Exploring synergy between measurement, reporting and verification under the Convention and monitoring of the implementation of the Sustainable Development Goals

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Contents

Executive summary

1. Climate change and sustainable development are two topics with interlinked agendas with respect to implementing a holistic and integrated development path that minimizes environmental damage and degradation and maximizes economic and social opportunities for all. The linchpin of the follow-up and review process in implementing the two global agendas for climate and sustainable development is at the national level. This creates an unprecedented opportunity to pursue the implementation of these two agendas in a way that can generate significant mutual benefits and move beyond the view that these agendas are somehow distinct or different avenues to achieving the transformational goals they share.

2. In terms of country-level monitoring and tracking of the progress made in the implementation of action on climate change and sustainable development agendas, there is a strong linkage between the Sustainable Development Goals (SDGs) monitoring framework and the measurement, reporting and verification (MRV) arrangements. **Eleven of the 17 SDGs** have a total number of 43 indicators that are aligned with the MRV elements. The **43 indicators** include the following:

    (a)   **Nineteen indicators** bring about **mutual SDG monitoring and MRV benefits**, as the data sets for the monitoring of these indicators overlap the data required for MRV elements;

    (b)   For **12 indicators**, MRV gains **co-benefits** from SDG monitoring or SDG monitoring gains co-benefits from MRV, as the data sets for these indicators can either inform or be informed by MRV elements;

    (c)   SDG monitoring of **9 indicators** could contribute to MRV or vice versa, in a broader conceptual linkage, and thus bring about **potential benefits**;

    (d)   Lastly, there are **3 indicators** of which linkage with MRV elements depends on future work on metadata, including the development of key concepts and methodology for data collection.

3. Such linkages open up more opportunities for countries to readily engage in the monitoring of the progress made in the achievement of the two global agendas. For developing countries, in particular, where resources may not be sufficient to carry out data collection and processing for all MRV provisions and/or SDG monitoring at the desired level of detail and frequency of monitoring, these linkages can serve as an example to explore a potential synergistic approach to reinforce mutual benefits based on their distinct national circumstances.

4. Understanding the alignment between the SDG global monitoring framework and the MRV framework, however, is only the first step in grasping the benefits of approaching monitoring and implementation in an integrated and mutually reinforcing manner. Much work remains to be done at the national level to achieve the kind of integrated approach that is called for.

5. Identifying opportunities to leverage the existing systems in order to maximize information and knowledge-sharing should be a priority at the country level. It will be useful to revisit the established database and monitoring systems, and compare the MRV provisions and SDG global monitoring framework with already existing data. For example, national databases such as national energy balances and national disaster loss databases can be used in the process of and the preparation of national communications (NCs)/biennial update reports (BURs), as well as

informing SDGs monitoring. This will enable the MRV arrangements, as a tracking tool, and the SDG monitoring framework to dovetail well into the existing national monitoring and evaluation frameworks, and to be an integral part of the successful implementation of national systems.

6. Ensuring the continuous flow of data from the data custodians, including the public and private sectors, to national statistics offices and the designated entity responsible for national reporting initiatives, will continue to be an important task. This is an overarching task for the post-2015 implementation agenda, which the SDGs themselves highlight, to foster policy and institutional coherence and multi-stakeholder partnerships as well as enhance the capacity of developing countries to increase the availability of high-quality, timely and reliable data.

7. Linking the ways in which monitoring and reporting are undertaken for climate action and sustainable development to achieve the SDGs can be a critical tool in linking the two agendas and facilitating country-level implementation more broadly in a coherent and comprehensive manner.

1. Introduction

Critical for the post-2015 development agenda, a set of landmark agreements were reached in 2015 – the 2030 Agenda for Sustainable Development, the Paris Agreement on climate change, the Sendai Framework for Disaster Risk Reduction 2015–2030 and the Addis Ababa Action Agenda on financing for development.

Climate change and sustainable development are two topics with interlinked agendas on how to implement a holistic and integrated development path that minimizes environmental damage and degradation and maximizes economic and social opportunities for all.[1] The linchpin of the follow-up and review process in implementing the two global agendas for climate and sustainable development is at the national level.

