acquired vehicles.

54. The actual share of electric and plug-in hybrid vehicles in the car fleet is currently rather low. The NECP projects that the proportion of hybrid and electric vehicles in Luxembourg would increase significantly, with an objective of 49 % in the car fleet by 2030, notably by reviewing the corporate vehicle benefit in kind – 40 % of all new vehicles sold in Luxembourg – in favour of e-vehicles. It is also predicted that the buses operating throughout the country will all be electrical by 2030.

55. A global strategy for the use of sustainable biofuels will promote the use of second-generation biofuels by introducing a blending obligation and by cooperating with Benelux partners. The use of first-generation biofuels will be limited to a maximum of 5 %.

56. Other planned measures in the NECP deal with a sustainable mobility and modal shift. Promoting and reinforcing the "MoDu" strategy *[→ Section III.3.4]* and free public transport on the whole national territory – in force since 1 march 2020 – are two of the emblematic policies in that domain.

57. In ***Figure IV.4-3***, the level of emissions for the first estimated year (i.e. 2020) is well below the latest historical emissions recorded. What happens is that in the modelling exercise, which uses

2015 as the reference year, 2017 is the first estimated year *[→ Section IV.3.4]*. Therefore, in the model, planned measures are considered from that year onwards despite the fact that they were not yet entirely implemented or even adopted. Moreover, for the WEM scenario, emissions for the year 2020 have been adjusted due to the Covid-19 pandemic *[→ Table IV.3-1]*.

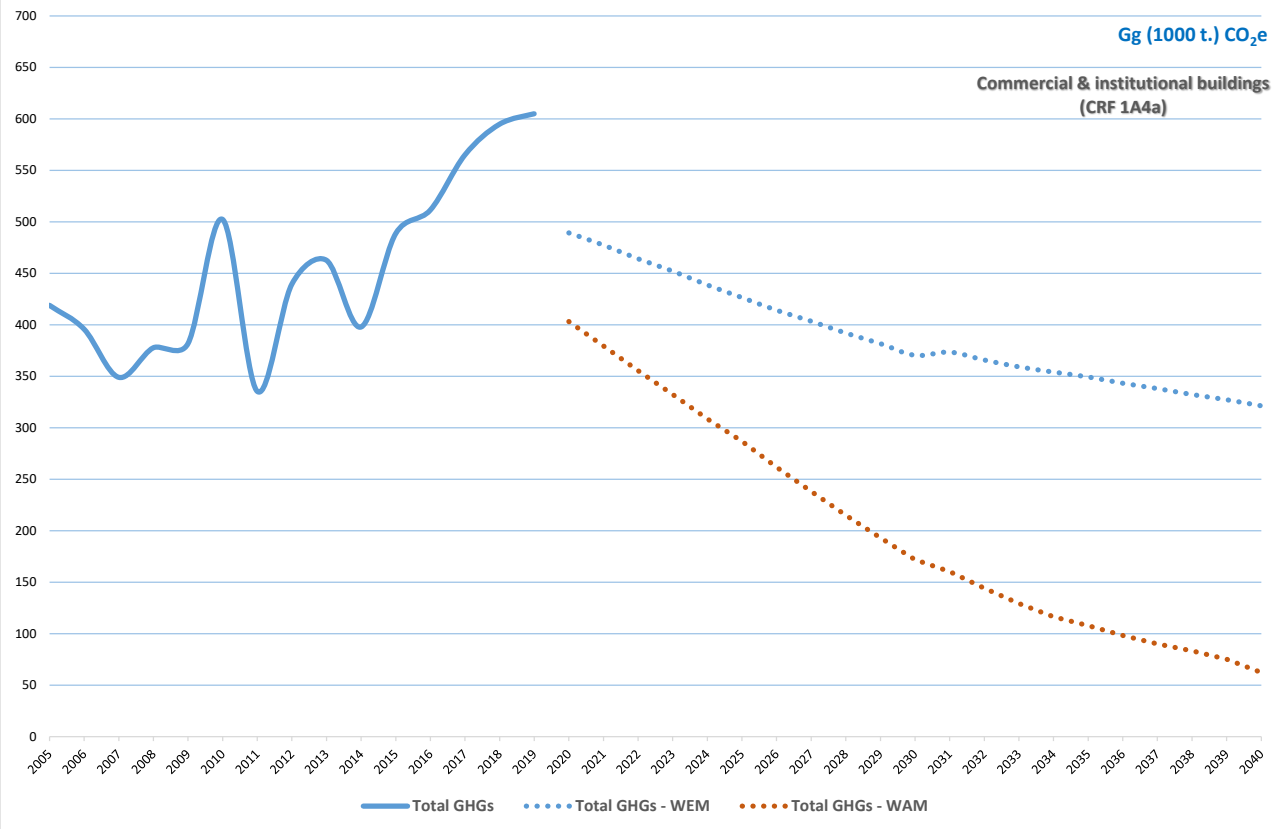
IV.4.4. Commercial and institutional buildings (1.A.4.a)

TABLE IV.4-4 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR COMMERCIAL & INSTITUTIONAL BUILDINGS

Sector	CRF	GHG	2005	2010	2015	2020	2025	2030	2035	2040	
Commercial & institutional buildings	1.A.4.a	Total GHGs	418.87	502.33	488.50	489.22	426.39	370.26	349.23	321.18	WEM
		Total GHGs	418.87	502.33	488.50	403.13	286.69	171.82	107.76	62.38	WAM
		Total GHGs	100.00	119.93	116.62	116.80	101.80	88.39	83.37	76.68	WEM
		Total GHGs	100.00	119.93	116.62	96.24	68.44	41.02	25.73	14.89	WAM

Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

FIGURE IV.4-4 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR COMMERCIAL & INSTITUTIONAL BUILDINGS



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

58. For the commercial and institutional buildings, projected emissions are taken from the baseline and target projections made by the "Konsortium" for tertiary activities during the preparation of the NECP for Luxembourg. To determine the share of CO_2, CH_4 and N_2O, the respective weights of these three gases in the 2017 projections have been applied to the "Konsortium" CO_2e projected emissions *[→ Table IV.3-1]*.

59. The ISI-DELUX model differentiates between "office buildings", "public buildings" and "other buildings" and depicts both the small and the large buildings. It also differentiates between old and new constructions and considers that the total number of tertiary buildings would develop from around 8 900 to around 10 200 units over the period 2017 to 2030.

60. A series of reinforced and additional measures are proposed in the NECP for new non-residential buildings. The main purpose is to increase energy efficiency standards with regard to heating and hot water by establishing a new standard based on the successful regulations and norms introduced in the residential sector, such as "nearly zero energy building" (NZEB) standards for new constructions that is in place since 2017. From 2020 onwards, NZEB are considered in the WAM projections for non-residential buildings.

61. Minimum energy requirements for existing non-residential buildings is a cornerstone in the NECP. Therefore, the encouragement to renovate both, old residential and non-residential buildings, is a key measure in the drafting of the "national long-term renovation strategy" in 2021, which contains innovative aid schemes defined in collaboration with all the stakeholders. In the framework of this strategy, the emergence of an energy efficiency market for the renovation of large functional buildings will be promoted through tools also envisaged for the manufacturing industry (→ §44): setting up a transparency platform for audits to support energy efficiency efforts, the introduction of a "de-risking" instrument, the "Energy Efficiency Obligation Scheme" (EEOS). The strategy would also comprise a bonus program for the replacement of fossil fuelled boilers and the installation of low-temperature heating networks, supplied with residual heat from the industrial sector and data centres, or working with renewable energy sources (deep geothermal energy, heat pumps, sustainable wood). There will also be special bonuses for the renovation of protected buildings.

62. Specific measures are also planned for public buildings (offices, schools, etc.): making environmental management and audit system EMAS (Environment Management and Audit Scheme) compulsory for the management of existing public buildings and setting up a strategy for sustainable and low-energy new construction and renovation. The aim is to improve sustainability, energy efficiency and the use of renewable energy sources in public buildings. In particular, the strategy will integrate the principles of circular economy and will provide for the introduction of an obligation to integrate photovoltaic (PV) systems on the roofs of public buildings, both for new constructions and for renovations. The objective is to equip all adequate public buildings with PV systems by 2025.

63. For the WAM scenario, renovation rate in the tertiary sector is expected to grow from 0.5 % of the building stock in 2017 to 2 % by 2030.

64. In ***Figure IV.4-4***, the level of emissions for the first estimated year (i.e. 2020) is well below the latest historical emissions recorded. What happens is that in the modelling exercise, which uses

2015 as the reference year, 2017 is the first estimated year *[→ Section IV.3.4]*. Therefore, in the model, planned measures are considered from that year onwards despite the fact that they were not yet entirely implemented or even adopted. Moreover, historical emissions being rather erratic through time – partially due to the way they are estimated – explains the level of WEM emissions for the first estimated year.

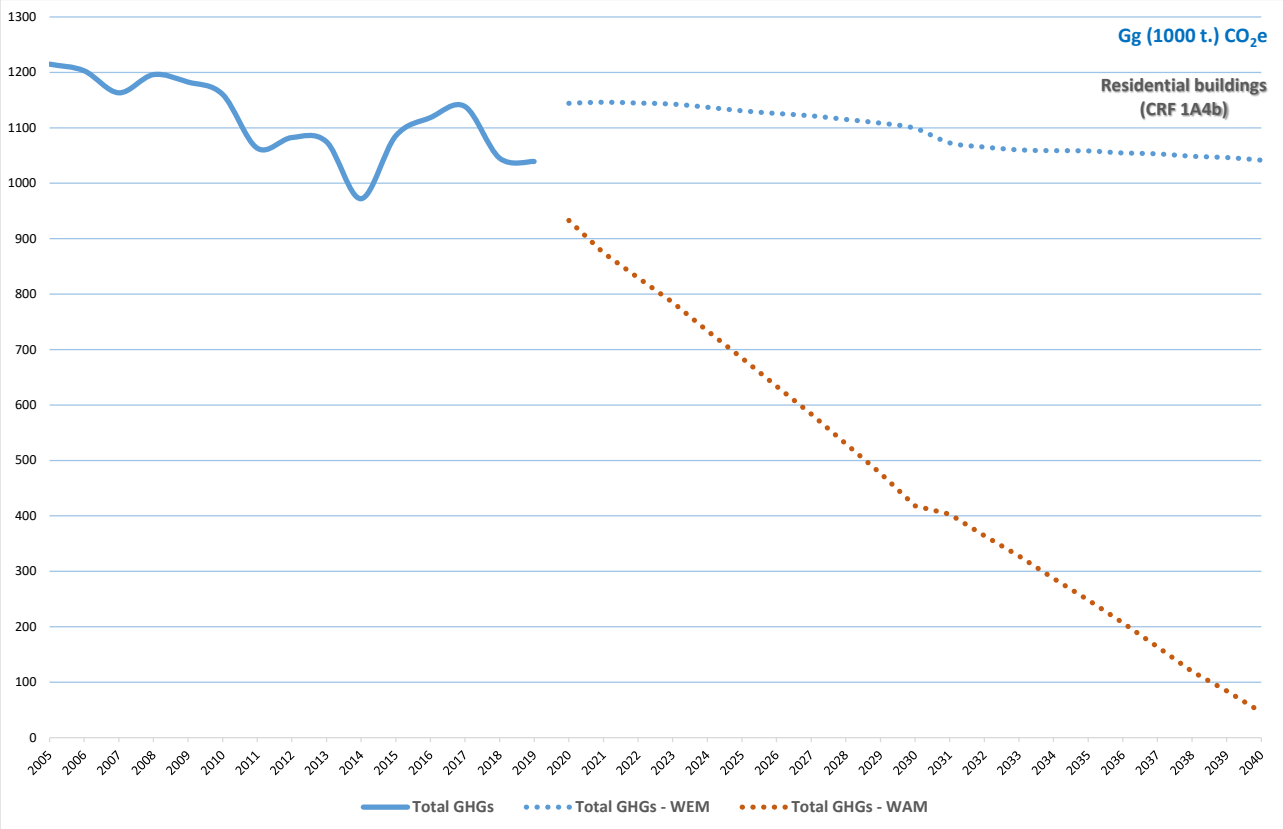
IV.4.5. Residential buildings (1.A.4.b)

TABLE IV.4-5 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR RESIDENTIAL BUILDINGS

Sector	CRF	GHG	2005	2010	2015	2020	2025	2030	2035	2040	
Residential buildings	1.A.4.b	Total GHGs	1 214.74	1 160.34	1 085.13	1 144.15	1 130.66	1 099.04	1 058.45	1 041.76	WEM
		Total GHGs	1 214.74	1 160.34	1 085.13	932.68	684.60	418.26	248.36	45.79	WAM
		Total GHGs	100.00	95.52	89.33	94.19	93.08	90.48	87.13	85.76	WEM
		Total GHGs	100.00	95.52	89.33	76.78	56.36	34.43	20.45	3.77	WAM

Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

FIGURE IV.4-5 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR RESIDENTIAL BUILDINGS



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

65. For the residential buildings, projected emissions are taken from the baseline and target projections made by the "Konsortium" for households during the preparation of the NECP for Luxembourg. To determine the share of CO_2, CH_4 and N_2O, the respective weights of these three

gases in the 2017 projections have been applied to the "Konsortium" CO_2e projected emissions *[→ Table IV.3-1]*.

66. The ISI-DELUX model differentiates between "single-family houses", "terraced houses" and "multi-family houses" of different age classes (before 1971, 1971 to 1991 and after 1991). It also differentiates between old and new buildings and assumes that, each year, around 2 500 renovations would be successfully carried out whilst, about 90 000 new residential units would be built over the period 2017 to 2030.

67. A series of reinforced measures are proposed in the NECP for new residential buildings. The main purpose is to complement NZEB energy efficiency standards with regard to heating and hot water, which are in place since 2017, by introducing a new A+ energy class to cover 100 % of the energy needs of new residential constructions by renewable energy sources.

68. In this respect, the main political instrument already put in place in 2001 and since then prolonged and amended several times – "PRIMe House"[19] – will be revised and reinforced. This scheme offers investment aid for the energy and sustainable renovation of residential buildings, as well as qualified energy advice for the construction of sustainable residential buildings and the use of renewable energies (PV systems, thermal solar systems, heat pump systems, wood pellet systems and wood chip boilers). For the WAM scenario, it is anticipated that this scheme would allow 1 900 successful renovations per year.

69. Minimum energy requirements for existing residential buildings is a cornerstone in the NECP. Therefore, to encourage the renovation of both old residential and non-residential buildings, a key planned measure is the drafting in 2021 of a "national long-term renovation strategy" as described in §61. For residential buildings, an ambitious renovation strategy will be set up: renovation rate of 3 % per year for a renovation depth of at least 72 %. The strategy also comprises a bonus program for the replacement of fossil fuelled boilers and the installation of low-temperature heating networks similar to the one for non-residential buildings. There will also be special bonuses for the renovation of protected buildings.

70. In *Figure IV.4-5*, the level of WAM emissions for the first estimated year (i.e. 2020) is quite below the latest historical emissions recorded. What happens is that in the modelling exercise, which uses 2015 as the reference year, 2017 is the first estimated year *[→ Section IV.3.4]*. Therefore, in the model, planned measures are considered from that year onwards despite the fact that they were not yet entirely implemented or even adopted.

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19 The current "PRIMe House" scheme runs from 1 January 2017 to end 2020. It has been extended to end March 2021 in the context of the post Covid-19 pandemic recovery measures: https://www.myenergy.lu/fr/particuliers/lois-et-reglements/soutien-financier#prime-house-nouveau-regime.

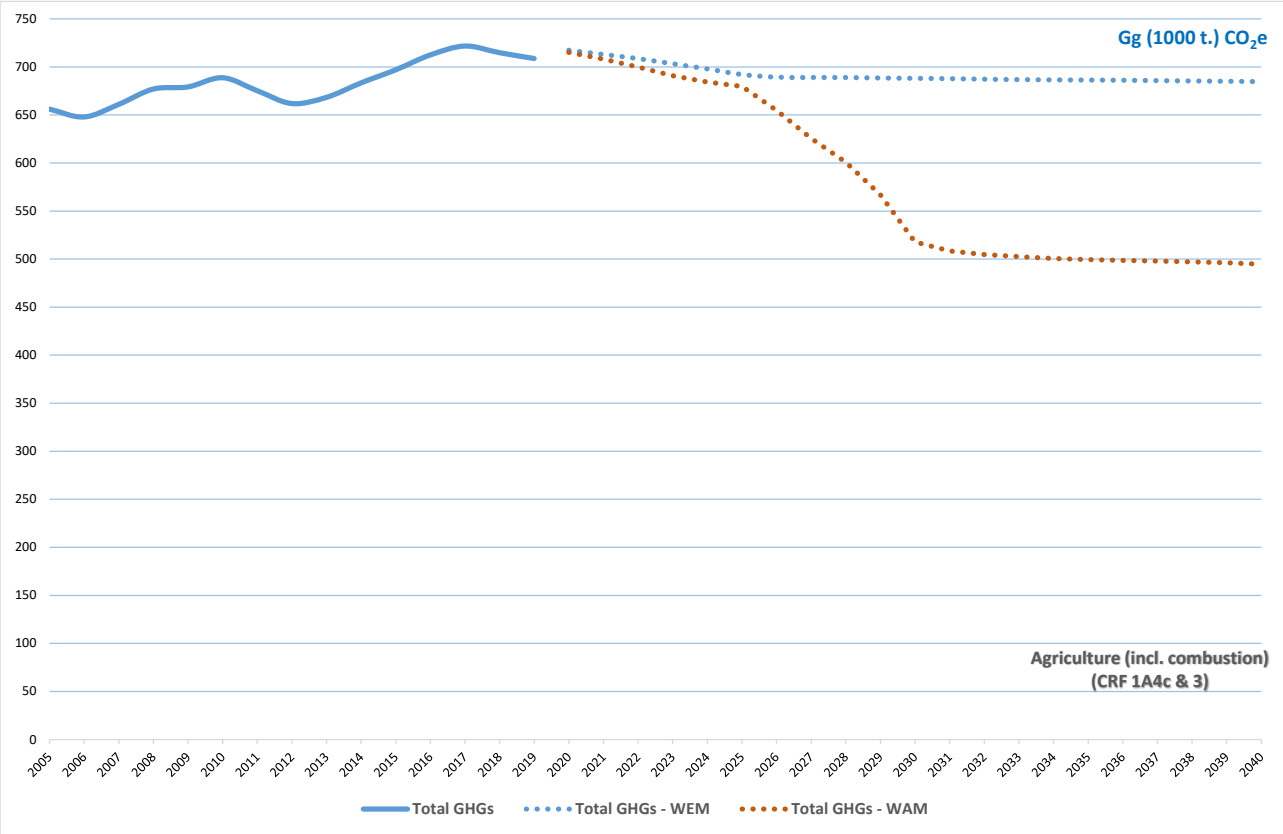
IV.4.6. Agriculture (incl. combustion) (1.A.4c & 3)

TABLE IV.4-6 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR AGRICULTURE

Sector	CRF	GHG	2005	2010	2015	2020	2025	2030	2035	2040	
Agriculture (incl. combustion)	1.A.4.c	Total GHGs	656.02	688.71	696.93	717.34	692.16	688.18	686.37	684.77	WEM
	3	Total GHGs	656.02	688.71	696.93	715.20	679.74	517.78	499.59	494.71	WAM
		Total GHGs	100.00	104.98	106.24	109.35	105.51	104.90	104.63	104.38	WEM
		Total GHGs	100.00	104.98	106.24	109.02	103.62	78.93	76.16	75.41	WAM

Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

FIGURE IV.4-6 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR AGRICULTURE



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

71. For the agriculture sector, projected emissions for combustion (CRF 1.A.4.c) are either derived from the activity data prepared for the NAPCP BAU projections (WEM scenario) or from MECDD hypotheses (WAM scenario). Concerning agricultural practices - animal husbandry and manure management, cultivation, and soils related emissions (CRF 3) – both WEM and WAM projected emissions had been estimated by gas by the SER *[→ Table IV.3-1]*.

72. For the WEM scenario, expected future emissions for agriculture related practices would remain rather constant up to 2040. For both enteric fermentation (CRF 3.A) and manure management (CRF 3.B), forecasted emissions are stable. This is the consequence of "business as usual" assumptions, such as dairy cows and suckler cows' projections based on the continuation of the observed trend since 2015 (the year when the milk quota ended); other cattle categories

projections based on estimated cow numbers and the correlation observed in previous years ("bottom-up" approach); continuing observed trend for laying hens; and unchanged patterns for swine and manure management systems. For agricultural soils (CRF 3.D), projections for synthetic nitrogen fertilizer, sewage sludge and compost spreading are based on recent years trends, whereas expected developments regarding cultivation of arable crops and grassland, as well as harvests, are based on trend assessments and simple hypotheses.

73. For the WAM scenario, various measures and developments are considered in the NECP, such as climate-friendly measures promoted in the agricultural sector; reduction of the number of dairy and suckler cows, as well as pigs; measures and systems to reduce nitrogen excreted (Nex); a more environment-friendly slurry management, incl. the use of slurry to produce biogas; organic farming; etc. Most of them are included in the WAM scenario but could not be estimated with sufficient certainty beyond 2030, which explains the flatter trend after 2030 for WAM projections in ***Figure IV.4-6***.

74. In details, the main planned measures in the NECP that might affect emissions directly are the following:

    - organic farming: reaching 20 % of the "utilised agricultural land" (UAL) under organic farming by 2025, and 100 % by 2050;
    - methane: elaborating a methane reduction strategy including, a.o., the use of organic livestock effluents of animal origin in biogas plants;
    - effluents: promoting environmentally friendly techniques regarding the spreading of organic livestock effluents and nitrogenous mineral fertilizers, encouraging the covering of existing open pits and prohibiting open pits slurry (for biogas) and deflectors, the latter from 2025 onwards;
    - fertilizer: encouraging farmers to use less or no nitrogen fertilizer at all, a measure in conjunction with agri-environmental measures defined within the framework of the EU's common agricultural policy (CAP), which include programs to reduce nitrogen fertilization on arable land and grassland. Abandoning the fertilization of flower strips and animal pounds, for example.

75. For liming (CRF 3.G), no satisfactory projections method and not enough information on possible developments led the SER to consider a "flat" WEM and WAM projection replicating the latest available historical year, which is also the year with the highest emissions on record.

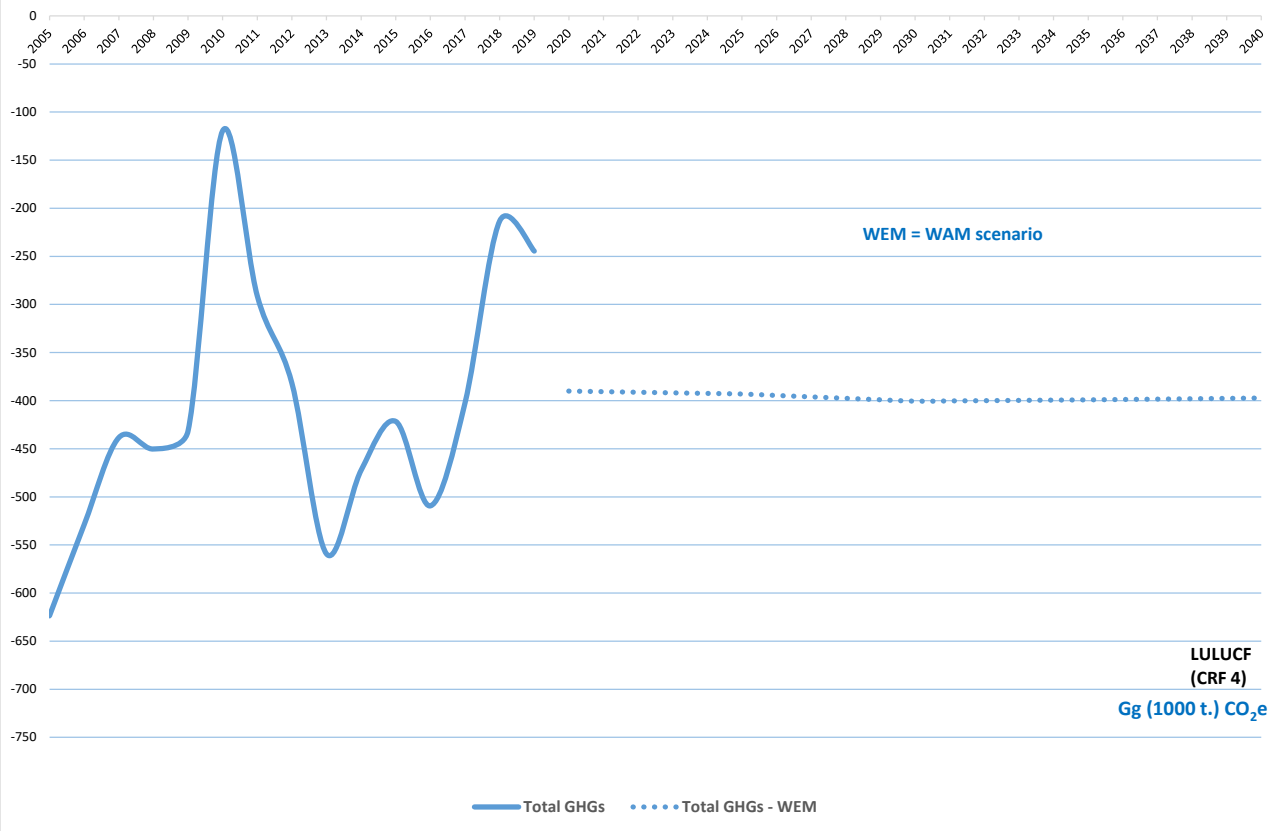
IV.4.7. LULUCF (4)

TABLE IV.4-7 – HISTORICAL AND PROJECTED WEM = WAM EMISSIONS FOR LULUCF

Sector	CRF	GHG	2005	2010	2015	2020	2025	2030	2035	2040	
LULUCF	4	Total GHGs	-623.72	-119.48	-421.57	-390.10	-393.13	-400.62	-399.21	-397.32	WEM
		Total GHGs	-623.72	-119.48	-421.57	-390.10	-393.13	-400.62	-399.21	-397.32	WAM
		Total GHGs	100.00	19.16	67.59	62.54	63.03	64.23	64.00	63.70	WEM
		Total GHGs	100.00	19.16	67.59	62.54	63.03	64.23	64.00	63.70	WAM

Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

FIGURE IV.4-7 – HISTORICAL AND PROJECTED WEM = WAM EMISSIONS FOR LULUCF



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

76. Projections for the LULUCF sector are the result of ad-hoc methods developed by the MECDD-AEV, which are making use of information on demographic and housing developments in Luxembourg. These projections do not distinguish between WEM and WAM scenario *[→ Table IV.3-1]*. That means that planned measures in the NECP are not at all considered in LULUCF projections yet.

77. The two main variables on which the projections are based are, on the one hand, the conversion of grass- and cropland into settlements and, on the other hand, the evolution of harvest rates in forestland, with land use for the development of settlements being the biggest driver of land use change in Luxembourg.

78. The projected decrease in carbon removals can mainly be attributed to an increase in harvest rates with a high proportion of forest stands reaching their maturity age over the evaluated period. In public forests, these rates are determined by the age class structure of forests and are therefore quite predictable. Harvest rates in private forests, on the other hand, are driven by policy and the price of wood. The latter one has been very depressed over the last decade and consequently harvest rates have been quite low. No assumption has however been made on the evolution of wood prices. Instead, the age class structure as well as past harvest rates have been used to determine future harvest rate. The method employed is identical to the one used to calculate the "Forest Management Reference Level" and is described in detail in the latest National Inventory Report [MECDD-AEV (2020), section 11.4]. It is nevertheless important to highlight that harvest rates always show very strong inter-annual variation and that projections can only provide long-term trends; hence, they will never be capable of reproducing those annual changes. Furthermore, extreme weather events followed by windfall and subsequent salvage logging can produce very high annual harvest rate that will strongly affect the balance.

79. The NECP planned measures focus on new incentives for forest management that is closer to nature and more resilient to climate change. Together with afforestation and more "wood volume" in forests, these measures should increase the "carbon sink" function of forests. Along with forests, the agricultural sector also represents a "carbon sink". In order to promote humus formation, the NECP recommends to develop good practice guidelines and to prolong the current ban on plowing permanent grasslands in sensitive areas. The obligation to diversify crops imposed as part of agri-environmental measures will also help "carbon sinks". All these measures will be considered in future projections.

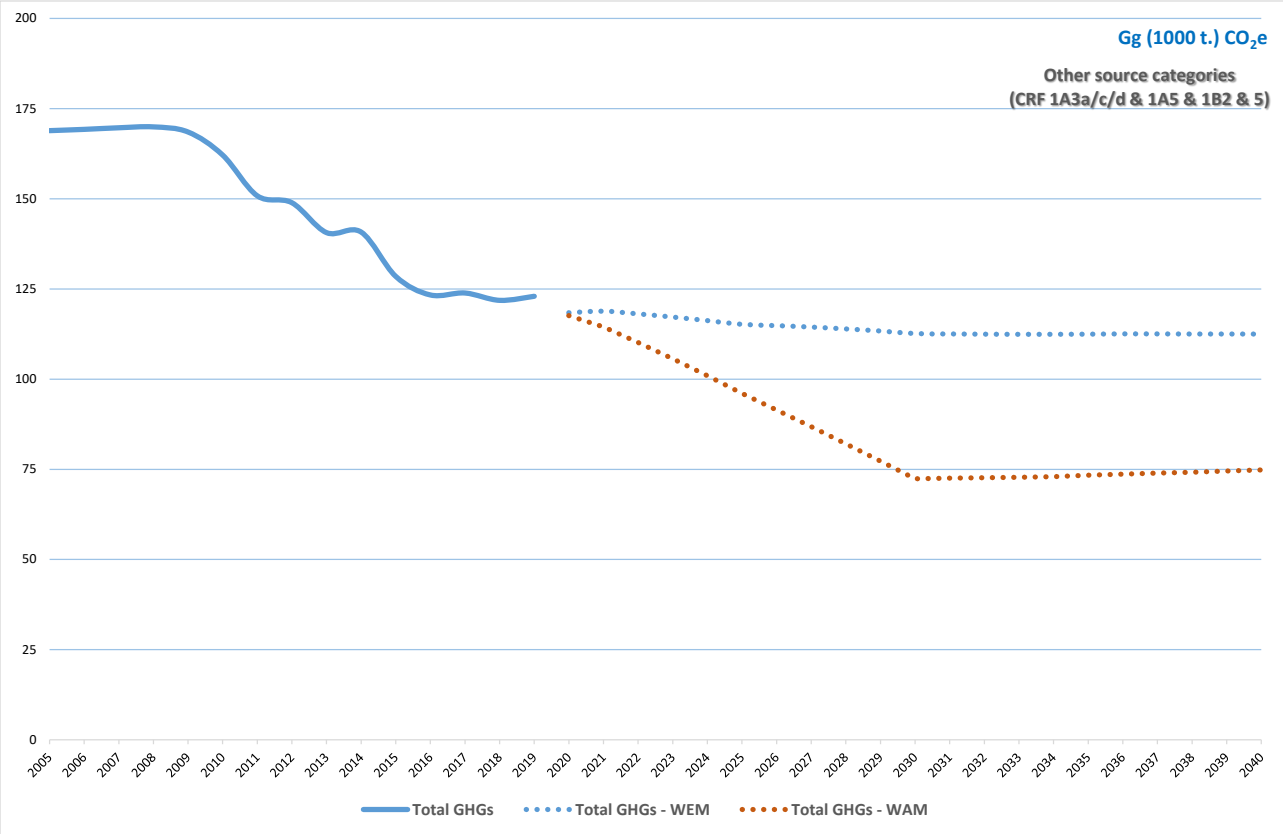
IV.4.8. Other source categories (1.A.3a/c/d, 1.A.5, 1.B.2 & 5)

TABLE IV.4-8 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR OTHER SOURCE CATEGORIES

Sector	CRF	GHG	2005	2010	2015	2020	2025	2030	2035	2040	
Other source categories	1.A.3.a/c/d	Total GHGs	168.91	162.15	128.47	118.38	115.19	112.65	112.48	112.51	WEM
	1.A.5	Total GHGs	168.91	162.15	128.47	117.63	96.07	72.37	73.35	74.82	WAM
	1.B.2	Total GHGs	100.00	96.00	76.06	70.09	68.19	66.69	66.59	66.61	WEM
	5	Total GHGs	100.00	96.00	76.06	69.64	56.87	42.85	43.42	44.29	WAM

Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

FIGURE IV.4-8 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR OTHER SOURCE CATEGORIES



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

80. Projections are:

- derived from activity data prepared for the NAPCP projections (CRF 1.A.3.c, 1.A.3.d, 1.A.5, 1.B.2 & 5.B);
- based on simple assumptions by the MECDD (CRF 1.A.3.a & 5.A -WAM);
- based on calculations from the MECDD-AEV (5.A - WEM) and from the Water Agency (5.D);
- derived from models (1.B.2 & 5.B – N2O) *[→ Table IV.3-1]*.

81. Setting aside the negligible combustion emissions reported and estimated for CRF sub-categories 1.A.3.a (domestic aviation), 1.A.3.d (inland navigation) et 1.A.5 (other mobile emissions), increasing emissions are anticipated for railways (CRF 1.A.3.c). Passengers rail transport is totally electrified. Thus, the planned increase would come from increasing freight manutention that is performed by diesel locomotives. The WAM scenario triggers a higher increase of emissions up to 2040 than the WEM scenario as, for the former, a higher share of freight will be diverted from road to rail, more precisely at the multimodal hub for intermodal transport that continues its expansion in the south of the country.

82. Decreasing emissions are reported for fugitive emissions from natural gas transmission and distribution (CRF 1.B.2) under the WAM scenario – emissions are predicted to remain rather constant under the WEM scenario.

83. Turning to waste emissions (CRF 5), solid waste disposal related emissions (5.A) are expected to decrease following Luxembourg policy aiming at minimising as much as possible quantities of waste dumped into landfills, hence reducing methane generation. The WAM scenario even considers a phase-out of the landfilling activity by 2030. Partly in return, composting emissions (5.B) are projected to increase. Wastewater handling emissions (5.D) would decline up to 2030 and then stabilize.

IV.4.9. Total GHG (excl. LULUCF)

TABLE IV.4-9 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR TOTAL (EXCL. LULUCF), ETS AND ESD/ESR

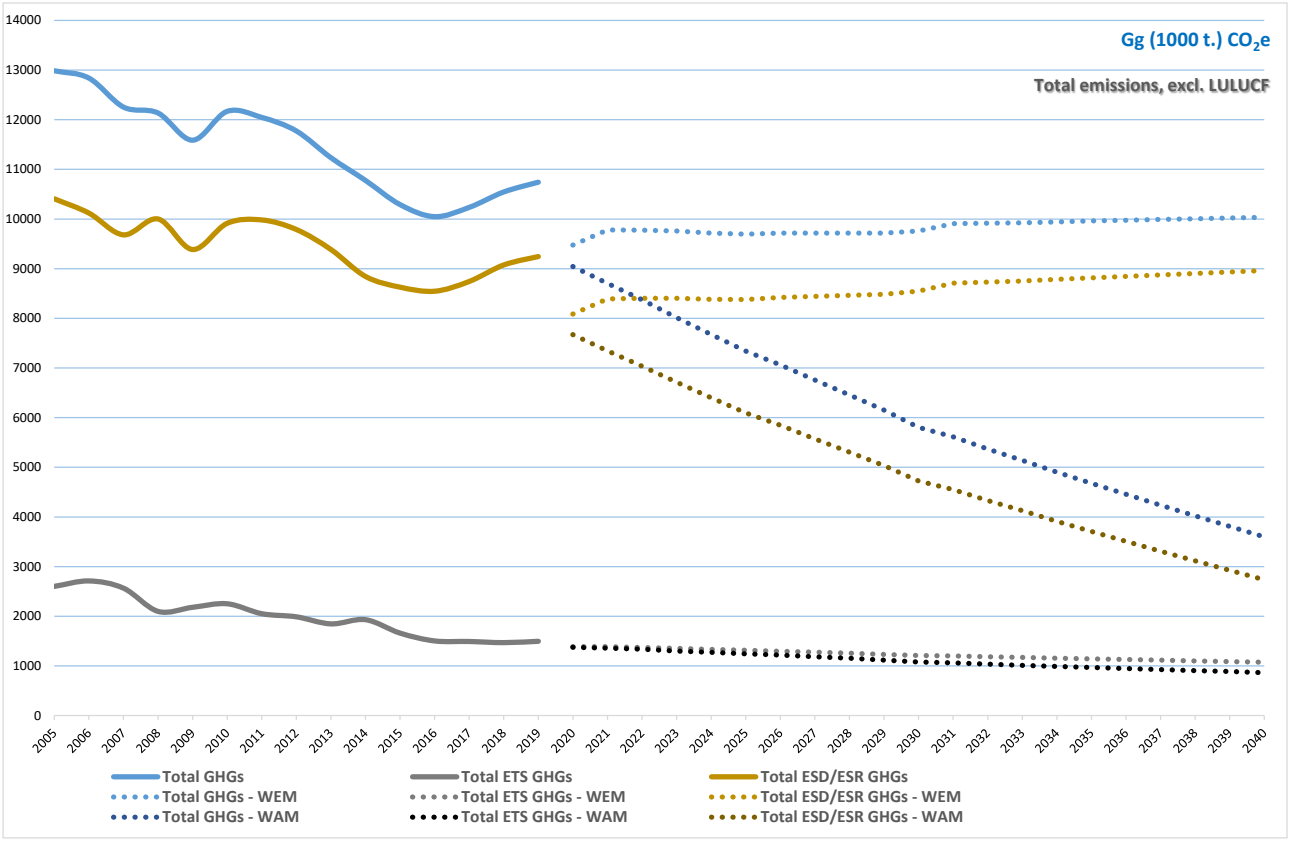
Sector	CRF	GHG	2005	2010	2015	2020	2025	2030	2035	2040	
Total emissions excl. LULUCF	-	Total GHGs	12 985.53	12 169.06	10 290.10	9 476.50	9 693.81	9 758.91	9 960.78	10 035.36	WEM
		Total ETS GHGs	2 603.35	2 252.66	1 660.83	1 388.85	1 315.60	1 208.46	1 143.75	1 073.66	
		Total ESD/ESR GHGs	10 406.77	9 914.49	8 628.66	8 087.07	8 377.64	8 549.88	8 816.46	8 961.14	
		Total GHGs	12 985.53	12 169.06	10 290.10	9 044.55	7 340.08	5 805.44	4 676.31	3 597.27	WAM
		Total ETS GHGs	2 603.35	2 252.66	1 660.83	1 374.07	1 244.80	1 079.33	969.61	864.39	
		Total ESD/ESR GHGs	10 406.77	9 914.49	8 628.66	7 669.92	6 094.71	4 725.54	3 706.13	2 732.31	
		Total GHGs	100.00	93.71	79.24	72.98	74.65	75.15	76.71	77.28	WEM
		Total ETS GHGs	100.00	86.53	63.80	53.35	50.53	46.42	43.93	41.24	
		Total ESD/ESR GHGs	100.00	95.27	82.91	77.71	80.50	82.16	84.72	86.11	
		Total GHGs	100.00	93.71	79.24	69.65	56.53	44.71	36.01	27.70	WAM
		Total ETS GHGs	100.00	86.53	63.80	52.78	47.82	41.46	37.24	33.20	
		Total ESD/ESR GHGs	100.00	95.27	82.91	73.70	58.56	45.41	35.61	26.26	

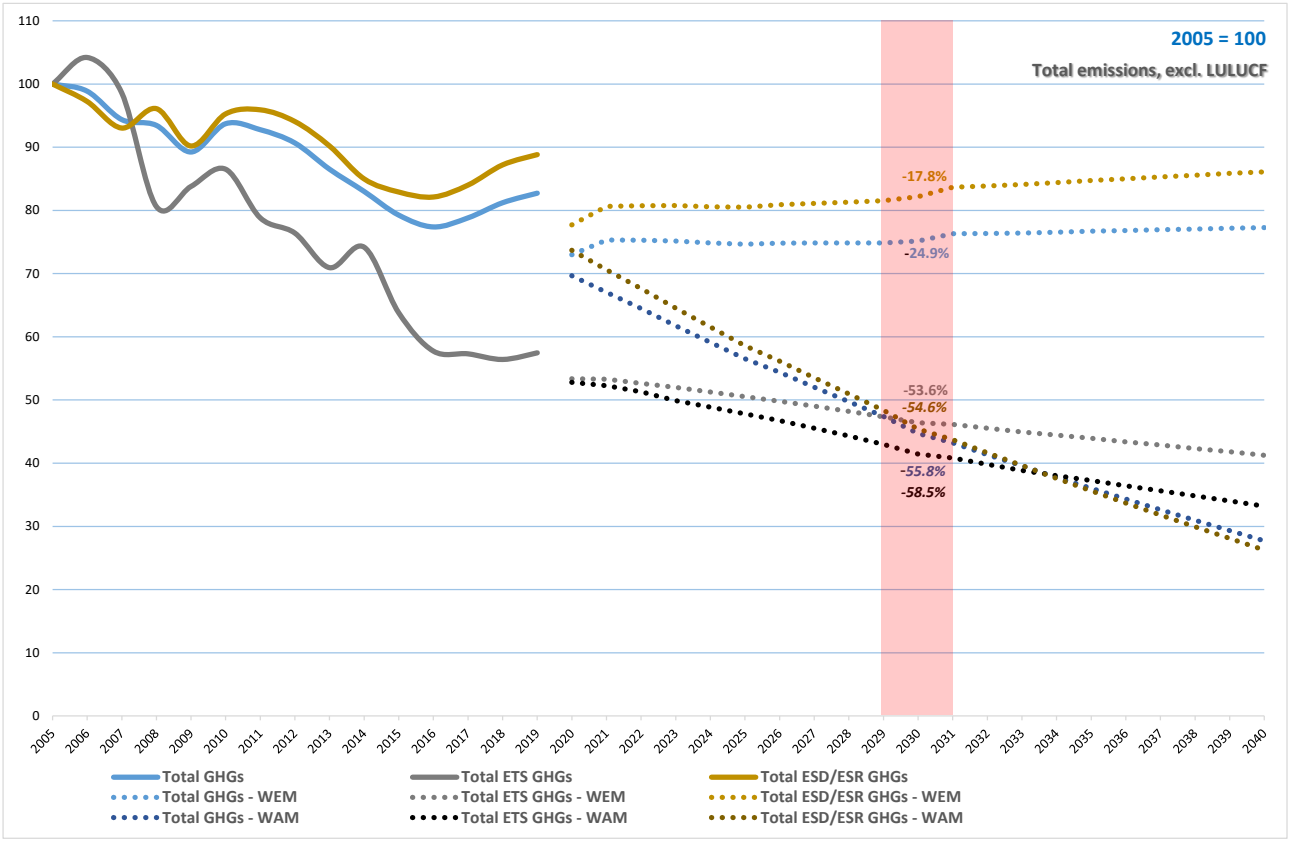
Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

84. Results of the projections exercise show that, in 2040, **total GHG emissions (excl. LULUCF)** would be between 23 % (WEM reference scenario) and 72 % (WAM planned scenario) below their 2005 level. Turning to the **non-ETS (ESD/ESR) emissions**, the diminution would reach about 14 % under the WEM scenario and 74 % under the WAM scenario. **ETS emissions**, on their side, would be more than divided by two between 2005 and 2040 for the reference scenario (- 59 %) and by two thirds for the scenario with planned measures (- 67 %).

85. Nevertheless, what is now crucial for Luxembourg is the 2030 target. As explained in *Section III.2.3*, Luxembourg has committed to a self-imposed 55 % reduction in the level of non-ETS (ESD/ESR) emissions by 2030 compared to 2005. Looking therefore at 2030, the above respective cuts would be - 25 %, - 18 % and - 54 % for the WEM scenario and - 55 %, - 55 % and -59 % for the WAM scenario: see *Figures IV.4-9*. Therefore, according to the **projections with additional and planned measures**, **Luxembourg would meet its 2030 nationally determined target**: see §89 and *Figures IV.4.10 & IV.4.12*.

FIGURES IV.4-9 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS FOR TOTAL (EXCL. LULUCF), ETS AND ESD/ESR

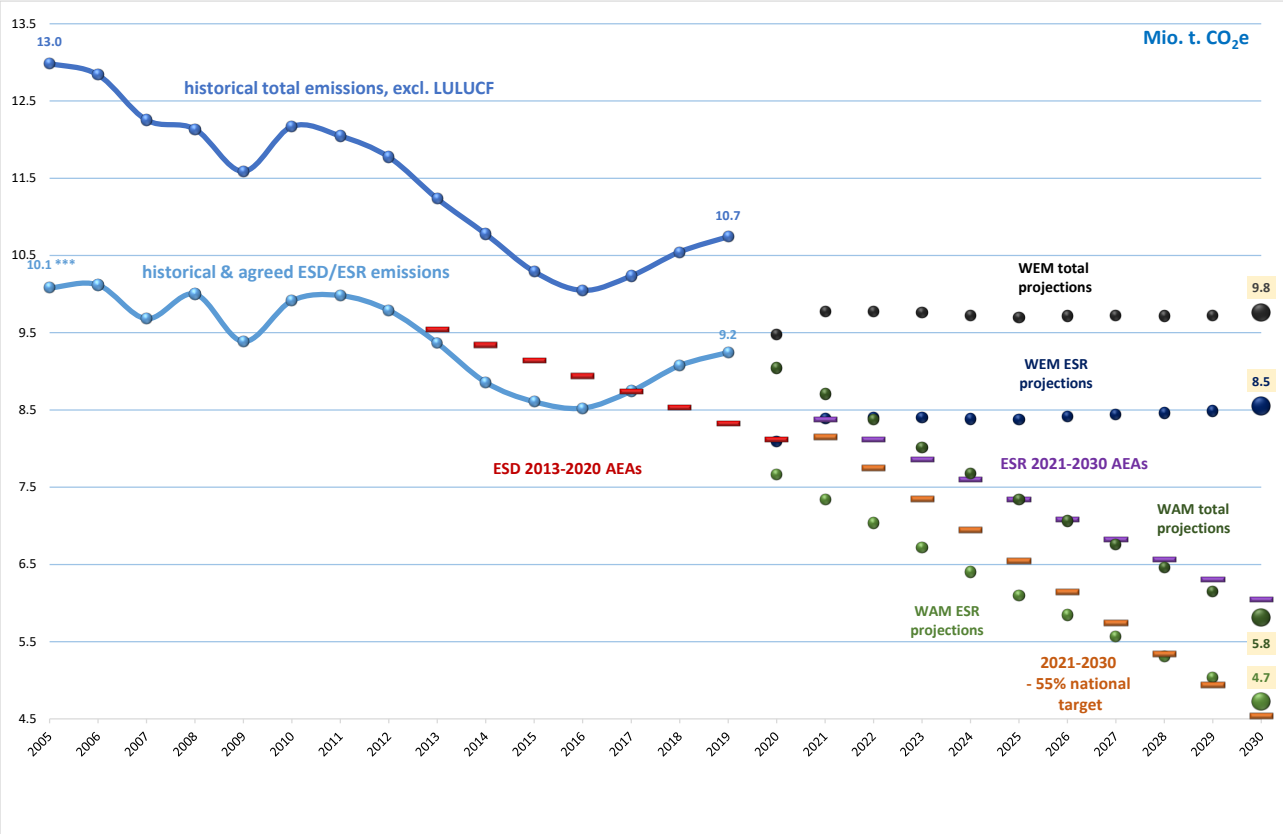




Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

86. *Figure IV.4-10* depicts historical and anticipated total GHG (excl. LULUCF) and non-ETS (ESD/ESR) emissions up to 2030. The various binding trajectories under the EU legislation – ESD up to 2020 and ESR from 2021 until 2030[20] - and for Luxembourg's unilateral commitment are also represented. The trajectories consist in "Annual Emission Allocations" (AEAs) *[→ Section III.2.2]*. Detailed explanations are given in the next paragraphs.

FIGURE IV.4-10 – HISTORICAL, PROJECTED AND TARGET WEM & WAM EMISSIONS FOR TOTAL (EXCL. LULUCF) AND ESD/ESR



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

Note: "agreed" historical ESD/ESR emissions are those that have been fixed under the ESD compliance procedure and they slightly differ from the emissions that would be calculated using the latest inventory submission and the verified ETS emissions. In practice, each yearly inventory submission is reviewed at EU level. Once the outcomes of this exercise are agreed between a Member Country and the Commission, the ESD/ESR emission for the latest reported inventory year is "frozen" and serves as the basis for calculating the yearly surplus or gap with the corresponding AEA. At the end of the period – 2013-2020 in this case – the sum of surpluses and gaps will determine if a Member State has been compliant under the ESD (PS: Member States are allowed not to "bank" their possible annual surpluses or to sell them to a Member State that is accumulating gaps. Luxembourg did not resort to these options).

87. Under the ESD, Luxembourg has to reach a **20 % reduction in non-ETS/ESD emissions by 2020** (compared to the level of ESD emissions in 2005) and to respect **binding annual GHG targets** – or AEAs - **for the period 2013-2020**. *Figure IV.4-11* shows that Luxembourg's ESD emissions were below or close to the linear trajectory up to 2016, but above it in 2017, 2018 and 2019. For 2020, both the WEM projection – adjusted for the Covid-19 pandemic anticipated effects – and the WAM projection are below the AEA: by 30 kt CO_2e (or 0.4 %) and 447 kt CO_2e (or 5.5 %)

20 ESD = Effort Sharing Decision: https://eur-lex.europa.eu/eli/dec/2009/406/oj.
ESR = Effort Sharing Regulation: https://eur-lex.europa.eu/eli/reg/2018/842/oj.

respectively. It is therefore anticipated that, despite the overachievements in 2018 and 2019, **it will not be necessary to buy AEAs and/or project-based credits to comply with the "ESD target"** – expected surplus of 0.17 Mio t CO_2e and of 0.58 Mio t CO_2e over the 2013-2020 period for the WEM and WAM scenarios respectively *[→ Table IV.4-10]*.

TABLE IV.4-10 – ESD IMPLICATION FOR LUXEMBOURG – 2013-2020 AEAS AND WEM & WAM EMISSIONS

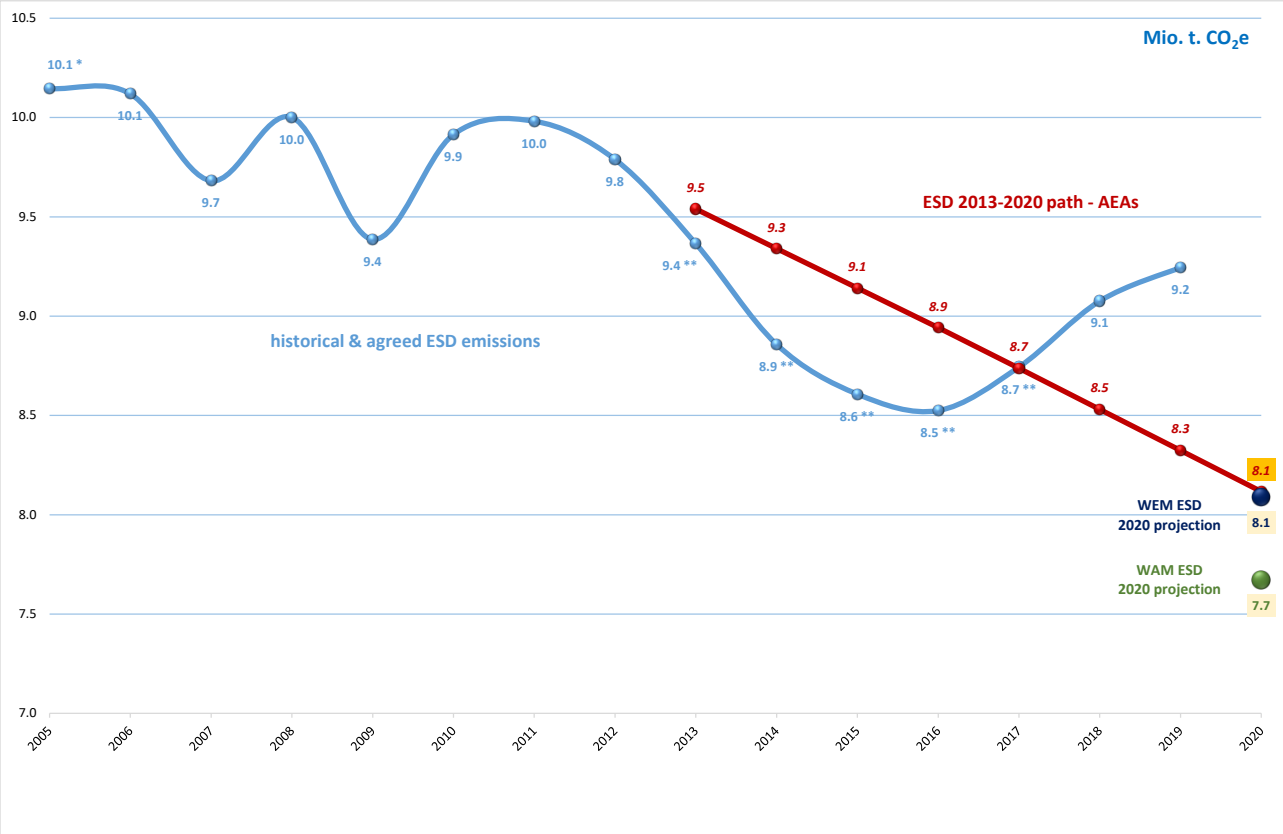
ESD emissions - WEM in Gg (1000 t.) CO_2e	2005	2013	2014	2015	2016	2017	2018	2019p	2020
	10146.18	9365.30	8858.31	8607.48	8524.45	8743.46	9075.52	9245.31	**8087.07**
AEAs		9539.56	9340.28	9141.01	8941.74	8737.85	8530.88	8323.91	**8116.94**
Surplus Gap		-174.26	-481.98	-533.53	-417.29	5.62	544.64	921.40	-29.87
cumulative		*-174.26*	*-656.23*	*-1189.77*	*-1607.05*	*-1601.43*	*-1056.79*	*-135.39*	*-165.26*

ESD emissions - WAM in Gg (1000 t.) CO_2e	2005	2013	2014	2015	2016	2017	2018	2019p	2020
	10146.18	9365.30	8858.31	8607.48	8524.45	8743.46	9075.52	9245.31	**7669.92**
AEAs		9539.56	9340.28	9141.01	8941.74	8737.85	8530.88	8323.91	**8116.94**
Surplus Gap		-174.26	-481.98	-533.53	-417.29	5.62	544.64	921.40	-447.03
cumulative		*-174.26*	*-656.23*	*-1189.77*	*-1607.05*	*-1601.43*	*-1056.79*	*-135.39*	*-582.42*

Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

Notes: - 2005 value = the reference level of ESD emissions considered for Luxembourg's compliance under the ESD;
- 2013 to 2016 values = "agreed" historical ESD emissions: see note under Figure IV.4-10.

FIGURE IV.4-11 – ESD IMPLICATION FOR LUXEMBOURG – 2013-2020 TRAJECTORY FOR ESD EMISSIONS AND 2020 PROJECTED WEM & WAM EMISSIONS



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

Note: agreed" historical ESD emissions: see note under Figure IV.4-10.

88. EU joint intended nationally determined contribution (INDC) for the Paris Agreement is reflected in the "**2030 Climate and Energy framework**" and the associated burden-sharing amongst Member States defined under the ESR *[→ Section III.2.3]*. For Luxembourg, it translates into a **40 % reduction in non-ETS/ESR emissions by 2030** (compared to the level of ESR emissions in 2005) and into **binding annual GHG targets** – or AEAs - **for the period 2021-2030**. *Figure IV.4-12* shows that Luxembourg's WEM projected ESR emissions (dark blue dotted line) would be above that linear trajectory (purple dots), but below under the WAM scenario (green dotted line).

89. However, Luxembourg has announced that **it would go further** than its commitment under the ESR, with nationally determined target of **minus 55 % by 2030** – compared to the level of ESR emissions in 2005. In this case, the 2030 WEM projection would be well above the target, with an overachievement of 4.01 Mio. t CO_2e (or 88.5 %), whereas the 2030 WAM projection would slightly miss it: overachievement of 0.19 Mio. t CO_2e (or 4.2 %). Over the ESR period 2021-2030, the estimated WAM ESR emissions would be below the AEAs for all years, but 2029 and 2030. However, the country would be compliant over the period with a surplus of 3.36 Mio. t CO_2e *[→ Figure IV.4-12 & Table IV.4-11]*. Such a development would be in line with Luxembourg's current intended climate policy for the next 10 years, i.e. achieving a reduction in emissions without having recourse to "carbon sinks" (LULUCF) and AEAs and/or project-based credits.

TABLE IV.4-11 – ESR IMPLICATION FOR LUXEMBOURG – 2021-2030 AEAS AND WEM & WAM EMISSIONS – LUXEMBOURG UNILATERAL COMMITMENT SCENARIO – MINUS 55 %

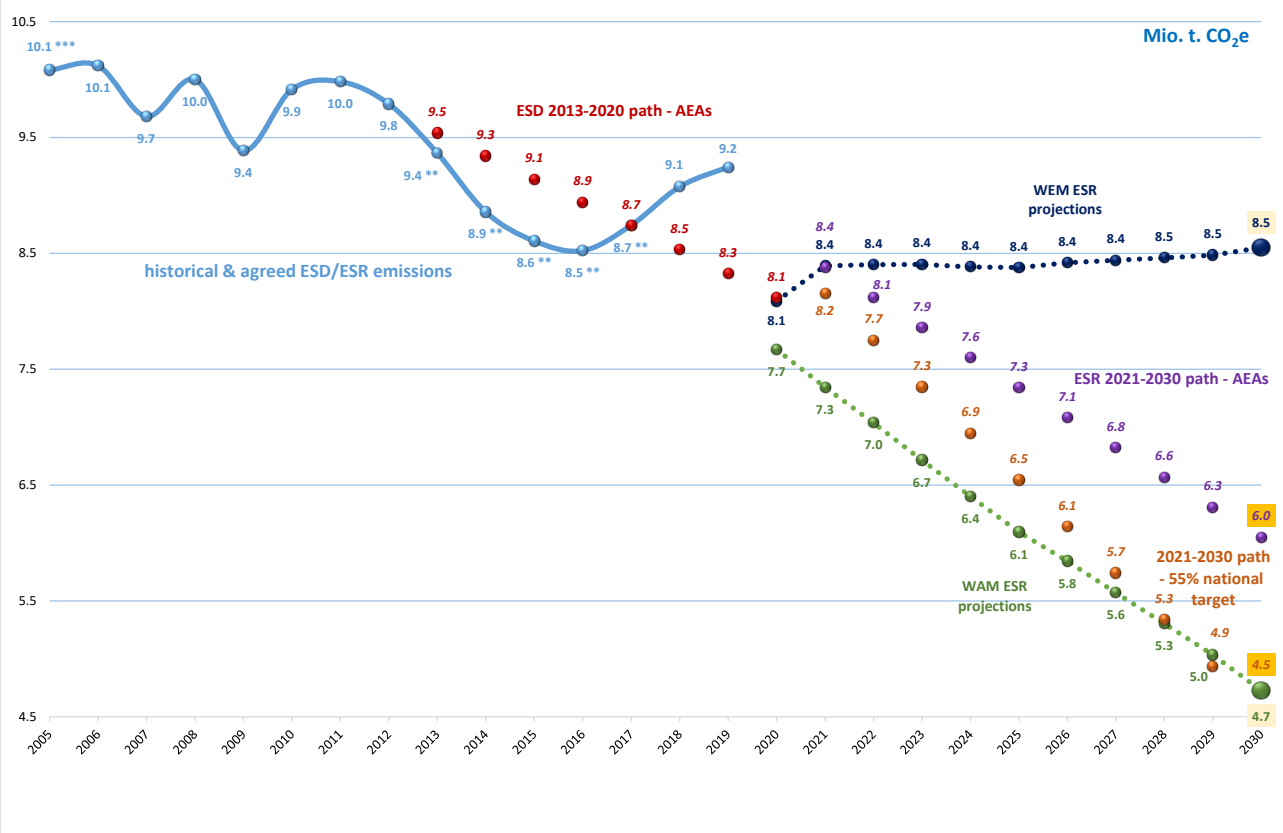
ESR emissions - WEM in Gg (1000 t.) CO_2e	2005	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	10081.82	8391.67	8403.47	8404.55	8383.54	8377.64	8419.13	8441.53	8461.99	8485.43	**8549.88**
AEAs		8150.88	7749.32	7347.76	6946.20	6544.63	6143.07	5741.51	5339.95	4938.38	**4536.82**
Surplus Gap		240.79	654.15	1056.79	1437.34	1833.00	2276.05	2700.02	3122.04	3547.05	4013.06
cumulative		*240.79*	*894.94*	*1951.73*	*3389.07*	*5222.07*	*7498.12*	*10198.15*	*13320.19*	*16867.24*	*20880.30*

ESR emissions - WAM in Gg (1000 t.) CO_2e	2005	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	10081.82	7345.47	7036.60	6716.06	6402.89	6094.71	5844.77	5570.60	5303.97	5034.53	**4725.54**
AEAs		8150.88	7749.32	7347.76	6946.20	6544.63	6143.07	5741.51	5339.95	4938.38	**4536.82**
Surplus Gap		-805.41	-712.72	-631.70	-543.30	-449.92	-298.31	-170.91	-35.98	96.15	188.72
cumulative		*-805.41*	*-1518.14*	*-2149.84*	*-2693.14*	*-3143.06*	*-3441.37*	*-3612.28*	*-3648.26*	*-3552.11*	*-3363.39*

Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

Note: 2005 value = the reference level of ESR emissions cconsidered for Luxembourg's compliance under the ESR.

FIGURE IV.4-12 – ESR IMPLICATION FOR LUXEMBOURG – 2021-2030 PROBABLE TRAJECTORY FOR NON-ETS EMISSIONS AND 2020 TO 2030 PROJECTED WEM & WAM EMISSIONS



Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

Note: agreed" historical ESD/ESR emissions: see note under Figure IV.4-10.

IV.4.10. WEM and WAM projections by gas

90. As for the projections by sector, in *Tables IV.4-11*, data are presented both in 1000 tonnes of CO_2e (kt or Gg) and in indices (with 2005 being equal to 100), whereas *Figures IV.4-13* is limited to emissions in kt or Gg. One figure presents CO_2 emissions only and another, the other GHGs, with the exception of SF_6 for which emission volumes are too low to be shown.

91. The pattern of carbon dioxide historical and projected emissions is very similar to the one for total emissions. Indeed, on average, CO_2 emissions represents around 90 % of total GHG emissions (excl. LULUCF). Consequently, details and explanations provided in the previous sections apply here too. Moreover, the graph resembles a lot to the one for road transportation *[→ Figure IV.4-3]* which is not surprizing since related CO_2 emissions represent, on average, 60 % of the historical and estimated WAM total CO_2 emissions.

92. For methane, the parallel can be made with the figure for the agriculture sector *[→ Figure IV.4-6*] since CH_4 emissions of this sector are, on average, about 80 % of the total methane

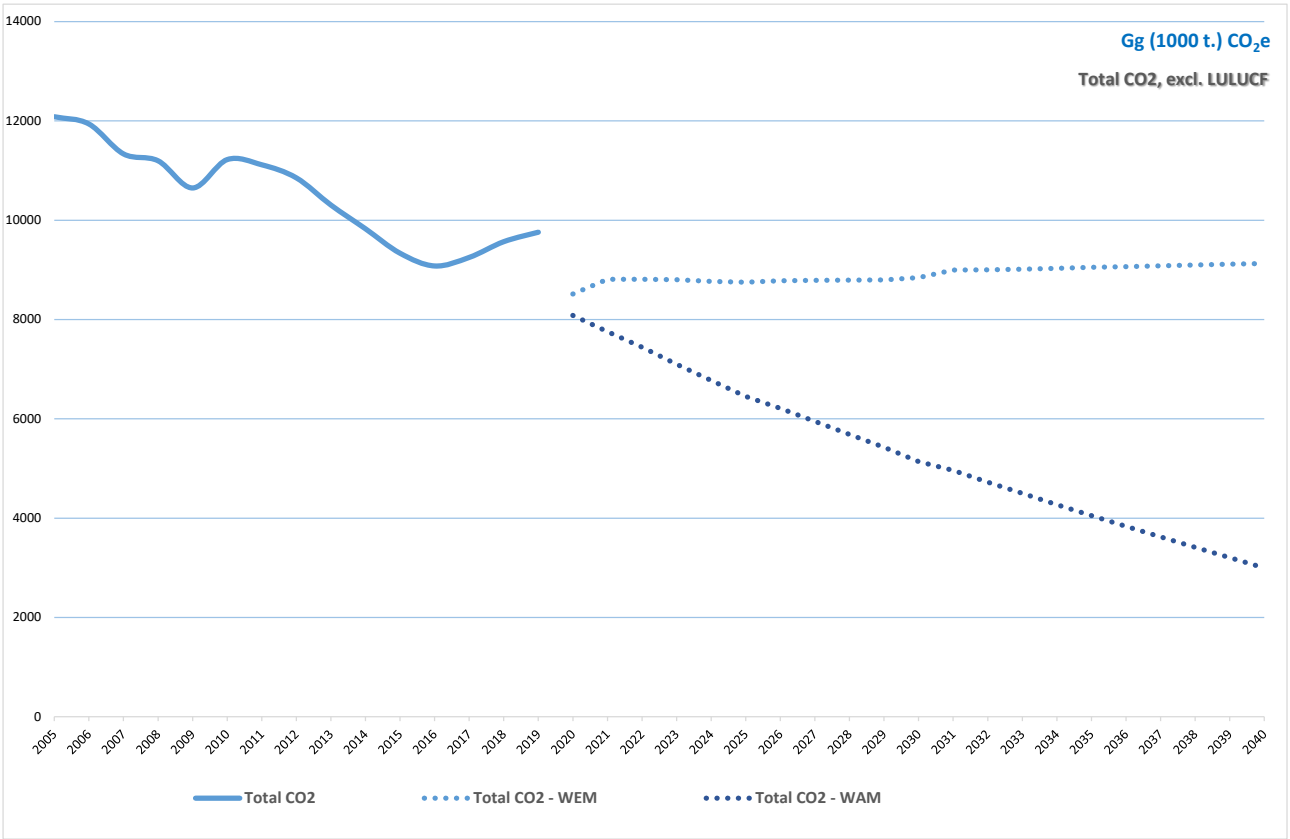
emissions. Such a comparison cannot be made for nitrous oxide for which the main source (on average 60 %) is CRF source category 3.D – agricultural soils.

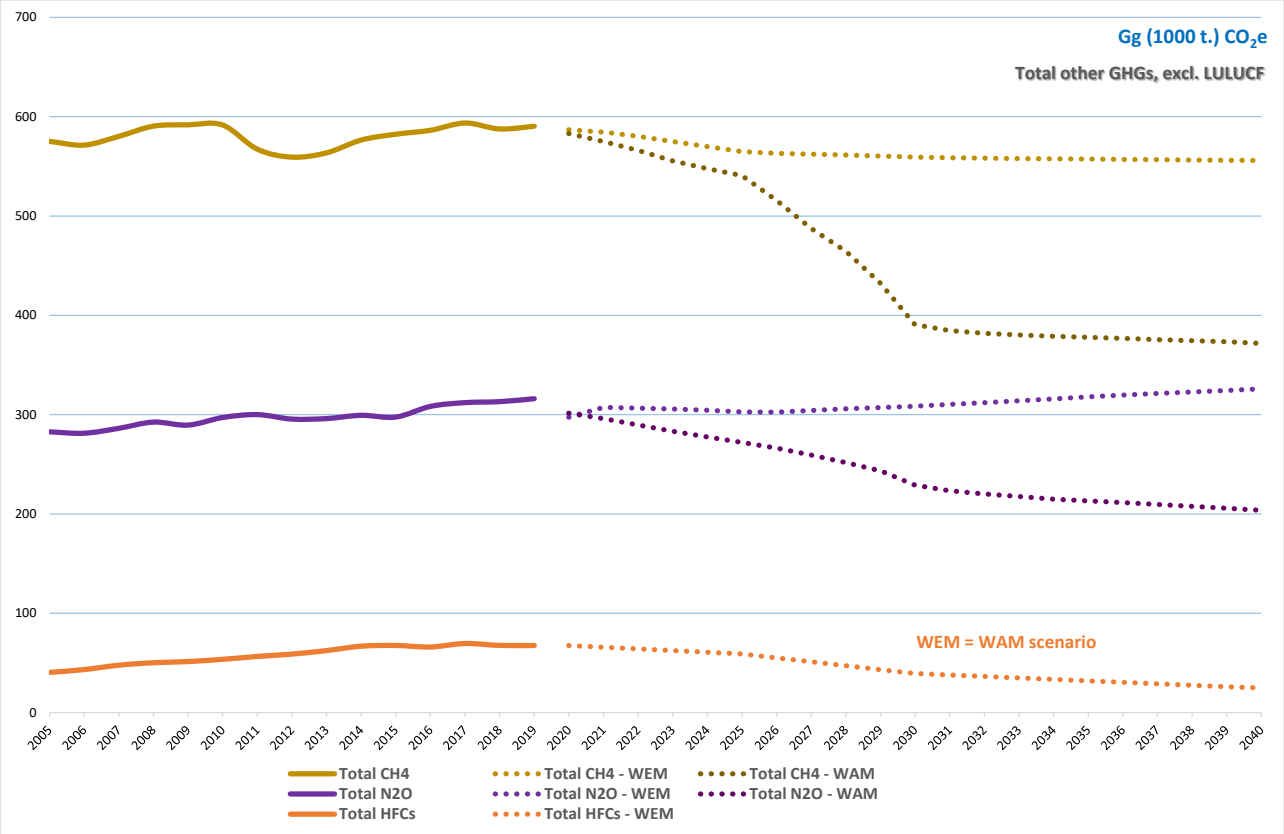
TABLE IV.4-12 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS BY GAS

Sector	CRF	GHG	2005	2010	2015	2020	2025	2030	2035	2040	
Total emissions excl.	-	CO2	12 081.87	11 219.29	9 333.17	8 514.14	8 752.63	8 845.66	9 051.50	9 126.94	WEM
LULUCF		CH4	575.20	591.66	582.38	586.77	564.78	559.25	557.30	555.82	
		N2O	282.69	297.15	297.59	297.49	302.69	308.44	317.98	325.93	
		HFCs	40.47	53.67	67.60	67.42	58.98	39.26	31.94	24.61	
		SF6	5.31	7.29	9.37	10.67	14.74	6.29	2.06	2.06	
		CO2	12 081.87	11 219.29	9 333.17	8 082.09	6 453.62	5 140.23	4 051.27	2 995.27	WAM
		CH4	575.20	591.66	582.38	582.96	540.72	390.59	377.82	371.68	
		N2O	282.69	297.15	297.59	301.42	272.03	229.07	213.22	203.64	
		HFCs	40.47	53.67	67.60	67.42	58.98	39.26	31.94	24.61	
		SF6	5.31	7.29	9.37	10.67	14.74	6.29	2.06	2.06	
		CO2	100.00	92.86	77.25	70.47	72.44	73.21	74.92	75.54	WEM
		CH4	100.00	102.86	101.25	102.01	98.19	97.23	96.89	96.63	
		N2O	100.00	105.11	105.27	105.23	107.07	109.11	112.48	115.30	
		HFCs	100.00	132.63	167.03	166.59	145.73	97.01	78.91	60.81	
		SF6	100.00	137.37	176.43	201.04	277.62	118.51	38.84	38.84	
		CO2	100.00	92.86	77.25	66.89	53.42	42.54	33.53	24.79	WAM
		CH4	100.00	102.86	101.25	101.35	94.01	67.90	65.69	64.62	
		N2O	100.00	105.11	105.27	106.62	96.23	81.03	75.42	72.04	
		HFCs	100.00	132.63	167.03	166.59	145.73	97.01	78.91	60.81	
		SF6	100.00	137.37	176.43	201.04	277.62	118.51	38.84	38.84	

Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

FIGURES IV.4-13 – HISTORICAL AND PROJECTED WEM & WAM EMISSIONS BY GAS





Sources: MECDD-AEV and MECDD – Submission 2020v1 & "approximated GHG inventory" – July 2020.
MECDD – 2020 projections for the 4th Biennial Report.

Notes: For HFCs there is only one projection (WEM = WAM).
SF_6 emissions are not reproduced because of their low level.
There are no PFCs and NF_3 emissions reported for Luxembourg.

IV.4.11. Sensitivity analyses

93. It is not straightforward to produce sensitivity analyses for the projections. Indeed, such an exercise is made **complex by the extremely high sensitivity of the projections to internal and external parameters**. Luxembourg is a small country and economy where, for instance, a single industrial project – internal parameter – or changes in relative road fuels pricing or VAT differences compared to neighbouring countries – external parameters – could strongly influence the projected emissions *[→ Section IV.2]*.

94. Thus, if a large company discontinues its activities or a new one settles in Luxembourg, this could have significant impacts on the GHG emissions, hence on their projections. Changes in processes in existing units could also lead to noticeable changes in the emissions *[→ Section IV.2.1]*.

95. For external parameters, changes in the policy of a neighbouring country might have a strong impact on national GHG emissions since "road fuel sales to non-residents" is responsible for about 39 % of the total GHG emissions (excl. LULUCF) in Luxembourg *[→ Section IV.2.2]*.

96. However, we have tried to evaluate the uncertainties of the projections for each of the GHG source category *[→ Table IV.4-14]*. It is not, strictly speaking, a sensitivity analysis but it gives, at least, an indication of the level of confidence for these projections.

TABLE IV.4-14 – LEVEL OF UNCERTAINTY OF THE PROJECTIONS

Source category	WEM & WAM
Public electricity & heat production	fair (if no new fossil fuel-based units start to operate, otherwise high)
Manufacturing industry	high (as decision centres are often outside Luxembourg, otherwise fair if no new large emitter plants start to operate)
Road Transportation	high
Residential, commercial & institutional combustion	fair (if the ambitious renovation rate can be met, otherwise high)
Agriculture	fair
Other miscellaneous sources	high (methods used are rather simple but these are mostly small sources)

Source: MECDD own appraisal.

97. As planned improvements, options could be to analyse the impacts on the emissions of new industrial projects or of cessation of activities. Various scenarios for the road transportation sector should also be regarded as an option for a sound sensitivity analysis of Luxembourg's emissions projections (e.g. various penetration rates for electro-mobility). It might also be investigated whether or not it would be possible to play with various hypotheses on population growth, the number of inhabitants per dwelling, prices of fuels, taxes and other fiscal instruments. For testing these hypotheses, the use of an equilibrium model could be a plus *[→ Section IV.5]*.

98. For the agriculture sector, it might be possible to implement and run a "Monte Carlo Simulation", and hence not only getting a "most likely value", but also an uncertainty range. This is particularly interesting for N_2O emission factors that are very uncertain.

IV.5. IMPROVEMENT OF METHODOLOGIES

99. The first well-thought-out projection exercise goes back to the years 2007-2008, when projections were based on an ad-hoc energy balance set up by the MECO, the FiFo-Köln and the MEV. Projected emissions were obtained using the MS™ Windows based TRAMO-SEATS software for time series analysis and used 2005 as the base year [MEV (2008)].

100. Later in 2008, data from the GHG inventory submission of January 2008 could be used and that helped to increase the quality of the projections significantly. Moreover, for the quantitative assessment of impacts of measures on GHG emissions projections, the results from the "National Energy Efficiency Action Plan" (NEEAP) submission of February 2008 could be applied as well as results from a study by Thöne (2008) analysing the specific feature of "road fuel sales to non-residents". Baseline projected emissions were obtained using the PRIMES baseline from July 2007 as a basis. However, PRIMES projections were modified if necessary, and for the transport sector two framing scenarios were introduced [MEV (2009)].

101. The **2009** exercise relies on detailed data from the GHG inventory submission of May 2009. As for the 2008 exercise, most of the impacts of the various PaMs identified were coming from the NEEAP and the study by Thöne (2008). Baseline projected emissions for the main gas (CO_2) and sectors (CRF 1A, CRF 2A-C) were obtained using ECONOTEC's EPM tool [MDDI-DEV (2009)].

102. The projections performed in **2011** were mostly updating the results obtained in 2008, but using the GHG inventory submission of April 2011 as a basis for the reference year. The effects of the PaMs were identical to those reported for the 2009 exercise [MDDI-DEV (2011)].

103. In **2013**, projections were realised in two stages. A "quick" update of the 2011 projections was performed early 2013 to allow Luxembourg to be compliant with regard to reporting at EU level [MDDI-DEV (2013) and ECONOTEC Consultants (2013a)]. Then, during the fall, this first update has been revised and completed in view of the writing of Luxembourg's NC6 and BR1 [ECONOTEC Consultants (2013b) and MDDI-DEV (2014a)]. These late 2013 projections were based on the GHG inventory submission of March 2013 and on ECONOTEC's EPM tool. Detailed assumptions and methodology regarding the 2013 exercises are presented in Luxembourg's sixth National Communication to the UNFCCC [MDDI-DEV (2014a), sections V.2.4 & V.2.5, p. 196-208].

104. Firstly in **2014** and then in **2015**, projections have been refined again. Based on the GHG inventory submission of April 2015 for the latter, they combined outcomes from various sources and approaches: (i) ECONOTEC's updated results [ECONOTEC Consultants (2015)], notably through its specific "Residential-Tertiary Tool" [ECONOTEC Consultants (2013c)]; (ii) Komobile's "bottom-up" models for the transportation sector [Komobile & FVT (2014)]; and (iii) several national sources (STATEC, Customs & Excises Administration) – for detailed assumptions and methodology, see [MDDI-DEV (2014b) & (2015)]. These 2015 projections were slightly revised in **2016** to reflect the latest historical developments – GHG inventory submission of March 2016 – as well as updated figures and forecasts for road fuel sales that were communicated to the Department of the Environment [MDDI-DEV (2016)].

105. A very similar approach has been used for the projections that were performed in **April 2017**. They are basically updating the 2015 and 2016 exercises considering (i) outcomes from the revised 2015 Komobile's study [Komobile & FVT (2017a) & (2017b)]; (ii) the latest results from STATEC models; as well as (iii) the PRIMES reference scenario from July 2016 [European Commission (2016a)].

106. The **April 2019** projections was a combination of new projections developed in the framework of the NECP by the "Konsortium" (CRF categories 1.A.2 (non-ETS emissions), 1.A.3.b (CO_2 emissions), 1.A.4.a & 1.A.4.b) and by the SER for the agriculture sector (CRF 3); completed by the 2017 (un-)adjusted projections (ECONOTEC, Komobile & FVT, MECDD-AEV, MECDD-

AGE). The use of PRIMES or GAINS 2016 reference scenario projections was limited to GAINS for CRF Sector 5.B (N_2O emissions) and, instead of PRIMES, POTEnCIA 2018 DCS v2 scenario was used to forecast international aviation.

107. Finally, the **May 2020** projections, and their **October 2020** update for this Biennial Report, mark another step forward to more elaborated projections. For a series of CRF source categories, activity data used to forecast various air pollutants have been used to calculate related GHG projections (CRF categories 1.A.3.c, 1.A.3.d, 1.A.4.c, 1.A.5, 1.B.2, 2.D & 5.B: → §14). This improvement comes on top of the projections developed in the framework of the NECP (→ §13). For the agriculture sector (→ §15), work is still on-going to improve the projections. Consequently, there are no longer projections based on PRIMES or GAINS.

108. The above summary on GHG projections through time testifies of their continuous improvement. Nevertheless, **significant future progress is still expected**. **Firstly**, via the **work done and still to be done on the PaMs**. Indeed, simply listing (and not necessarily quantifying) mitigation actions allows to identify those that are going to have a material impact on projections, and it helps to prioritize them for quantification and integration into projections. Then, understanding and quantifying these actions helps to build more realistic projections.

109. **Secondly**, the macro-economic "computable general equilibrium" (CGE) model **LuxGEM** that is developed by STATEC is still being improved, especially with regard to one specific addition, the "energy & environment module". This module allows the assessment of certain PaMs in the Luxembourg energy market and, therefore, their corresponding impact on GHG development. Nevertheless, CGE models alone could not lead to appropriate GHG projections since their predictive power lies more in the interaction between economic parameters – "general equilibrium" – than in an accurate technological representation – CGE models are "top-down" models. Consequently, it is recommended to use the CGE approach as a framework model that will look at cross-sectoral effects of measures that would be estimated better using "bottom-up" technology driven models, though the latter do not encompass the impacts of measures in one sector on all the other sectors. So far, no technology driven model is coupled with LuxGEM, only the "empirical" model NEAM is coupled *[→ Box 3]*.