The SDGs, which encompass 17 goals and 169 targets, are comprehensive, universal and interlinked, and cut across all dimensions of sustainable development. They will be pursued differently in each country, according to national priorities, needs, institutional set-ups and the financing mix available for their implementation.[2] In order to track the implementation process of the SDGs and to provide an incentive for ambitious national measures, the United Nations Statistical Commission (STATCOM) adopted a set of indicators for monitoring the achievement of the goals at the global level.[3] Data on individual indicators will be collected at the national and regional level. Considerable efforts are needed to ensure that national statistical offices can collect and provide data in the required format and quality.

Under the Convention, all Parties are obliged to communicate to the Conference of the Parties (COP) information relevant to the implementation of the Convention.[4] Over the decade that followed the entry into force of the Convention, the arrangements for national reporting have been elaborated, including the MRV framework and the ongoing work of developing an enhanced transparency framework under the Paris Agreement. With the objective of communicating reliable, transparent and comprehensive information on emissions, actions and support, and thereby forming an essential basis for understanding current emission levels, the ambition of existing efforts, as well as progress on both the national and the international scale, developed country Parties and developing country Parties have participated in the process of and the preparation of NCs, biennial reports, BURs and national greenhouse gas (GHG) inventories, as appropriate. Data are collected, processed and maintained using various tools and databases in a country, and the process involves various sectors and stakeholder groups. A bigger framework of collaboration at the country level is essential.

This creates an unprecedented opportunity to pursue the implementation of these two agendas in a way that can generate significant mutual benefits and move beyond the view that these agendas are somehow distinct or different avenues to achieving the transformational goals they share.

Against this backdrop, this paper aims to examine the linkages between SDG indicators and MRV elements. It will explore the extent to which the two agendas are aligned in a concrete way by identifying elements of the SDG global monitoring framework that have the potential to generate mutual benefits with national

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[1] Message from the Executive Secretary at a Group of 7 meeting of environment ministers, held in Bologna, Italy, on 11 June 2017. Available at http://newsroom.unfccc.int/unfccc-newsroom/all-government-ministries-need-to-be-involved-in-climate-action/.

[2] United Nations General Assembly document, A/72/124-E/2018/3.

[3] United Nations Economic and Social Council document, E/CN.3/2016/2/Rev.1.

[4] Article 12 of the Convention.

reporting under the Convention; and how the information for monitoring the implementation of the SDGs can inform MRV elements, and vice versa. Questions that will be addressed include: In the process of tracking and monitoring, what SDG indicators can be linked to MRV elements? What sets of information can inform and/or feed into monitoring and reporting under both agendas? What are the opportunities for synergies in the implementation, monitoring and reporting of the two interlinked global agendas?

2. The approach of examining the degree of alignment between the Sustainable Development Goals monitoring framework and the measurement, reporting and verification framework

2.1. Methodology

To understand the degree of alignment between the MRV framework for developing countries under the Convention and the global monitoring framework for SDGs, elements of the information required to track, monitor and report under the two frameworks are identified.

Elements of MRV are drawn from UNFCCC and Intergovernmental Panel on Climate Change guidelines. For SDG indicators, elements are drawn from a metadata repository (i.e. a complete set of metadata for currently available indicators (as at May 2017); and work plans for tier III indicators (as at March 2017)).[5]

MRV elements (especially regarding national GHG inventories) and SDG indicators are broken down into subcomponents (or sub-indicators) and compared. For some SDG indicators and MRV elements, this mapping exercise involves a conceptual work, taking into account key concepts and definitions related to the implementation of sustainable development and climate agendas.

It is important to note that the work on the development of the metadata for tier III SDG indicators and an enhanced transparency framework under the Paris Agreement is still in progress. This leaves room for further analysis and adjustment of the analysis results in due course.

2.2. The nature of the alignment

This paper considers **alignment** as involving three potential types of benefits that can be derived from linkages between the MRV and SDG monitoring frameworks during implementation:

   a. *Mutual benefits*: a set of information can directly serve the purposes of the two agendas. Specific components of SDG indicators are compatible with specific information for MRV. In such a case, monitoring of an SDG indicator can benefit the monitoring and reporting of an MRV element, or the process of and the preparation of an NC and/or a BUR can benefit the monitoring of an SDG indicator, and thereby the implementation of an SDG target. As such, tracking and monitoring of an SDG indicator and an MRV element can be mutually reinforcing;
   b. *Co-benefits*: specific information for an MRV element can inform the monitoring of an SDG indicator, or a specific element of an SDG indicator can inform an MRV element. In this case, SDG monitoring gains co-benefits from MRV; or MRV gains co-benefits from SDG monitoring;
   c. *Potential benefits:* this shows a rather weaker link between MRV and the SDG monitoring framework, but using broader conceptual definitions, data tracked and collected for SDG indicators could be relevant to MRV, and vice versa.