110. Luxembourg still believes that the **"bottom-up" and "top-down" approaches are complementary**. The move to a more elaborated system for GHG projections would also offer better opportunities to realize relevant projections sensitivity analyses.

BOX 3 – STATEC – NEAM MODEL: A "BOTTOM-UP" EMPIRICAL MODEL INTERACTING WITH A CGE MODEL

NEAM is a "bottom-up" model developed by STATEC, which is based on the establishment of stocks and their evolution up to 2035. It is an empirical model, at annual time interval. The latest version has been calibrated using data from energy balances for the period 2001-2015. It allows simulating energy scenarios for the mid (2020) and long (2050) terms.

NEAM is structured based on a hybrid "actor-use" typology:

- the residential sector;
- the tertiary sector;
- the industrial sector;
- transport use.

Main outputs are the final and primary energy demand on the national territory, broken down by production means, energy types and use, as well as the associated CO_2 emissions.

The model is made of three parts:

- energy balances derived from NAMEA-Energy;
- data and information for developing a reference or BAU scenario;
- data, information and hypotheses for developing an "energy trajectory" scenario.

Energy demand is modelled for the following sectors: (i) industry (anticipated production level, anticipated energy efficiency gains); (ii) transport - road, rail, maritime, air (anticipated vehicles stocks and mileage, anticipated activity development for road and maritime transport), anticipated energy efficiency gains); (iii) institutional and commercial sectors - electricity and heat (anticipated employment developments, anticipated shares of the various energy types); and (iv) residential sector - electricity and heat (anticipated development of the housing stock, anticipated population growth, anticipated energy efficiency gains of buildings and appliances). Sector related desegregation is realised at sub-sector level (e.g. cogeneration & thermal power plants), and for each energy type (liquid fuel, solid fuel, gaseous fuel, etc.).

Energy supply is modelled for four energy types: coal, natural gas, petroleum products, electricity & heat.

In practice, STATEC interacts NEAM with LuxGEM, a macro-economic "computable general equilibrium" (CGE) model. CGE models are widely employed for economic policy analysis and are built upon economic general equilibrium theory. The abstract modelling structure is combined with detailed micro-data on, e.g. relevant production processes, assumptions on supply and demand behaviour or the market structure. Hence, CGE models allow analysing the impact of structural changes, e.g. in input prices, taxes or other framework conditions on several markets of an economy.

The coupling of the two models is accomplished through the application of a single exchange cycle between them. As a **first step**, LuxGEM, which contains the demographic and econometric hypotheses, is launched to forecast five "interacting" variables, i.e. (i) population; (ii) domestic employment; (iii) cross-border commuters' employment; (iv) manufacturing industries value added; and (v) fuel imports. **Then**, these LuxGEM forecasts are introduced into the NEAM model, as exogenous variables. Coupled with NEAM's own hypotheses, six variables are estimated: (i) renewable electricity generation; (ii) energy consumption; (iii) biofuels consumption; (iv) number of buildings and electric vehicles (stock variables); (v) energy efficiency rates; and (vi) CO_2 emission factors. As a **third step**, the six variables are introduced in LuxGEM, which will be launched a second time in order to generate output files, such as energy demand and CO2 emissions by economic branches.

In both the NEAM and the LuxGEM models, many hypotheses support estimates of potential scenarios. Therefore, in order to assess the magnitude generated by the macroeconomic assumptions considered, three combinations of strong, intermediate and weak hypotheses were tested to ultimately provide a high, a low and a middle scenario. These hypotheses are: (i) the evolution of the population and its impact on disposable income; (ii) the share of cross-border workers in total employment; (iii) GDP growth; and (iv) the employment rate. Hypotheses concerning the technological aspects – namely the rates of renovation and demolition of buildings, the unit consumption per type of building, efficiency of the industrial processes, the vehicle fleet use and the unit efficiency by vehicle type – have been kept identical.

An analysis of the results of these simulations (high, low and intermediate) was then performed by sector and type of energy. From this analysis, it appears that the main factors determining energy demand are the evolution of the population and the prices of petroleum products (both wholesale & retail).

IV.6. ASSESSMENT OF THE AGGREGATE EFFECTS OF POLICIES AND MEASURES

111. The aggregated effects of implemented and adopted PaMs is calculated as the sum of estimated impacts of individual PaMs reported in CTF Table 3 and presented in *Section III.5*. Either the impact estimates use 1990 or the starting year of a PaM as the reference, i.e. calculating the impact of a PaM compared to a situation where this PaM would not have been implemented in a given year. This approach facilitates avoiding double counting of emissions savings.

112. In preparation of ex-ante estimates, priority has been given to those PaMs that are expected to have the most significant impact on GHG emissions in the stationary energy, transport, waste and IPPU sectors. The estimates for agriculture and many transport sector PaMs are not yet available, which is expected to underestimate the total impact of PaMs presented in *Table IV.6-1*.

113. Keeping in mind that the **PaMs do not always reflect the latest GHG projections** (see §11), **total impact of PaMs in 2020**, in accordance with the **with measures** definition is **269 kt CO_2e**, which means that in the absence of the PaMs, Luxembourg's GHG emissions would be at least 269 kt CO_2e higher than in the with measures projection. Over the **period relevant for the second commitment period of the Kyoto Protocol and for the ESD**, i.e. 2013-2020, total savings due to PaMs in place reach **1.4 Mio. t CO_2e.**

TABLE IV.6-1 – TOTAL IMPACT OF IMPLEMENTED AND ADOPTED PAMS, BY SECTOR AND GAS, 2013-2035 AND CUMULATIVE IMPACTS RELEVANT FOR THE SECOND COMMITMENT PERIOD OF THE KYOTO PROTOCOL

Sector & number of the PaM	GHG affected	kt CO_2e/year											kt CO_2e, cumulative	
		2013	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035	2013-2019	2013-2020
Stationary Energy		12.15	45.25	62.68	76.66	91.72	109.92	128.26	146.86	189.20	234.82	279.64	**526.64**	673.51
ES01	CO2	2.36	21.47	24.51	23.18	23.18	23.18	23.18	23.18	23.18	23.18	141.06	117.88	164.25
ES02	CO2	7.19	8.19	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	62.86	53.36	72.35
EC01	CO2	NO	9.67	18.27	29.18	39.61	52.89	65.96	78.89	107.85	141.36	215.57	149.61	294.47
EC01	CH4	NO	NE	NE	NE	NE	NE	NE	NE	0.61	0.79	NE	NE	NE
EC01	N2O	NO	NE	NE	NE	NE	NE	NE	NE	0.16	0.21	NE	NE	NE
EC07	CO2	NO	0.63	1.58	2.74	4.12	5.77	7.75	10.12	10.12	10.12	22.59	14.84	32.71
EC07	CH4	NO	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.06	0.06	0.14	0.09	0.20
EC07	N2O	NO	0.02	0.06	0.11	0.17	0.24	0.32	0.43	0.43	0.43	0.92	0.59	1.35
EC21	CO2	2.11	4.26	7.09	9.67	12.24	14.82	17.40	19.98	32.52	44.36	67.60	50.19	87.57
EC21	CH4	0.01	0.01	0.02	0.03	0.04	0.05	0.05	0.06	0.10	0.14	0.21	0.15	0.27
EC21	N2O	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.04	0.06	0.09	0.07	0.11
EC22	CO2	0.48	0.98	1.63	2.22	2.81	3.41	4.00	4.59	4.59	4.59	15.54	11.54	20.13
EC22	CH4	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.04	0.06
EC22	N2O	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.03
Transport		9.92	12.34	14.38	16.46	31.36	33.24	35.05	36.80	NE	NE	NE	152.75	189.54
TR01	CO2	2.20	4.66	6.77	8.94	11.06	13.12	15.11	17.05	NE	NE	61.86	46.74	78.90
TR11	CO2	7.72	7.68	7.61	7.52	20.30	20.12	19.94	19.75	NE	NE	90.89	70.95	110.64
IPPU		NO	NO	NO	NO	1.94	10.09	9.68	9.87	59.64	87.86	115.53	21.70	31.57
IP01	HFCs	NO	NO	NO	NO	1.85	9.63	9.20	9.37	58.61	86.54	20.67	11.47	30.05
IP01	SF6	NO	NO	NO	NO	0.09	0.47	0.48	0.49	1.03	1.32	1.03	0.55	1.52
Agriculture		NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Forestry		NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Waste		53.08	53.91	57.05	59.16	65.84	69.09	72.34	75.34	88.59	99.59	100.34	430.47	505.81
WM22	CH4	46.25	47.25	48.25	52.50	56.00	59.25	62.50	65.50	78.75	89.75	372.00	309.50	437.50
WM24	CH4	6.83	6.66	8.80	6.66	6.66	6.66	6.66	6.66	6.66	6.66	48.92	42.26	55.58
WM33	CO2	NO	NO	NO	NO	3.18	3.18	3.18	3.18	3.18	3.18	9.55	6.36	12.73
Total		75.15	111.50	134.12	152.27	190.86	222.34	245.33	268.87	337.43	422.27	495.50	1131.56	1400.43
Total	CO2	22.06	57.54	76.96	92.94	126.01	145.99	166.03	186.24	190.95	236.29	687.51	521.49	873.76
Total	CH4	53.09	53.93	57.09	59.21	62.73	66.00	69.27	72.30	86.19	97.42	421.32	352.05	493.62
Total	N2O	0.00	0.03	0.07	0.12	0.19	0.26	0.35	0.46	0.64	0.71	1.03	0.68	1.49
Total	HFCs	NO	NO	NO	NO	1.85	9.63	9.20	9.37	58.61	86.54	20.67	NO	30.05
Total	SF6	NO	NO	NO	NO	0.09	0.47	0.48	0.49	1.03	1.32	1.03	NO	1.52

Source: Aether / Benviroc (2017), updated by MECDD. Note: EC01 is a PaM that is repealed and replaced (see *Section III.5.4*).

IV.7. SUPPLEMENTARITY RELATING TO MECHANISMS UNDER ARTICLE 6, 12 AND 17 OF THE KYOTO PROTOCOL

IV.7.1. Bridging the gap – target assessment 2013-2020

114. To reach its target under the second commitment period (CP2) of the Kyoto Protocol, Luxembourg is considering the use of "Kyoto Protocol Units" (hereafter KPUs) in addition to its domestic PaMs, even though actual tendencies show that the recourse to such mechanisms may not be necessary.

115. As explained in the above chapters and sections *[e.g. Section IV.2.2]*, transport sector emissions are variable and have a significant impact on the total GHG emission trends of Luxembourg. At the end of CP1, the transport sector projections predicted high GHG emissions for the coming years, and Luxembourg decided to enlarge its credit acquisition program to CP2 credits, focusing mainly on Gold Standard credits *[→ Section III.5.6]*.

116. However, at the start of the 2013-2020 period, the emission development in the transport sector was more moderate than expected, and from 2013 to 2016, Luxembourg's GHG emissions did not exceed its national targets. It is only in 2017 that a very small "gap" between the emissions and the annual emission allocation (AEA) under the ESD was observed. This "gap" increased in both 2018 and 2019 (the latter based on the "approximated inventory"). Considering the Covid-19 adjustment for the year 2020, both the WEM and, of course, WAM scenarios anticipate emissions below the AEA for that year *[→ Section IV.4.9]*.

117. Consequently, as of today, Luxembourg did not use any of the purchased CP2 credits and based on the most recent WEM and WAM projections, it is still expected that Luxembourg **will not need to use KPUs in addition to its domestic PaMs to reach its CP2 target** *[→ Tables IV.7-1 & IV.7-2* and CTF Tables 4 & 4(b)*]*.

118. The same conclusion applies for the **use of market-based mechanisms under the Convention** (MBMs). Consequently, both CTF Tables 4 (report on progress) and 4(b) (reporting on progress) are filled with "zeroes".

TABLE IV.7-1 – ANNUAL AND CUMULATIVE GAPS – CP2 – Mio. t. CO_2e

-20 % target in 2020	2013	2014	2015	2016	2017	2018	2019p	2020
ESD emissions	9.365	8.858	8.607	8.524	8.743	9.076	9.245	
WEM projection								*8087*
WAM projection								*7670*
Annual emission allocation (AEA)	9.540	9.340	9.141	8.942	8.738	8.531	8.324	8.117
Gap – annual	-0.174	-0.482	-0.534	-0.417	0.006	0.545	0.921	
WEM projection								*-0.030*
WAM projection								*-0.447*
Gap – cumulative	-0.174	-0.656	-1.190	-1.607	-1.601	-1.057	-0.135	
								-0.165
								-0.582

Source: MECDD based on the GHG inventory submission 2020v1, approximated inventory 2019 and October 2020 updated GHG projections.

Notes: - for the years 2013 to 2016, ESD emissions are "agreed" emissions already set at EU level for the compliance period under the ESD.
- a negative sign indicates that the actual ESD emissions are below the annual emission allocation (AEA) determined under the ESD.

TABLE IV.7-2 – AVAILABLE CREDITS FROM KPUS AND THEIR EXPECTED USE – CP2

	Kyoto Mechanisms (Mio. t. CO_2e)
Carry-over from CP1 to CP2	0.49
Purchase of CP2 CDM credits by end of June 2020	1.10
On-going purchase projects (estimate)	0.10
Total available credits at the end of CP2 (estimate)	1.69
Use of credits by end of June 2020	0.00
Total use of credits in CP2 (estimate)	0.00

Sources: MECDD and Aether / Benviroc (2017).

119. *Table IV.7-3* compares the use of KPUs *[→ Table IV.7-2]* to the impact of domestic PaMs *[→ Table IV.6-1]* for 2013-2019 and for the entire duration of the CP2, 2013-2020. In both periods, the impact of domestic measures is higher than the use of KPUs. Based on this information it is concluded that, unless a sudden increase in transport emissions occurs,[21] **the use of the KPUs by Luxembourg is supplemental to domestic action**, and domestic action thus constitutes a significant element of the effort made to meet Luxembourg's quantified limitation and reduction commitments under Article 3, paragraph 1, of the Kyoto Protocol.

TABLE IV.7-3 – REALIZED (2013-2019) AND EXPECTED USE OF KPUS COMPARED WITH THE IMPACTS OF DOMESTIC PAMS – CP2

Years	Use of Kyoto Mechanisms (Mio. t. CO_2e)	Cumulative impact of domestic PaMs (Mio. t. CO_2e)
2013-2019	0.00	1.13
CP2 (2013-2020)	0.00	1.40

Sources: MECDD and Aether / Benviroc (2017).

21 Which seems now not to be the case due to the Covid-19 pandemic that should lead to a decrease in road fuel sales in 2020 compared to previous years level.

IV.7.2. How financing the use of KPUs? – the "Climate and Energy Fund"

120. By a law of 23 December 2004, **Luxembourg has set up a fund to finance the Kyoto mechanisms** (the "Kyoto Fund").[22] In January 2011, this Fund was renamed "Climate and Energy Fund" to reflect the fact that from that year onward it is also used to finance projects in the domains of energy efficiency and renewable energy sources following the objectives set out for Luxembourg in the context of the EU "2020 Climate and Energy package" *[→ Section III.2.2]*.

121. The MECDD remains in charge of the "Climate" side of the "Climate and Energy Fund", and decision-making responsibility for CDM and JI rests with the same Ministry. According to the Law, the Minister in charge of the environment is advised by an inter-ministerial committee made up of representatives of the MECDD, MAEE-COOP, the MEA and the MFIN.

122. The Government has deployed various types of instruments in order to acquire "Certified Emission Reductions" units (CERs) and "Emission Reduction Units" (ERUs). Firstly, voluntary and non-binding Memoranda of Understanding with some potential host countries. Secondly, for the selection of projects and the purchase of CERs and ERUs, various intermediary organizations have been contracted along the following tracks:

- participation in carbon funds of multilateral and regional financial institutions;
- facilities with private international banks;
- bilateral purchase agreements.

123. The **current annual budget** of the "Kyoto Fund" (2005-2010) / "Climate and Energy Fund" (from 2011) is as follows *[→ Table.IV.7-4]*.

TABLE IV.7-4 – CURRENT ANNUAL BUDGET OF THE "KYOTO FUND" / "CLIMATE AND ENERGY FUND" IN MIO. EUR

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013 to 2019
Budget	5.00	10.00	10.00	10.50	11.00	11.00	11.00	5.00	0.00

Source: MECDD.

Note: 2013 to 2019: the exact amount is 100 EUR, i.e. it has been decided that the Fund will be financed only by taxation revenues.

124. Since 2013, the fund is "exclusively" **supplied by 40 % of the CO_2-based vehicle tax** and **100 % of the "Kyoto-cent"**. The "Kyoto-cent" is an additional tax on every gasoline and diesel litre sold in Luxembourg (2 & 2.5 euro-cents per litre respectively, increased to 2.5 & 3.5 euro-cents in May 2019).[23] In 2019, the CO_2-based vehicle tax contributed an amount of 26.8 Mio. EUR to the "Climate and Energy Fund", whereas the "Kyoto-cent" generated an income of 85 Mio. EUR. These two PaMs are notably described in the Seventh National Communication of

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22 Loi du 23 décembre 2004 1) établissant un système d'échange de quotas d'émission de gaz à effet de serre; 2) créant un fonds de financement des mécanismes de Kyoto; 3) modifiant l'article 13bis de la loi modifiée du 10 juin 1999 relative aux établissements classés (http://www.legilux.public.lu/leg/a/archives/2004/0210/a210.pdf, p. 3792-3799).

23 The increase was actually 1 euro-cent for gasoline and 2 euro-cents for diesel (→ §52). Only a part of this increase has been affected to the "Kyoto-cent".

Luxembourg under the UNFCCC (Table IV.3-3 – "P&Ms according to the WEM scenario in the Transport Sector" – TR11 and TR12, p.189) [MDDI-DEV (2018)]. Moreover, in 2019, the "Climate and Energy Fund" received an amount of 18 Mio. EUR from the auctioning of CO_2 credits under the EU Emissions Trading System (ETS).

125. Since 2005, **Luxembourg disbursed about 125.15 Mio. EUR**[24] for the use of project-based mechanisms - KPUs, through the Kyoto Fund:

- International Emission Trading, transfer of "Assigned Amount Units" (AAUs) through the development of "Green Investment Schemes" (GIS);
- "Clean Development Mechanism" (CDM), allowing emission-reduction projects that assist in creating sustainable development in developing countries to generate CERs for use by the investor;
- "Joint Implementation" (JI), allowing countries to claim credit for emission reductions that arise from investment in other industrialized countries, which result in a transfer of equivalent ERUs between the countries.

126. Besides the conclusion of a multitude of bilateral purchase agreements (GIS/CDM), Luxembourg participates in various carbon funds of international financial institutions covering ERPAs pertaining to CDM and JI projects:

- "Biocarbon Fund" of the World Bank;
- "Community Development Carbon Fund" of the World Bank;
- "Carbon Fund for Europe" of the European Investment Bank and the World Bank (terminated);
- "Multilateral Carbon Credit Fund" of the European Bank for Reconstruction and Development (terminated);
- "Asian Pacific Carbon Fund" of the Asian Development Bank (terminated).

127. Around **78 % of the expenses are allocated to bilateral purchase agreements and 22 % to the multilateral funds**. The counterpart of these payments represents approx. 15.8 Mt CO_2e. This volume enabled Luxembourg to comply with its 2008-2012 emission reduction objective as it faced a gap of 14.2 Mt CO_2e during CP1.

24 This amount includes the return of funds of a total amount of 6.4 Mio. EUR performed by two multilateral funds.

128. In 2019, Luxembourg disbursed some 0.15 Mio. EUR for the acquisition of emission rights (mainly CERs). These expenditures are linked to previously concluded and still ongoing purchase agreements with the multilateral funds, as well as with the Gold Standard Foundation. Budgetary provisions are equally foreseen for the years 2021-2024 *[→ Table IV.7-5]*, in case there is a need to purchase additional credits in the future.

TABLE IV.7-5 – LUXEMBOURG'S 2014-2019 DISBURSEMENTS AND 2020-2024 BUDGETARY PROVISIONS FOR THE PURCHASE OF EMISSION RIGHTS (IN MIO. EUR)

Year	Emission rights in Mio. EUR
2014	4.25*
2015	4.35**
2016	0.94
2017	0.78
2018	0.37***
2019	0.15
2020	1.00
2021	1.00
2022	1.00
2023	1.00
2024	20.00

Source: MECDD.
Note: *The 2014 disbursement does not reflect the reimbursement of 5.58 million EUR by the MCCF.
**The 2015 disbursement does not reflect the reimbursement of 0.71million EUR by the CFE.
*** The 2018 disbursement does not reflect the reimbursement of 0.098 million EUR by the CFE.

129. Though this is not the objective (→ §89), this distribution of funds is likely to be revised and adapted, depending on the development of emission projections, notably with regard to possible changes in the transport sector, for which emissions could suddenly shift – as the Covid-19 related lockdown just recently demonstrated – and have a significant impact on the total GHG emission trends of Luxembourg. Indeed, post-2020 Luxembourg will have to comply with its self-imposed national emission reduction target of 55 % in 2030 compared to 2005 that will require active measures over the period 2021-2030, especially in the transport sector.

Annex 1 – Changes in reporting compared to the latest submission

The table below summarizes the main changes compared to the previous submission – NC7 and BR3 – for the sections of this chapter, as well as for CTF related Tables.

Section or CTF Table in NC7/BR3	Section in BR4 and revisions
V.1	IV.2 – no revision except some figures.
V.2	IV.3 – updated & more explanatory material.
V.3	IV.4 – updated (except IV.4.11) & including a presentation of the projections by gas (IV.4.10).
V.4	IV.5 – addition of two new paragraphs: 106 & 107.
V.5	IV.6 – table updated for cumulative emissions 2013-2019 instead of 2013-2018.
V.6	IV.7 – updated & deletion of former section V.6.1.
CTF Table 5	revised with the parameters used for the latest projections.
CTF Tables 6(a) & 6(b)	revised with the latest WEM & WAM projections.

Annex 2 – Implementation of recommendations and encouragements from the latest review

The table below indicates if recommendations and encouragements from the latest review – TRR.3, Table 10 [UNFCCC (2019b)] – have been included or not in this submission, and if not, why.

Reporting requirement	Issue type	Assessment	Description	Included Y/N
para. 28	Transparency	Encouragement	To enhance the transparency of the reporting, the ERT encourages Luxembourg in its next BR to report a WOM scenario or information on why it cannot do so.	See §10. There is still no WOM scenario estimated for Luxembourg, but it is a planned improvement for the coming years that should be implemented alongside the regular evaluation of NECP PaMs.
para. 29	Transparency	Encouragement	The ERT encourages Luxembourg to provide WAM projections in its next BR that encompass planned PaMs.	Done: see sections IV.3.2 & IV.4.1 to IV.4.10.
para. 35	Completeness	Encouragement	The ERT encourages Luxembourg to improve completeness and, in its next BR, report projections of indirect GHGs.	Reporting guidelines for GHG inventories stipulates that Annex I Parties may report indirect CO_2 from the atmospheric oxidation of CH_4, CO and NMVOCs and may report as a memo item indirect N_2O emissions from other than the agriculture and LULUCF sources. According to the latest GHG inventory submission from Luxembourg (2020v1), there are no such indirect emissions, hence no projections.
para. 36	Completeness	Recommendation	The ERT reiterates the recommendation made in the previous review report that Luxembourg report in its next BR projections for fuel sold to ships and aircraft engaged in international transport, to the extent possible, separately and not included in the totals, including reporting when figures are zero.	Reported for both ships and aircraft engaged in international transport: see CTF Tables 6(a) & 6(c).
para. 37	Transparency	Encouragement	The ERT encourages Luxembourg to present in its next BR projections in tabular format together with actual data for the period 1990–2000 or the latest year available.	The years prior to 2005 are not included in the report for readability reasons – but 1990, 1995 and 2000 are available in CTF Tables 6a) & 6(c). Also, all actual GHG mitigation targets for Luxembourg are based on the reference year 2005 and no longer 1990.
para. 38	Completeness	Encouragement	The ERT encourages Luxembourg to also present in its next BR diagrams showing unadjusted inventory data and WEM projections for the period from 1990 (or another base year, as appropriate) to 2020.	Done: see figures IV.4-9 to IV.4-13 but with 2005 as the base year.
para. 43	Transparency	Encouragement	The ERT encourages Luxembourg to report in its next BR all information according to the UNFCCC reporting guidelines on NCs and on BRs for each model used for the projections.	Partially done as for a series of CRF categories, estimates are based on ad-hoc information and experts judgments and are the result of "bottom-up" approaches. For the main models, however, a description is provided (see section IV.3.4).
para. 46	Transparency	Encouragement	The ERT reiterates the encouragement made in the previous review report for Luxembourg to include in its next BR a quantitative sensitivity analysis where possible. The ERT noted that one possible way to accomplish this would be to make different assumptions on the amount of transport fuel sold to non-residents based on different assumed circumstances.	Not implemented. Luxembourg has still to acknowledge that a quantitative sensitivity analysis is not available for the projections and that it can therefore not be reported.
para. 48	Completeness	Recommendation	The ERT reiterates the recommendation made in the previous review report that Luxembourg include in its next BR relevant information on factors and activities for each sector to help the reader to understand the projected emission trends.	CTF Table 5 – in combination with information in Table IV.3-1 and explanations given in sections IV.4.1 to IV.4.8 – partially respond to this recommendation.

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➔ http://data.europa.eu/eli/reg_impl/2014/749/oj

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Chapter V

Provision of financial, technological and capacity-building support to developing country Parties

V.1. INTRODUCTION

1. After introductory notes on **Luxembourg's development cooperation** *[→ Section V.2]*, and accordingly to **paragraph 13 of the UNFCCC biennial reporting guidelines for developed countries Parties** (BR GL), some information will be given on the provision of "**new and additional**" financial resources: Luxembourg's Fast Start Finance and International Climate Finance and the GEF *[→ Section V.3]*. The national approach for **tracking of the provision of financial, technological and capacity-building support** disbursed or committed to ensure that the resources provided effectively address the needs of non-Annex I Parties as requested by **paragraphs 14 to 16 of the BR GL** is also briefly touched upon in *Sections V.2 & V.3*. In accordance with **paragraphs 17, 18 and 20 of the BR GL**, climate related Official Development Assistance, GEF, as well as other climate related official flows, including Luxembourg's International Climate Finance, are summarized using CTF Tables 7 *[→ Section V.4]*. Support for **technology transfer to developing country Parties to the UNFCCC** is presented in *Section V.5* in line with **paragraphs 21 and 22 of the BR GL**, including CTF Table 8. **Activities related to capacity building – paragraphs 23 if the BR GL**, including CTF Table 9 – are also discussed in that same section *[→ Section V.5]*. Finally, **Annex 1 summarizes changes between the BR4 and the NC7/BR3** and **Annex 2** indicates whether **recommendations and encouragements from the latest review** – TRR.3 [UNFCCC (2019b)] – have been implemented or not.

2. **Paragraphs 19 and 22** (partly) **of the BR GL** request Annex II Parties to report, to the extent possible, on **private financial flows** leveraged by bilateral climate finance towards mitigation and adaptation activities in non-Annex I Parties, as well as on **measures and activities related to technology transfer**. This issue is only briefly touched upon in *Sections V.4 & V.5*, §43 & §44 and §48 & §49 as, for the time being, only incomplete information is available due to the lack of established practice for the measurement and reporting of publicly mobilized private climate finance.

3. This chapter has been written by the MECDD and the MAEE-COOP[1] and edited by the MECDD to be in line with the UNFCCC reporting guidelines.

1 https://cooperation.gouvernement.lu/en.html.

V.2. LUXEMBOURG'S DEVELOPMENT COOPERATION

V.2.1. Official Development Assistance (ODA)

4. The primary objective of Luxembourg's Development Cooperation is **to contribute to the eradication of extreme poverty and the promotion of economic, social and environmental sustainability**, notably in least developed countries. Its activities are conceived in the light of the 2030 Agenda and the Sustainable Development Goals (SDGs) for 2020-2030. The actions carried out by Luxembourg's development cooperation aim to be inclusive and to leave no one behind. Luxembourg will continue to maintain its untied aid while keeping both International Climate Finance and in-donor refugees' costs additional to ODA.

5. In the section discussing Luxembourg's development cooperation, the 2018-2023 Government Programme states that "*In order to consolidate its strengths and maximize its impact, Luxembourg will maintain its objective of allocating 1 % of its gross national income to official development assistance (ODA). ODA in the form of grants will be favoured, while strengthening the role of cooperation as a catalyst for mobilizing additional resources. Luxembourg will continue to apply the "additionality" of funds mobilized for international climate financing and for the host of refugees in Luxembourg, thus strengthening its brand and influence on the international scene as a leader in development*" [Government of the Grand Duchy of Luxembourg (2018), p. 224-225]. **In 2019**, Luxembourg's ODA amounted to **420 797 575 EUR** and represented **1.04 % of the GNI** [MAEE-COOP (2020)[2]]. Luxembourg thus confirms **its position among the top five donors** who meet the commitment made in 1970 at the UN General Assembly to allocate at least 0.7 % of their GNI to development cooperation. As in the past, this ODA consists of grants only (no loans) and is implemented through bilateral and multilateral cooperation instruments, technical cooperation and cooperation with development NGOs and humanitarian actors. ODA is additional to International Climate Finance.

6. From a geographic point of view, and in order to maximise its effectiveness and impact, Luxembourg's development cooperation follows a policy of targeted intervention in **a limited number of partner countries,** which are chosen primarily by taking into account the composite human development index (HDI) of the UNDP and geographic concentration in West Africa. Nowadays, the partner countries are among the Least Developed Countries (LDCs) and Small Island Developing States (SIDS). The five partner countries in West Africa are Burkina Faso, Cabo Verde, Mali, Niger and Senegal. The other countries are Lao People's Democratic Republic and Nicaragua. Luxembourg also supports and supported projects in eight countries, which are Kosovo, El Salvador, Viet Nam, Mongolia, Myanmar, Afghanistan, Tajikistan and the Occupied Palestinian Territories. El Salvador and Viet Nam's Indicative Cooperation Programmes ended

2 http://www.cooperation.lu/2019/. For 2018, the amount was 401 296 347 EUR and represented 0.98 % of the GNI. For 2017, the amount was 377 093 414 EUR and represented 1 % of the GNI.

in 2015 as they both had attained the status of middle-income countries. Development cooperation activities with these countries are distinguished by a heightened sense of partnership with both public authorities and civil society. This spirit of partnership, which is achieved through actual ownership of the programmes and projects by the beneficiaries themselves, is the cornerstone of the multi-annual cooperation programmes, the "**Indicative Cooperation Programmes**" (ICPs).

7. Luxembourg's development cooperation focuses on four thematic priorities: improving access to quality basic social services, enhancing socio-economic integration of women and youth, promoting inclusive and sustainable growth as well as strengthening inclusive governance. **Underlying each theme is a focus on cross-cutting priorities including human rights, gender equality and equity as well as environmental sustainability**. By ensuring the systematic inclusion of cross-cutting priorities Luxembourg aims to provide a holistic and multi-faceted approach to supporting sustainable development. Based on partner country contexts and national priorities and needs, targeted programme and project interventions are being developed. The thematic and cross-cutting priorities are closely aligned with the SDGs and aim to contribute to meaningful progress towards achieving the Agenda 2030 goals.

8. Building on Luxembourg's four thematic priorities and recognising that current development challenges cannot be addressed by any one country alone, Luxembourg will now focus its support on a limited number of targets as defined through the indicators of its 12 priority SDGs. In accordance with its focus on "**Leaving no one behind**", Luxembourg will promote and support multi-stakeholder partnerships adopting an integrated graduation approach, focused on ensuring that basic needs of vulnerable populations are met to enable their progressive transition towards more sustainable livelihoods.

9. In order to improve reporting of ODA statistics to the OECD's Development Assistance Committee (DAC), Luxembourg has **mainstreamed the DAC policy marker system in all projects and programmes**. This system includes an "Aid to Environment" marker, as well as the four so-called "Rio markers", covering biodiversity, combat against desertification, mitigation and adaptation.

V.2.2. Assistance to developing country Parties that are particularly vulnerable to climate change

10. In 2009, the MAEE-COOP elaborated a **policy paper on environment and climate change** and in 2014 it developed a **strategy for environment and climate change action** [MAEE-COOP (2014)]. Both have been replaced by the **new general strategy** [MAEE-COOP (2018)].

11. Furthermore, the following environmental and climate change related clause are included in ICPs,[3] these vary from country to country:

"With reference to the Kyoto Protocol (1997), the seventh Millennium Development Goal (2000) and the Cancun Agreement (2010), both parties agree to promote policies for the conservation of natural resources, sustainable development, environmental taxation and the regulation of pollution.

To this end, Luxembourg's "strategy for environment and climate change action" will be considered at all levels of the project / program cycle management; that is to say at the levels of identification, formulation, instruction and implementation of projects / programs.

Luxembourg's Development Cooperation will assist the (partner countries) to identify interventions that preserve natural resources and are part of efforts to adapt to climate change. It may also support the (partner countries) in terms of capacity building, particularly at institutions responsible for Clean Development Mechanisms (CDMs).

Pooling resources and sharing of environmental information will be given priority to promote interventions that generate the highest environmental and social benefits in terms of local and global public goods. Depending on the respective national laws, it may be useful to conduct a specific strategic environmental assessment or environmental impact studies.

Luxembourg's Development Cooperation will work to integrate environmental concerns and climate policy acquisition and promote sustainable energy, clean technology and technology transfer and access to environmental information. Collaboration with research centres may be considered for this purpose.

In synergy with the MAEE-COOP, [the MECDD, which] is in charge of the management of the "Climate and Energy Fund", may make available to the partner country additional funds to public development aid, to implement projects against climate change in the areas of adaptation and mitigation, including emissions reductions through the use of market mechanisms."

V.2.3. Overall multilateral financial flows[4]

12. **Cooperation with multilateral partners is an important component of Luxembourg's development cooperation policy**, notably in the context of achieving the SDGs. In order to

3 For example: https://cooperation.gouvernement.lu/dam-assets/partenaires/partenaires/pays-partenaires/cabo-verde/cabo-verde-pic-de-4ieme-generation-2016-2020.pdf.

4 This section describes all the financial flows to development. It therefore exceeds the climate change related financial assistance.

achieve a high degree of predictability, multilateral aid is principally delivered through multi-annual framework agreements.

13. The interventions of Luxembourg's development cooperation are firmly based on the **four principles of effective development cooperation,** i.e. ownership by the partner countries, focus on results, inclusive partnerships as well as transparency and mutual accountability. The principles of untied aid, predictability of funds through multi-annual indicative programmes, concentration in sectors where Luxembourg has a real added value and full alignment on the priorities and development strategies of our partner countries remain at the heart of Luxembourg's development cooperation. Over the past years, Luxembourg has made considerable progress in terms of aid transparency, in the use of country-led results frameworks and has developed innovative means of implementation that fully respect and strengthen national public finance systems.

14. Following the summits in Rome, Paris and Accra, Luxembourg participated in 2016 at the second high-level meeting of the Global Partnership for Effective Development Cooperation in Nairobi. The conference enabled to take stock of the implementation of commitments in terms of development effectiveness and Luxembourg's development cooperation has in fact been used as an example in the brochure "*Effective Development Cooperation: Has the European Union delivered?*" [European Commission (2016)]. In the light of the commitments made in Nairobi and the new development paradigms agreed both at the international level – through Agenda 2030 and the Addis Ababa action programme on financing development – and at the European level – through the new European consensus on development – Luxembourg reviewed its "***Action plan for effective development cooperation***" that covers the years 2017 to 2019.

15. In 2019, the share of **multilateral cooperation in the total ODA** – i.e.420 797 575 EUR – was 28.15 %[5] *[→ Table V.2-1]*.

[5] It was 28.42% in 2018 and 28.27% in 2017.

TABLE V.2-1 – OVERALL MULTILATERAL COOPERATION FOR THE YEAR 2019

Institution	Total in EUR	% of multilateral ODA	% of total ODA
United Nations (Agencies, Programmes, etc.)	41 803 767	34.93 %	9.83 %
European Union	36 685 820	30.66 %	8.63 %
World Bank & IMF	20 915 000	17.48 %	4.92 %
Regional Development Banks	12 701 601	10.61 %	2.99 %
Other	7 563 852	6.32 %	1.78 %
Total	119 670 041	100.00 %	28.15 %

Source: MAEE-COOP.

16. *Table V.2-2* below synthesises **Luxembourg's overall financial contributions to multilateral institutions and programmes**. This table is produced according to the format suggested for Table 4 of the National Communications guidelines for Annex I Parties [UNFCCC (1999)].

TABLE V.2-2 – OVERALL MULTILATERAL COOPERATION: FINANCIAL CONTRIBUTIONS ACCORDING TO "TABLE 4" FORMAT FOR THE YEARS 2016, 2017, 2018 AND 2019 IN EUR

Institution or Programme	2016	2017	2018	2019
European Union				
European Commission Budget	22 811 079	22 515 567	23 113 146	23 947 648
European Development Fund (EDF)	9 034 480	10 086 145	10 773 543	11 228 173
European investment Bank (EIB) *	1 805 000	1 805 000	2 875 000	4 792 700
United Nations				
FAO	1 603 537	1 914 579	1 140 372	488 559
UNCCD	6 049	6 151	-	4 731
UNDP incl. thematic contribution to the Environment Trust Fund (500k)	12 398 494	12 800 945	13 497 319	15 058 510
UNEP	250 000	250 000	250 000	250 000
UNICEF	9 084 567	10 461 715	9 794 972	11 096 461
International Financial Institutions				
World Bank **	not available	800 000	400 000	900 000
International Development Association (IDA) **	16 686 454	13 275 000	15 505 000	18 665 000
International Bank for Reconstruction and Development (IRBD)	3 945 000	1 250 000	1 550 000	1 750 000
European Bank for Reconstruction and Development (EBRD) **	not available	3 000 000	2 500 000	2 000 000
Asian Development Bank (ADB) **	2 469 712	2 108 243	2 554 347	2 561 274
Other Multilateral Institutions				
OECD *	560 000	1 900 266	2 441 747	1 710 000

Source: MAEE-COOP.
Note: Contributions coming partly * or totally ** from the MFIN.

17. Luxembourg is also represented in the "**Global Environment Facility**" (GEF) by its MFIN and has been a member of the GEF since 1997. For the last five years, Luxembourg's contributions are depicted below *[→ Table V.2-3]*.

TABLE V.2-3 – LUXEMBOURG'S FINANCIAL CONTRIBUTIONS TO THE GEF FOR THE YEARS 2015-2019 IN EUR

	2015	2016	2017	2018	2019
Global Environment Facility	1 030 500	952 400	904 500	862 350	1 164 500

Source: MFIN.

V.3. PROVISION OF NEW AND ADDITIONAL FINANCIAL RESOURCES

V.3.1. The principle of "additionality"

18. Luxembourg upholds the **principle of "additionality" between ODA and climate finance**. Indeed, the poverty eradication challenge is made more complex due to climate change impacts, especially in developing countries, and therefore calls for additional financial means on top of existing ODA commitments. Consequently, "new and additional" means that the resources that Luxembourg commits to deliver are not taken over from earlier commitments and are thus "new". "Additional" means that they come "on top of" Luxembourg's ODA commitments and thus are not "double counted" or draining on other resources dedicated to poverty eradication: as stated in the 2018-2023 Governmental Programme: *"Luxembourg will continue to apply the "additionality" of funds mobilized for international climate financing (...)"* [Government of the Grand Duchy of Luxembourg (2018), p. 224].

V.3.2. Luxembourg's Fast Start Finance

19. As regards **Fast Start Finance 2010-2012**, Luxembourg pledged a contribution of 9 Mio EUR on the top of the country's ODA commitment, to be provided by the "Climate and Energy Fund" *[→ Section IV.7.2]*. At the end of 2015, a total amount of 7.86 Mio. EUR had been disbursed *[→ Table V.3-1]*.

20. In order to avoid double counting, it has to be mentioned that 3 Mio. EUR – 1 Mio. EUR for the GFDRR and 2 Mio EUR for the Adaptation Fund – of the total 7.86 Mio EUR have only been disbursed in 2015 and are therefore accounted for under the 2014-2020 International Climate Finance (120 Mio. EUR) commitment (→ §21).

V.3.3. Luxembourg's International Climate Finance (ICF)

21. During the United Nations Sustainable Development Summit, that took place in New York in **September 2015**, Luxembourg's Prime Minister announced that Luxembourg would provide a total amount of **120 Mio. EUR for ICF** from 2014 to 2020 *[→ Table V.3-2]*. This amount includes

an annual contribution of 5 Mio. EUR to the "**Green Climate Fund**" (GCF), representing a total of 35 Mio. EUR. Since this engagement, Luxembourg has disbursed a total of 91.15 Mio. EUR[6] of its ICF pledge for mitigation and adaptation relevant actions, including REDD+.

TABLE V.3-1 –LUXEMBOURG'S FAST START COMMITMENTS 2010, 2011 & 2012 IN EUR AND DISBURSEMENTS

Projects	Fast Start Finance 2010-2012	Thematic area	Commitment
GFDRR	Support of integrated climate risk management and adaptation	Adaptation	1 000 000 / 1 000 000
UN-REDD	Core contribution	REDD+	2 000 000
Adaptation Fund	Core contribution	Adaptation	2 000 000
IUCN – SIDS	Pacific SIDS EESLI (Energy, Ecosystems and Sustainable Livelihoods Initiative) - Managing the Ecosystem and Livelihood Implications of Energy Policies	Renewable Energies / Mitigation	1 000 000
Yasuni National Park	*Saving Yasuni National Park in Ecuador**	*Adaptation / Mitigation*	*1 000 000**
Bilateral programmes in partner countries	LuxDev / Solartec – Cabo Verde Project: Electric installation at the professional training centre for renewable energy and industrial maintenance	Renewable Energies / Mitigation	681 000
	ASTM/ARFA – Burkina Faso: Promotion and construction of adaptation and mitigation devices against the effects of climate change and creation of village risk prevention mechanisms in the North and East of Burkina	Renewable Energies / Mitigation	67 196
	Scoping Study for the elaboration and implementation of a NAMA	Mitigation	112 262
Total Fast Start Finance Commitments			**8 860 458**
Disbursements considered as Fast Start Finance			**4 860 458**
Disbursements earmarked as Fast Start Finance but accounted for under the International Climate Finance Budget			**3 000 000**

Source: MECDD.
Note: *Yasuni: restitution of the funds due to the stop of the project in 2013.

TABLE V.3-2 –LUXEMBOURG'S FINANCIAL CONTRIBUTIONS TO ICF FOR THE YEARS 2014-2020 IN EUR

	2014	2015	2016	2017	2018	2019	2020
Pledged	0	14 000 000	12 000 000	17 000 000	22 000 000	25 000 000	30 000 000
Disbursed	0	13 268 421	11 774 979	15 531 060	23 496 600	27 079 466	-

Source: MECDD.
Notes: The 2015 disbursed amount contains 3 Mio. EUR "Fast Start Finance" engagements.
Disbursed amounts have been financed by the "Climate and Energy Fund - ICF" except for:
100 000 EUR in 2016, 2017 & 2018 from the MAEE-COOP and the MFIN for the LuxFlag Labelling Agency (→§26); 1 000 000 EUR in 2018 from the MFIN for the IFC's "Green Cornerstone Bond Fund Support Program" (→§26); and 473 982 EUR in 2018 from the MFIN for the ICFA (→§26).

22. These **ICF funds are new and additional** to Luxembourg's ODA. The disbursements related to ICF are being carried out to a large extent via the "**Climate and Energy Fund**" *[→ Section IV.7.2]*.

6 Of the 91.15 Mio. EUR, disbursements in the amount of 78.81 mio. EUR were carried out via the "Climate and Energy Fund".

23. In **2016**, a large part of the work of the inter-ministerial committee of the "Climate and Energy Fund" was to discuss and develop a **strategy for the allocation of Luxembourg's ICF pledge,** earmarked as such in the "Climate and Energy Fund". The strategy called "*Attribution des fonds pour le financement international de la lutte contre le changement climatique*"[7] was finalized and published in the first half of 2017 [MDDI-DEV(2017)].

24. The main characteristics of the strategy are presented below.

Themes and preferential sectors

Luxembourg's ICF pledge concentrates on three main areas: (i) GHG emissions mitigation, (ii) adaptation to a changing climate, and (iii) actions for reducing emissions resulting from deforestation and forest degradation, for the conservation of carbon stocks, and for a sustainable forest management and a consolidation of forest carbon stocks (REDD+).

Preferential sectors benefiting from the Luxembourg's ICF are:

- *mitigation (renewable energy, energy efficiency, transport, waste management, agriculture);*
- *adaptation (especially in the least developed countries (LDCs) and Small Island developing States (SIDS): resilience to climate change, reducing vulnerability to climate variability, early warning, adaptation in the agricultural sector);*
- *REDD+ (fight against deforestation and forest degradation, activities that are integrated into national REDD + activities).*

Activities in the eligible areas for the Luxembourg ICF are described in detail in the strategy document. A "negative list" summarizes projects that cannot benefit from Luxembourg funding.

Balanced allocation

A balanced distribution is the main criteria for distributing ICF funds and it is adapted to the needs of the target countries. The Paris Agreement reiterated the objective to increase substantially funding for adaptation. The Luxembourg strategy foresees the following distribution key: (i) 40 % for adaptation measures, (ii) 40 % for mitigation measures, and (iii) 20 % for the REDD+ – knowing that this distribution is only an indication, and that account will be taken of the needs of the host and partner countries.

Geographical distribution

The ICF program seeks a balanced distribution of the host countries, with, to the extent possible, a minimum amount of 50 % of the ICF for projects in cooperation (current and former) partner countries, the LDCs and SIDS.

Eligibility criteria

The strategy proposes criteria for the eligibility of activities as well as of beneficiaries and managers of ICF Funds (experience, implementation at the field level, registration and/or license by the regulator or financial

7 That could be translated as "Attribution of international climate finance funds in the fight against climate change".

sector surveillance authority of the country, administrative and financial capacity). Regarding NGOs and associations in particular, their selection will be based on simple and easily verifiable criteria (proof of prior activities, experience in the field, financial health, bilateral consultation between the MECDD and the MAEE-COOP to avoid double funding).

Five main selection criteria are being proposed:

- *impact and efficiency;*
- *compliance with sustainable development;*
- *transforming potential;*
- *creation of an enabling environment for investments;*
- *national priority, political will, needs of the beneficiaries.*

Forms of support offered by the ICF

The ICF will be provided, on the one hand, through donations, and on the other, by own funds, special capital (at risk, initial, patient) and guarantees (e.g. first loss). The MECDD will make an analysis of the support required by funding applicants and, if it is considered useful, can steer applications, depending on the type of funding requested, to different evaluation platforms or specialized entities that can support the MECDD in its analyses and monitoring.

Eligibility criteria for funding applicants

The application process is open to all types of candidates, subject to such eligibility as defined in the strategy paper. In this context, the MECDD also had contacts with representatives of NGOs and the "Cercle de Coopération des ONG de développement",[8] for the conception of procedures applying to their funding demands.

25. In 2019, the "Climate and Energy Fund" *[→ Section IV.7.2]* has supported the implementation of already ongoing projects, as well as the development of new initiatives and partnerships:
    - **multilateral adaptation/mitigation programs and initiatives** such as the "Green Climate Fund" (GCF), the "Land Use Finance project: leveraging public finance to decouple private investment from deforestation, climate and ecosystem impacts" (UNEP), the "20x20 initiative" (WRI), amongst others;
    - **bilateral/regional climate related projects** such as "Vanishing Treasures" (UNEP), "Enhancing resilience to climate change through solar power driven access to water in rural areas of Outer Islands, Vanuatu" (GGGI), "Vietnam Green Bond Readiness Program" (GGGI), "Clean Energy for People Resilience - Burkina Faso" (UNCDF), "Green Secondary Cities Wastewater, Plastic Waste and WEEE Management: Innovative Business Model for Recycling and Valorization – Senegal" (GGGI), as well as several **NGOs** projects;

8 http://cercle.lu/.

- **cross-cutting initiatives**, such as sustainable finance initiatives *[→ Section V.3.4]* and activities for the promotion of human rights in the context of climate change (CIEL).

26. CTF Tables 7, 7(a) and 7(b) as defined in Annex of Decision 9/CP.21 [UNFCCC (2015)] provide a detailed overview of the disbursed and committed contributions of Luxembourg's ICF (referred to under "other official flows (OOF)") for the years 2017 – 2018 *[→ Section V.4]*.

27. In **September 2019**, during the United Nations Climate Action Summit in New York, Luxembourg's Prime Minister announced that Luxembourg would continue to support developing countries in the fight against climate change during the post-2020 period, by providing a total of **200 Mio. EUR in ICF funding from 2021 until 2025**. This pledge includes a contribution of 40 Mio. EUR to the GCF for the years 2020-2024.

V.3.4. Public – private interface

28. ICF is one of the priorities of the Government policy. Ambitious targets have been set at COP21 in Paris. It turns out that **public investment will not be sufficient** and that it is necessary that the latter constitutes a lever for the mobilization of other sources of financing, including financing from the **private sector**.

29. To this end, the "**Climate Finance Task Force**" (CFTF) has been convened early 2015, in an informal, interdisciplinary and multi-stakeholder format, bringing together representatives of the public sector and the private finance sector with the double aim to make a meaningful contribution to the international fight against climate change and advising the Government on ways to establish Luxembourg as an international centre for climate finance. The initial work of the CFTF was aiming at sensitizing the private sector partners to both the challenge of climate finance and the economic opportunities that come with serious investment mainly in economically viable infrastructure for the production of renewable energy around the world.

30. Worth mentioning initiatives related to **sustainable and climate finance**:

- the "**LuxFlag Climate Finance Label**"[9] was officially launched on **23 September 2016**. The goal is to grant an official label to funds investing in climate action while respecting well-defined criteria. The Government has been actively involved in the development of these criteria. In **2017**, the "**LuxFlag Green Bond Label**"[10] was launched. The primary objective of the Green Bond Label is to reassure investors that the Green Bond follows internationally recognised standards and uses its proceeds to finance green projects. This label is added to the ones already launched by LuxFlag since 2006; the microfinance label, the environment label and the ESG label issued to funds that meet criteria complying with environmental and social objectives and governance. An annual financial contribution to LuxFlag is made available by the MFIN, the "Climate and Energy Fund" and the MAEE-COOP. This contribution is considered as ICF;
- the Luxembourg Stock Exchange launched on **27 September 2016** the first platform in the world entirely dedicated to green financial instruments ("**Luxembourg Green Exchange**"). It can be considered as a precursory project to promote the role of Luxembourg in green finance;
- in **September 2017**, a Contribution Agreement between the Government and the European Investment Bank (EIB) has been signed, with the aim to implement a platform dedicated to climate finance, the "**LU-EIB Climate Finance Platform**". The objective of this joint initiative is, on the one hand, to finance innovative investment projects with high impact in the fight against climate change, in and outside of the European Union, and on the other, to increase the leverage effect on investments from the private sector by reducing the financial risk of private partners investing in innovative climate action. An initial participation of 30 Mio. EUR for the years 2017-2019 has been secured. In 2019, the Government decided to make available an additional funding of 40 Mio. EUR for the period 2020-2024. Those contributions are divided between the "Climate and Energy Fund" (ICF commitment) and funds from the MFIN ("Sustainable finance budget" – also additional to ODA);
- on **20 October 2017**, the Government, together with the *Banque et Caisse d'Epargne de l'Etat* (BCEE) and the *Banque Internationale à Luxembourg* (BIL) and the insurance company *Foyer*, and in collaboration with "Luxembourg Microfinance and Development Fund SICAV", have launched the "**Forestry and Climate Change Fund**" (FCCF). This public-private partnership will provide financing for companies, communities and small farmers to manage secondary and degraded forests in the tropics. By creating the enabling environment for business models that allow the generation of revenues, deforestation can be stopped so to yield a substantial positive climate impact. A participation of 11.5 Mio. EUR over 5 years, divided

9 https://www.luxflag.org/labels/climate-finance/.

10 https://www.luxflag.org/labels/green-bond/.

between the "Climate and Energy Fund"(ICF commitment) and funds from the MFIN ("Sustainable finance budget" – also additional to ODA), has been made available;

- the idea for an accelerator for climate finance was a demand from the private sector and was developed in a working group within the CFTF. The working group was led by "Innpact", a fund manager working in impact finance and the "Luxembourg Microfinance and Development Fund SICAV". The main objective of the "**International Climate Finance Accelerator Luxembourg**" (ICFA Luxembourg), **officially launched in 2018**, is to allow for small and innovative climate-related funds and asset managers to set up successfully in Luxembourg and attract private investment. The Accelerator has the form of a public-private partnership and is directly complementary to the "LU-EIB Climate Finance platform" and the "LuxFlag Climate Finance Label". Funding is provided by the "Climate and Energy Fund"(ICF commitment) and funds from the MFIN ("Sustainable finance budget" – also additional to ODA);
- in **October 2018**, the Government of Luxembourg, in collaboration with the Financial Initiative of the United Nations Environment Program (UNEP), presented the new "*Luxembourg Sustainable Finance Roadmap*" (LSFR) and its recommendations [UNEP Finance Initiative (2018)].[11]

  The roadmap aims to draw up an inventory of existing initiatives in Luxembourg in the field of sustainable finance, and to lay thereby the foundations for a sustainable finance strategy, contributing to the 2030 Agenda and the objectives of the Paris Agreement on Climate Change. It furthermore has the aim to consolidate the leading role of the Luxembourg financial centre in the field of sustainable finance. This roadmap is ambitious in terms of Luxembourg's contributions to sustainable development and to European and international climate initiatives; and it is forward-looking in terms of future opportunities and challenges. The roadmap outlines how to achieve this vision over time.
- **in 2018**, the Government of Luxembourg, through its MFIN, provided 1 Mio. EUR ("Sustainable finance budget" – also additional to ODA) to IFC's "**Green Cornerstone Bond Fund Support Program**", a technical assistance program managed by IFC to complement the Amundi Planet Emerging Green One Fund—the world's largest targeted green bond fund focused on emerging markets;
- in **November 2019, the European Microfinance Award**, co-organised by the MFEA, the European Microfinance Platform (eMFP) and the Inclusive Finance Network Luxembourg (InFiNe.lu) were awarded at the EIB. The Award with the theme "**Strengthening Resilience to Climate Change**", aims at highlighting the critical role of the financial inclusion sector in increasing the resilience of communities vulnerable to the effects of climate change. Applicants were expected to submit initiatives that respond to the problems caused by

11 https://gd.lu/dZPCCn.

climate change, and to demonstrate a proven or potential positive impact on the lives and livelihood of target groups. This means enabling groups to reduce their exposure to risks, reducing the sensitivity of livelihoods to shocks and increasing target populations' adaptive capacity.

V.4. CLIMATE CHANGE RELATED FINANCIAL FLOWS TO DEVELOPING COUNTRY PARTIES TO THE UNFCCC

31. As indicated above (→ §6), five out of Luxembourg's seven partner countries are among the LDCs and are located in West Africa. The negative effects of climate change affect them all.

32. *Tables V.4-1 to V.4-3* below **are derived from CTF Tables 7, 7(a) and 7(b)** as defined in Annex of Decision 9/CP.21 [UNFCCC (2015)] – for effective CTF Tables and amounts in USD, see the CTF submission.[12] They cover the years 2017 and 2018 as requested for the 4th Biennial Report, but also the year 2019 as the data is available at the time of the drafting of this report. Luxembourg has also similar tables for the years 2013, 2014, 2015 and 2016.[13] They are completed by summary *Tables V.4-4 & V.4-5*, which allocate financial flows by status, funding sources and type of support.

33. The tables report **ODA's financial flows and contributions** managed by the MAEE-COOP, **contributions to the Global Environment Facility** (GEF) which are under the responsibility of the MFIN (→ §17), and **other official flows** (OOF) coming from **Luxembourg's International Climate Finance** (ICF) commitment *[→ Section V.3.3]* managed mostly through the "Climate and Energy Fund" *[→ Section IV.7.2]*.

34. In both 2017 and 2018, about **two thirds of the climate specific public financial support was committed**. In 2019 however, this ratio rose to three-quarters *[→ Figure V.4-1]*. Committed amounts are only reported for programmes, actions or projects which are still on-going at the end of the reported year or for which the whole committed amount has not yet been disbursed at the end of that year. These are therefore net committed amounts, i.e. the remaining committed amounts at the end of the reported year. By proceeding in this manner, **there is no double counting of financial flows**. When it comes to ODA or OOF, the ratio committed vs. disbursed is different: **most ODA related flows are disbursed**, whereas **most OOF flows are committed**. The latter is the result of announced substantial commitments by Luxembourg in the framework of its ICF policy *[→ Figure V.4-2]*.

12 https://unfccc.int/documents/209489.

13 There are also tables for the years 2010, 2011 & 2012. However, information is incomplete for these years. (https://cdr.eionet.europa.eu/lu/eu/mmr/art16_finance/envx4xzoa/).

35. Luxembourg's climate specific **disbursed** provision of public financial support is **made of bilateral rather than multilateral contributions**, **as well as of co-financing and framework agreements with NGOs** *[→ Tables 7(b)]*. The bilateral contributions are chiefly managed by Luxembourg's executing agency for development cooperation, LuxDev.[14] As for **committed** amounts, most of them will be spent through **multilateral channels** and are related to **Luxembourg's ICF**.

36. *Tables V.4-4 & V.4-5* show that for 2017 the shares of the total public financial support allocated (i.e. disbursed and committed) for mitigation, adaptation and cross-cutting projects were 8.7 %, 19.3 % and 72.0 %, respectively. In addition, 71.8 % of the total public financial support was allocated through multilateral channels and 28.2 % through bilateral, regional and other channels. The respective percentages for 2018 are 8.9 %, 31.2 % and 59.9 %; 64.5 % and 35.5 %. For 2019, these percentages are 5.4 %, 15.8 % and 78.8 %; 78.8 % and 21.2 %. *Figures V.4-3* illustrate these findings.

37. The same summary tables show that in 2017 the majority (87.9 %) of financial **contributions made through multilateral channels** were allocated to cross-cutting activities, which are mainly linked to Luxembourg's ICF. Some funds were allocated for adaptation activities (12.0 %), mostly committed amounts for the "Blue Natural Capital Financing Facility and Fund" from the IUCN and the "United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women)", as reported in CTF Table 7(a). The corresponding allocations for 2018 were 77.6 % for cross-cutting activities (mainly linked again to Luxembourg's ICF) and 22.4 % for adaptation, this time for the UNEP Vanishing Treasures "Mountain Flagship Species" and the "United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women)". As for 2019, 91.2 % of multilateral financial contributions were identified as cross-cutting activities (mainly linked as well to Luxembourg's ICF) and only 6.7 % for adaptation activities, primarily committed for the "Blue Natural Capital Financing Facility and Fund" from the IUCN and the UNEP Vanishing Treasures "Mountain Flagship Species".

38. Concerning the financial **contributions made through bilateral, regional and other channels**, projects and programmes reported in CTF Table 7(b) for 2017, 2018 and 2019 address mitigation, adaptation and cross-cutting activities in a wide range of sectors, including energy, agriculture, forestry, water and sanitation, waste management and other areas. If, for 2017, the financial contributions disbursed and committed are rather equally distributed amongst mitigation, adaptation and cross-cutting activities, in both 2018 and 2019 almost half of these contributions went to adaptation projects and programmes *[→ Figures V.4-3]*.

14 http://luxdev.lu/en/home.

39. If financial **contributions made through bilateral, regional and other channels** were mostly pertaining to ODA, these last years there has been an increasing number of projects financed through International Climate Finance provided by the "Climate and Energy Fund" of the MECDD.

40. With regard to **recipient countries**, it is worth mentioning that Least Developed Countries receive a high share of total climate related ODA - Burkina Faso, Niger, Mali, Senegal and Lao People's Democratic Republic being among Luxembourg's privileged partner countries. Cabo Verde (Cape Verde in CTF Tables) – as a SIDS, member of AOSIS – is another privileged partner country of Luxembourg's Development Cooperation.

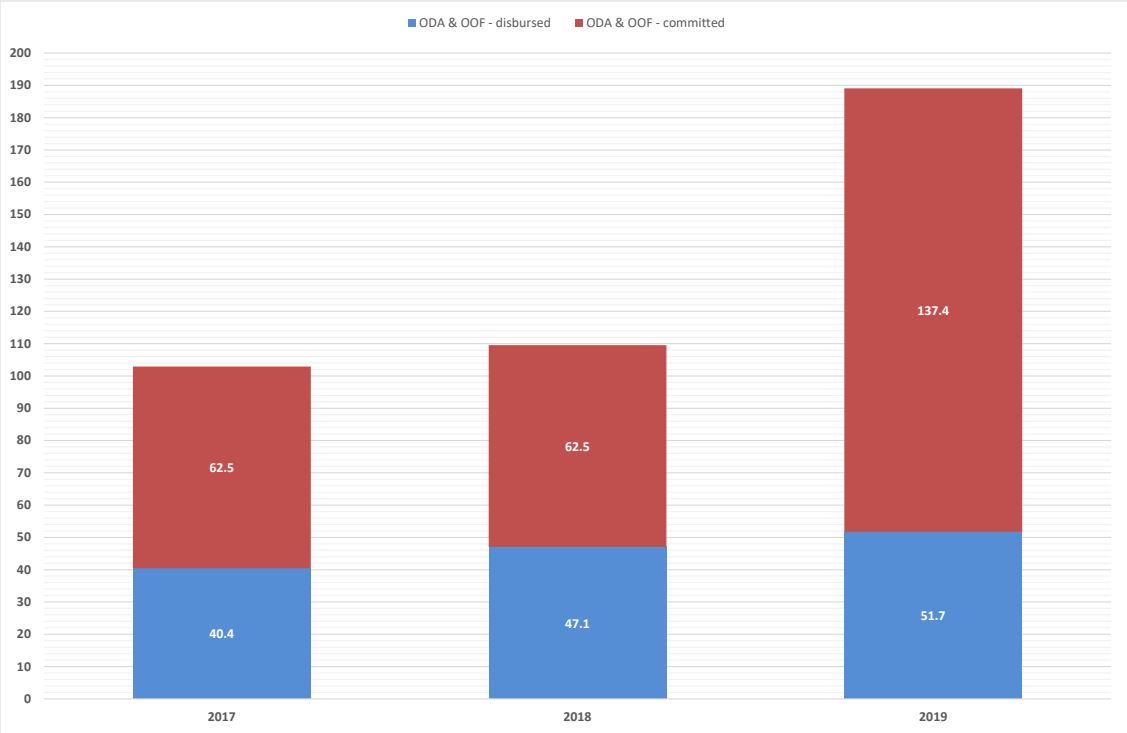
41. Luxembourg reserves 5 % of its humanitarian aid to **disaster risk reduction and prevention activities**. Among these funds, regular contributions to the UNISDR and GFDRR have to be mentioned.

42. **Resilience building activities** are playing an increasingly important role in Luxembourg's ODA, as the prevention of catastrophes by addressing the causes of recurrent crises rather than only responding to disasters is not only better for the beneficiaries, it is also more cost-efficient. Luxembourg tries to facilitate the transition between humanitarian aid and development aid, with resilience building activities at its intersection. Contributions to the GFDRR, UN-Women and various NGO projects reflect Luxembourg's commitment in this regard.

43. For the time being, Luxembourg cannot report information on **private financial flows leveraged by bilateral climate finance towards mitigation and adaptation activities in non-Annex I Parties**. As presented in *Section V.3.4*, several climate finance initiatives together with the private financial sector, including the "LU-EIB Climate Finance Platform", the "Forestry and Climate Change Fund" (FCCF), and the "International Climate Finance Accelerator Luxembourg" (ICFA Luxembourg). In this context, the Government of Luxembourg is providing financial support through its ICF budget as well as the Government's yearly budget in order to attract private sector investment by providing first-loss guarantees ("LU-EIB Climate Finance Platform", FCCF) or to help innovative funds and asset managers to set up climate-related funds by providing support grants (ICFA Luxembourg). But, Luxembourg does not currently have a specific methodology for tracking private financial flows and it would be extremely difficult to track private finance as the country is an international finance centre. However, one of the recommendations of the "*Luxembourg Sustainable Finance Roadmap*" (LSFR) is the creation of a public–private partnership, the "**Luxembourg Sustainable Finance Initiative**", to bring together government representatives and private finance actors with the aim of translating the recommendations of the road map into real action. In this context, the development of a methodology for tracking private financial flows is being considered.

44. There is however the possibility that a small fraction of the budget dedicated to the "LU-EIB Climate finance platform" and the "International Climate Finance Accelerator Luxembourg" is being invested in climate action initiatives that are not directly located in developing countries. At this stage, it is not possible to identify the exact amount but the fraction shall not exceed 10 % of the overall budget committed for the 2 initiatives.

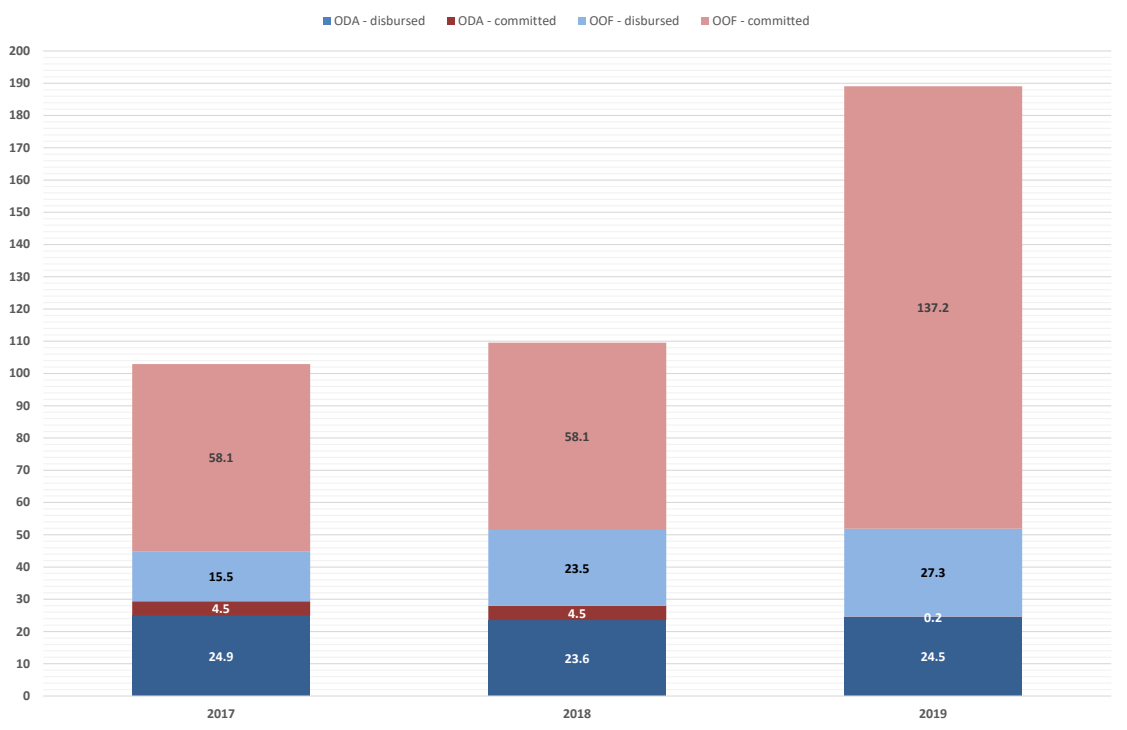
FIGURE V.4-1 – PROVISION OF CLIMATE SPECIFIC MULTILATERAL AND BILATERAL PUBLIC FINANCIAL SUPPORT DISBURSED AND COMMITTED IN 2017, 2018 AND 2019 – MIO.EUR



Source: MECDD.

Note: Core/general support is not included in the multilateral allocation channel.

FIGURE V.4-2 – PROVISION OF CLIMATE SPECIFIC MULTILATERAL AND BILATERAL PUBLIC FINANCIAL SUPPORT DISBURSED AND COMMITTED IN 2017, 2018 AND 2019, BY FUNDING SOURCE – MIO.EUR

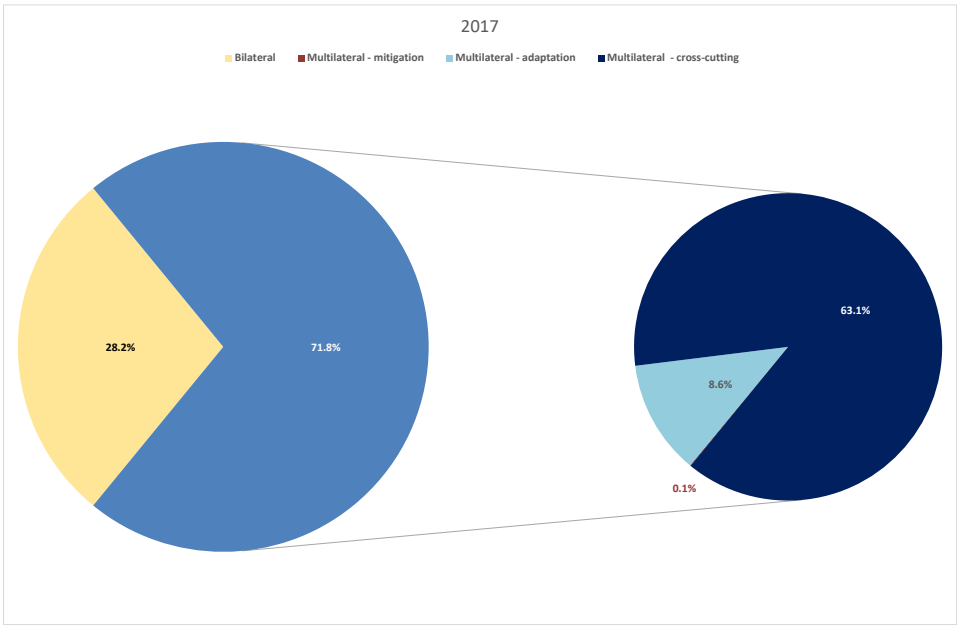


Source: MECDD.

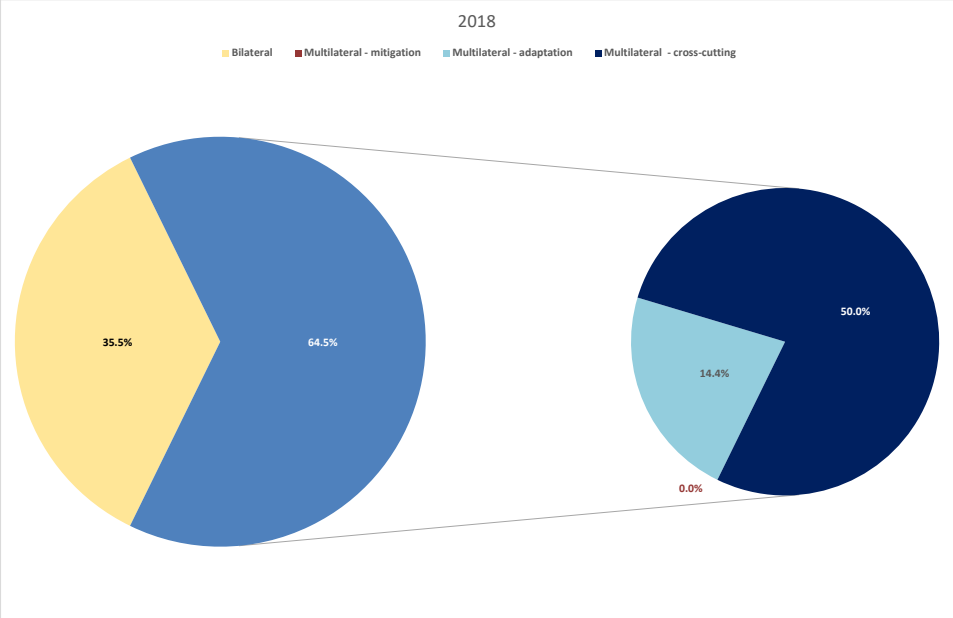
Note: Core/general support is not included in the multilateral allocation channel.

FIGURES V.4-3 – PROVISION OF CLIMATE SPECIFIC PUBLIC MULTILATERAL AND BILATERAL FINANCIAL SUPPORT DISBURSED AND COMMITTED IN 2017, 2018 AND 2019 – ALLOCATION BY TYPE OF SUPPORT – IN %

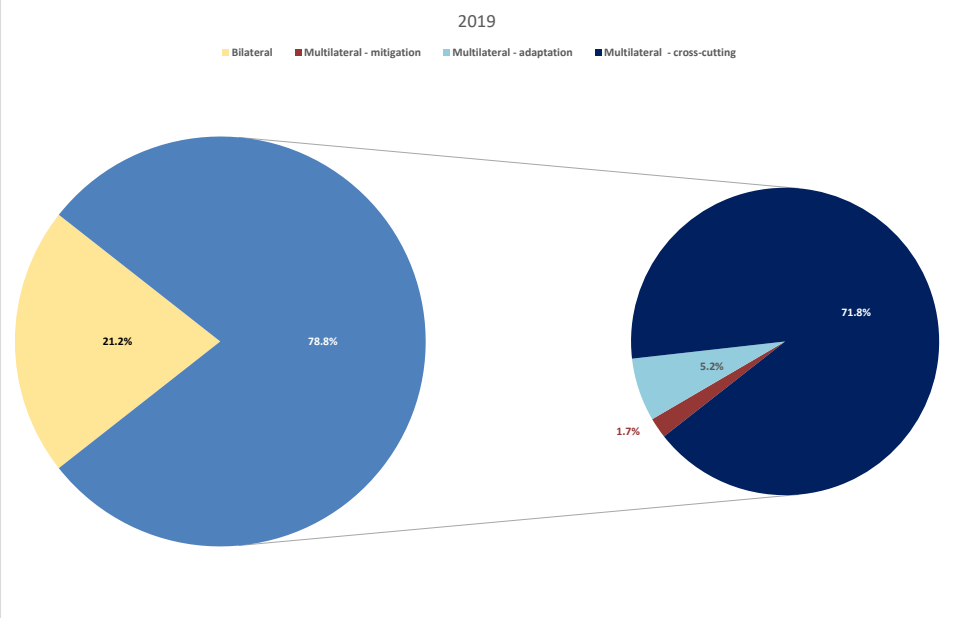
2017 – Multilateral allocation



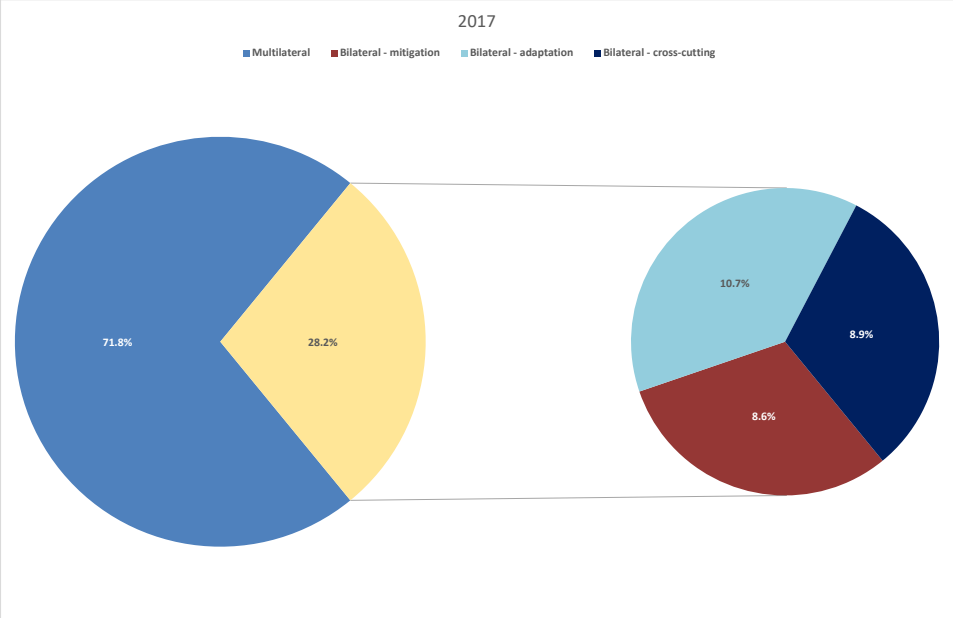
2018 – Multilateral allocation



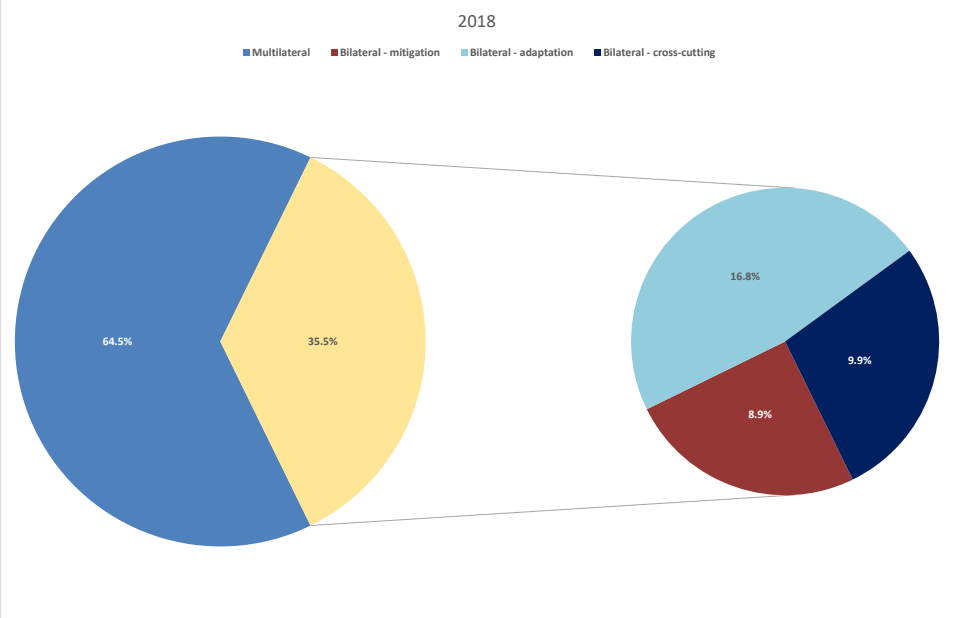
2019 – Multilateral allocation



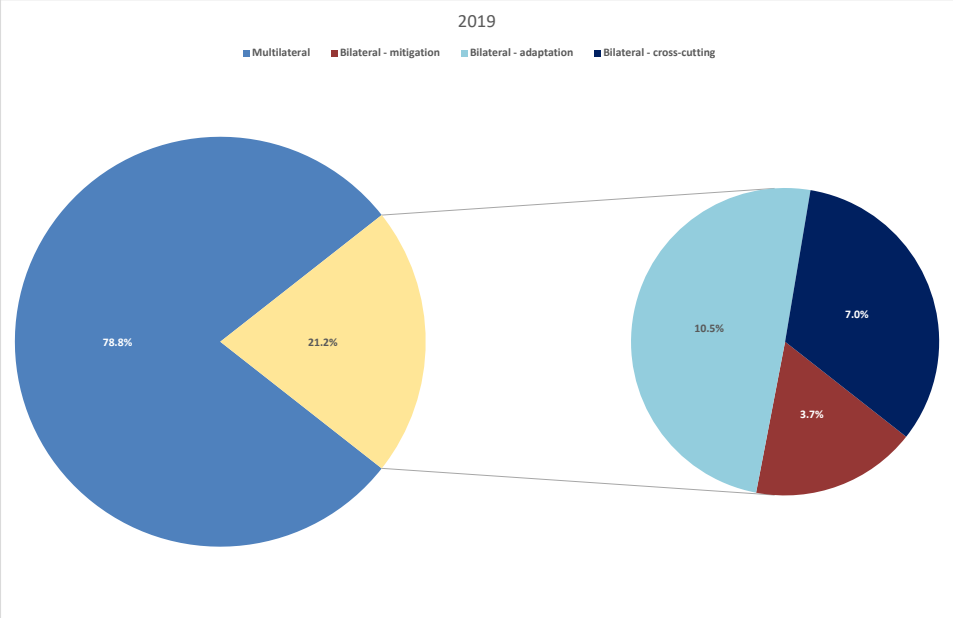
2017 – Bilateral allocation



2018 Bilateral allocation



2019 Bilateral allocation



Source: MECDD.

Note: Core/general support is not included in the multilateral allocation channel.