Some SDG indicators whose metadata are currently being further developed might have the potential to link with MRV elements, depending on disaggregation by subsector or concepts/definition to be determined.

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[5] https://unstats.un.org/sdgs/metadata/.

3. Mapping the Sustainable Development Goals monitoring framework to the measurement, reporting and verification framework

3.1. Key elements of the measurement, reporting and verification framework

MRV is one of the key components of the current intergovernmental climate action under the Convention. It is a crucial vehicle to understand individual or collective emissions profiles as well as commitments or pledges, track progress towards them and provide background information, including on the scope and ambition of national climate responses and support received and needed. Transparent and complete reporting, combined with subsequent third-party consideration, helps to increase trust and confidence in and accountability of the information measured and reported.

The arrangements for national reporting have evolved throughout the history of the Convention and its Kyoto Protocol into a more comprehensive MRV framework. Measures to significantly enhance transparency of action and support under the Convention were adopted as part of the Bali Action Plan at COP 13 and elaborated in decisions adopted at subsequent COP sessions.

At COP 21, Parties agreed to establish an enhanced transparency framework for action and support, which would build on and enhance the transparency arrangements under the Convention.[6] Under the Paris Agreement, the modalities, procedures and guidelines of an enhanced transparency framework are being developed. That said, the full mapping of the SDG global monitoring framework to an enhanced transparency framework is not available at this stage. However, it is important to note that its components (broad areas) are expected to be fundamentally very close to the existing MRV arrangements.

The current reporting component of the MRV framework lays out which countries are to report which information, in which format and frequency. Table 1 summarizes the category of information to measure and report based on the guidelines adopted under the Convention.

3.2. Overview of Sustainable Development Goals indicators

This paper takes into account the global indicator framework developed by the Inter-Agency and Expert Group on Sustainable Development Goal Indicators and agreed at the 48th session of the United Nations Statistical Commission, held in March 2017.[7]

The global indicator framework contains 244 indicators upholding the 17 goals and 169 targets of the 2030 Agenda for Sustainable Development. Nine indicators are repeated under two or three different targets, which makes the actual total number of individual indicators 232.

Elements of SDG indicators are drawn from a complete set of metadata for currently available indicators (last updated in May 2017);[8] and workplans for tier III indicators (as at March 2017).[9] Concepts, methodology, data source, collection process and responsible entities (i.e. data providers and compilers) are considered to examine the potential alignment with MRV elements. Figure 1 shows an example of the elements of SDG indicators and how linkages to MRV were drawn.

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[6] Article 13 of the Paris Agreement.
[7] Inter-Agency and Expert Group on Sustainable Development Goal Indicators document, E/CN.3/2017/2.
[8] https://unstats.un.org/sdgs/metadata/.
[9] *Work Plans for Tier III Indicators*. 2017. Background document, prepared by the United Nations Statistics Division with inputs provided by international and regional entities responsible for global data compilation.

Table 1. Overview of information requested in the measurement, reporting and verification process

Information requested	Where	Mandate/Guideline
1. National circumstances		
- Development priorities, objectives and circumstances - Institutional arrangements	NC, BUR	Decision 17/CP.8, annex, paragraphs 3 and 5
2. National GHG inventories		

- Procedures and arrangements undertaken to collect and archive data;
- Country-specific and regional emission factors and activity data;
- Sectors include:
  1. Energy
  2. Industrial processes and product use
  3. Agriculture, forestry and other land use
  4. Waste
	NC, BUR	Decision 17/CP.8, annex, paragraphs 6–24;
		Decision 2/CP.17, annex III, paragraphs 3–10