TABLES V.4-1 – PROVISION OF CLIMATE CHANGE RELATED PUBLIC FINANCIAL SUPPORT FOR THE YEAR 2017 IN EUR

Note: an Excel file containing these tables for the years 2010 to 2019 is available following this link: https://cdr.eionet.europa.eu/lu/eu/mmr/art16_finance/envx4xzoa/. However, tables for the years 2010, 2011 and 2012 are incomplete.

Table 7

Provision of public financial support: summary information in 2017

Committed & disbursed

Allocation channels	Year									
	European euro - EUR					National currency [a]				
	Core/ general [b, 1]	Climate-specific [2]				Core/ general	Climate-specific [2]			
		Mitigation [c]	Adaptation [c]	Cross-cutting [c]	Other [cd]		Mitigation	Adaptation	Cross-cutting	Other
Total contributions through multilateral channels:	904 500.00	58 500.00	8 900 000.00	64 975 350.00	-					
Multilateral climate change funds [e]	904 500.00	-	-	15 000 000.00	-					
Other multilateral climate change funds [f]	-	-	-	-	-					
Multilateral financial institutions, including regional development banks	-	58 500.00	3 650 000.00	48 415 350.00	-					
Specialized United Nations bodies	-	-	5 250 000.00	1 560 000.00	-					
Total contributions through bilateral, regional and other channels		8 891 002.34	10 991 748.00	9 116 830.29	-					
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		8 949 502.34	19 891 748.00	74 092 180.29	-					
Total climate specific finance		102 933 430.63								

Total climate specific by funding source (EUR)		Total climate specific by financial instrument (EUR)	
ODA	29 351 035.15	Grant	61 433 430.63
OOF	73 582 395.48	Concessional loan	-
Other	-	Non-concessional loan	-
Total	102 933 430.63	Equity	-
		Other	41 500 000.00
		of which committed	*62 501 335.49*
		of which disbursed	*40 432 095.14*

1-7 Please provide information on definitions or methodologies used for reporting in the Documentation box

[a] Please provide exchange rate

[b] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[c] These categories should be mutually exclusive

[d] Please specify

[e] Multilateral climate change funds: Global Environment Facility, Least Developed Countries Fund, Special Climate Change Fund, Adaptation Fund, Green Climate Fund and the Trust Fund for Supplementary Activities (paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in 2/CP.17).

[f] Not listed under e)

Luxembourg's notes

Committed amounts are only reported for programs/actions/projects which are still on-going or for which the whole committed amount has not yet been disbursed at the end of 2017.

Net committed (committed minus already disbursed amounts)

Allocation channels	Year									
	European euro - EUR					National currency [a]				
	Core/ general [b, 1]	Climate-specific [2]				Core/ general	Climate-specific [2]			
		Mitigation [c]	Adaptation [c]	Cross-cutting [c]	Other [cd]		Mitigation	Adaptation	Cross-cutting	Other
Total contributions through multilateral channels:	-	-	6 050 000.00	50 425 350.00	-					
Multilateral climate change funds [e]	-	-	-	10 000 000.00	-					
Other multilateral climate change funds [f]	-	-	-	-	-					
Multilateral financial institutions, including regional development banks	-	-	3 100 000.00	39 525 350.00	-					
Specialized United Nations bodies	-	-	2 950 000.00	900 000.00	-					
Total contributions through bilateral, regional and other channels		2 000 000.00	3 582 238.49	443 747.00	-					
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		2 000 000.00	9 632 238.49	50 869 097.00	-					
Total climate specific finance		62 501 335.49								

Total climate specific by funding source (EUR)		Total climate specific by financial instrument (EUR)	
ODA	4 450 000.00	Grant	28 751 335.49
OOF	58 051 335.49	Concessional loan	-
Other	-	Non-concessional loan	-
Total	62 501 335.49	Equity	-
		Other	33 750 000.00

Disbursed

Allocation channels	Year									
	European euro - EUR					National currency [a]				
	Core/ general [b, 1]	Climate-specific [2]				Core/ general	Climate-specific [2]			
		Mitigation [c]	Adaptation [c]	Cross-cutting [c]	Other [cd]		Mitigation	Adaptation	Cross-cutting	Other
Total contributions through multilateral channels:	904 500.00	58 500.00	2 850 000.00	14 550 000.00	-					
Multilateral climate change funds [e]	904 500.00	-	-	5 000 000.00	-					
Other multilateral climate change funds [f]	-	-	-	-	-					
Multilateral financial institutions, including regional development banks	-	58 500.00	550 000.00	8 890 000.00	-					
Specialized United Nations bodies	-	-	2 300 000.00	660 000.00	-					
Total contributions through bilateral, regional and other channels		6 891 002.34	7 409 509.51	8 673 083.29	-					
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		6 949 502.34	10 259 509.51	23 223 083.29	-					
Total climate specific finance		40 432 095.14								

Total climate specific by funding source (EUR)		Total climate specific by financial instrument (EUR)	
ODA	24 901 035.15	Grant	32 682 095.14
OOF	15 531 059.99	Concessional loan	-
Other	-	Non-concessional loan	-
Total	40 432 095.14	Equity	-
		Other	7 750 000.00

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 2017

Donor funding	Total amount				Status: disbursed, committed [b, 3]	Funding source: ODA, OOF, Other [4]	Financial instrument: grant, concessional loan, non-concessional loan, equity, other [5]	Type of support: Mitigation, adaptation, crosscutting, other [c,6]	Sector [d, 7]
	Core/general [a, 1]		Climate-specific [2]						
	European euro - EUR	National currency	European euro - EUR	National currrency					
Multilateral climate change funds									
1. Global Environment Facility	904 500.00		-		disbursed [2]	ODA	Equity	Cross-cutting	Other (multisectoral)
2. Least Developed Countries Fund			-		-	-	-	-	-
3. Special Climate Change Fund			-		-	-	-	-	-
4. Adaptation Fund			-		-	-	-	-	-
5. Green Climate Fund			10 000 000.00		committed [3]	OOF [1]	Grant	Cross-cutting	Cross-cutting
5. Green Climate Fund			5 000 000.00		disbursed	OOF [1]	Grant	Cross-cutting	Cross-cutting
6. UNFCCC Trust Fund for Supplementary Activities			-		-	-	-	-	-
7. Other multilateral climate change funds			-		-	-	-	-	-
Multilateral financial institutions, including regional development banks									
1a. World Bank - Global Facility for Disaster Reduction and Recovery (GFDRR)	-		300 000.00		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction)
1b. World Bank - ESMAP Laos Clean Cookstoves	-		1 000 000.00		disbursed	OOF [1]	Grant	Cross-cutting	Energy Other (health)
2. International Finance Corporation	-		-		-	-	-	-	-
3. African Development Bank	-		-		-	-	-	-	-
4. Asian Development Bank	-		-		-	-	-	-	-
5. European Bank for Reconstruction and Development	-		-		-	-	-	-	-
6. Inter-American Development Bank	-		-		-	-	-	-	-
7. Other									
Mekong River Commission (MRC)	-		*600 000.00*		*committed [4]*	*ODA*	*Grant*	*Adaptation*	*Cross-cutting*
Gold Standard Foundation - gender methodology	-		*58 500.00*		*disbursed*	*OOF [1]*	*Grant*	*Mitigation*	*Other (gender equality)*
International Union for Conservation of Nature - Blue Natural Capital Financing Facility and Fund (IUCN - BNCFF)	-		*2 000 000.00*		*committed [5]*	*OOF [1]*	*Grant*	*Adaptation*	*Other (ecosystems protection & restoration)*
International Union for Conservation of Nature - Blue Natural Capital Financing Facility and Fund (IUCN - BNCFF)	-		*210 000.00*		*disbursed*	*OOF [1]*	*Grant*	*Adaptation*	*Other (ecosystems protection & restoration)*
United Nations Office for Disaster Risk Reduction (UNISDR), Global Facility for Disaster Reduction and Recovery (GFDRR) & World Meteorological Organization (WMO) - Climate Risk and Early Warning Systems (CREWS)	-		*500 000.00*		*committed [6]*	*OOF [1]*	*Grant*	*Adaptation*	*Other (resilience and disaster risk reduction)*
Observatoire du Sahara et du Sahel (OSS)	-		*40 000.00*		*disbursed*	*OOF [1]*	*Grant*	*Adaptation*	*Other (capacity building)*
International Climate Finance Accelerator Luxembourg (ICFA)	-		*5 775 350.00*		*committed [7]*	*OOF [1]*	*Grant*	*Cross-cutting*	*Other (assistance and advice for new fund managers)*
International Climate Finance Accelerator Luxembourg (ICFA)	-		*140 000.00*		*disbursed*	*OOF [1]*	*Grant*	*Cross-cutting*	*Other (assistance and advice for new fund managers)*
Luxembourg - European Investment Bank (EIB) Climate Finance Platform	-		*24 000 000.00*		*committed [8]*	*OOF [1]*	*Other (first loss guarantee)*	*Cross-cutting*	*Energy*
Luxembourg - European Investment Bank (EIB) Climate Finance Platform	-		*6 000 000.00*		*disbursed*	*OOF [1]*	*Other (first loss guarantee)*	*Cross-cutting*	*Energy*
Luxembourg - Forestry & Climate Change Fund (Investing for Development SICAV - formerly Luxembourg - Microfinance and Development Fund SICAV - LMDF)	-		*9 750 000.00*		*committed [9]*	*OOF [1]*	*Other (first loss guarantee)*	*Cross-cutting*	*Forestry*
Luxembourg - Forestry & Climate Change Fund (Investing for Development SICAV - formerly Luxembourg - Microfinance and Development Fund SICAV - LMDF)	-		*1 750 000.00*		*disbursed*	*OOF [1]*	*Other (first loss guarantee)*	*Cross-cutting*	*Forestry*

Specialized United Nations bodies									
1. United Nations Development Programme									
Luxembourg's contribution to resilience and disaster risk reduction related activities	-		*2 000 000.00*		*disbursed*	*ODA*	*Grant*	*Adaptation*	*Other (resilience and disaster risk reduction)*
Luxembourg's contribution to climate change related activities	-		*300 000.00*		*disbursed*	*ODA*	*Grant*	*Cross-cutting*	*Cross-cutting*
2. United Nations Environment Programme									
Luxembourg's voluntary contribution to climate change related activities	-		*300 000.00*		*disbursed*	*ODA*	*Grant*	*Cross-cutting*	*Cross-cutting*
Multilateral Fund	-		*55 000.00*		*disbursed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Other (capacity building)*
3. Other									
United Nations and FAO World Food Programme (WFP)	-		*300 000.00*		*disbursed* [10]	*ODA*	*Grant*	*Adaptation*	*Agriculture* *Other (food safety)*
United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women)	-		*2 950 000.00*		*committed* [11]	*ODA*	*Grant*	*Adaptation*	*Agriculture*
Food and Agriculture Organization of the United Nations (FAO)	-		*900 000.00*		*committed* [12]	*ODA*	*Grant*	*Cross-cutting*	*Agriculture*
International Work Group on Indigenous Affairs (IWGIA)			*5 000.00*		*disbursed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Other (capacity building)*
Total contributions through multilateral channels	**904 500.00**		**73 933 850.00**						
disbursed - ODA	***904 500.00***		***3 200 000.00***	***18 363 000.00***				***Adaptation***	***8 900 000.00***
disbursed - OOF	***0.00***		***14 258 500.00***					***Cross-cutting***	***65 879 850.00***
net committed - ODA (committed minus already disbursed amounts)	***0.00***		***4 450 000.00***	***56 475 350.00***				***Mitigation***	***58 500.00***
net committed - OOF (committed minus already disbursed amounts)	***0.00***		***52 025 350.00***					***Check***	***0.00***

Abbreviations: ODA = official development assistance, OOF = other official flows.

[a] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[b] In the context of the MMR, the term "provided" equals "disbursed".

[c] These categories should be mutually exclusive

[d] See the OECD purpose codes at http://www.oecd.org/investment/stats/dacandcrscodelists.htm. Codes include energy, transport, industry, agriculture, forestry, water and sanitation etc.

Luxembourg's notes

Committed amounts are only reported for programs/actions/projects which are still on-going or for which the whole committed amount has not yet been disbursed at the end of 2017. Therefore, (net) committed amounts = remaining committed amounts for the post-2017 years.

(1) International Climate Finance

(2) 904 500 EUR as annual emitted amount and 812 700 EUR as replenishment of the Facility's resources

(3) 35 000 000 EUR committed for the period 2014-2020; 10 000 000 EUR disbursed in both 2015 & 2016 and 5 000 000 EUR disbursed in 2017; net commitment end 2017 = 10 000 000 EUR

(4) 1 000 000 EUR committed for the period 2016-2020; 400 000 EUR disbursed in 2016 and no disbursement made in 2017; net commitment end 2017 = 600 000 EUR

(5) 2 220 000 EUR initially committed for the period 2018-2020 increased by 100 000 EUR in 2017; 110 000 EUR disbursed already in 2016 and 210 000 EUR disbursed in 2017 for a feasibility study; net commitment end 2017 = 2 000 000 EUR

(6) 500 000 EUR initially committed for the period 2018-2019; no disbursement made in 2017; net commitment end 2017 = 500 000 EUR

(7) 5 915 350 EUR committed for the period 2017-2021; 140 000 EUR disbursed in 2017; net commitment end 2017 = 5 775 350 EUR

(8) 30 000 000 EUR committed for the period 2017-2019; 6 000 000 EUR disbursed in 2017; net commitment end 2017 = 24 000 000 EUR

(9) 11 500 000 EUR initially committed for the period 2018-2020; 1 750 000 EUR disbursed already in 2017; net commitment end 2017 = 9 750 000 EUR

(10) 1 500 000 EUR committed for the period 2015-2019; 700 000 EUR disbursed in 2015, 500 000 EUR disbursed in 2016 and 300 000 EUR disbursed in 2017; net commitment end 2017 = 0 EUR

(11) 3 950 000 EUR committed for the period 2016-2020; 1 000 000 EUR disbursed in 2016 and no disbursement made in 2017; net commitment end 2017 = 2 950 000 EUR

(12) 1 500 000 EUR committed for the period 2015-2018; 600 000 EUR already disbursed up to 2016 and no disbursement made in 2017; net commitment end 2017 = 900 000 EUR

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 2017

Recipient country/region/project/programme	*Total amount*		*Status: disbursed, committed*	*Funding source: ODA, OOF, Other*	*Financial instrument: grant, concessional loan, non-concessional loan, equity, other*	*Type of support: Mitigation, adaptation, crosscutting, other*[a]	*Sector*[b]	*Additional information*[c]
	Climate-specific							
	European euro - EUR	*national currency*						
Africa / AOSIS-SIDS / bilateral	13 440.49		disbursed	ODA	Grant	Cross-cutting	Other (technical and vocational training)	Projects in Cabo Verde (CVE/081 - training & access to employment [06.16-11.20]).
Africa / AOSIS-SIDS / bilateral	133 402.33		disbursed	ODA	Grant	Mitigation	Water and sanitation	Projects in Cabo Verde (CVE/082 - water and sanitation [06.16-11.20]).
Africa / AOSIS-SIDS / bilateral	334 949.65		disbursed	ODA	Grant	Mitigation	Energy	Project in Cabo Verde (CVE/083 - renewable energies [06.17-12.20]).
Africa / AOSIS-SIDS / bilateral	170 609.16		disbursed	OOF[1]	Grant	Mitigation	Energy Waste	Implementing entity: Lee Sàrl. Project in Cabo Verde: setting up of a resource centre on the Santiago Island for recovering waste and extracting energy from it through methanization.
Africa / DEs / NGOs	15 731.11		disbursed	ODA	Grant	Adaptation	Other (technical and vocational training)	Projects in West African countries (training).
Africa / DEs / NGOs	28 652.00		disbursed	ODA	Grant	Mitigation	Other (technical and vocational training)	Project in South Africa (training & education).
Africa / LDCs / bilateral	4 760 794.76		disbursed	ODA	Grant	Adaptation	Agriculture Forestry Other (food safety, technical and vocational training)	Projects in Burkina Faso (BKF/019 - forestry [07.12-06.18]), Mali (MLI/021 - food safety and rural development [04.16-12.19]), Niger (NIG/025 - rural development [10.16-12.20]) and Senegal (SEN/029 - training [07.13-06.18]).
Africa / LDCs / bilateral	5 039 009.73		disbursed	ODA	Grant	Cross-cutting	Agriculture Forestry Other (technical and vocational training)	Projects in Burkina Faso (BKF/019 - forestry [07.12-06.18]) and Niger (NIG/024 - training & education [10-16-12.20] & NIG/025 - rural development [10.16-12.20]).
Africa / LDCs / bilateral	5 935 090.28		disbursed	ODA	Grant	Mitigation	Other (health, technical and vocational training)	Projects in Burkina Faso (BKF/018 - training [07.12-07.17]) and Senegal (SEN/027 - health [07.13-06.18] & SEN/028 - training [07.13-06.18]).
Africa / LDCs / bilateral	71 233.00		committed[2]	OOF[1]	Grant	Cross-cutting	Cross-cutting Other (capacity building)	Implementing entity: Centre de Suivi Ecologique de la République du Sénégal. Project in Senegal: capacity-building convention for both adaptation and mitigation - better knowledge of the impacts of anthropogenic activities on climate and eco-systems, identifying the best endogenous policies and measures, communication and awareness.
Africa / LDCs / bilateral	50 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Cross-cutting Other (capacity building)	Implementing entity: Centre de Suivi Ecologique de la République du Sénégal. Project in Senegal: capacity-building convention for both adaptation and mitigation - better knowledge of the impacts of anthropogenic activities on climate and eco-systems, identifying the best endogenous policies and measures, communication and awareness.
Africa / LDCs / NGOs	66 352.28		disbursed	ODA	Grant	Adaptation	Other (financial techniques, food safety, technical and vocational training)	Project in Burkina Faso (food safety, micro-finance & training).
Africa / LDCs / NGOs	308 655.82		disbursed	ODA	Grant	Cross-cutting	Agriculture Other (living conditions, financial support)	Projects in Burkina Faso (agriculture & integrated development), Dem. Rep. of the Congo (agriculture), Niger (integrated development), Senegal (rural development) and Togo (agriculture, integrated development).
Africa / LDCs / NGOs	228 300.69		disbursed	ODA	Grant	Mitigation	Agriculture Water and sanitation Other (rural development)	Projects in Burkina Faso (agriculture, water & sanitation) and in Ethiopia (rural development).
Africa / LDCs / NGOs	173 468.70		committed [3]	OOF[1]	Grant	Adaptation	Agriculture Energy Water Other (land)	ASTM_1: Project in Burkina Faso (agriculture).
Africa / LDCs / NGOs	103 003.25		disbursed	OOF[1]	Grant	Adaptation	Agriculture Energy Water Other (land)	ASTM_1: Project in Burkina Faso (agriculture).
Africa / LDCs / NGOs	43 256.54		committed[4]	OOF[1]	Grant	Adaptation	Agriculture Other (knowlegde transfer, technical and vocational training)	ASTM_2: Project in Togo (agriculture).
Africa / LDCs / NGOs	60 443.13		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (knowlegde transfer, technical and vocational training)	ASTM_2: Project in Togo (agriculture).
Africa / LDCs / NGOs	398 177.55		committed[5]	OOF[1]	Grant	Adaptation	Agriculture Other (gender equality, knowlegde transfer, technical and vocational training)	Frères des Hommes_1: Project in Senegal (resilience).
Africa / LDCs / NGOs	100 843.88		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (gender equality, knowlegde transfer, technical and vocational training)	Frères des Hommes_1: Project in Senegal (resilience).
Africa / LDCs / NGOs	293 383.08		committed[6]	OOF[1]	Grant	Adaptation	Agriculture Other (resilience and disaster risk reduction)	SOS Faim_1: Project in Niger (resilience/agriculture).
Africa / LDCs / NGOs	106 616.88		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (resilience and disaster risk reduction)	SOS Faim_1: Project in Niger (resilience/agriculture).

Asia-Pacific / DEs / bilateral	1 449 719.35		disbursed	ODA	Grant	Adaptation	Agriculture Other (living conditions)	Projects in Vietnam (VIE/033 - local development [07.13-06.18], VIE/035 - increase the efficiency and effectiveness of the IFAD loan [02.14-09.17] & VIE/036 - water irrigation for agriculture [08.15-07.20]).
Asia-Pacific / DEs / bilateral	1 185 110.73		disbursed	ODA	Grant	Cross-cutting	Other (living conditions)	Project in Vietnam (VIE/033 - integrated local development [07.13-06.18]).
Asia-Pacific / DEs / bilateral	2 000 000.00		committed[7]	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction)	Project in Vietnam (VIE/433 - climate adaptation and resilience [05.18-11.20]).
Asia-Pacific / DEs / bilateral	2 000 000.00		committed[8]	OOF[1]	Grant	Mitigation	Energy	Project in Vietnam (VIE/401 - energy ffficient lighting NAMA Pilot [05.18-05-21]).
Asia-Pacific / DEs / NGOs	179 758.08		disbursed	ODA	Grant	Cross-cutting	Agriculture Other (food safety, living conditions)	Projects in India (living conditions) and Philippines (organic & sustainable farming, food safety).
Asia-Pacific / DEs / NGOs	27 998.23		disbursed	ODA	Grant	Mitigation	Other (waste management)	Project in India (waste recycling).
Asia-Pacific / DEs / NGOs	98 009.00		committed[9]	OOF[1]	Grant	Cross-cutting	Energy Other (microfinance)	ADA_1: Project in the Philippines (promoting renewable energy in microfinance institutions (MFI's)).
Asia-Pacific / DEs / NGOs	98 009.00		disbursed	OOF[1]	Grant	Cross-cutting	Energy Other (microfinance)	ADA_1: Project in the Philippines (promoting renewable energy in microfinance institutions (MFI's)).
Asia-Pacific / LDCs / bilateral	153 947.10		disbursed	ODA	Grant	Adaptation	Other (living conditions, tourism)	Projects in Laos (LAO/029 - human resources development in the tourism sector [08.16-08.21]) and Myanmar (MYA/002 - rural development [12.17-12.22]).
Asia-Pacific / LDCs / NGOs	552 104.77		disbursed	ODA	Grant	Cross-cutting	Agriculture Other (living conditions)	Projects in Bangladesh (integrated & rural development) and in Laos (rural development).
Asia-Pacific / LDCs / NGOs	401 353.00		committed[10]	OOF[1]	Grant	Adaptation	Agriculture Other (asset transfer, capacity building)	Caritas Luxembourg_2: Project in Bangladesh (resilience/agriculture).
Asia-Pacific / LDCs / NGOs	98 143.00		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (asset transfer, capacity building)	Caritas Luxembourg_2: Project in Bangladesh (resilience/agriculture).
Asia-Pacific / LDCs / NGOs	272 599.62		committed[11]	OOF[1]	Grant	Adaptation	Agriculture Other (access to information, gender equality, resilience and disaster risk reduction)	CARE_1: Project in Laos (resilience/agriculture).
Asia-Pacific / LDCs / NGOs	84 263.04		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (access to information, gender equality, resilience and disaster risk reduction)	CARE_1: Project in Laos (resilience/agriculture).
LAC / DEs / NGOs	409 651.73		disbursed	ODA	Grant	Adaptation	Agriculture Forestry Other (resilience and disaster risk reduction, technical and vocational training)	Projects in Bolivia (agriculture, forestry, training & risk management), Ecuador (training) and Peru (agriculture & training).
LAC / DEs / NGOs	337 965.88		disbursed	ODA	Grant	Cross-cutting	Agriculture Other (health, living conditions, technical and vocational training)	Projects in Bolivia (organic & sustainable farming, integrated development, natural resources management) and Peru (agriculture, health and training).
LAC / DEs / NGOs	32 000.00		disbursed	ODA	Grant	Mitigation	Other (rural development, technical and vocational training)	Project in Nicaragua (rural development & training).
LAC / LDCs / NGOs	185 000.00		committed[12]	OOF[1]	Grant	Cross-cutting	Forestry Other (awareness raising, technical and vocational training)	Caritas Luxembourg_1: Project in Haiti.
LAC / LDCs / NGOs	100 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Forestry Other (awareness raising, technical and vocational training)	Caritas Luxembourg_1: Project in Haiti.
Various / bilateral	508 400.14		disbursed	ODA	Grant	Cross-cutting	Other (financial techniques & support)	Financial support through the Forestry & Climate Change Fund (Investing for Development SICAV - formerly Luxembourg - Microfinance and Development Fund SICAV - LMDF).
Various / bilateral	150 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Other (investment funds)	Implementing entity: Luxembourg Fund Labelling Agency LuxFLAG. Convention - awarding a climate finance label to investment funds according to agreed and published criteria.
Various / bilateral	42 713.65		disbursed	OOF[1]	Grant	Cross-cutting	Other (awareness raising, capacity building, sustainable finance)	LU-EIB Side Event Pavillon at COP23 and speaker participation fees.
Various / bilateral	50 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Other (financial & technical support)	Support to COP23 Presidency Climate Engagement Program.
Various / bilateral	89 505.00		committed[13]	OOF[1]	Grant	Cross-cutting	Other (legal advisory)	Legal and advisory services in climate change matters
Various / bilateral	57 915.00		disbursed	OOF[1]	Grant	Cross-cutting	Other (legal advisory)	Legal and advisory services in climate change matters
Total contributions through bilateral, regional and other channels	28 999 580.63						28 999 580.63	
disbursed - ODA	*21 701 035.15*	*22 973 595.14*				*Adaptation*	*10 991 748.00*	
disbursed - OOF	*1 272 559.99*					*Cross-cutting*	*9 116 830.29*	
net committed - ODA	*0.00*	*6 025 985.49*				*Mitigation*	*8 891 002.34*	
net committed - OOF	*6 025 985.49*					*Check*	*0.00*	

Abbreviations: ODA = official development assistance, OOF = other official flows; USD = United States dollars.

[a] These categories should be mutually exclusive.

[b] See the OECD purpose codes at http://www.oecd.org/investment/stats/dacandcrscodelists.htm. Codes include energy, transport, industry, agriculture, forestry, water and sanitation etc.

[c] Parties should report, as appropriate, on project details and the implementing agency.

Luxembourg's notes

Committed amounts are only reported for programs/actions/projects which are still on-going or for which the whole committed amount has not yet been disbursed at the end of 2017. Therefore, (net) committed amounts = remaining committed amounts for the post-2017 years.

Except when indicated, bilateral projects or programmes are implemented by Lux-Development SA - https://luxdev.lu/en/home.

(1) International Climate Finance

(2) 201 233 EUR committed for the period 2016-2019; 80 000 EUR disbursed in 2016 and 50 000 EUR disbursed in 2017; net commitment end 2017 = 71 233 EUR

(3) 276 471.95 EUR initially committed for the year 2018; 103 003.25 EUR already disbursed in 2017; net commitment end 2017 = 173 468.70 EUR

(4) 103 699.67 EUR initially committed for the year 2018; 60 443.13 EUR already disbursed in 2017; net commitment end 2017 = 43 256.54 EUR

(5) 499 021.43 EUR initially committed for the period 2018-2021; 100 843.88 EUR already disbursed in 2017; net commitment end 2017 = 398 177.55 EUR

(6) 399 999.96 EUR initially committed for the period 2018-2020; 106 616.88 EUR already disbursed in 2017; net commitment end 2017 = 293 383.08 EUR

(7) 2 000 000 EUR committed in 2016, no disbursements made in both 2016 and 2017; net commitment end 2017 = 2 000 000 EUR

(8) 2 000 000 EUR committed in 2016, no disbursements made in both 2016 and 2017; net commitment end 2017 = 2 000 000 EUR

(9) 196 018 EUR committed for the period 2017-2018; 98 009 EUR disbursed in 2017; net commitment end 2017 = 98 009 EUR

(10) 499 496 EUR committed for the period 2017-2021; 98 143 EUR disbursed in 2017; net commitment end 2017 = 401 353 EUR

(11) 356 862.66 EUR initially committed for the period 2018-2020; 84 263.04 EUR already disbursed in 2017; net commitmend end 2017 = 272 599.62 EUR

(12) 285 000 EUR committed for the period 2017-2019; 100 000 EUR disbursed in 2017; net commitment end 2017 = 185 000 EUR

(13) 147 420 EUR initially committed for the period 2018-2019; 57 915 EUR already disbursed in 2017; net commitment end 2017 = 89 505 EUR

TABLES V.4-2 – PROVISION OF CLIMATE CHANGE RELATED PUBLIC FINANCIAL SUPPORT FOR THE YEAR 2018 IN EUR

Notes: an Excel file containing these tables for the years 2010 to 2019 is available following this link: https://cdr.eionet.europa.eu/lu/eu/mmr/art16_finance/envx4xzoa/. However, tables for the years 2010, 2011 and 2012 are incomplete.

From 2018 onwards, Table 7(b) is displaying one entry per Party instead of a grouping of countries by region as it was the case for the previous years. This follows a recommendation made during the in-country review of Luxembourg's 7th National Communication and 3rd Biennial Report: see IDR7, Table 17 [UNFCCC (2019a)].

Table 7

Provision of public financial support: summary information in 2018

Committed & disbursed

Allocation channels	Year									
	European euro - EUR					National currency[a]				
	Core/general[b, 1]	Climate-specific [2]				Core/general	Climate-specific [2]			
		Mitigation[c]	Adaptation[c]	Cross-cutting[c]	Other[c,d]		Mitigation	Adaptation	Cross-cutting	Other
Total contributions through multilateral channels:	862 350.00	-	15 825 714.29	54 830 949.00	-					
Multilateral climate change funds[e]	862 350.00	-	-	10 040 000.00	-					
Other multilateral climate change funds[f]	-	-	-	-	-					
Multilateral financial institutions, including regional development banks	-	-	3 140 000.00	40 534 549.00	-					
Specialized United Nations bodies	-	-	12 685 714.29	4 256 400.00	-					
Total contributions through bilateral, regional and other channels		9 720 184.02	18 377 868.90	10 820 134.91	-					
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		9 720 184.02	34 203 583.19	65 651 083.91	-					
Total climate specific finance		109 574 851.12								

Total climate specific by funding source (EUR)		Total climate specific by financial instrument (EUR)	
ODA	28 004 205.35	Grant	75 824 851.12
OOF	81 570 645.77	Concessional loan	-
Other	-	Non-concessional loan	-
Total	**109 574 851.12**	Equity	-
		Other	33 750 000.00
		of which committed	*62 524 046.48*
		of which disbursed	*47 050 804.64*

1-7 Please provide information on definitions or methodologies used for reporting in the Documentation box

[a] Please provide exchange rate

[b] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[c] These categories should be mutually exclusive

[d] Please specify

[e] Multilateral climate change funds: Global Environment Facility, Least Developed Countries Fund, Special Climate Change Fund, Adaptation Fund, Green Climate Fund and the Trust Fund for Supplementary Activities (paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in 2/CP.17).

[f] Not listed under e)

Luxembourg's notes

Committed amounts are only reported for programs/actions/projects which are still on-going or for which the whole committed amount has not yet been disbursed at the end of 2018.

Net committed (committed minus already disbursed amounts)

Allocation channels	Year									
	European euro - EUR					National currency[a]				
	Core/general[b] [1]	Climate-specific [2]				Core/general	Climate-specific [2]			
		Mitigation[c]	Adaptation[c]	Cross-cutting[c]	Other[ad]		Mitigation	Adaptation	Cross-cutting	Other
Total contributions through multilateral channels:	-	-	12 840 020.00	39 317 706.40	-					
Multilateral climate change funds[e]	-	-	-	5 000 000.00	-					
Other multilateral climate change funds[f]	-	-	-	-	-					
Multilateral financial institutions, including regional development banks	-	-	1 620 000.00	31 827 306.40	-					
Specialized United Nations bodies	-	-	11 220 020.00	2 490 400.00	-					
Total contributions through bilateral, regional and other channels		999 608.02	4 998 604.54	4 368 107.52	-					
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		999 608.02	17 838 624.54	43 685 813.92	-					
Total climate specific finance		62 524 046.48								

Total climate specific by funding source (EUR)		Total climate specific by financial instrument (EUR)	
ODA	4 450 000.00	Grant	35 524 046.48
OOF	58 074 046.48	Concessional loan	-
Other	-	Non-concessional loan	-
Total	62 524 046.48	Equity	-
		Other	27 000 000.00

Disbursed

Allocation channels	Year									
	European euro - EUR					National currency[a]				
	Core/general[b] [1]	Climate-specific [2]				Core/general	Climate-specific [2]			
		Mitigation[c]	Adaptation[c]	Cross-cutting[c]	Other[ad]		Mitigation	Adaptation	Cross-cutting	Other
Total contributions through multilateral channels:	862 350.00	-	2 985 694.29	15 513 242.60	-					
Multilateral climate change funds[e]	862 350.00	-	-	5 040 000.00	-					
Other multilateral climate change funds[f]	-	-	-	-	-					
Multilateral financial institutions, including regional development banks	-	-	1 520 000.00	8 707 242.60	-					
Specialized United Nations bodies	-	-	1 465 694.29	1 766 000.00	-					
Total contributions through bilateral, regional and other channels		8 720 576.00	13 379 264.36	6 452 027.39	-					
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		8 720 576.00	16 364 958.65	21 965 269.99	-					
Total climate specific finance		47 050 804.64								

Total climate specific by funding source (EUR)		Total climate specific by financial instrument (EUR)	
ODA	23 554 205.35	Grant	40 300 804.64
OOF	23 496 599.29	Concessional loan	-
Other	-	Non-concessional loan	-
Total	47 050 804.64	Equity	-
		Other	6 750 000.00

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 2018

Donor funding	*Total amount*				*Status: disbursed, committed* [b, 3]	*Funding source: ODA, OOF, Other* [4]	*Financial instrument: grant, concessional loan, non-concessional loan, equity, other* [5]	*Type of support: Mitigation, adaptation, crosscutting, other* [c,6]	*Sector* [d, 7]
	Core/general [a, 1]		*Climate-specific* [2]						
	European euro - EUR	*National currency*	*European euro - EUR*	*National currrency*					
Multilateral climate change funds									
1. Global Environment Facility	862 350.00		-		disbursed	ODA	Equity	Cross-cutting	Other (multisectoral)
2. Least Developed Countries Fund			-		-	-	-	-	-
3. Special Climate Change Fund			-		-	-	-	-	-
4. Adaptation Fund			-		-	-	-	-	-
5. Green Climate Fund			5 000 000.00		committed[(3)]	OOF[(1)]	Grant	Cross-cutting	Cross-cutting
			5 000 000.00		disbursed	OOF[(1)]	Grant	Cross-cutting	Cross-cutting
6. UNFCCC Trust Fund for Supplementary Activities			40 000.00		disbursed	OOF[(1)]	Grant	Cross-cutting	Cross-cutting
7. Other multilateral climate change funds			-		-	-	-	-	-
Multilateral financial institutions, including regional development banks									
1. World Bank	-		-		-	-	-	-	-
2. International Finance Corporation	-		1 000 000.00		disbursed	OOF[(2)]	Grant	Cross-cutting	Cross-cutting
3. African Development Bank	-		-		-	-	-	-	-
4. Asian Development Bank	-		-		-	-	-	-	-
5. European Bank for Reconstruction and Development	-		-		-	-	-	-	-
6. Inter-American Development Bank	-		-		-	-	-	-	-
7. Other									
Mekong River Commission (MRC)	-		*600 000.00*		*committed* [(4)]	*ODA*	*Grant*	*Adaptation*	*Cross-cutting*
International Union for Conservation of Nature - Blue Natural Capital Financing Facility and Fund (IUCN - BNCFF)	-		*1 000 000.00*		*committed* [(5)]	*OOF* [(1)]	*Grant*	*Adaptation*	*Other (ecosystems protection & restoration)*
	-		*1 000 000.00*		*disbursed*	*OOF* [(1)]	*Grant*	*Adaptation*	*Other (ecosystems protection & restoration)*
United Nations Office for Disaster Risk Reduction (UNISDR), Global Facility for Disaster Reduction and Recovery (GFDRR) & World Meteorological Organization (WMO) - Climate Risk and Early Warning Systems (CREWS)	-		*500 000.00*		*disbursed* [(6)]	*OOF* [(1)]	*Grant*	*Adaptation*	*Other (resilience and disaster risk reduction)*
Observatoire du Sahara et du Sahel (OSS)	-		*20 000.00*		*committed* [(7)]	*OOF* [(1)]	*Grant*	*Adaptation*	*Other (capacity building)*
	-		*20 000.00*		*disbursed*	*OOF* [(1)]	*Grant*	*Adaptation*	*Other (capacity building)*
International Climate Finance Accelerator Luxembourg (ICFA)	-		*4 827 306.40*		*committed* [(8)]	*OOF* [(1)(2)]	*Grant*	*Cross-cutting*	*Other (assistance and advice for new fund managers)*
	-		*957 242.60*		*disbursed*	*OOF* [(1)(2)]	*Grant*	*Cross-cutting*	*Other (assistance and advice for new fund managers)*
Luxembourg - European Investment Bank (EIB) Climate Finance Platform	-		*19 000 000.00*		*committed* [(9)]	*OOF* [(1)(2)]	*Other (first loss guarantee)*	*Cross-cutting*	*Energy*
	-		*5 000 000.00*		*disbursed*	*OOF* [(1)(2)]	*Other (first loss guarantee)*	*Cross-cutting*	*Energy*
Luxembourg - Forestry & Climate Change Fund (Investing for Development SICAV - formerly Luxembourg - Microfinance and Development Fund SICAV - LMDF)	-		*8 000 000.00*		*committed* [(10)]	*OOF* [(1)(2)]	*Other (first loss guarantee)*	*Cross-cutting*	*Forestry*
	-		*1 750 000.00*		*disbursed*	*OOF* [(1)(2)]	*Other (first loss guarantee)*	*Cross-cutting*	*Forestry*

Specialized United Nations bodies									
1. United Nations Development Programme									
Luxembourg's contribution to the capacity for disaster reduction initiative partnership (CADRI)	-		*500 000.00*		*disbursed*	*ODA*	*Grant*	*Adaptation*	*Other (resilience and disaster risk reduction)*
Luxembourg's contribution to climate change related activities	-		*300 000.00*		*disbursed*	*ODA*	*Grant*	*Cross-cutting*	*Cross-cutting*
2. United Nations Environment Programme									
Luxembourg's voluntary contribution to climate change related activities	-		*250 000.00*		*disbursed*	*ODA*	*Grant*	*Cross-cutting*	*Cross-cutting*
UNEP Vanishing Treasures "Mountain Flagship Species"	-		*8 270 020.00*		*committed*	*OOF* [1]	*Grant*	*Adaptation*	*Other (ecosystems protection & restoration)*
	-		*729 980.00*		*disbursed*	*OOF* [1]	*Grant*	*Adaptation*	*Other (ecosystems protection & restoration)*
UNEP Finance initiative "Luxembourg Sustainable Finance Roadmap"	-		*53 000.00*		*committed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Sustainable Finance*
	-		*200 000.00*		*disbursed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Sustainable Finance*
UNEP REDD+ "Land Use Finance project: leveraging public finance to decouple private investment from deforestation, climate and ecosystem impacts"	-		*1 492 400.00*		*committed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Sustainable Finance Forestry*
	-		*971 000.00*		*disbursed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Sustainable Finance Forestry*
3. Other									
United Nations Convention to Combat Desertification - CRIC17	-		*15 000.00*		*disbursed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Capacity building*
United Nations and FAO World Food Programme (WFP) - Luxembourg's contribution to climate change related activities	-		*235 714.29*		*disbursed*	*ODA*	*Grant*	*Adaptation*	*Agriculture Other (food safety)*
United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women)	-		*2 950 000.00*		*committed* [11]	*ODA*	*Grant*	*Adaptation*	*Agriculture*
Food and Agriculture Organization of the United Nations (FAO)	-		*900 000.00*		*committed* [12]	*ODA*	*Grant*	*Cross-cutting*	*Agriculture*
Climate and Clean Air Coalition Trust Fund (CCAC)	-		*45 000.00*		*committed* [13]	*OOF* [1]	*Grant*	*Cross-cutting*	*Capacity building*
	-		*30 000.00*		*disbursed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Capacity building*
Total contributions through multilateral channels	**862 350.00**		**70 656 663.29**						
disbursed - ODA	*862 350.00*		*1 285 714.29*	*19 361 286.89*				**Adaptation**	*15 825 714.29*
disbursed - OOF	*0.00*		*17 213 222.60*					**Cross-cutting**	*55 693 299.00*
net committed - ODA (committed minus already disbursed amounts)	*0.00*		*4 450 000.00*	*52 157 726.40*				**Mitigation**	*0.00*
net committed - OOF (committed minus already disbursed amounts)	*0.00*		*47 707 726.40*					**Check**	*0.00*

Abbreviations: ODA = official development assistance, OOF = other official flows.

[a] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[b] In the context of the MMR, the term "provided" equals "disbursed".

[c] These categories should be mutually exclusive

[d] See the OECD purpose codes at http://www.oecd.org/investment/stats/dacandcrscodelists.htm. Codes include energy, transport, industry, agriculture, forestry, water and sanitation etc.

Luxembourg's notes

Committed amounts are only reported for programs/actions/projects which are still on-going or for which the whole committed amount has not yet been disbursed at the end of 2018. Therefore, (net) committed amounts = remaining committed amounts for the post-2018 years.

(1) International Climate Finance provided by the Climate and Energy Fund of the Ministry of the Environment, Climate and Sustainable Development

(2) Sustainable Finance provided by the Ministry of Finance

(3) 35 000 000 EUR committed for the period 2014-2020; 10 000 000 EUR disbursed in both 2015 & 2016 and 5 000 000 EUR disbursed in both 2017 & 2018; net commitment end 2018 = 5 000 000 EUR

(4) 1 000 000 EUR committed for the period 2016-2020; 400 000 EUR disbursed in 2016 and no disbursement made in both 2017 & 2018; net commitment end 2018 = 600 000 EUR

(5) 2 220 000 EUR initially committed for the period 2018-2020 increased by 100 000 EUR in 2017; 110 000 EUR disbursed already in 2016, 210 000 EUR disbursed in 2017 and 1 000 000 EUR disbursed in 2018; net commitment end 2018 = 1 000 000 EUR

(6) 1 000 000 EUR disbursed in 2016 and 500 000 EUR committed for the period 2018-2019; 500 000 EUR disbursed in 2018; net commitment end 2018 = 0 EUR

(7) 40 000 EUR disbursed in 2017 and another 40 000 EUR committed in 2018; 20 000 EUR disbursed in 2018; net commitment end 2018 = 20 000 EUR

(8) 5 915 350 EUR + 9 199 EUR committed for the period 2017-2021; 140 000 EUR disbursed in 2017 and 957 242.60 EUR disbursed in 2018; net commitment end 2018 = 4 827 306.40 EUR

(9) 30 000 000 EUR committed for the period 2017-2019; 6 000 000 EUR disbursed in 2017 and 5 000 000 EUR disbursed in 2018; net commitment end 2018 = 19 000 000 EUR

(10) 11 500 000 EUR initially committed for the period 2018-2020; 1 750 000 EUR disbursed in both 2017 & 2018; net commitment end 2018 = 8 000 000 EUR

(11) 3 950 000 EUR committed for the period 2016-2020; 1 000 000 EUR disbursed in 2016 and no disbursement made in both 2017 & 2018; net commitment end 2018 = 2 950 000 EUR

(12) 1 500 000 EUR committed for the period 2015-2018; 600 000 EUR already disbursed up to 2016 and no disbursement made in both 2017 & 2018; net commitment end 2018 = 900 000 EUR

(13) 75 000 EUR committed for the period 2018-2020; 30 000 EUR disbursed in 2018; net commitment end 2018 = 45 000 EUR

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 2018

Recipient country/region/project/programme	*Total amount*		*Status: disbursed, committed*	*Funding source: ODA, OOF, Other*	*Financial instrument: grant, concessional loan, non-concessional loan, equity, other*	*Type of support: Mitigation, adaptation, crosscutting, other*[a]	*Sector*[b]	*Additional information*[c]
	Climate-specific							
	European euro - EUR	*national currency*						
Africa / AOSIS-SIDS / bilateral	966 393.77		disbursed	ODA	Grant	Mitigation	Energy	Cabo Verde: programme CVE/083 under the 4th Indicative Cooperation Programme (ICP IV) - renewable energies [06.2017-12.2020].
Africa / AOSIS-SIDS / bilateral	258 194.60		disbursed	ODA	Grant	Mitigation	Energy Other (technical and vocational training)	Cabo Verde: programme CVE/085 under the 4th Indicative Cooperation Programme (ICP IV) - supporting the partnership between the Centre for Renewable Energies and Industrial Maintenance and the Centre of competence-Technical Engineering of Luxembourg (CERMI / CdC-GTB) [07.2018-07.2021].
Africa / AOSIS-SIDS / NGOs	42 767.43		disbursed	ODA	Grant	Mitigation	Energy	Cabo Verde: "Athénée de Luxembourg" support to solar energy projects.
Africa / LDCs / bilateral	5 874 700.78		disbursed	ODA	Grant	Adaptation	Other (food safety, rural development)	Mali: programme MLI/021 under the 3rd Indicative Cooperation Programme (ICP III) - food safety and rural development [04.2016-12.2019].
Africa / LDCs / bilateral	556 269.45		disbursed	ODA	Grant	Adaptation	Other (technical and vocational training)	Senegal: territorial development, decentralization and good local governance programme SEN/029 under the 3rd Indicative Cooperation Programme (ICP III) - decentralisation and citizenship education programme [07.2013-06.2018].
Africa / LDCs / bilateral	445 496.20		disbursed	ODA	Grant	Cross-cutting	Agriculture	Burkina Faso: project BKF/024 under the 3rd Indicative Cooperation Programme (ICP III) - land reclamation efforts towards pastoral usage and in conservation areas [05.2018-05.2022].
Africa / LDCs / bilateral	454 040.61		disbursed	ODA	Grant	Cross-cutting	Forestry	Burkina Faso: programme BKF/019 under the 2nd Indicative Cooperation Programme (ICP II) - support for implementing the National Forest Resources Management Programme [07.2012-06.2018].
Africa / LDCs / bilateral	1 564 091.40		disbursed	ODA	Grant	Cross-cutting	Forestry	Burkina Faso: project BKF/023 under the 3rd Indicative Cooperation Programme (ICP III) - support to the sustainable management of the forest resources through contributions to the Forest Sector Support Programme (FSSP) [09.2018-09.2022].
Africa / LDCs / bilateral	698 472.88		disbursed	ODA	Grant	Mitigation	Other (health)	Senegal: programme SEN/027 under the 3rd Indicative Cooperation Programme (ICP III) - support to the basic health sector [07.2013-06.2018].
Africa / LDCs / bilateral	5 298 090.39		disbursed	ODA	Grant	Mitigation	Other (technical and vocational training)	Senegal: professional training and insertion programme SEN/028 under the 3rd Indicative Cooperation Programme (ICP III) - vocational training and employment programme [07.2013-06.2018].
Africa / LDCs / bilateral	2 246 546.00		committed[3]	OOF[1]	Grant	Cross-cutting	Waste Other (living conditions)	Senegal: project in the regions of Thiees, Diourbel and Dakar - design of innovative business models for recycling and valorisation of waste in secondary cities to create green jobs and improve the quality of sanitation in three cities (Tivaouane, Touba, Dakar) where the interventions will impact on the environment, unemployment and behaviours with improved the standard of living by bringing lasting improvements on the incomes and lives of beneficiaries with creation of green jobs and green services while promoting a green perspective in access to sustainable, reliable and affordable service in the management of plastic wastes, faecal sludge and wastes from electronic and electrical equipment (WEEE). Implementing entity: Global Green Growth Institute (GGGI).
	753 454.00		disbursed	OOF[1]	Grant	Cross-cutting	Waste Other (living conditions)	
Africa / LDCs / bilateral	21 233.00		committed[4]	OOF[1]	Grant	Cross-cutting	Other (capacity building)	Senegal: capacity-building convention for both adaptation and mitigation - better knowledge of the impacts of anthropogenic activities on climate and eco-systems, identifying the best endogenous policies and measures, communication and awareness. Implementing entity: Centre de Suivi Ecologique de la République du Sénégal
	50 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Other (capacity building)	
Africa / LDCs / NGOs	152 824.00		disbursed	ODA	Grant	Adaptation	Agriculture	Mali: Lofinè pond development project.
Africa / LDCs / NGOs	74 608.63		disbursed	ODA	Grant	Adaptation	Agriculture Forestry	Burkina Faso: support programme for agricultural, forestry & pastoral activities and environmental protection.

Africa / LDCs / NGOs	261 567.48		disbursed	ODA	Grant	Adaptation	Agriculture Other (technical and vocational training)	Burkina Faso: training of agents for an ecological environment at the Tond Tenga Agricultural School.
Africa / LDCs / NGOs	100 620.95		disbursed	ODA	Grant	Adaptation	Forestry	Senegal: reforestation and participatory local development.
Africa / LDCs / NGOs	132 926.98		disbursed	ODA	Grant	Adaptation	Other (food safety)	Burkina Faso: support to improve food safety.
Africa / LDCs / NGOs	16.83		disbursed	ODA	Grant	Adaptation	Other (food safety, technical and vocational training)	Burkina Faso: strengthening of training by and for the partners in order to increase the food sovereignty of the communities.
Africa / LDCs / NGOs	3 731.16		disbursed	ODA	Grant	Adaptation	Other (rural development)	Senegal: setting-up of and consolidating production and marketing areas for local products thanks to partners' investments.
Africa / LDCs / NGOs	283 429.32		disbursed	ODA	Grant	Cross-cutting	Agriculture	Burkina Faso: promoting agricultural development.
Africa / LDCs / NGOs	198 179.99		disbursed	ODA	Grant	Cross-cutting	Agriculture	Burkina Faso: agro-pastoral production in Kongoussi.
Africa / LDCs / NGOs	122 123.80		disbursed	ODA	Grant	Cross-cutting	Agriculture Other (food safety)	Dem. Rep. of the Congo: sustainable valorisation of agriculture for food safety and household empowerment in South Kivu.
Africa / LDCs / NGOs	14 473.93		disbursed	ODA	Grant	Cross-cutting	Agriculture Other (technical and vocational training)	Burkina Faso: support to the "Conseil National d'Agriculture Biologique" (National Council of Organic Agriculture).
Africa / LDCs / NGOs	39 803.31		disbursed	ODA	Grant	Cross-cutting	Agriculture Other (technical and vocational training)	Niger: strengthening the Mooriben integrated services system.
Africa / LDCs / NGOs	28 000.00		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Burkina Faso: promote the sustainable management of natural resources.
Africa / LDCs / NGOs	77 797.38		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Dem. Rep. of the Congo: support and structuring of agricultural producers' organizations in South Kivu.
Africa / LDCs / NGOs	24 605.68		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Mali: CMAT cluster (Convergence Malienne contre les Accaparements des Terres - Malian Convergence against Land Grabbing).
Africa / LDCs / NGOs	31 420.19		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Togo: promotion of agro-rural entrepreneurship and conservation of the environment in the Doufelgou prefecture (PAER - "Promotion de l'Agro-Entreprenariat Rural").
Africa / LDCs / NGOs	58 800.35		disbursed	ODA	Grant	Mitigation	Agriculture Other (technical and vocational training)	Ethiopia: strengthening organizational capacity and competitiveness of dairy marketing cooperatives and unions.
Africa / LDCs / NGOs	68 751.17		disbursed	ODA	Grant	Mitigation	Agriculture Other (technical and vocational training)	Ethiopia: support for institutional development and capacity building for farmers' organizations in the Bure and Dimtu communities.
Africa / LDCs / NGOs	82 275.37		committed[5]	OOF[1]	Grant	Adaptation	Agriculture Energy Water Other (land)	Burkina Faso: ASTM_1 project - contribution to the resilience of rural populations through the promotion of ecological farming techniques and technologies for adaptation to climate change.
	91 193.33		disbursed	OOF[1]	Grant	Adaptation	Agriculture Energy Water Other (land)	
Africa / LDCs / NGOs	400 000.00		committed[6]	OOF[1]	Grant	Adaptation	Agriculture Other (sensitisation)	Burkina Faso: Chrèschte mam Sahel_1 project - support for local initiatives to adapt to climate change in the municipality of Toma.
	100 000.00		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (sensitisation)	
Africa / LDCs / NGOs	379 620.00		committed[7]	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction)	Burkina Faso: Frères des Hommes_2 project - sustainable and structural strengthening project for the resilience of vulnerable communities to climate
	99 126.00		disbursed	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction)	
Africa / LDCs / NGOs	293 383.08		committed[8]	OOF[1]	Grant	Adaptation	Agriculture Other (resilience and disaster risk reduction)	Niger: SOS Faim_1 project - support to improve the resilience of rural populations in the Niger River region, through the promotion of deep urea placement in irrigated rice areas and the protection and development of lowlands.
Africa / LDCs / NGOs	200 000.00		committed[9]	OOF[1]	Grant	Adaptation	Agriculture Other (resilience and disaster risk reduction)	Niger: Croix rouge_1 project - strengthening the resilience of vulnerable communities to climate change in the urban district of Saga in Niamey.
	100 000.00		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (resilience and disaster risk reduction)	
Africa / LDCs / NGOs	396 440.00		committed[10]	OOF[1]	Grant	Adaptation	Other (capacity building, early warning, food safety)	Niger: CARE_2 project - supporting adaptation to climate change and food security (PAACCSA - projet d'appui à l'adaptation au changement climatique et à
	99 110.00		disbursed	OOF[1]	Grant	Adaptation	Other (capacity building, early warning, food safety)	
Africa / LDCs / NGOs	43 256.54		disbursed[11]	OOF[1]	Grant	Adaptation	Agriculture Other (knowledge transfer, technical and vocational training)	Togo: ASTM_2 project - promotion of adaptation techniques to climate change by the "Centre International pour le Développement Agropastoral" (CIDAP - International Centre for Agropastoral Development).
Africa / LDCs / NGOs	167 087.03		committed[12]	OOF[1]	Grant	Adaptation	Agriculture Other (technical and vocational training)	Togo: ASTM_3 project - communities' resilience to climate change in the Agou and Kpélé Prefectures.
	98 847.33		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (technical and vocational training)	
Africa / LDCs / NGOs	398 177.55		committed[13]	OOF[1]	Grant	Cross-cutting	Agriculture Other (gender equality, knowledge transfer, technical and vocational training)	Senegal: Frères des Hommes_1 project - building climate resilience for vulnerable communities in the Sine Saloum region.

Africa / LDCs / NGOs	94 912.00		committed[14]	OOF[1]	Grant	Cross-cutting	Energy Forestry Other (job creation, women empowerment)	Senegal: PADEM_2 project - AMP support project for mitigation and adaptation to climate change in the Sine Saloum region.
	100 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Energy Forestry Other (job creation, women empowerment)	
Asia-Pacific / AOSIS-SIDS / bilateral	750 000.00		committed[15]	OOF[1]	Grant	Adaptation	Energy Water Other (capacity building)	Vanuatu: implementing reliable and affordable water access through the installation of 30 solar powered water pumps and strengthening of the institutional environment for management of solar water pumping systems and water resources. Training and increasing capacity in communities and of key provincial and national actors. Guidelines and strengthening capacity of institutions, creating an enabling environment for the implementation of NDC mitigation targets (100% electricity from renewables by 2030, expanding solar power PV generation capacity), NAPA (mainstreaming disaster risk reduction), the green growth strategies, the national energy roadmap and the national sustainable development plan. Implementing entity: Global Green Growth Institute (GGGI).
	750 000.00		disbursed	OOF[1]	Grant	Adaptation	Energy Water Other (capacity building)	
Asia-Pacific / AOSIS-SIDS / bilateral	1 000 000.00		committed[16]	OOF[1]	Grant	Adaptation	Other (financial techniques & support)	Fiji: the Drua Incubator is meant to accelerate the development of transformational and scalable initiatives to increase the flow of climate finance and especially private sector climate finance into climate adaptation, and to deliver insurance mechanisms that meet the specific requirements of Pacific SIDS. Implementing entity: Republic of Fiji
Asia-Pacific / LDCs / bilateral	769 445.64		disbursed	ODA	Grant	Adaptation	Other (rural development)	Myanmar: project MYA/002 - Eastern Shan State rural development and inclusion project [01.2018-12.2022].
Asia-Pacific / LDCs / NGOs	131 671.35		disbursed	ODA	Grant	Adaptation	Other (food safety)	Bangladesh: community risk prevention.
Asia-Pacific / LDCs / NGOs	232 142.00		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction)	Bangladesh: disaster risk reduction in North and South of the country.
Asia-Pacific / LDCs / NGOs	83 740.00		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction)	Myanmar: resilience of hospitals facing natural disasters.
Asia-Pacific / LDCs / NGOs	212 500.00		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction, rural development)	Laos: improving resilience of vulnerable people.
Asia-Pacific / LDCs / NGOs	175 765.00		disbursed	ODA	Grant	Cross-cutting	Other (resilience and disaster risk reduction)	Nepal: disaster risk reduction.
Asia-Pacific / LDCs / NGOs	401 353.00		committed[17]	OOF[1]	Grant	Adaptation	Agriculture Other (asset transfer, capacity building)	Bangladesh: Caritas Luxembourg_2 project - building resilience and adaptation capacities for improved livelihoods of climate change affected poor farmers in the Brahmaputra Char Basin, North Bangladesh.
Asia-Pacific / LDCs / NGOs	272 599.62		committed[18]	OOF[1]	Grant	Adaptation	Agriculture Other (access to information, gender equality, resilience and disaster risk reduction)	Laos: CARE_1 project - Agro-climate information for the adoption of resilient farming practices by women and ethnic minority farmers.
Asia-Pacific / LDCs / NGOs	285 000.00		committed[19]	OOF[1]	Grant	Cross-cutting	Forestry Other (ecosystem conservation and restoration, job creation, technical and vocational training)	Bangladesh: Friendship_1 project - mangrove plantation for environmental sustainability.
	215 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Forestry Other (ecosystem conservation and restoration, job creation, technical and vocational training)	
Asia-Pacific / LMICs / bilateral	16 950.52		disbursed	ODA	Grant	Adaptation	Agriculture	Vietnam: project VIE/035 under the 3rd Indicative Cooperation Programme (ICP III) - technical assistance to the IFAD Tam Nong Support Project in Tuyen Quang Province (terminated).
Asia-Pacific / LMICs / bilateral	1 009 750.33		disbursed	ODA	Grant	Adaptation	Other (food safety, rural development)	Vietnam: irrigation project VIE/036 under the 3rd Indicative Cooperation Programme (ICP III) - wise use of water and agriculture in Cao Bang [08.2015-06.2020].
Asia-Pacific / LMICs / bilateral	449 961.01		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Vietnam: climate adapted local development and innovation project VIE/033 under the 3rd Indicative Cooperation Programme (ICP III) - local development and adaptation to climate change impacts in the lagoon area of the in Thua Thien Hue Province [07-2013-06.2018].
Asia-Pacific / LMICs / bilateral	200 000.00		committed[20]	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction)	Vietnam: project VIE/433 - climate adaptation and resilience in Thua Thien Hue Province [05.18-11.20].
	1 800 000.00		disbursed	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction)	
Asia-Pacific / LMICs / bilateral	800 000.00		committed[21]	OOF[1]	Grant	Mitigation	Energy	Vietnam: project VIE/401 - energy efficient lighting NAMA Pilot in Hue City [05.18-05-21].
	1 200 000.00		disbursed	OOF[1]	Grant	Mitigation	Energy	
Asia-Pacific / LMICs / NGOs	86 007.34		disbursed	ODA	Grant	Adaptation	Other (circular economy, technical and vocational training)	Philippines: Green Village (LP4Y (Life Project 4 Youth) Alliance).
Asia-Pacific / LMICs / NGOs	23 593.12		disbursed	ODA	Grant	Cross-cutting	Other (fishing)	Philippines: establishment of a fisheries management system.

Asia-Pacific / LMICs / NGOs	40 493.80		disbursed	ODA	Grant	Cross-cutting	Other (food safety)	Philippines: strengthening civil society organizations working for food security.
Asia-Pacific / LMICs / NGOs	34 189.66		disbursed	ODA	Grant	Cross-cutting	Other (food safety)	Philippines: strengthening of the Philippine Network of Food Security Programmes.
Asia-Pacific / LMICs / NGOs	22 401.91		disbursed	ODA	Grant	Cross-cutting	Other (living conditions, technical and vocational training)	India: right to land and improving livelihoods of indigenous communities in Raigad (Maharashtra).
Asia-Pacific / LMICs / NGOs	242 592.85		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Laos: reduction of economic vulnerability through improved rural livelihoods in the Mok villages.
Asia-Pacific / LMICs / NGOs	35 846.15		disbursed	ODA	Grant	Cross-cutting	Other (rural development, technical and vocational training)	Philippines: strengthening the status of peasants through the promotion of ecological agriculture and an agrarian reform.
Asia-Pacific / LMICs / NGOs	38 694.86		disbursed	ODA	Grant	Cross-cutting	Other (rural development, technical and vocational training)	Philippines: strengthening the fight against GMOs and industrial agriculture and promoting sustainable agriculture.
Asia-Pacific / LMICs / NGOs	29 109.63		disbursed	ODA	Grant	Mitigation	Other (technical and vocational training)	India: acting for the "Swachh Bharat" (Clean India) programme to become inclusive, equitable and sustainable.
Asia-Pacific / LMICs / NGOs	98 009.00		disbursed[22]	OOF[1]	Grant	Cross-cutting	Energy Other (microfinance)	Philippines: ADA_1 project - promoting renewable energy in microfinance institutions (MFI's).
LAC / LDCs / NGOs	185 000.00		committed[23]	OOF[1]	Grant	Cross-cutting	Forestry Other (awareness raising, technical and vocational training)	Haiti: Caritas Luxembourg_1 project in Haiti - strengthening the resilience of the population of Palmes to climate change (reforestation, information, awareness).
LAC / LMICs / NGOs	147 065.76		disbursed	ODA	Grant	Adaptation	Agriculture	El Salvador: milk and dairy production in San Agustin.
LAC / LMICs / NGOs	9 779.42		disbursed	ODA	Grant	Adaptation	Other (food safety, technical and vocational training)	Guatemala: strengthening of training by and for the partners in order to increase the food sovereignty of the communities.
LAC / LMICs / NGOs	4 306.56		disbursed	ODA	Grant	Adaptation	Other (food safety, technical and vocational training)	Nicaragua: strengthening of training by and for the partners in order to increase the food sovereignty of the communities.
LAC / LMICs / NGOs	85 000.00		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction)	Bolivia: disaster risk reduction.
LAC / LMICs / NGOs	68 009.27		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Bolivia: strengthening livelihoods and local participation in the municipalities of Chuma and Puerto Carabuco.
LAC / LMICs / NGOs	3 463.79		disbursed	ODA	Grant	Adaptation	Other (rural development)	Bolivia: setting-up of and consolidating production and marketing areas for local products thanks to the partners' investments.
LAC / LMICs / NGOs	5 787.69		disbursed	ODA	Grant	Adaptation	Other (rural development)	Guatemala: setting-up of and consolidating production and marketing areas for local products thanks to the partners' investments.
LAC / LMICs / NGOs	69 292.74		disbursed	ODA	Grant	Cross-cutting	Other (rural development, technical and vocational training)	Bolivia: bringing specialized expertize on the exploitation of natural resources model.
LAC / LMICs / NGOs	39 286.93		disbursed	ODA	Grant	Adaptation	Other (technical and vocational training)	El Salvador: defence and exercise of sexual and reproductive rights, as well as environmental rights, of young women and adolescent girls.
LAC / LMICs / NGOs	405 846.44		committed[24]	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction, technical and vocational training)	Nicaragua: Frères des Hommes_3 project - resilient and proactive communities with regard to climate change and the risks associated with natural phenomena in the Calico river micro-watersheds in San Dionisio.
	94 087.72		disbursed	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction, technical and vocational training)	
LAC / LMICs / NGOs	381 963.00		committed[25]	OOF[1]	Grant	Cross-cutting	Agriculture Forestry Other (job creation, technical and vocational training)	Bolivia: PADEM_1 project - reducing the vulnerability of the Yampara population to the effects of climate change.
	99 935.00		disbursed	OOF[1]	Grant	Cross-cutting	Agriculture Forestry Other (job creation, technical and vocational training)	
LAC / LMICs / NGOs	199 608.02		committed[26]	OOF[1]	Grant	Mitigation	Forestry Other (ecosystem conservation and restoration)	Costa Rica: Rainforest_1 "COBIGA – Corredor Biologico La Gamba" project - intelligent and ecological CO2 sequestration and creation of a biological corridor in the Golfo Dulce region.
	99 995.78		disbursed	OOF[1]	Grant	Mitigation	Forestry Other (ecosystem conservation and restoration)	
LAC / UMICs / NGOs	39 005.92		disbursed	ODA	Grant	Adaptation	Other (technical and vocational training)	Peru: strengthening public capacities and community organizations in the regions of Piura, Cajamarca and Amazonas, as well as strengthening the organizational and leadership capacities of indigenous and rural Peruvian communities for the exercise of their rights and the peaceful and sustainable management of their territories.
LAC / UMICs / NGOs	53 176.04		disbursed	ODA	Grant	Cross-cutting	Other (health, technical and vocational training)	Peru: integrated intervention to improve maternal and child health and nutrition of Quechua communities, as well as capacity development and promoting territorial participation and conflict management participation.
Various / bilateral	262 789.18		disbursed	ODA	Grant	Cross-cutting	Other (financial techniques & support)	Financial support through the Forestry & Climate Change Fund (Investing for Development SICAV - formerly Luxembourg - Microfinance and Development Fund SICAV - LMDF).
Various / NGOs	14 473.93		disbursed	ODA	Grant	Adaptation	Agriculture Other (capacity building, living conditions)	West Africa (South Sahara): strengthening the capitalization of experiences, the dissemination of information and networking for the benefit of rural actors and their organizations.

Various / bilateral	50 000.00		committed[27]	OOF[1]	Grant	Adaptation	Finance	Corporate Air Passenger Solidarity Programme - CAPS (feasibility study). Implementing entity: BVRio and Oxford Climate Policy.
	56 000.00		disbursed	OOF[1]	Grant	Adaptation	Finance	
Various / bilateral	55 388.41		disbursed	OOF[1]	Grant	Cross-cutting	Other (awareness raising, capacity building, sustainable finance)	Luxembourg-European Investment Bank joint side event Pavilion at COP24.
Various / bilateral	229 309.53		committed[28]	OOF[1]	Grant	Cross-cutting	Other (awareness raising, capacity building, sustainable finance)	Awareness raising on waste and sustainable forest management in refugee camps. Implementing entity: Catch a smile.
	50 215.19		disbursed	OOF[1]	Grant	Cross-cutting	Other (awareness raising, capacity building, sustainable finance)	
Various / bilateral	8 139.83		disbursed	OOF[1]	Grant	Cross-cutting	Other (human rights)	Human Rights & Climate Change event organisation / Human Rights & Climate Change reporting. Implementing entity: Centre for International Environmental Law (CIEL).
Various / bilateral	480 000.00		committed[29]	OOF[1][2]	Grant	Cross-cutting	Other (investment funds labelling)	Convention - awarding a climate finance label to investment funds according to agreed and published criteria. Implementing entity: Luxembourg Fund Labelling Agency LuxFLAG.
	150 000.00		disbursed	OOF[1][2]	Grant	Cross-cutting	Other (investment funds labelling)	
Various / bilateral	45 966.44		committed[30]	OOF[1]	Grant	Cross-cutting	Other (legal advisory)	Legal and advisory services in climate change matters
	71 618.56		disbursed	OOF[1]	Grant	Cross-cutting	Other (legal advisory)	
Total contributions through bilateral, regional and other channels	**38 918 187.83**						**38 918 187.83**	
disbursed - ODA	***22 268 491.06***	***28 551 867.75***				***Adaptation***	***18 377 868.90***	
disbursed - OOF	***6 283 376.69***					***Cross-cutting***	***10 820 134.91***	
net committed - ODA	***0.00***	***10 366 320.08***				***Mitigation***	***9 720 184.02***	
net committed - OOF	***10 366 320.08***					Check	0.00	

Abbreviations: ODA = official development assistance, OOF = other official flows; USD = United States dollars.

[a] These categories should be mutually exclusive.

[b] See the OECD purpose codes at http://www.oecd.org/investment/stats/dacandcrscodelists.htm. Codes include energy, transport, industry, agriculture, forestry, water and sanitation etc.

[c] Parties should report, as appropriate, on project details and the implementing agency.

Luxembourg's notes

Committed amounts are only reported for programs/actions/projects which are still on-going or for which the whole committed amount has not yet been disbursed at the end of 2018. Therefore, (net) committed amounts = remaining committed amounts for the post-2018 years.

Except when indicated, bilateral projects or programmes are implemented by Lux-Development SA - https://luxdev.lu/en/home.

(1) International Climate Finance provided by the Climate and Energy Fund of the Ministry of the Environment, Climate and Sustainable Development

(2) Sustainable Finance provided by the Ministry of Finance

(3) 3 000 000 EUR committed for the innovative business model for recycling and valorisation; 753 454 EUR disbursed in 2018; net commitment end 2018 = 2 246 546 EUR

(4) 201 233 EUR committed for the period 2016-2019; 80 000 EUR disbursed in 2016; 50 000 EUR disbursed in both 2017 & 2018; net commitment end 2018 = 21 233 EUR

(5) 276 471.95 EUR initially committed for the year 2018; 103 003.25 EUR already disbursed in 2017 and 91 193.33 EUR disbursed in 2018; net commitment end 2018 = 82 275.37 EUR

(6) 500 000 EUR committed for the support for local initiative; 100 000 EUR disbursed in 2018; net commitment end 2018 = 400 000 EUR

(7) 478 746 EUR committed for the resilience of vulnerable communities to climate risks; 99 126 EUR disbursed in 2018; net commitment end 2018 = 379 620 EUR

(8) 399 999.96 EUR initially committed for the period 2018-2020; 106 616.88 EUR disbursed in 2017; no disbursement made in 2018; net commitment end 2018 = 293 383.08 EUR

(9) 300 000 EUR committed for strengthening the resilience of vulnerable communities to climate change; 100 000 EUR disbursed in 2018; net commitment end 2018 = 200 000 EUR

(10) 495 550 EUR committed to support adaptation to climate change and food security ; 99 110 EUR disbursed in 2018; net commitment end 2018 = 396 440 EUR

(11) 103 699.67 EUR initially committed for the year 2018; 60 443.13 EUR disbursed in 2017 and 43 256.54 EUR disbursed in 2018; net commitment end 2018 = 0 EUR

(12) 265 934.36 EUR committed for communities' resilience to climate change; 98 847.33 EUR disbursed in 2018; net commitment end 2018 = 167 087.03 EUR

(13) 499 021.43 EUR initially committed for the period 2018-2021; 100 843.88 EUR disbursed in 2017 and no disbursement made in 2018; net commitment end 2018 = 398 177.55 EUR

(14) 194 912 EUR committed for a support project for mitigation and adaptation to climate change; 100 000 EUR disbursed in 2018; net commitment end 2018 = 94 912 EUR

(15) 1 500 000 EUR committed for energy, water and capacity building projects; 750 000 EUR disbursed in 2018; net commitment end 2018 = 750 000 EUR

(16) 1 000 000 EUR committed for the Drua Incubator; no disbursement made in 2018; net commitment end 2018 = 1 000 000 EUR

(17) 499 496 EUR committed for the period 2017-2021; 98 143 EUR disbursed in 2017; no disbursement made in 2018; net commitment end 2018 = 401 353 EUR

(18) 356 862.66 EUR initially committed for the period 2018-2020; 84 263.04 EUR already disbursed in 2017; no disbursement made in 2018; net commitment end 2018 = 272 599.62 EUR

(19) 500 000 EUR committed for the mangrove restoration; 215 000 EUR disbursed in 2018; net commitment end 2018 = 285 000 EUR

(20) 2 000 000 EUR committed in 2016, no disbursements made in both 2016 and 2017; 1 800 000 EUR disbursed in 2018; net commitment end 2018 = 200 000 EUR

(21) 2 000 000 EUR committed in 2016, no disbursements made in both 2016 and 2017; 1 200 000 EUR disbursed in 2018; net commitment end 2017 = 800 000 EUR

(22) 196 018 EUR committed for the period 2017-2018; 98 009 EUR disbursed in both 2017 and 2018; net commitment end 2018 = 0 EUR

(23) 285 000 EUR committed for the period 2017-2019; 100 000 EUR disbursed in 2017; no disbursement made in 2018; net commitment end 2018 = 185 000 EUR

(24) 499 934.16 EUR committed for supporting resilient and proactive communities with regard to climate change; 94 087.72 EUR disbursed in 2018; net commitment end 2018 = 405 846.44 EUR

(25) 481 898 EUR committed for reducing population vulnerability to the effects of climate change; 99 935 EUR disbursed in 2018; net commitment end 2018 = 381 963 EUR

(26) 299 603.80 EUR committed for CO2 sequestration and the creation of a biological corridor; 99 995.78 EUR disbursed in 2018; net commitment end 2018 = 199 608.02 EUR

(27) 106 000 EUR committed for feasibility study; 56 000 EUR disbursed in 2018; net commitment end 2018 = 50 000 EUR

(28) 279 524.72 EUR committed for awareness raising; 50 215.19 EUR disbursed in 2018; net commitment end 2018 = 229 309.53 EUR

(29) 930 000 EUR committed for the Convention; 150 000 EUR disbursed in 2016, 2017 and 2018; net commitment end 2018 = 480 000 EUR

(30) 147 420 EUR+28 028 EUR committed for the period 2018-2019; 57 915 EUR disbursed in 2017 and 71 618.56 EUR disbursed in 2018; net commitment end 2018 = 45 966.44 EUR

TABLES V.4-3 – PROVISION OF CLIMATE CHANGE RELATED PUBLIC FINANCIAL SUPPORT FOR THE YEAR 2019 IN EUR

Note: an Excel file containing these tables for the years 2010 to 2019 is available following this link: https://cdr.eionet.europa.eu/lu/eu/mmr/art16_finance/envx4xzoa/. However, tables for the years 2010, 2011 and 2012 are incomplete.

Table 7

Provision of public financial support: summary information in 2019

Committed & disbursed

Allocation channels	*Year*									
	European euro - EUR					*National currency* [a]				
	Core/ general [b, 1]	*Climate-specific* [2]				*Core/ general*	*Climate-specific* [2]			
		Mitigation [c]	*Adaptation* [c]	*Cross-cutting* [c]	*Other* [cd]		*Mitigation*	*Adaptation*	*Cross-cutting*	*Other*
Total contributions through multilateral channels:	4 812 876.82	3 232 000.00	9 910 020.00	135 839 706.40	-					
Multilateral climate change funds [e]	1 164 500.00	-	-	45 000 000.00	-					
Other multilateral climate change funds [f]	-	-	-	-	-					
Multilateral financial institutions, including regional development banks	2 248 376.82	-	1 600 000.00	81 827 306.40	-					
Specialized United Nations bodies	1 400 000.00	3 232 000.00	8 310 020.00	9 012 400.00	-					
Total contributions through bilateral, regional and other channels		6 983 378.06	19 905 171.19	13 224 841.28	-					
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		10 215 378.06	29 815 191.19	149 064 547.68	-					
Total climate specific finance				**189 095 116.94**						

Total climate specific by funding source (EUR)		**Total climate specific by financial instrument (EUR)**	
ODA	24 636 875.97	Grant	120 593 116.94
OOF	164 458 240.97	Concessional loan	-
Other	-	Non-concessional loan	-
Total	**189 095 116.94**	Equity	-
		Other	68 502 000.00
		of which committed	*137 358 229.58*
		of which disbursed	*51 736 887.36*

1-7 Please provide information on definitions or methodologies used for reporting in the Documentation box

[a] Please provide exchange rate

[b] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[c] These categories should be mutually exclusive

[d] Please specify

[e] Multilateral climate change funds: Global Environment Facility, Least Developed Countries Fund, Special Climate Change Fund, Adaptation Fund, Green Climate Fund and the Trust Fund for Supplementary Activities (paragraph 17(a) of the "UNFCCC biennial reporting guidelines for developed country Parties" in 2/CP.17).

[f] Not listed under e)

Luxembourg's notes

Committed amounts are only reported for programs/actions/projects which are still on-going or for which the whole committed amount has not yet been disbursed at the end of 2019.