3. General description of steps taken or envisaged to implement the Convention		
3.1 Adaptation related: measures to facilitate adequate adaptation to climate change		
- Vulnerability and adaptation (V&A) assessment - Description of approaches, methods and tools - Specific needs and concerns related to V&A assessment - Key findings and integrating effects - Adaptation strategies and measures - Frameworks for adaptation	NC	Decision 17/CP.8, annex, paragraphs 28–36
3.2 Mitigation related: measures to mitigate climate change		
- Mitigation assessment (ex ante, ex post assessment, including information on effects of avoided emissions)	NC	Decision 17/CP.8, annex, paragraphs 38 and 39
- Programmes and measures implemented or planned - Mitigation actions	NC, BUR	Decision 17/CP.8, annex, paragraph 40 Decision 2/CP.17, annex III, paragraphs 11 and 12
- Domestic MRV	BUR	Decision 2/CP.17, annex III, paragraph 13
4. Constraints and gaps, and related financial, technical and capacity needs and support received and needed		
- Financial, technical and capacity-building needs - Financial and technical resources	NC, BUR	Decision 17/CP.8, annex, paragraphs 49–51 and 55 Decision 2/CP.17, annex III, paragraphs 14 and 15
- Proposed projects for financing	NC	Decision 17/CP.8, annex, paragraph 52
- Information on implementation of adaptation measures	NC	Decision 17/CP.8, annex, paragraph 53
5. Other information: steps taken to integrate climate change		
- Activities relating to technology transfer - Climate change research and systematic observation - Information on education, training and public awareness - Information and networking	NC	Decision 17/CP.8, annex, paragraphs 41–48 and 54 Decision 2/CP.17, annex III, paragraph 16

Figure 1. An example of elements of Sustainable Development Goal indicators and linkage to measurement, reporting and verification

Indicators	Concepts	Methodology	Data source	Data collection	Linkage	MRV element
Goal 1. End poverty in all its forms everywhere						
1.5.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	The disaster loss data on mortality is significantly influenced by large-scale catastrophic events, which represents important outliers in terms of mortality, as they normally imply considerable numbers of people killed. UNISDR recommends Countries to report the data by event, so complementary analysis to determine true trends can be done by both including and excluding such catastrophic events that can represent important outliers in terms of mortality.	Summation of data on related sub-indicators from national disaster loss databases divided by the sum of relative figures of global population data (e.g. World Bank or UN Statistics information). Affected people will be calculated as summation of sub-indicators. Several of sub-indicators will be calculated based on country averages of inhabitants per household, number of workers per hectare of agriculture, per livestock, per industry and per commerce.	National disaster loss database, reported to UNISDR	-Time series: 1990-2013 (National Disaster Loss Database) -Data collection: 2017-2018. initial datasets to be released in 2017, a first fairly complete dataset by 2019 -Data providers: agencies in charge of national disaster loss database (e.g. national DM agencies, civil protection / meteorological agencies, and disaster data collected by line ministries) -Data compilers: UNISDR	<=>	Adaptation
1.5.2 Direct economic loss attributed to disasters in relation to global gross domestic product (GDP)	Direct economic loss: the monetary value of total or partial destruction of physical assets existing in the affected area. Direct economic loss is nearly equivalent to physical damage.	The original national disaster loss databases usually register physical damage value (housing unit loss, infrastructure loss etc.), which needs conversion to monetary value according to the UNISDR methodology*. The converted global value is divided by global GDP (inflation adjusted, constant USD) calculated from the World Bank Development Indicators.	National disaster loss database, reported to UNISDR	-Time series: 1990-2013 (National Disaster Loss Database) -Data collection: 2017-2018. initial datasets to be released in 2017, a first fairly complete dataset by 2019 -Data providers: agencies in charge of national disaster loss database (e.g. national DM agencies, civil protection / meteorological agencies, and disaster data collected by line ministries) -Data compilers: UNISDR	<=>	Adaptation
1.5.3 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030	The indicator will build bridge between the SDGs and the Sendai Framework for DRR. Increasing number of national governments that adopt and implement national and local DRR strategies, which the Sendai Framework calls for, will contribute to sustainable development from economic, environmental and social perspectives.	Summation of data from National Progress Reports of the Sendai Monitor	National Progress Report of the Sendai Monitor, reported to UNISDR	-Time series: 2013 and 2015: HFA monitor -Data collection: 2017-2018. initial datasets to be released in 2017, a first fairly complete dataset by 2019 -Data providers: The coordinating lead institution chairing the National DRR platform (compised of special purpose agencies including national disaster agencies, civil progection / meteorological agencies) -Data compilers: UNISDR	<=>	Adaptation

4. Key findings

4.1. Overview

The extent of alignment between the SDGs monitoring framework and the MRV framework under the Convention highlights the significant opportunities for national and subnational governments as well as other key stakeholders to approach the tracking and monitoring of the implementation of climate and sustainable development agendas in an integrated and synergistic manner.

Table 2 summarizes a list of SDG indicators identified to be aligned with MRV elements and the types of benefits that can be derived from the linkages. Eleven of the 17 SDG goals have a total number of 50 indicators that are aligned with the MRV elements. Taking into account 4 indicators that repeat under two or three different targets, the actual total number of indicators aligned with MRV elements is 43.[10] The **43 indicators** include the following:

a. **Nineteen indicators** bring about *mutual SDG monitoring and MRV benefits*, as the data sets for the monitoring of these indicators overlap the data required for MRV elements;

b. **Twelve indicators** are linked with MRV elements, as the data sets for the monitoring of these indicators can either inform or be informed by MRV elements. In such cases, *MRV gains co-benefits from SDG monitoring or SDG monitoring gains co-benefits from MRV*;

c. **Nine indicators** are indirectly linked with MRV elements, in a broader conceptual linkage. In this case, *SDG monitoring could contribute to MRV or vice versa, bringing about potential benefits*;

d. Lastly, there are **three indicators** whose linkage with MRV elements depends on future work on metadata, including the development of key concepts and methodology for data collection.
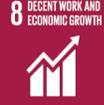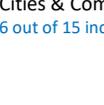
Given the breadth of the climate agenda addressing social and economic dimensions as well as the environmental dimension of sustainable development, the degree of alignment across the full set of SDG indicators is comprehensive. Excluding Goal 13, which specifically refers to climate action and national reports under the Convention are identified as key data sources for the monitoring of its indicators, the degree of alignment is greatest for those SDGs that reflect the economic dimension of sustainable development, including Goal 7 on affordable and clean energy, where 4 out of 6 indicators (67 per cent) are aligned with MRV elements; Goal 12 on responsible consumption and production (6 out of 13 indicators, 46 per cent); and Goal 11 on sustainable cities and communities (6 out of 15 indicators, 40 per cent).

Table 2. Overview of the degree of alignment between the Sustainable Development Goal indicators and measurement, reporting and verification elements

List of SDG indicators aligned with MRV elements			Degree of alignment	
1 NO POVERTY **Goal 1** No Poverty 4 out of 14 indicators (29%)	1.5.1	Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	Mutual benefits	⇔
	1.5.2	Direct economic loss attributed to disasters in relation to global GDP	Mutual benefits	⇔
	1.5.3	Number of countries that adopt and implement national DRR strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030	Mutual benefits	⇔
	1.5.4	Proportion of local governments that adopt and implement local DRR strategies in line with national DRR strategies	Mutual benefits	⇔

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[10] Indicators that repeat and that are relevant to this analysis are the following:
1) 8.4.1/12.2.1;
2) 1.5.1/11.5.1/13.1.1;
3) 1.5.3/11.b.1/13.1.2;
4) 1.5.4/11.b.2/13.1.3.