Net committed (committed minus already disbursed amounts)

Allocation channels	Year									
	European euro - EUR					National currency [a]				
	Core/ general [b, 1]	Climate-specific [2]				Core/ general	Climate-specific [2]			
		Mitigation [c]	Adaptation [c]	Cross-cutting [c]	Other [cd]		Mitigation	Adaptation	Cross-cutting	Other
Total contributions through multilateral channels:	-	2 262 400.00	7 455 854.94	116 099 425.08	-					
Multilateral climate change funds [e]	-	-	-	40 000 000.00	-					
Other multilateral climate change funds [f]	-	-	-	-	-					
Multilateral financial institutions, including regional development banks	-	-	1 160 284.94	68 899 925.08	-					
Specialized United Nations bodies	-	2 262 400.00	6 295 570.00	7 199 500.00	-					
Total contributions through bilateral, regional and other channels		1 665 780.35	5 216 828.20	4 657 941.01	-					
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		3 928 180.35	12 672 683.14	120 757 366.09	-					
Total climate specific finance		**137 358 229.58**								

Total climate specific by funding source (EUR)		Total climate specific by financial instrument (EUR)	
ODA	160 284.94	Grant	80 606 229.58
OOF	137 197 944.64	Concessional loan	-
Other	-	Non-concessional loan	-
Total	**137 358 229.58**	Equity	-
		Other	56 752 000.00

Disbursed

Allocation channels	Year									
	European euro - EUR					National currency [a]				
	Core/ general [b, 1]	Climate-specific [2]				Core/ general	Climate-specific [2]			
		Mitigation [c]	Adaptation [c]	Cross-cutting [c]	Other [cd]		Mitigation	Adaptation	Cross-cutting	Other
Total contributions through multilateral channels:	4 812 876.82	969 600.00	2 454 165.06	19 740 281.32	-					
Multilateral climate change funds [e]	1 164 500.00	-	-	5 000 000.00	-					
Other multilateral climate change funds [f]	-	-	-	-	-					
Multilateral financial institutions, including regional development banks	2 248 376.82	-	439 715.06	12 927 381.32	-					
Specialized United Nations bodies	1 400 000.00	969 600.00	2 014 450.00	1 812 900.00	-					
Total contributions through bilateral, regional and other channels		5 317 597.71	14 688 342.99	8 566 900.27						
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		6 287 197.71	17 142 508.05	28 307 181.59	-					
Total climate specific finance		**51 736 887.36**								

Total climate specific by funding source (EUR)		Total climate specific by financial instrument (EUR)	
ODA	24 476 591.03	Grant	39 986 887.36
OOF	27 260 296.33	Concessional loan	-
Other	-	Non-concessional loan	-
Total	**51 736 887.36**	Equity	-
		Other	11 750 000.00

Table 7(a)

Provision of public financial support: contribution through multilateral channels in 2019

Donor funding	Total amount				Status: disbursed, committed [b, 3]	Funding source: ODA, OOF, Other [4]	Financial instrument: grant, concessional loan, non-concessional loan, equity, other [5]	Type of support: Mitigation, adaptation, crosscutting, other [c,6]	Sector [d, 7]
	Core/general [a, 1]		Climate-specific [2]						
	European euro - EUR	National currency	European euro - EUR	National currrency					
Multilateral climate change funds									
1. Global Environment Facility	1 164 500.00		-		disbursed	ODA	Equity	Cross-cutting	Other (multisectoral)
2. Least Developed Countries Fund			-		-	-	-	-	-
3. Special Climate Change Fund			-		-	-	-	-	-
4. Adaptation Fund			-		-	-	-	-	-
5. Green Climate Fund ***NEW commitment!***			40 000 000.00		committed [3]	OOF [1]	Grant	Cross-cutting	Cross-cutting
			5 000 000.00		disbursed	OOF [1]	Grant	Cross-cutting	Cross-cutting
6. UNFCCC Trust Fund for Supplementary Activities			-		-	-	-	-	-
7. Other multilateral climate change funds			-		-	-	-	-	-
Multilateral financial institutions, including regional development banks									
1. World Bank ***NEW commitment!***			2 000 000.00		committed [4]	OOF [1]	Grant	Cross-cutting	Article 2.1.c (PA) Energy, Resilience
2. International Finance Corporation									
3. African Development Bank	1 186 803.00				disbursed	ODA	Equity	Cross-cutting	Other (multisectoral)
4. Asian Development Bank	1 061 573.82				disbursed	ODA	Other (treasury bonds)	Cross-cutting	Other (multisectoral)
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank									
7. Other									
Mekong River Commission (MRC)	-		*160 284.94*		*committed [5]*	*ODA*	*Grant*	*Adaptation*	*Cross-cutting*
	-		*439 715.06*		*disbursed*	*ODA*	*Grant*	*Adaptation*	*Cross-cutting*
*European Investment Bank **NEW commitment!***			*8 000 000.00*		*committed [4]*	*OOF [1]*	*Grant*	*Cross-cutting*	*Article 2.1.c (PA) Energy, Resilience*
International Union for Conservation of Nature - Blue Natural Capital Financing Facility and Fund (IUCN - BNCFF)	-		*1 000 000.00*		*committed [6]*	*OOF [1]*	*Grant*	*Adaptation*	*Other (ecosystems protection & restoration)*
International Climate Finance Accelerator Luxembourg (ICFA)	-		*3 649 925.08*		*committed [7]*	*OOF [1][2]*	*Grant*	*Cross-cutting*	*Article 2.1.c (PA) Other (assistance and advice for new fund managers)*
	-		*1 177 381.32*		*disbursed*	*OOF [1][2]*	*Grant*	*Cross-cutting*	*Other (assistance and advice for new fund managers)*
*Luxembourg - European Investment Bank (EIB) Climate Finance Platform **NEW commitment!***	-		*49 000 000.00*		*committed [8]*	*OOF [1][2]*	*Other (first loss guarantee)*	*Cross-cutting*	*Article 2.1.c (PA) Energy, Land restoration, Resilience*
	-		*10 000 000.00*		*disbursed*	*OOF [1][2]*	*Other (first loss guarantee)*	*Cross-cutting*	*Energy*
Luxembourg - Forestry & Climate Change Fund (Investing for Development SICAV - formerly Luxembourg - Microfinance and Development Fund SICAV - LMDF)	-		*6 250 000.00*		*committed [9]*	*OOF [1][2]*	*Other (first loss guarantee)*	*Cross-cutting*	*Article 2.1.c (PA) Forestry*
	-		*1 750 000.00*		*disbursed*	*OOF [1][2]*	*Other (first loss guarantee)*	*Cross-cutting*	*Forestry*

Specialized United Nations bodies									
1. United Nations Development Programme									
UNDP - Gender and Climate Change (Chile) – n°00111024	-		*202 000.00*		*committed* [10]	*OOF* [1]	*Other (first loss guarantee)*	*Cross-cutting*	*Article 2.1.c (PA) Energy, Land restoration, Resilience*
UNDP - "Implementation of an integrated municipal solid waste management strategy in the province of Chiloé" - n°0122251	-		*1 300 000.00*		*committed* [11]	*OOF* [1]	*Other (first loss guarantee)*	*Cross-cutting*	*Article 2.1.c (PA) Energy, Land restoration, Resilience*
Luxembourg's contribution to climate change related activities	-		*400 000.00*		*disbursed*	*ODA*	*Grant*	*Cross-cutting*	*Cross-cutting*
Luxembourg's contribution to sustainable development related activities	*1 400 000.00*		-		*disbursed*	*ODA*	*Grant*	*Cross-cutting*	*Cross-cutting*
2. United Nations Environment Programme									
UNEP Vanishing Treasures "Mountain Flagship Species"	-		*6 275 570.00*		*committed* [12]	*OOF* [1]	*Grant*	*Adaptation*	*Other (ecosystems protection & restoration)*
	-		*1 994 450.00*		*disbursed*	*OOF* [1]	*Grant*	*Adaptation*	*Other (ecosystems protection & restoration)*
UNEP Finance initiative "Luxembourg Sustainable Finance Roadmap"	-		*53 000.00*		*disbursed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Sustainable Finance*
UNEP REDD+ "Land Use Finance project: leveraging public finance to decouple private investment from deforestation, climate and ecosystem impacts"	-		*667 500.00*		*committed* [13]	*OOF* [1]	*Grant*	*Cross-cutting*	*Article 2.1.c (PA) Forestry*
	-		*824 900.00*		*disbursed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Sustainable Finance Forestry*
UNEP "Restoration Seed Capital Facility" ***NEW commitment!***	-		*5 000 000.00*		*committed* [14]	*OOF* [1]	*Grant*	*Cross-cutting*	*Article 2.1.c (PA) Forestry and Landscape Restoration*
3. Other									
Observatoire du Sahara et du Sahel (OSS) ***NEW commitment!***	-		*20 000.00*		*committed* [15]	*OOF* [1]	*Grant*	*Adaptation*	*Other (capacity building)*
	-		*20 000.00*		*disbursed*	*OOF* [1]	*Grant*	*Adaptation*	*Other (capacity building)*
Climate and Clean Air Coalition Trust Fund (CCAC)	-		*30 000.00*		*committed* [16]	*OOF* [1]	*Grant*	*Cross-cutting*	*Capacity building*
	-		*15 000.00*		*disbursed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Capacity building*
UNFCCC TFSA - Local Communities and Indigenous People's Platform			*20 000.00*		*disbursed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Capacity building*
UNFCCC - Support of expenditures of the UNFCCC Secretariat during COP25			*500 000.00*		*disbursed*	*OOF* [1]	*Grant*	*Cross-cutting*	*Capacity building*
UNCDF - CleanStart Programme (Burkina Faso) ***NEW commitment!***	-		*2 262 400.00*		*committed* [17]	*OOF* [1]	*Grant*	*Mitigation*	*Energy*
	-		*969 600.00*		*disbursed*	*OOF* [1]	*Grant*	*Mitigation*	*Energy*
Total contributions through multilateral channels	**4 812 876.82**		**148 981 726.40**						
disbursed - ODA	***4 812 876.82***		***839 715.06***	***27 976 923.20***				***Adaptation***	***9 910 020.00***
disbursed - OOF	***0.00***		***22 324 331.32***					***Cross-cutting***	***140 652 583.22***
net committed - ODA (committed minus already disbursed amounts)	***0.00***		***160 284.94***	***125 817 680.02***				***Mitigation***	***3 232 000.00***
net committed - OOF (committed minus already disbursed amounts)	***0.00***		***125 657 395.08***					Check	0.00

Abbreviations: ODA = official development assistance, OOF = other official flows.

[a] This refers to support to multilateral institutions that Parties cannot specify as climate-specific.

[b] In the context of the MMR, the term "provided" equals "disbursed".

[c] These categories should be mutually exclusive

[d] See the OECD purpose codes at http://www.oecd.org/investment/stats/dacandcrscodelists.htm. Codes include energy, transport, industry, agriculture, forestry, water and sanitation etc.

Luxembourg's notes

Committed amounts are only reported for programs/actions/projects which are still on-going or for which the whole committed amount has not yet been disbursed at the end of 2019. Therefore, (net) committed amounts = remaining committed amounts for the post-2019 years.

(1) International Climate Finance provided by the Climate and Energy Fund of the Ministry of the Environment, Climate and Sustainable Development

(2) Sustainable Finance provided by the Ministry of Finance

(3) 35 000 000 EUR committed and disbursed for the period 2014-2020; 10 000 000 EUR disbursed in both 2015 & 2016 and 5 000 000 EUR disbursed in 2017, 2018 & 2019; balance end 2019 = 0 EUR. New commitment for the period 2020-2024 = 40 000 000 EUR

(4) "Cities Climate Finance Gap Fund", a joint initiative to be launched in 2020 together with Germany. Commitments: LU 10 000 000 EUR & DE 40 000 000 EUR. Vehicles are the World Bank and the EIB

(5) 1 000 000 EUR committed for the period 2016-2020; 400 000 EUR disbursed in 2016 and 439 715.06 EUR disbursed in 2019; no disbursements in both 2017 & 2018; net commitment end 2019 = 160 284.94 EUR

(6) 2 220 000 EUR initially committed for the period 2018-2020 increased by 100 000 EUR in 2017; 110 000 EUR disbursed in 2016, 210 000 EUR disbursed in 2017 and 1 000 000 EUR disbursed in 2018; no disbursement in 2019; net commitment end 2019 = 1 000 000 EUR

(7) 5 915 350 EUR + 9 199 EUR committed for the period 2017-2021; 140 000 EUR disbursed in 2017; 957 242.60 EUR disbursed in 2018; 1 177 381.32 EUR disbursed in 2019; net commitment end 2019 = 3 649 925.08 EUR

(8) 30 000 000 EUR committed for the period 2017-2019; 6 000 000 EUR disbursed in 2017; 5 000 000 EUR disbursed in 2018; 10 000 000 EUR disbursed in 2019; balance end 2019 = 9 000 000 EUR. Another 40 000 000 EUR committed for the period 2020-2024. Final net commitment end 2019 = 49 000 000 EUR

(9) 11 500 000 EUR committed for the period 2018-2020; 1 750 000 EUR disbursed in 2017, 2018 & 2019; net commitment end 2019 = 6 250 000 EUR

(10) 202 000 EUR committed for the period 2020-2021; net commitment end 2019 = 202 000 EUR

(11) 1 300 000 EUR committed for the period 2020-2022; net commitment end 2019 = 1 300 000 EUR

(12) 9 000 000 EUR committed for the period 2018-2022; 729 980 EUR disbursed in 2018 and 1 994 450 EUR disbursed in 2019; net commitment end 2019 = 6 275 570 EUR

(13) 2 463 400 EUR committed for the period 2018-2020; 971 000 EUR disbursed in 2018 and 824 900 EUR disbursed in 2019; net commitment end 2019 = 667 500 EUR

(14) Joint initiative together with Germany to be launched in 2020. Commitments for the period 2020-2021: LU 5 000 000 EUR & DE 20 000 000 EUR

(15) 40 000 EUR committed in 2018; 20 000 EUR disbursed in both 2018 & 2019; balance end 2019 = 0 EUR. New commitment of 20 000 EUR for 2020

(16) 75 000 EUR committed for the period 2018-2020; 30 000 EUR disbursed in 2018 and 15 000 EUR disbursed in 2019; net commitment end 2019 = 30 000 EUR

(17) 323 200 EUR committed for the period 2019-2022; 969 600 EUR disbursed in 2019; net commitment end 2019 = 2 262 400 EUR

(18) There is the possibility that a small fraction of the budget dedicated to the ICFA & the "LU-EIB Climate finance platform"is being invested in climate action initiatives that are not directly located in developing countries.

At this stage, it is not possible to identify the exact amount but the fraction shall not exceed 10% of the overall budget committed for the 2 initiatives.

Table 7(b)

Provision of public financial support: contribution through bilateral, regional and other channels in 2019

Recipient country/region/project/programme	*Total amount*		*Status: disbursed, committed*	*Funding source: ODA, OOF, Other*	*Financial instrument: grant, concessional loan, non-concessional loan, equity, other*	*Type of support: Mitigation, adaptation, crosscutting, other*[a]	*Sector*[b]	*Additional information*[c]
	Climate-specific							
	European euro - EUR	*national currency*						
Africa / AOSIS-SIDS / bilateral	1 058 444.56		disbursed	ODA	Grant	Mitigation	Energy	Cabo Verde: programme CVE/083 under the 4th Indicative Cooperation Programme (ICP IV) - renewable energies [06.2017-06.2021].
Africa / AOSIS-SIDS / bilateral	1 475 027.21		disbursed	ODA	Grant	Mitigation	Energy Other (technical and vocational training)	Cabo Verde: programme CVE/085 under the 4th Indicative Cooperation Programme (ICP IV) - supporting the partnership between the Centre for Renewable Energies and Industrial Maintenance and the Centre of competence-Technical Engineering of Luxembourg (CERMI / CdC-GTB) [07.2018-06.2021].
Africa / LDCs / bilateral	4 290 396.53		disbursed	ODA	Grant	Adaptation	Other (food safety, rural development)	Mali: programme MLI/021 under the 3rd Indicative Cooperation Programme (ICP III) - food safety and rural development [04.2016-06.2021].
Africa / LDCs / bilateral	1 000 000.00		disbursed	ODA	Grant	Adaptation	Food safety	Niger: "Dispositif National de Prévention et de Gestion des Crises Alimentaires" (DNPGCA) (National Food Crisis Prevention and Management System) [2018-2021]. Implementing entity: government of Niger.
Africa / LDCs / bilateral	1 050 183.15		disbursed	ODA	Grant	Cross-cutting	Agriculture	Burkina Faso: programme BKF/024 under the 3rd Indicative Cooperation Programme (ICP III) - land reclamation efforts towards pastoral usage and in conservation areas [09.2018-08.2022].
Africa / LDCs / bilateral	4 134 088.96		disbursed	ODA	Grant	Cross-cutting	Forestry	Burkina Faso: programme BKF/023 under the 3rd Indicative Cooperation Programme (ICP III) - support to the sustainable management of the forest resources through contributions to the Forest Sector Support Programme (FSSP) [09.2018-08.2022].
Africa / LDCs / bilateral	2 246 546.00		committed[3]	OOF[1]	Grant	Cross-cutting	Waste Other (living conditions)	Senegal: project in the regions of Thiees, Diourbel and Dakar - design of innovative business models for recycling and valorisation of waste in secondary cities to create green jobs and improve the quality of sanitation in three cities (Tivaouane, Touba, Dakar) where the interventions will impact on the environment, unemployment and behaviours with improved the standard of living by bringing lasting improvements on the incomes and lives of beneficiaries with creation of green jobs and green services while promoting a green perspective in access to sustainable, reliable and affordable service in the management of plastic wastes, faecal sludge and wastes from electronic and electrical equipment (WEEE). Implementing entity: Global Green Growth Institute (GGGI).
Africa / LDCs / bilateral	21 233.00		committed[4]	OOF[1]	Grant	Cross-cutting	Other (capacity building)	Senegal: capacity-building convention for both adaptation and mitigation - better knowledge of the impacts of anthropogenic activities on climate and eco-systems, identifying the best endogenous policies and measures, communication and awareness. Implementing entity: Centre de Suivi Ecologique de la République du Sénégal.
Africa / LDCs / NGOs	193 384.72		disbursed	ODA	Grant	Adaptation	Agriculture	Benin: strengthening resilience of family agricultural production.
Africa / LDCs / NGOs	9 696.91		disbursed	ODA	Grant	Adaptation	Agriculture	Niger: capacity building and training of local agricultural authorities on how to avoid food crisis.
Africa / LDCs / NGOs	179 634.23		disbursed	ODA	Grant	Adaptation	Agriculture Other (technical and vocational training)	Burkina Faso: training of agents for an ecological environment at the Tond Tenga Agricultural School.
Africa / LDCs / NGOs	4 000.00		disbursed	ODA	Grant	Adaptation	Forestry	Senegal: reforestation and participatory local development.
Africa / LDCs / NGOs	133 761.99		disbursed	ODA	Grant	Adaptation	Other (food safety)	Burkina Faso: support to improve food safety.
Africa / LDCs / NGOs	147 654.11		disbursed	ODA	Grant	Adaptation	Other (food safety, rural development)	Mali: support to improve food safety
Africa / LDCs / NGOs	4 720.00		disbursed	ODA	Grant	Adaptation	Other (food safety, technical and vocational training)	Burkina Faso: strengthening of training by and for the partners in order to increase the food sovereignty of the communities.

Africa / LDCs / NGOs	155 315.00		disbursed	ODA	Grant	Adaptation	Other (land)	Burkina Faso: fight against soil degradation.
Africa / LDCs / NGOs	10 000.00		disbursed	ODA	Grant	Adaptation	Other (land)	Niger: combating desertification through training and the introduction of alternative fuel consumption techniques. Provision of adapted equipment and materials for the Gaya community.
Africa / LDCs / NGOs	30 000.00		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction)	Niger: building sustainable houses with latrines for better protection against weather conditions and flooding in Gaya.
Africa / LDCs / NGOs	5 000.00		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction)	Niger: strengthening the capacity for sustainable construction and sanitation at the level of the village community, local authorities and volunteers of the Gaya Provincial Red Cross Committee and strengthening the resilience capacity.
Africa / LDCs / NGOs	4 000.00		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction)	Senegal: carry out land-use planning with local communities and authorities in Ronkh to identified "at risks areas".
Africa / LDCs / NGOs	364 848.31		disbursed	ODA	Grant	Adaptation	Other (rural development)	Burkina Faso: improve agro-pastoral production.
Africa / LDCs / NGOs	73 447.95		disbursed	ODA	Grant	Adaptation	Other (rural development)	Ethiopia: sustainable agricultural development to take into account environmental issues.
Africa / LDCs / NGOs	60 000.00		disbursed	ODA	Grant	Adaptation	Other (rural development)	Niger: carry out land-use planning by building small dikes or by protecting with gabion structures with the support of the local communities and authorities of Gaya.
Africa / LDCs / NGOs	207 687.06		disbursed	ODA	Grant	Cross-cutting	Agriculture	Burkina Faso: promoting agricultural development.
Africa / LDCs / NGOs	16 190.36		disbursed	ODA	Grant	Cross-cutting	Agriculture	Niger: sustainable agricultural crop production.
Africa / LDCs / NGOs	21 277.47		disbursed	ODA	Grant	Cross-cutting	Agriculture	Niger: promote new technologies to increase agricultural productivity (dry cereals).
Africa / LDCs / NGOs	17 977.46		disbursed	ODA	Grant	Cross-cutting	Agriculture Other (technical and vocational training)	Burkina Faso: support to the "Conseil National d'Agriculture Biologique" (National Council of Organic Agriculture).
Africa / LDCs / NGOs	10 250.30		disbursed	ODA	Grant	Cross-cutting	Forestry	Togo: seed bank for fertile and forest trees.
Africa / LDCs / NGOs	53 020.88		disbursed	ODA	Grant	Cross-cutting	Other (land)	Togo: revitalisation of the "Social Network for Responsible Land Management".
Africa / LDCs / NGOs	80 000.00		disbursed	ODA	Grant	Cross-cutting	Other (resilience and disaster risk reduction)	Burkina Faso: building sustainable housing in Namentenga province.
Africa / LDCs / NGOs	38 990.37		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Benin: sustainable agricultural development to take into account environmental issues.
Africa / LDCs / NGOs	54 477.39		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Benin: strengthening dialogue with local authorities to promote sustainable agricultural development.
Africa / LDCs / NGOs	40 000.00		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Burkina Faso: promote the sustainable management of natural resources.
Africa / LDCs / NGOs	77 882.10		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Democratic Republic of the Congo: sustainable agricultural development to take into account environmental issues.
Africa / LDCs / NGOs	6 295.54		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Democratic Republic of the Congo: strengthening dialogue with local authorities to promote sustainable agricultural development.
Africa / LDCs / NGOs	84 695.42		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Democratic Republic of the Congo: training adults in sustainable agriculture in Kananga.
Africa / LDCs / NGOs	163 986.85		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Democratic Republic of the Congo: training young people and adults in sustainable agriculture and livestock in Kamutanga.
Africa / LDCs / NGOs	75 966.16		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Ethiopia: strengthening dialogue with local authorities to promote sustainable agricultural development.
Africa / LDCs / NGOs	44 506.81		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Niger: sustainable agricultural development to take into account environmental issues.
Africa / LDCs / NGOs	44 506.81		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Niger: strengthening dialogue with local authorities to promote sustainable agricultural development.
Africa / LDCs / NGOs	35 481.82		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Togo: strengthening the resilience of populations through the promotion of agroecological practices in the Prefecture of Tchamba and in the savannah region.
Africa / LDCs / NGOs	59 136.37		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Togo: support and protect the livelihoods of family farms in the maritime region of Togo.
Africa / LDCs / NGOs	4 535.55		disbursed	ODA	Grant	Mitigation	Other (land)	Niger: promote land governance and accelerate agro-ecological transition (land security).
Africa / LDCs / NGOs	5 000.00		disbursed	ODA	Grant	Mitigation	Other (resilience and disaster risk reduction)	Senegal: train and raise awareness of workers in sustainable construction techniques and promote them in the municipality of Ronkh.
Africa / LDCs / NGOs	2 500.00		disbursed	ODA	Grant	Mitigation	Other (resilience and disaster risk reduction)	Senegal: strengthening the capacity for sustainable construction and sanitation at the level of the village community, local authorities and volunteers of the Senegalese Red Cross and strengthening their resilience capacity.

Africa / LDCs / NGOs	82 275.37		disbursed [5]	OOF[1]	Grant	Adaptation	Agriculture Energy Water Other (land)	Burkina Faso: ASTM_1 project - contribution to the resilience of rural populations through the promotion of ecological farming techniques and technologies for adaptation to climate change.
Africa / LDCs / NGOs	100 000.00		committed[6]	OOF[1]	Grant	Adaptation	Agriculture Other (resilience and disaster risk reduction)	Niger: Croix rouge_1 project - strengthening the resilience of vulnerable communities to climate change in the urban district of Saga in Niamey.
	100 000.00		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (resilience and disaster risk reduction)	
Africa / LDCs / NGOs	191 650.67		committed[7]	OOF[1]	Grant	Adaptation	Agriculture Other (resilience and disaster risk reduction)	Niger: SOS Faim_1 project - support to improve the resilience of rural populations in the Niger River region, through the promotion of deep urea placement in irrigated rice areas and the protection and development of lowlands.
	101 732.41		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (resilience and disaster risk reduction)	
Africa / LDCs / NGOs ***NEW committment!***	185 121.42		committed[8]	OOF[1]	Grant	Adaptation	Agriculture Other (resilience and disaster risk reduction)	Senegal: Frères des Hommes_4 project - strengthening initiatives and the resilience of rural populations to climate variability in Guelack.
	47 859.92		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (resilience and disaster risk reduction)	
Africa / LDCs / NGOs	300 000.00		committed [9]	OOF[1]	Grant	Adaptation	Agriculture Other (sensitisation)	Burkina Faso: Chrëschte mam Sahel_1 project - support for local initiatives to adapt to climate change in the municipality of Toma.
	100 000.00		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (sensitisation)	
Africa / LDCs / NGOs	78 503.57		committed[10]	OOF[1]	Grant	Adaptation	Agriculture Other (technical and vocational training)	Togo: ASTM_3 project - communities' resilience to climate change in the Agou and Kpélé Prefectures.
	88 583.46		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (technical and vocational training)	
Africa / LDCs / NGOs	396 440.00		committed[11]	OOF[1]	Grant	Adaptation	Other (capacity building, early warning, food safety)	Niger: CARE_2 project - supporting adaptation to climate change and food security (PAACCSA - "projet d'appui à l'adaptation au changement climatique et à la sécurité alimentaire").
Africa / LDCs / NGOs	277 409.00		committed [12]	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction)	Burkina Faso: Frères des Hommes_2 project - sustainable and structural strengthening project for the resilience of vulnerable communities to climate risks, Eastern Region.
	102 211.00		disbursed	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction)	
Africa / LDCs / NGOs	299 325.31		committed[13]	OOF[1]	Grant	Cross-cutting	Agriculture Other (gender equality, knowledge transfer, technical and vocational training)	Senegal: Frères des Hommes_1 project - building climate resilience for vulnerable communities in the Sine Saloum region.
	98 852.24		disbursed	OOF[1]	Grant	Cross-cutting	Agriculture Other (gender equality, knowledge transfer, technical and vocational training)	
Africa / LDCs / NGOs	94 912.00		committed[14]	OOF[1]	Grant	Cross-cutting	Energy Forestry Other (job creation, women empowerment)	Senegal: PADEM_2 project - AMP support project for mitigation and adaptation to climate change in the Sine Saloum region.
Africa / LDCs / NGOs ***NEW committment!***	245 000.00		committed[15]	OOF[1]	Grant	Cross-cutting	Waste Other (living conditions)	Cabo Verde: CALAO_1 project - biodiversity protection and sustainable management of waste on Sal island.
	25 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Waste Other (living conditions)	
Africa/ REG /NGOs	27 280.67		disbursed	ODA	Grant	Adaptation	Other (rural development)	Africa, regional: setting-up of and consolidating production and marketing areas for local products thanks to the partners' investments.
Africa/ REG /NGOs	37 353.53		disbursed	ODA	Grant	Adaptation	Other (rural development)	Africa, regional: strengthening dialogue with local authorities to promote sustainable agricultural development.
Africa/ REG /NGOs	37 353.53		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Africa, regional: sustainable agricultural development to take into account environmental issues.
Asia-Pacific / AOSIS-SIDS / bilateral	1 000 000.00		committed[16]	OOF[1]	Grant	Adaptation	Other (financial techniques & support)	Fiji: the Drua Incubator is meant to accelerate the development of transformational and scalable initiatives to increase the flow of climate finance and especially private sector climate finance into climate adaptation, and to deliver insurance mechanisms that meet the specific requirements of Pacific SIDS. Implementing entity: Republic of Fiji.

Asia-Pacific / AOSIS-SIDS / bilateral	300 000.00		committed[17]	OOF[1]	Grant	Adaptation	Energy Water Other (capacity building)	Vanuatu: implementing reliable and affordable water access through the installation of 30 solar powered water pumps and strengthening of the institutional environment for management of solar water pumping systems and water resources. Training and increasing capacity in communities and of key provincial and national actors. Guidelines and strengthening capacity of institutions, creating an enabling environment for the implementation of NDC mitigation targets (100% electricity from renewables by 2030, expanding solar power PV generation capacity), NAPA (mainstreaming disaster risk reduction), the green growth strategies, the national energy roadmap and the national sustainable development plan. Implementing entity: Global Green Growth Institute (GGGI).
	450 000.00		disbursed	OOF[1]	Grant	Adaptation	Energy Water Other (capacity building)	
Asia-Pacific / LDCs / Bilateral	1 607 940.00		disbursed	ODA	Grant	Adaptation	Other (food safety, rural development)	Laos: alternative development and food security in Houaphan. Implementing entity: United Nations Office on Drugs and Crime (UNODC).
Asia-Pacific / LDCs / bilateral	1 958 429.81		disbursed	ODA	Grant	Adaptation	Other (rural development)	Myanmar: project MYA/002 - Eastern Shan State rural development and inclusion project [01.2018-12.2022].
Asia-Pacific / LDCs / NGOs	141 046.30		disbursed	ODA	Grant	Adaptation	Other (food safety)	Bangladesh: community risk prevention.
Asia-Pacific / LDCs / NGOs	176 836.73		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction)	Bangladesh: disaster risk reduction in North and South of the country.
Asia-Pacific / LDCs / NGOs	73 030.22		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction)	Bangladesh: create mass awareness, conduct advocacy and networking activities to build an enabling environment for disaster-affected people to access government services (resources, safety net,...) and sensitize government bodies to the need for special policies/provisions for disaster victims.
Asia-Pacific / LDCs / NGOs	212 500.00		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction, rural development)	Laos: improving resilience of vulnerable people.
Asia-Pacific / LDCs / NGOs	40 000.00		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction)	Nepal: building sustainable houses for better protection against weather conditions and earthquakes.
Asia-Pacific / LDCs / NGOs	18 000.00		disbursed	ODA	Grant	Adaptation	Other (resilience and disaster risk reduction)	Nepal: train and sensitize the local community and the local Nepalese Red Cross to better control future disasters and strengthen their resilience capacity.
Asia-Pacific / LDCs / NGOs	82 093.35		disbursed	ODA	Grant	Adaptation	Other (rural development)	Laos: agricultural development in remote villages in Sekong.
Asia-Pacific / LDCs / NGOs	19 570.55		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Nepal: training of traineers on sustainable agricultural methods.
Asia-Pacific / LDCs / NGOs	9 221.64		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	Nepal: training by the peers on on sustainable agricultural methods.
Asia-Pacific / LDCs / NGOs	1 051.04		disbursed	ODA	Grant	Mitigation	Other (rural development)	Bangladesh: setting-up of and consolidating production and marketing areas for local products.
Asia-Pacific / LDCs / NGOs	27 242.48		disbursed	ODA	Grant	Mitigation	Other (rural development)	Myanmar: improving ability to adopt appropriate agricultural technological innovations and products (in kind agricultural inputs, formation and training of farmer interest groups/village development organisations).
Asia-Pacific / LDCs / NGOs	198 760.00		committed[18]	OOF[1]	Grant	Adaptation	Agriculture Other (asset transfer, capacity building)	Bangladesh: Caritas Luxembourg_2 project - building resilience and adaptation capacities for improved livelihoods of climate change affected poor farmers in the Brahmaputra Char Basin, North Bangladesh.
	202 593.00		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (asset transfer, capacity building)	
Asia-Pacific / LDCs / NGOs ***NEW commitment!***	300 000.00		committed[19]	OOF[1]	Grant	Adaptation	Agriculture Other (asset transfer, capacity building)	Bangladesh: Caritas Luxembourg_3 project - Smallholder Adaptive Farming and Biodiversity Network SAFBIN.
	100 000.00		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (asset transfer, capacity building)	
Asia-Pacific / LDCs / NGOs	175 555.97		committed[20]	OOF[1]	Grant	Adaptation	Agriculture Other (access to information, gender equality, resilience and disaster risk reduction)	Laos: CARE_1 project - agro-climate information for the adoption of resilient farming practices by women and ethnic minority farmers.
	97 043.65		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (access to information, gender equality, resilience and disaster risk reduction)	
Asia-Pacific / LDCs / NGOs ***NEW commitment!***	396 439.77		committed[21]	OOF[1]	Grant	Adaptation	Agriculture Other (access to information, gender equality, resilience and disaster risk reduction)	Laos: CARE_3 project: agro-climate information for the adoption of resilient farming practices by women and ethnic minority farmers in Southern Laos.
	99 109.76		disbursed	OOF[1]	Grant	Adaptation	Agriculture Other (access to information, gender equality, resilience and disaster risk reduction)	

Asia-Pacific / LDCs / NGOs ***NEW commitment!***	199 994.00		committed[22]	OOF[1]	Grant	Cross-cutting	Agriculture Other (asset transfer, capacity building)	Nepal: AEIN_2 project:" Towards Climate Smart Villages": promotion of affordable and replicable adaptation and mitigation practices to enhance livelihoods of vulnerable communities in the Kavrepalanchowk and Bhaktapur Districts.
	99 995.00		disbursed	OOF[1]	Grant	Cross-cutting	Agriculture Other (asset transfer, capacity building)	
Asia-Pacific / LDCs / NGOs	285 000.00		committed[23]	OOF[1]	Grant	Cross-cutting	Forestry Other (ecosystem conservation and restoration, job creation, technical and vocational training)	Bangladesh: Friendship_1 project - mangrove plantation for environmental sustainability.
Asia-Pacific / LMICs / bilateral	1 149 277.97		disbursed	ODA	Grant	Adaptation	Other (food safety, rural development)	Vietnam: irrigation project VIE/036 under the 3rd Indicative Cooperation Programme (ICP III) - wise use of water and agriculture in Cao Bang [08.2015-09.2020].
Asia-Pacific / LMICs / bilateral ***NEW commitment!***	961 000.00		committed[24]	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction)	Vietnam: project VIE/433 - climate adaptation and resilience in Thua Thien Hue Province [07.18-06.22].
	200 000.00		disbursed	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction)	
Asia-Pacific / LMICs / bilateral	800 000.00		disbursed[25]	OOF[1]	Grant	Mitigation	Energy	Vietnam: project VIE/401 - energy efficient lighting NAMA Pilot in Hue City [07.18-06-21].
Asia-Pacific / LMICs / bilateral ***NEW commitment!***	1 566 147.00		committed[26]	OOF[1]	Grant	Mitigation	Other (Article 2.1.c (PA))	Vietnam: "Green Bond Readiness Programme". Implementing entity: Global Green Growth Institute (GGGI).
	830 000.00		disbursed	OOF[1]	Grant	Mitigation	Other (Article 2.1.c (PA))	
Asia-Pacific / LMICs / NGOs	73 635.60		disbursed	ODA	Grant	Adaptation	Other (food safety, rural development)	India: strengthening the indigenous community "Adivasis" in order to increase food sovereinty.
Asia-Pacific / LMICs / NGOs	25 651.94		disbursed	ODA	Grant	Adaptation	Other (food safety, rural development)	India: food security programme.
Asia-Pacific / LMICs / NGOs	21 912.79		disbursed	ODA	Grant	Cross-cutting	Other (fishing)	Philippines: establishment of a fisheries management system.
Asia-Pacific / LMICs / NGOs	23 962.43		disbursed	ODA	Grant	Cross-cutting	Other (living conditions, technical and vocational training)	India: right to land and improving livelihoods of indigenous communities in Raigad (Maharashtra).
Asia-Pacific / LMICs / NGOs	43 173.14		disbursed	ODA	Grant	Cross-cutting	Other (food safety)	Philippines: strengthening civil society organizations working for food security.
Asia-Pacific / LMICs / NGOs	26 698.10		disbursed	ODA	Grant	Cross-cutting	Other (food safety)	Philippines: strengthening of the Philippine Network of Food Security Programmes.
Asia-Pacific / LMICs / NGOs	42 901.02		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	India: improving rural living conditions through new farming methods.
Asia-Pacific / LMICs / NGOs	68 200.45		disbursed	ODA	Grant	Cross-cutting	Other (rural development)	India: sustainable development measures.
Asia-Pacific / LMICs / NGOs	39 970.38		disbursed	ODA	Grant	Cross-cutting	Other (rural development, technical and vocational training)	Philippines: strengthening the status of peasants through the promotion of ecological agriculture and an agrarian reform.
Asia-Pacific / LMICs / NGOs	40 385.23		disbursed	ODA	Grant	Cross-cutting	Other (rural development, technical and vocational training)	Philippines: strengthening the fight against GMOs and industrial agriculture and promoting sustainable agriculture.
Asia-Pacific / LMICs / NGOs	121 563.06		disbursed	ODA	Grant	Mitigation	Water & Sanitation	India: improving wastewater treatment.
Asia-Pacific / LMICs / NGOs	29 688.87		disbursed	ODA	Grant	Mitigation	Other (technical and vocational training)	India: acting for the "Swachh Bharat" (Clean India) programme to become inclusive, equitable and sustainable.
Asia-Pacific / LMICs / NGOs ***NEW commitment!***	200 406.00		committed[27]	OOF[1]	Grant	Cross-cutting	Agriculture Other (asset transfer, capacity building)	India: AEIN_1 project - "Towards Climate Smart Villages": promotion of affordable and replicable adaptation and mitigation practices to enhance livelihoods of vulnerable communities in the Ananthapur District of Andhra Pradesh.
	99 589.00		disbursed	OOF[1]	Grant	Cross-cutting	Agriculture Other (asset transfer, capacity building)	
Europe / LMICs / bilateral	750 000.00		disbursed	ODA	Grant	Mitigation	Energy	Kosovo: improvement of Pristina's district heating system. Implementing entity: KfW Development Bank.
LAC / LDCs / NGOs	85 000.00		committed[28]	OOF[1]	Grant	Cross-cutting	Forestry Other (awareness raising, technical and vocational training)	Haiti: Caritas Luxembourg_1 project in Haiti - strengthening the resilience of the population of Palmes to climate change (reforestation, information, awareness).
	100 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Forestry Other (awareness raising, technical and vocational training)	
LAC / LMICs / NGOs	172 291.41		disbursed	ODA	Grant	Adaptation	Other (food safety, technical and vocational training)	Guatemala: strengthening of training by and for the partners in order to increase the food sovereignty of the communities.
LAC / LMICs / NGOs	33 314.43		disbursed	ODA	Grant	Adaptation	Other (food safety, technical and vocational training)	Nicaragua: strengthening of training by and for the partners in order to increase the food sovereignty of the communities.
LAC / LMICs / NGOs	87 016.22		disbursed	ODA	Grant	Adaptation	Other (food safety, rural development)	Bolivia: support to improve food safety.
LAC / LMICs / NGOs	2 442.42		disbursed	ODA	Grant	Adaptation	Other (rural development)	Bolivia: setting-up of and consolidating production and marketing areas for local products thanks to the partners' investments.
LAC / LMICs / NGOs	52 398.64		disbursed	ODA	Grant	Adaptation	Other (rural development)	Bolivia: comprehensive human resource training in the San Marcos agro-ecological community.
LAC / LMICs / NGOs	58 088.71		disbursed	ODA	Grant	Adaptation	Other (rural development)	Bolivia: comprehensive human resource training in the Vila-Vila agro-ecological community.

LAC / LMICs / NGOs	43 276.71		disbursed	ODA	Grant	Adaptation	Other (rural development)	Guatemala: setting-up of and consolidating production and marketing areas for local products thanks to the partners' investments.
LAC / LMICs / NGOs	36 614.34		disbursed	ODA	Grant	Adaptation	Other (technical and vocational training)	El Salvador: defence and exercise of sexual and reproductive rights, as well as environmental rights, of young women and adolescent girls.
LAC / LMICs / NGOs	77 696.97		disbursed	ODA	Grant	Cross-cutting	Other (rural development, technical and vocational training)	Bolivia: bringing specialized expertize on the exploitation of natural resources model.
LAC / LMICs / NGOs	305 947.80		committed[29]	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction, technical and vocational training)	Nicaragua: Frères des Hommes_3 project - resilient and proactive communities with regard to climate change and the risks associated with natural phenomena in the Calico river micro-watersheds in San Dionisio.
	99 898.64		disbursed	OOF[1]	Grant	Adaptation	Other (resilience and disaster risk reduction, technical and vocational training)	
LAC / LMICs / NGOs	292 762.00		committed[30]	OOF[1]	Grant	Cross-cutting	Agriculture Forestry Other (job creation, technical and vocational training)	Bolivia: PADEM_1 project - reducing the vulnerability of the Yampara population to the effects of climate change.
	89 201.00		disbursed	OOF[1]	Grant	Cross-cutting	Agriculture Forestry Other (job creation, technical and vocational training)	
LAC / LMICs / NGOs	99 633.35		committed[31]	OOF[1]	Grant	Mitigation	Forestry Other (ecosystem conservation and restoration)	Costa Rica: Rainforest_1 "COBIGA – Corredor Biologico La Gamba" project - intelligent and ecological CO2 sequestration and creation of a biological corridor in the Golfo Dulce region.
	99 974.67		disbursed	OOF[1]	Grant	Mitigation	Forestry Other (ecosystem conservation and restoration)	
LAC / UMICs / NGOs	42 657.03		disbursed	ODA	Grant	Adaptation	Other (technical and vocational training)	Peru: strengthening public capacities and community organizations in the regions of Piura, Cajamarca and Amazonas, as well as strengthening the organizational and leadership capacities of indigenous and rural Peruvian communities for the exercise of their rights and the peaceful and sustainable management of their territories.
LAC / UMICs / NGOs	55 138.27		disbursed	ODA	Grant	Cross-cutting	Other (health, technical and vocational training)	Peru: integrated intervention to improve maternal and child health and nutrition of Quechua communities, as well as capacity development and promoting territorial participation and conflict management participation.
LAC / UMICs / NGOs	78 991.26		disbursed	ODA	Grant	Cross-cutting	Other (food safety, rural development)	Peru: sustainable management of natural resources for food security, Maras.
LAC / UMICs / NGOs	90 552.11		disbursed	ODA	Grant	Mitigation	Forestry	Peru: reforestation and food production in Querocoto district.
LAC / UMICs / NGOs	22 018.16		disbursed	ODA	Grant	Mitigation	Water & Sanitation	Cuba: improving sustainable access to water.
Various / bilateral	330 440.11		disbursed	ODA	Grant	Cross-cutting	Other (financial techniques & support)	Financial support through the Forestry & Climate Change Fund (Investing for Development SICAV - formerly Luxembourg - Microfinance and Development Fund SICAV - LMDF).
Various / bilateral	50 000.00		committed[32]	OOF[1]	Grant	Adaptation	Finance	Corporate Air Passenger Solidarity Programme - CAPS (feasibility study). Implementing entity: BVRio and Oxford Climate Policy.
Various / bilateral ***NEW commitment!***	250 000.00		committed[33]	OOF[1]	Grant	Cross-cutting	Forestry	20x20 Initiative. Implementing entity: World Resources Institute.
	250 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Forestry	
Various / bilateral ***NEW commitment!***	1 620.74		disbursed	OOF[1]	Grant	Cross-cutting	Forestry	Contribution to the annual meeting of the Global Partnership on Forest and Landscape Restoration.
Various / bilateral	82 870.90		disbursed	OOF[1]	Grant	Cross-cutting	Other (awareness raising, capacity building, sustainable finance)	BENELUX-EIB joint side event Pavilion at COP25.
Various / bilateral	83 366.77		committed[34]	OOF[1]	Grant	Cross-cutting	Other (awareness raising, capacity building, sustainable finance)	Awareness raising on waste and sustainable forest management in refugee camps. Implementing entity: Catch a smile.
	145 942.76		disbursed	OOF[1]	Grant	Cross-cutting	Other (awareness raising, capacity building, sustainable finance)	
Various / bilateral	140 040.98		disbursed	OOF[1]	Grant	Cross-cutting	Other (human rights)	Human Rights & Climate Change event organisation / Human Rights & Climate Change reporting. Implementing entity: Centre for International Environmental Law (CIEL).
Various / bilateral ***NEW commitment!***	20 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Other (human rights)	Colloquium on human rights and climate change. Implementing entity: Académie Africaine de Théorie du Droit.

Various / bilateral	320 000.00		committed[35]	OOF[1][2]	Grant	Cross-cutting	Other (investment funds labelling)	Convention - awarding a climate finance label to investment funds according to agreed and published criteria. Implementing entity: Luxembourg Fund Labelling Agency LuxFLAG.
	160 000.00		disbursed	OOF[1][2]	Grant	Cross-cutting	Other (investment funds labelling)	
Various / bilateral	34 395.93		committed[36]	OOF[1]	Grant	Cross-cutting	Other (legal advisory)	Legal and advisory services in climate change matters.
	11 570.51		disbursed	OOF[1]	Grant	Cross-cutting	Other (legal advisory)	
Various / bilateral ***NEW commitment!***	10 000.00		disbursed	OOF[1]	Grant	Cross-cutting	Other (transparency)	Transparency and access to information during COP25 Implementing entity: International Institute for Sustainable Development (IISD).
Total contributions through bilateral, regional and other channels	**40 113 390.54**						**40 113 390.54**	
disbursed - ODA	***23 636 875.97***	***28 572 840.98***				***Adaptation***	***19 905 171.19***	
disbursed - OOF	***4 935 965.01***					***Cross-cutting***	***13 224 841.28***	
net committed - ODA	***0.00***	***11 540 549.56***				***Mitigation***	***6 983 378.06***	
net committed - OOF	***11 540 549.56***					***Check***	***0.00***	

Abbreviations: ODA = official development assistance, OOF = other official flows; USD = United States dollars.

[a] These categories should be mutually exclusive.

[b] See the OECD purpose codes at http://www.oecd.org/investment/stats/dacandcrscodelists.htm. Codes include energy, transport, industry, agriculture, forestry, water and sanitation etc.

[c] Parties should report, as appropriate, on project details and the implementing agency.

Luxembourg's notes

Committed amounts are only reported for programs/actions/projects which are still on-going or for which the whole committed amount has not yet been disbursed at the end of 2019. Therefore, (net) committed amounts = remaining committed amounts for the post-2019 years.

Except when indicated, bilateral projects or programmes are implemented by Lux-Development SA - https://luxdev.lu/en/home.

(1) International Climate Finance provided by the Climate and Energy Fund of the Ministry of the Environment, Climate and Sustainable Development

(2) Sustainable Finance provided by the Ministry of Finance

(3) 3 000 000 EUR committed for the period 2018-2021; 753 454 EUR disbursed in 2018; no disbursement in 2019; net commitment end 2019 = 2 246 546 EUR

(4) 201 233 EUR committed for the period 2016-2019; 80 000 EUR disbursed in 2016; 50 000 EUR disbursed in both 2017 & 2018; no diburserment in 2019; net commitment end 2019 = 21 233 EUR

(5) 276 471.95 EUR committed for the period 2017-2019; 103 003.25 EUR disbursed in 2017; 91 193.33 EUR disbursed in 2018; 82 275.37 EUR disbursed in 2019; balance end 2019 = 0 EUR

(6) 300 000 EUR committed for the period 2018-2020; 100 000 EUR disbursed in both 2018 & 2019; net commitment end 2019 = 100 000 EUR

(7) 399 999.96 EUR committed for the period 2017-2021; 106 616.88 EUR disbursed in 2017; no disbursement in 2018; 101 732.41 EUR disbursed in 2019; net commitment end 2019 = 191 650.67 EUR

(8) 232 981.34 EUR committed for the period 2019-2023; 47 859.92 EUR disbursed in 2019; net commitment end 2019 = 185 121.42

(9) 500 000 EUR committed for the period 2018-2022; 100 000 EUR disbursed in both 2018 & 2019; net commitment end 2019 = 300 000 EUR

(10) 265 934.36 EUR committed for the period 2018-2020; 98 847.33 EUR disbursed in 2018; 88 583.46 EUR disbursed in 2019; net commitment end 2019 = 78 503.57 EUR

(11) 495 550 EUR committed for the period 2018-2022; 99 110 EUR disbursed in 2018; no disbursement in 2019; net commitment end 2019 = 396 440 EUR

(12) 478 746 EUR committed for the period 2018-2022; 99 126 EUR disbursed in 2018; 102 211 EUR disbursed in 2019; net commitment end 2019 = 277 409 EUR

(13) 499 021.43 EUR committed for the period 2017-2021; 100 843.88 EUR disbursed in 2017; no disbursement in 2018; 98 852.24 EUR disbursed in 2019; net commitment end 2019 = 299 325.31 EUR

(14) 194 912 EUR committed for the period 2018-2020; 100 000 EUR disbursed in 2018; no disbursement in 2019; net commitment end 2019 = 94 912 EUR

(15) 270 000 EUR committed for the period 2019-2022; 25 000 EUR disbursed in 2019; net commitment end 2019 = 245 000 EUR

(16) 1 000 000 EUR committed; no disbursements in both 2018 & 2019; net commitment end 2019 = 1 000 000 EUR

(17) 1 500 000 EUR committed for the period 2018-2021; 750 000 EUR disbursed in 2018; 450 000 EUR disbursed in 2019; net commitment end 2019 = 300 000 EUR

(18) 499 496 EUR committed for the period 2017-2021; 98 143 EUR disbursed in 2017; no disbursement in 2018; 202 593 EUR disbursed in 2019; net commitment end 2019 = 198 760 EUR

(19) 400 000 EUR committed for the period 2019-2022; 100 000 EUR disbursed in 2019; net commitment end 2019 = 300 000 EUR

(20) 356 862.66 EUR initially committed for the period 2018-2020; 84 263.04 EUR already disbursed in 2017; no disbursement in 2018; 97 043.65 EUR disbursed in 2019; net commitment end 2019 = 175 555.97 EUR

(21) 495 549.53 EUR committed for the period 2019-2023; 99 109.76 EUR disbursed in 2019; net commitment end 2019 = 396 439.77

(22) 299 989 EUR committed for the period 2019-2022; 99 995 EUR disbursed in 2019; net commitment end 2019 = 199 994 EUR

(23) 500 000 EUR committed for the period 2018-2022; 215 000 EUR disbursed in 2018; no disbursement in 2019; net commitment end 2019 = 285 000 EUR

(24) 2 000 000 EUR committed in 2016, no disbursements in both 2016 & 2017; 1 800 000 EUR disbursed in 2018; 200 000 EUR disbursed in 2019; balance end 2019 = 0 EUR. New commitment for the period 2020-2022 = 961 000 EUR

(25) 2 000 000 EUR committed in 2016, no disbursements in both 2016 & 2017; 1 200 000 EUR disbursed in 2018; 800 000 EUR disbursed in 2019; balance end 2019 = 0 EUR

(26) 2 396 147 EUR committed for the period 2019-2022; 830 000 EUR disbursed in 2019; net commitment end 2019 = 1 566 147 EUR

(27) 299 995 EUR committed for the period 2019-2022; 99 589 EUR disbursed in 2019; net commitment end 2019 = 200 406 EUR

(28) 285 000 EUR committed for the period 2017-2019; 100 000 EUR disbursed in 2017 and in 2019; no disbursement in 2018; net commitment end 2019 = 85 000 EUR

(29) 499 934.16 EUR committed the period 2018-2022; 94 087.72 EUR disbursed in 2018; 99 898.64 disbursed in 2019; net commitment end 2019 = 305 947.80 EUR

(30) 481 898 EUR committed for the period 2018-2022; 99 935 EUR disbursed in 2018; 89 201 disbursed in 2019; net commitment end 2019 = 292 762 EUR

(31) 299 603.80 EUR committed the period 2018-2020; 99 995.78 EUR disbursed in 2018; 99 974.67 EUR disbursed in 2019; net commitment end 2019 = 99 633.35 EUR

(32) 106 000 EUR committed for feasibility study; 56 000 EUR disbursed in 2018; no disbursement in 2019; net commitment end 2019 = 50 000 EUR

(33) 500 000 EUR committed for the period 2019-2021; 250 000 EUR disbursed in 2019; net commitment end 2019 = 250 000 EUR

(34) 279 524.72 EUR committed for the period 2018-2020; 50 215.19 EUR disbursed in 2018; 145 942.76 EUR disbursed in 2019; net commitment end 2019 = 83 366.77 EUR

(35) 930 000 EUR committed for the Convention; 150 000 EUR disbursed in 2016, 2017 and 2018; 160 000 EUR disbursed in 2019; net commitment end 2019 = 320 000 EUR

(36) 147 420 EUR+28 028 EUR committed for the period 2018-2019; 57 915 EUR disbursed in 2017; 71 618.56 EUR disbursed in 2018; 11 570.51 EUR disbursed in 2019; net commitment end 2019 = 34 395.93 EUR

TABLES V.4-4 – PROVISION OF CLIMATE SPECIFIC PUBLIC FINANCIAL SUPPORT: SUMMARY OF INFORMATION ON CHANNELS OF FINANCIAL SUPPORT USED IN 2017, 2018 & 2019 – MIO. EUR

Source: MECDD.

Note: Core/general support is not included in the multilateral allocation channel.

Allocation channels of public financial support	*2017*								
	ODA			*OOF*			***Total***		
	Disbursed	*Committed*	*Total*	*Disbursed*	*Committed*	*Total*	***Disbursed***	***Committed***	***Total***
Multilateral									
Mitigation	-	-	-	58 500.00	-	58 500.00	**58 500.00**	-	**58 500.00**
Adaptation	2 600 000.00	3 550 000.00	6 150 000.00	250 000.00	2 500 000.00	2 750 000.00	**2 850 000.00**	**6 050 000.00**	**8 900 000.00**
Cross-cutting	600 000.00	900 000.00	1 500 000.00	13 950 000.00	49 525 350.00	63 475 350.00	**14 550 000.00**	**50 425 350.00**	**64 975 350.00**
Total	**3 200 000.00**	**4 450 000.00**	**7 650 000.00**	**14 258 500.00**	**52 025 350.00**	**66 283 850.00**	**17 458 500.00**	**56 475 350.00**	**73 933 850.00**
Bilateral									
Mitigation	6 720 393.18	-	6 720 393.18	170 609.16	2 000 000.00	2 170 609.16	**6 891 002.34**	**2 000 000.00**	**8 891 002.34**
Adaptation	6 856 196.33	-	6 856 196.33	553 313.18	3 582 238.49	4 135 551.67	**7 409 509.51**	**3 582 238.49**	**10 991 748.00**
Cross-cutting	8 124 445.64	-	8 124 445.64	548 637.65	443 747.00	992 384.65	**8 673 083.29**	**443 747.00**	**9 116 830.29**
Total	**21 701 035.15**	-	**21 701 035.15**	**1 272 559.99**	**6 025 985.49**	**7 298 545.48**	**22 973 595.14**	**6 025 985.49**	**28 999 580.63**
Total: multilateral and bilateral									
Mitigation	6 720 393.18	-	6 720 393.18	229 109.16	2 000 000.00	2 229 109.16	**6 949 502.34**	**2 000 000.00**	**8 949 502.34**
Adaptation	9 456 196.33	3 550 000.00	13 006 196.33	803 313.18	6 082 238.49	6 885 551.67	**10 259 509.51**	**9 632 238.49**	**19 891 748.00**
Cross-cutting	8 724 445.64	900 000.00	9 624 445.64	14 498 637.65	49 969 097.00	64 467 734.65	**23 223 083.29**	**50 869 097.00**	**74 092 180.29**
Total	**24 901 035.15**	**4 450 000.00**	**29 351 035.15**	**15 531 059.99**	**58 051 335.49**	**73 582 395.48**	**40 432 095.14**	**62 501 335.49**	**102 933 430.63**
Total: multilateral and bilateral									
Multilateral	3 200 000.00	4 450 000.00	7 650 000.00	14 258 500.00	52 025 350.00	66 283 850.00	**17 458 500.00**	**56 475 350.00**	**73 933 850.00**
Bilateral	21 701 035.15	-	21 701 035.15	1 272 559.99	6 025 985.49	7 298 545.48	**22 973 595.14**	**6 025 985.49**	**28 999 580.63**
Total	**24 901 035.15**	**4 450 000.00**	**29 351 035.15**	**15 531 059.99**	**58 051 335.49**	**73 582 395.48**	**40 432 095.14**	**62 501 335.49**	**102 933 430.63**

Allocation channels of public financial support	2018								
	ODA			OOF			Total		
	Disbursed	Committed	Total	Disbursed	Committed	Total	Disbursed	Committed	Total
Multilateral									
Mitigation	-	-	-	-	-	-	-	-	-
Adaptation	735 714.29	3 550 000.00	4 285 714.29	2 249 980.00	9 290 020.00	11 540 000.00	**2 985 694.29**	**12 840 020.00**	**15 825 714.29**
Cross-cutting	550 000.00	900 000.00	1 450 000.00	14 963 242.60	38 417 706.40	53 380 949.00	**15 513 242.60**	**39 317 706.40**	**54 830 949.00**
Total	**1 285 714.29**	**4 450 000.00**	**5 735 714.29**	**17 213 222.60**	**47 707 726.40**	**64 920 949.00**	**18 498 936.89**	**52 157 726.40**	**70 656 663.29**
Bilateral									
Mitigation	7 420 580.22	-	7 420 580.22	1 299 995.78	999 608.02	2 299 603.80	**8 720 576.00**	**999 608.02**	**9 720 184.02**
Adaptation	10 048 266.91	-	10 048 266.91	3 331 620.92	4 998 604.54	8 330 225.46	**13 379 887.83**	**4 998 604.54**	**18 378 492.37**
Cross-cutting	4 804 122.22	-	4 804 122.22	1 651 759.99	4 368 107.52	6 019 867.51	**6 455 882.21**	**4 368 107.52**	**10 823 989.73**
Total	**22 272 969.35**	**-**	**22 272 969.35**	**6 283 376.69**	**10 366 320.08**	**16 649 696.77**	**28 556 346.04**	**10 366 320.08**	**38 922 666.12**
Total: multilateral and bilateral									
Mitigation	7 420 580.22	-	7 420 580.22	1 299 995.78	999 608.02	2 299 603.80	**8 720 576.00**	**999 608.02**	**9 720 184.02**
Adaptation	10 783 981.20	3 550 000.00	14 333 981.20	5 581 600.92	14 288 624.54	19 870 225.46	**16 365 582.12**	**17 838 624.54**	**34 204 206.66**
Cross-cutting	5 354 122.22	900 000.00	6 254 122.22	16 615 002.59	42 785 813.92	59 400 816.51	**21 969 124.81**	**43 685 813.92**	**65 654 938.73**
Total	**23 558 683.64**	**4 450 000.00**	**28 008 683.64**	**23 496 599.29**	**58 074 046.48**	**81 570 645.77**	**47 055 282.93**	**62 524 046.48**	**109 579 329.41**
Total: multilateral and bilateral									
Multilateral	1 285 714.29	4 450 000.00	5 735 714.29	17 213 222.60	47 707 726.40	64 920 949.00	**18 498 936.89**	**52 157 726.40**	**70 656 663.29**
Bilateral	22 272 969.35	-	22 272 969.35	6 283 376.69	10 366 320.08	16 649 696.77	**28 556 346.04**	**10 366 320.08**	**38 922 666.12**
Total	**23 558 683.64**	**4 450 000.00**	**28 008 683.64**	**23 496 599.29**	**58 074 046.48**	**81 570 645.77**	**47 055 282.93**	**62 524 046.48**	**109 579 329.41**

Allocation channels of public financial support	2019								
	ODA			OOF			Total		
	Disbursed	Committed	Total	Disbursed	Committed	Total	Disbursed	Committed	Total
Multilateral									
Mitigation	-	-	-	969 600.00	2 262 400.00	3 232 000.00	**969 600.00**	**2 262 400.00**	**3 232 000.00**
Adaptation	439 715.06	160 284.94	600 000.00	2 014 450.00	7 295 570.00	9 310 020.00	**2 454 165.06**	**7 455 854.94**	**9 910 020.00**
Cross-cutting	400 000.00	-	400 000.00	19 340 281.32	116 099 425.08	135 439 706.40	**19 740 281.32**	**116 099 425.08**	**135 839 706.40**
Total	**839 715.06**	**160 284.94**	**1 000 000.00**	**22 324 331.32**	**125 657 395.08**	**147 981 726.40**	**23 164 046.38**	**125 817 680.02**	**148 981 726.40**
Bilateral									
Mitigation	3 587 623.04	-	3 587 623.04	1 729 974.67	1 665 780.35	3 395 755.02	**5 317 597.71**	**1 665 780.35**	**6 983 378.06**
Adaptation	12 817 035.78	-	12 817 035.78	1 871 307.21	5 216 828.20	7 088 135.41	**14 688 342.99**	**5 216 828.20**	**19 905 171.19**
Cross-cutting	7 232 217.14	-	7 232 217.14	1 334 683.13	4 657 941.01	5 992 624.14	**8 566 900.27**	**4 657 941.01**	**13 224 841.28**
Total	**23 636 875.97**	**-**	**23 636 875.97**	**4 935 965.01**	**11 540 549.56**	**16 476 514.57**	**28 572 840.98**	**11 540 549.56**	**40 113 390.54**
Total: multilateral and bilateral									
Mitigation	3 587 623.04	-	3 587 623.04	2 699 574.67	3 928 180.35	6 627 755.02	**6 287 197.71**	**3 928 180.35**	**10 215 378.06**
Adaptation	13 256 750.84	160 284.94	13 417 035.78	3 885 757.21	12 512 398.20	16 398 155.41	**17 142 508.05**	**12 672 683.14**	**29 815 191.19**
Cross-cutting	7 632 217.14	-	7 632 217.14	20 674 964.45	120 757 366.09	141 432 330.54	**28 307 181.59**	**120 757 366.09**	**149 064 547.68**
Total	**24 476 591.03**	**160 284.94**	**24 636 875.97**	**27 260 296.33**	**137 197 944.64**	**164 458 240.97**	**51 736 887.36**	**137 358 229.58**	**189 095 116.94**
Total: multilateral and bilateral									
Multilateral	839 715.06	160 284.94	1 000 000.00	22 324 331.32	125 657 395.08	147 981 726.40	**23 164 046.38**	**125 817 680.02**	**148 981 726.40**
Bilateral	23 636 875.97	-	23 636 875.97	4 935 965.01	11 540 549.56	16 476 514.57	**28 572 840.98**	**11 540 549.56**	**40 113 390.54**
Total	**24 476 591.03**	**160 284.94**	**24 636 875.97**	**27 260 296.33**	**137 197 944.64**	**164 458 240.97**	**51 736 887.36**	**137 358 229.58**	**189 095 116.94**

TABLES V.4-5 – PROVISION OF CLIMATE SPECIFIC PUBLIC FINANCIAL SUPPORT: SUMMARY OF INFORMATION ON CHANNELS OF FINANCIAL SUPPORT USED IN 2017, 2018 & 2019 – IN %

Source: MECDD.

Note: Core/general support is not included in the multilateral allocation channel.

Allocation channels of public financial support	*2017*								
	ODA			*OOF*			***Total***		
	Disbursed	*Committed*	*Total*	*Disbursed*	*Committed*	*Total*	***Disbursed***	***Committed***	***Total***
Multilateral									
Mitigation	-	-	-	0.4%	-	0.1%	**0.3%**	-	**0.1%**
Adaptation	81.3%	79.8%	80.4%	1.8%	4.8%	4.1%	**16.3%**	**10.7%**	**12.0%**
Cross-cutting	18.8%	20.2%	19.6%	97.8%	95.2%	95.8%	**83.3%**	**89.3%**	**87.9%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Bilateral									
Mitigation	31.0%	-	31.0%	13.4%	33.2%	29.7%	**30.0%**	**33.2%**	**30.7%**
Adaptation	31.6%	-	31.6%	43.5%	59.4%	56.7%	**32.3%**	**59.4%**	**37.9%**
Cross-cutting	37.4%	-	37.4%	43.1%	7.4%	13.6%	**37.8%**	**7.4%**	**31.4%**
Total	**100.0%**	**-**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Total: multilateral and bilateral									
Mitigation	27.0%	-	22.9%	1.5%	3.4%	3.0%	**17.2%**	**3.2%**	**8.7%**
Adaptation	38.0%	79.8%	44.3%	5.2%	10.5%	9.4%	**25.4%**	**15.4%**	**19.3%**
Cross-cutting	35.0%	20.2%	32.8%	93.4%	86.1%	87.6%	**57.4%**	**81.4%**	**72.0%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Total: multilateral and bilateral									
Multilateral	12.9%	100.0%	26.1%	91.8%	89.6%	90.1%	**43.2%**	**90.4%**	**71.8%**
Bilateral	87.1%	-	73.9%	8.2%	10.4%	9.9%	**56.8%**	**9.6%**	**28.2%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Allocation channels of public financial support	2018								
	ODA			OOF			Total		
	Disbursed	Committed	Total	Disbursed	Committed	Total	Disbursed	Committed	Total
Multilateral									
Mitigation	-	-	-	-	-	-	-	-	-
Adaptation	57.2%	79.8%	74.7%	13.1%	19.5%	17.8%	**16.1%**	**24.6%**	**22.4%**
Cross-cutting	42.8%	20.2%	25.3%	86.9%	80.5%	82.2%	**83.9%**	**75.4%**	**77.6%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Bilateral									
Mitigation	33.3%	-	33.3%	20.7%	9.6%	13.8%	**30.5%**	**9.6%**	**25.0%**
Adaptation	45.1%	-	45.1%	53.0%	48.2%	50.0%	**46.9%**	**48.2%**	**47.2%**
Cross-cutting	21.6%	-	21.6%	26.3%	42.1%	36.2%	**22.6%**	**42.1%**	**27.8%**
Total	**100.0%**	-	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Total: multilateral and bilateral									
Mitigation	31.5%	-	26.5%	5.5%	1.7%	2.8%	**18.5%**	**1.6%**	**8.9%**
Adaptation	45.8%	79.8%	51.2%	23.8%	24.6%	24.4%	**34.8%**	**28.5%**	**31.2%**
Cross-cutting	22.7%	20.2%	22.3%	70.7%	73.7%	72.8%	**46.7%**	**69.9%**	**59.9%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Total: multilateral and bilateral									
Multilateral	5.5%	100.0%	20.5%	73.3%	82.1%	79.6%	**39.3%**	**83.4%**	**64.5%**
Bilateral	94.5%	-	79.5%	26.7%	17.9%	20.4%	**60.7%**	**16.6%**	**35.5%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Allocation channels of public financial support	2019								
	ODA			OOF			Total		
	Disbursed	Committed	Total	Disbursed	Committed	Total	Disbursed	Committed	Total
Multilateral									
Mitigation	-	-	-	4.3%	1.8%	2.2%	**4.2%**	**1.8%**	**2.2%**
Adaptation	52.4%	100.0%	60.0%	9.0%	5.8%	6.3%	**10.6%**	**5.9%**	**6.7%**
Cross-cutting	47.6%	-	40.0%	86.6%	92.4%	91.5%	**85.2%**	**92.3%**	**91.2%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Bilateral									
Mitigation	15.2%	-	15.2%	35.0%	14.4%	20.6%	**18.6%**	**14.4%**	**17.4%**
Adaptation	54.2%	-	54.2%	37.9%	45.2%	43.0%	**51.4%**	**45.2%**	**49.6%**
Cross-cutting	30.6%	-	30.6%	27.0%	40.4%	36.4%	**30.0%**	**40.4%**	**33.0%**
Total	**100.0%**	-	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Total: multilateral and bilateral									
Mitigation	14.7%	-	14.6%	9.9%	2.9%	4.0%	**12.2%**	**2.9%**	**5.4%**
Adaptation	54.2%	100.0%	54.5%	14.3%	9.1%	10.0%	**33.1%**	**9.2%**	**15.8%**
Cross-cutting	31.2%	-	31.0%	75.8%	88.0%	86.0%	**54.7%**	**87.9%**	**78.8%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Total: multilateral and bilateral									
Multilateral	3.4%	100.0%	4.1%	81.9%	91.6%	90.0%	**44.8%**	**91.6%**	**78.8%**
Bilateral	96.6%	-	95.9%	18.1%	8.4%	10.0%	**55.2%**	**8.4%**	**21.2%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

V.5. SUPPORT FOR TECHNOLOGY TRANSFER AND CAPACITY BUILDING TO DEVELOPING COUNTRY PARTIES TO THE UNFCCC

45. The following projects and programmes illustrate the efforts of Luxembourg's Development Cooperation support for **technology transfer** and **capacity building** to developing countries. It should be noted that capacity building is one of the cornerstones to Luxembourg's programmes in developing countries. The list below is pinpointing some emblematic projects – see CTF Tables 8 and 9 for a more complete list:

Technology development and transfer support – Cabo Verde – CVE/085 – supporting the partnership between the Cabo Verde Centre for Renewable Energies and Industrial Maintenance (CERMI) and the Centre of competence-Technical Engineering of Luxembourg (CdC-GTB) – 2018-2021 – 4 Mio. EUR

An innovative project was launched in 2018 in Cabo Verde to create a public enterprise between Cabo Verde's "Centre for Renewable Energy and Industrial Maintenance" (CERMI) and a Luxembourg based economic interest group, the "Centre of Competence-Technical Engineering of Luxembourg" (CdC-GTB). Through this alliance, the two entities with the support of Luxembourg's Development Cooperation established a private company in Cabo Verde known as "3C". The aim of the company is to facilitate the energy transition of the country by providing training in renewable energy technology. Besides training activities, the project also supports the creation of consulting poles which are covering educational engineering, engineering and energy efficiency and renewable energy consulting. Clusters in the fields of certification, metrology and Research / Development / Innovation (RDI) are also being implemented. Furthermore, the "3C" aims at becoming a regional/international centre for training certification, audit, research and development as well as entrepreneurship in the field of renewable energy.

(→ CTF Table 8 https://caboverde.luxdev.lu/en/activities/project/CVE/085)

Capacity building support – Cabo Verde – CVE/083 – renewable energies programme – 2017-2021– 5.5 Mio. EUR

Renewable energy is one of the three key sectors under the 4th Indicative Cooperation Programme (ICP IV) in Cabo Verde, and the aim of the programme is to ensure access to clean, reliable modern and affordable energy for all, while increasing energy independence. It also seeks to reinforce governance, regulation and business climate of the renewable energy sector in Cabo Verde. The activities further aim at increasing national fundraising capacities for renewable energies.

(→ CTF Table 9 and https://caboverde.luxdev.lu/en/activities/project/CVE/083)

Capacity building support – Burkina Faso – BKF/023 and BKF/024 – support to the sustainable management of the forest resources & project for land reclamation efforts towards pastoral usage and in conservation areas – 2018-2022 – 18.7 & 5.3 Mio. EUR

In Burkina Faso, Luxembourg's development cooperation projects include interventions in the forestry sector and natural resources management. Currently, two programmes, building on previous projects, are being implemented.

BKF/023 support to the sustainable management of the forest resources is the logical follow-up to the actions of the 2nd Indicative Cooperation Programme (ICP II) in the management of natural resources, particularly forestry. With the contribution to the "Forest Sector Support Programme" (FSSP), the Ministry for Environment, Green Economy and Climate Change (MEGECC) has been able to mainly develop tools for planning, steering and monitoring its activities and now has its sectoral policy document, a three-year action plan and a budget programme by objectives.

Building on the achievements of the FSSP and the second forest inventory, the new support will enable a better knowledge, preservation and sustainable management of timber and non-timber forest resources by and for the benefit of the populations. It will complement MEGECC's efforts in the implementation of its sectoral policy and in particular its budget programmes 1 "sustainable management of forest and wildlife resources", 3 "local governance and sustainable development", 4 "green economy and climate change", as well as its "steering and support" programme.

BKF/024 project for land reclamation efforts towards pastoral usage and in conservation areas is aligned with the strategic objective of the Ministry of Animal and Fisheries Resources (MAH) budget program 081. This program aims to "create a secure and sustainable environment for sustainable production" and the two results of the project are aligned with actions 1 and 2 of this program:

- R1 "Secure pastoral areas are created";
- R2 "The created pastoral spaces are operationalised".

The project provides for the restoration and securing, through the development of 15 land charters, 10 800 hectares (ha) of pastoral areas in addition to the 8 500 ha of the previous phase, the marking of 60 kilometres of trails livestock and rest areas, the creation of 10 water points, the valorisation of sites restored by mowing and conservation of hay, the development of income-generating activities related to small livestock farming and the sale of carbon credits.

The expected effects are the increase in functional pastoral areas, the securing of pastoral activities and the reduction of conflicts between farmers and pastoralists, an improved representation of women in local authorities, the lengthening of the duration of the feeding of cattle in village lands and improving the coverage of food needs for livestock, as well as improving the income of women and the poor for the promoted activities.

(→ CTF Table 9 and https://burkinafaso.luxdev.lu/en/activities/project/BKF/023 & https://burkinafaso.luxdev.lu/en/activities/project/BKF/024)

Capacity building support – Mali – MLI/021 - rural development and food security – 2016-2021 25.2 Mio. EUR

The overall objective of this programme is to diversify and build sustainable sources of agricultural income and household food security. The specific objective is to develop and increase the productivity, sustainability and profitability of three agricultural sectors.

The program operates in the districts of Segou, San, Tominian, Bla, Barouéli (Segou Region) and Yorosso (Sikasso Region). The targeted direct beneficiaries include 190 selected Producer Organisations (POs) in the rice, sesame and fonio sectors, including POs working on irrigation schemes, as well as a hundred micro and small businesses specialised in rice and fonio processing.

The results identified for achieving this goal are to:

- develop pathways for sesame and fonio by supporting 90 POs and 50 micro and small businesses in sesame and fonio production and processing;
- improve food security, in particular through the development of the rice sector;
- contribute to the achievement of environmental and climate performance in terms of agricultural policies and strategies; and
- promote investment and business environment for better sector development.

(→ CTF Table 9 and https://mali.luxdev.lu/en/activities/project/MLI/021)

Capacity building support – Myanmar – MYA/002 – Eastern Shan State rural development and inclusion project – 2018-2022 – 10 Mio. EUR

"Eastern Shan State Rural Development and Inclusion Project aims" (i) to improve the means and resources for legal livelihood activities of the local communities and (ii) to promote the interaction, interdependence, cooperation and capacity in the community's development of participatory governance.

(→ CTF Table 9 and https://luxdev.lu/en/activities/project/MYA/002)

Capacity building support – Viet Nam – VIE/036 – Cao Bang/Wise Use of water and agriculture – 2015-2020 – 6.6 Mio. EUR

The "Cao Bang/Wise Use of water and agriculture Project" objective is to assist sustainable trends of poverty reduction and food security in mountainous areas of Cao Bang province.

The specific objective of VIE/036 is to improve effective natural and financial resource management focused on agricultural production while meeting the needs of ethnic minorities and other population segments with difficulties.

The anticipated outcome of the project is threefold:

- improved and sustainable agriculture service delivery mechanisms in Cao Bang that are demand oriented linking farmers to markets and applying improved (optimised, diversified and more resilient) agricultural production systems with improved productivity;

- strengthened local authorities providing efficient and effective participatory investments services for small-scale roads and irrigation, thus allowing farmers better access to markets and better productivity from irrigation systems; and
- improved irrigation development by the Department of Agriculture and Rural Development by applying the principles of participatory irrigation management in (i) prioritization, (ii) planning and design, (iii) monitoring of investments and quality control, and (iv) operation and maintenance optimizing available resources.

(→ CTF Table 9 and https://vientiane.luxdev.lu/en/activities/project/VIE/036)

46. In 2018, Luxembourg Development Cooperation initiated the development of a technical and economic feasibility study that was launched in 2020 in the framework of the "Brava - sustainable island" project in Cabo Verde, whose goal is to achieve a 100 % renewable energy penetration rate on the island of Brava through the installation of a photovoltaic power station, a wind power plant and a pump storage station. Opportunities are currently being explored to build a multi-stakeholder partnership to support the implementation of the "Brava – sustainable island" project which already includes the construction of a 300 m^3/day solar powered desalinisation unit financed by Luxembourg.

47. All activities described above are publicly financed (respectively co-financed to at least 60 % as far as regards NGO projects). As a public administration, primarily concerned with development policies and ODA management, the MAEE-COOP does not report on private sector's investments.

48. That said, for publicly funded (bilateral or NGO) projects in the field of technology transfer, the MFEA **does rely on the private sector as a skilled and specialised technical partner**. In this context, the following examples illustrate how Luxembourg encouraged private sector activities:
    - the "Business Partnership Facility" (BPF) is a financing facility aimed at encouraging the private sector to engage with partners in developing countries to implement sustainable business projects. The facility has an annual budget of 1 Mio. EUR to co-finance private sector initiatives that contribute to development and job creation in developing countries and/or transfers of technology. The BPF addresses the sectors of bio-health, information and communication technologies (ICT), fintech, eco-innovation/circular economy and logistics in developing countries;[15]
    - proactively promote "sustainable investing", often also referred to as "responsible investment", with the aim to incorporate environmental, social and governance (ESG) factors into investment decisions, to better manage risk and generate sustainable, long-term returns;

[15] For details see, e.g., https://cooperation.gouvernement.lu/fr/actualites/articles/2018/BPF.html and https://cooperation.gouvernement.lu/fr/support/recherche.gouvernement%2Bfr%2Bactualites%2Btoutes_actualites%2Bcommuniques%2B2019%2B04-avril%2B05-lenert-partnership.html.

- engagement in promoting financial inclusion since more than 20 years, providing access to adequate financial services (transfers, savings, credit, micro-insurance) to micro, small and medium enterprises helps populations which don't have access to regular banking services;
- through the ADA, an NGO specialized in inclusive finance,[16] Luxembourg has launched a digital finance initiative, which provides capacity building to microfinance institutions on the integration of digital financial services, and co-finances selected projects in this area;
- the "Luxembourg House of Financial Technology" (LHoFT)'s Fincluder bootcamp, a conference bringing together 12 of the most promising African Fintech start-ups, and supporting them to develop their business plans and to exchange knowledge with other key actors of the sectors, is supported by the MFEA;
- a regional cybersecurity centre for microfinance institutions, based in Dakar, co-funded by Luxembourg;
- capacity building activities in Cabo Verde's "Energies Training Centres" that will create an incentive for private sector investment in clean technologies in these countries;
- collaboration with companies that provide solar panels or more complex solar container systems: These collaborations are organized as follows: either LuxDev chooses the companies through a tendering process *[→ Box 1]* or NGOs choose the companies and the MAEE-COOP co-finances such projects to at least 66 %.

49. With regard to the **types of technologies to be transferred by companies from Luxembourg to developing countries**, there are companies specialised in photovoltaic slabs and containers, and others specialised in biogas installations and yet others constructing thermo-solar boilers. It is worth mentioning that the majority of those companies operating in the field of energy, environment and sustainable development are regrouped within the "EcoInnovation Cluster" – now "CleanTech Cluster" – of Luxinnovation, an agency linked to the MECO. This Cluster focuses on the following two topics: "circular economy" and "ecocities & urban resources management" (incl. smart technologies).[17] From 2013 on, the contacts between the "CleanTech Cluster" and the MAEE-COOP have intensified in order to encourage Luxembourg's companies to engage in developing countries and, more specifically in the case of renewable energy sources, in Cabo Verde, where concrete opportunities and needs have been identified. It is important however to note that given the untied nature of Luxembourg's ODA, no public tender advantages can be given to Luxembourg companies through ODA grants.

16 https://www.ada-microfinance.org/en.

17 For more information, see: https://www.luxinnovation.lu/cluster/luxembourg-cleantech-cluster/.

50. In the field of agriculture and through bilateral programmes as well as through NGO projects, Luxembourg supports farmer organisations that promote **endogenous capacities**, try to divulge these technologies and organise trainings and awareness raising seminars on this purpose (e.g., ASTM's[18] collaboration with ARFA[19] and *Jonggbaueren a Jongwënzer*[20] - field labour with donkeys).

BOX 1 – INTEGRATION OF ENVIRONMENT AND CLIMATE CHANGE INTO LUXDEV PROCUREMENTS

General Regulations of LuxDev's acquisition process

The award of contracts of goods, services and works financed (…) by the Government (…) of Luxembourg and for which LuxDev is the Awarding Authority translates the development policy of the Government, according to which the environment must imperatively be taken into account for any development that aims to be sustainable.

(…) LuxDev acting as Awarding Authority can require that particular conditions related to environmental protection and climate change are included in the tender dossiers.

These clauses will aim at promoting sustainable energies and clean technologies as well as the transfer of these technologies and the access to environmental information in the partner countries.

Consequently, the award of contracts might be refused if a given contract is likely to have a negative impact on the environment and the ecosystems of the partner country; this in order to contribute avoiding all interventions that could prove harmful to the environment.

18 ASTM stands for "*Action Solidarité Tiers-Monde*" – https://actionsolidaritetiersmonde.org/.

19 ARFA stands for "*Association de Recherche et de Formation Agro-écologique*" – https://actionsolidaritetiersmonde.org/portfolio/arfa/.

20 http://jongbaueren.lu/.

Annex 1 – Changes in reporting compared to the latest submission

The table below summarizes the main changes compared to the previous submission – NC7 and BR3 – for the sections of this chapter, as well as for CTF related Tables. In comparison with the NC7/BR3, this chapter has been completely restructured.

Section or CTF Table in NC7/BR3	Section in BR4 and revisions
VII.1.1	V.3.3 – updated.
VII.1.2	V.3.4 – updated.
VII.2	V.2.1 – updated.
VII.3	V.3.1 – no revision. V.3.2 – no revision. GEF → V.2.3 – updated with the latest figures.
VII.4	V.2.2 – no revision.
VII.5.1	V.2.3 – updated with the latest figures.
VII.5.2	V.4 – completed by an analysis of the financial flows and by graphics, as well as with information on tracking private finance flows.
VII.6	V.5 – revised and updated with the latest figures and information.
VII.7	not applicable.
CTF Tables 7, 7(a) & 7(b)	updated for 2017 & 2018. These tables have also been completed for 2019 and are copied in section V.4.
CTF Table 8	now provided.
CTF Table 9	now provided.

Annex 2 – Implementation of recommendations and encouragements from the latest review

The table below indicates if recommendations and encouragements from the latest review – TRR.3, Tables 11 & 14 [UNFCCC (2019b)] – have been included or not in this submission, and if not, why.

Reporting requirement	Issue type	Assessment	Description	Included Y/N
para. 14	Transparency	Recommendation	The ERT reiterates the recommendation made in the previous review report that Luxembourg provide in its next BR a description of the national approach to tracking financial, technological and capacity-building support to non-Annex I Parties or changes therein since its previous BR, including information on indicators for tracking other official flows.	The situation has not really change since the last review. As pointed out in the TRR.3, "Luxembourg has a small administration, which limits the resources available for tracking". However, to refine data and better report in the future, both LuxDev and the MAEE-COOP are working on an integrated database. Luxembourg is also examining the possibility of using machine-readable information and has joined the International Aid Transparency Initiative (IATI) in May 2020.
para. 15	Transparency	Recommendation	The ERT recommends that Luxembourg improve the transparency of its reporting by including in its next BR information on the underlying assumptions and methodologies used to produce information on finance.	So far, Luxembourg cannot fix percentages of the overall budget that are considered to be allocated to climate-specific work depending on the climate markers attributed. Luxembourg is currently developing a new strategy that consists in adopting a national approach to ensure greater coherence in the country development actions. As part of this approach, the MAEE-COOP works in close collaboration with the MECDD in order to coordinate the programs and projects financed by the ODA budget and those financed across the "Climate and Energy Fund", which is considered additional. In this context, it is planned to set up a new monitoring system specific to this collaboration, which will allow for greater production of quantitative information concerning the mainstreaming of climate change considerations.
para. 19	Completeness	Encouragement	The ERT encourages Luxembourg to report in its next BR, to the extent possible, on private financial flows leveraged by bilateral climate finance towards mitigation and adaptation activities in non-Annex I Parties.	The situation has not really change since the last review, as indicated in §43 & §44. Some information on how to work with private partners has however been added in §48 & §49. But, it is still not possible to report on private financial flows leveraged by bilateral climate finance towards mitigation and adaptation activities in non-Annex I Parties.

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