List of SDG indicators aligned with MRV elements			Degree of alignment	
Goal 2 Zero Hunger 3 out of 13 indicators (23%)	2.4.1	Proportion of agricultural area under productive and sustainable agriculture	Potential benefits	Δ
	2.5.2	Proportion of local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction	Potential benefits	Δ
	2.a.1	The agriculture orientation index for government expenditures	Co-benefits	√
Goal 6 Clean Water & Sanitation 2 out of 11 indicators (18%)	6.3.1	Proportion of wastewater safely treated	Mutual benefits	⇔
	6.5.1	Degree of integrated water resources management implementation (0–100)	Potential benefits	Δ
Goal 7 Affordable & Clean Energy 4 out of 6 indicators (67%)	7.1.2	Proportion of population with primary reliance on clean fuels and technology	Co-benefits	√
	7.2.1	Renewable energy share in the total final energy consumption	Co-benefits	√
	7.3.1	Energy intensity measured in terms of primary energy and GDP	Co-benefits	√
	7.a.1	International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems	Co-benefits	√
Goal 8 Decent Work & Economic Growth 2 out of 17 indicators (12%)	8.4.1	Material footprint, material footprint per capita, and material footprint per GDP	Co-benefits	√
	8.4.2	Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP	Potential benefits	Δ
Goal 9 Industry, Innovation & Infrastructure 4 out of 12 indicators (33%)	9.1.2	Passenger and freight volumes, by mode of transport	Potential benefits	Δ
	9.2.1	Manufacturing value added as a proportion of GDP and per capita	Potential benefits	Δ
	9.4.1	CO_2 emission per unit of value added	Co-benefits	√
	9.a.1	Total official international support (ODA plus other official flows) to infrastructure	TBD	Δ
Goal 11 Sustainable Cities & Communities 6 out of 15 indicators (40%)	11.2.1	Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities	Potential benefits	Δ
	11.5.1	Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	Mutual benefits *(repeated)*	⇔
	11.5.2	Direct economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters	Mutual benefits	⇔
	11.6.1	Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities	Mutual benefits	⇔
	11.b.1	Number of countries that adopt and implement national DRR strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030	Mutual benefits *(repeated)*	⇔
	11.b.2	Proportion of local governments that adopt and implement local DRR strategies in line with national DRR strategies	Mutual benefits *(repeated)*	⇔
Goal 12 Responsible Consumption & Production 6 out of 13 indicators (46%)	12.2.1	Material footprint, material footprint per capita, and material footprint per GDP	Co-benefits *(repeated)*	√
	12.3.1	Global food loss index	Co-benefits	√
	12.4.2	Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment	Mutual benefits	⇔
	12.5.1	National recycling rate, tons of material recycled	Potential benefits	Δ
	12.8.1	Extent to which (i) global citizenship education and (ii) education for sustainable development (including climate change education) are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment	Mutual benefits	⇔
	12.c.1	Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels	Mutual benefits	⇔
	13.1.1	Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	Mutual benefits *(repeated)*	⇔

List of SDG indicators aligned with MRV elements			Degree of alignment	
13 CLIMATE ACTION **Goal 13** Climate Action 8 out of 8 indicators (100%)	13.1.2	Number of countries that adopt and implement national DRR strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030	Mutual benefits *(repeated)*	⇔
	13.1.3	Proportion of local governments that adopt and implement local DRR strategies in line with national DRR strategies	Mutual benefits *(repeated)*	⇔
	13.2.1	Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low GHG emissions development in a manner that does not threaten food production (including a NAP, NDC, NC, BUR or other)	Mutual benefits	⇔
	13.3.1	Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula	Mutual benefits	⇔
	13.3.2	Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions	Mutual benefits	⇔
	13.a.1	Mobilized amount of United States dollars per year (2020–2025) accountable towards the USD 100 billion commitment	Mutual benefits	⇔
	13.b.1	Number of LDCs and SIDS that are receiving specialized support, and amount of support, including finance, technology and capacity-building, for mechanisms for raising capacities for effective climate change related planning and management, including focusing on women, youth and local and marginalized communities	Mutual benefits	⇔
15 LIFE ON LAND **Goal 15** Life on Land 4 out of 14 indicators (29%)	15.1.1	Forest area as a proportion of total land area	Mutual benefits	⇔
	15.2.1	Progress towards sustainable forest management	Mutual benefits	⇔
	15.3.1	Proportion of land that is degraded over total land area	Mutual benefits	⇔
	15.4.2	Mountain Green Cover Index	Mutual benefits	⇔
17 PARTNERSHIPS FOR THE GOALS **Goal 17** Partnerships for the Goals 7 out of 25 indicators (28%)	17.2.1	Net ODA, total and to LDCs, as a proportion of the OECD DAC donors' GNI	TBD	Δ
	17.6.1	Number of science and/or technology cooperation agreements and programmes between countries, by type of cooperation	TBD	Δ
	17.9.1	Dollar value of financial and technical assistance (including through North–South, South–South and triangular cooperation) committed to developing countries	TBD	Δ
	17.18.1	Proportion of sustainable development indicators produced at the national level with full disaggregation when relevant to the target, in accordance with the Fundamental Principles of Official Statistics	Co-benefits	√
	17.18.2	Number of countries that have national statistical legislation that complies with the Fundamental Principles of Official Statistics	Co-benefits	√
	17.18.3	Number of countries with a national statistical plan that is fully funded and under implementation, by source of funding	Co-benefits	√
	17.19.1	Dollar value of all resources made available to strengthen statistical capacity in developing countries	Co-benefits	√
11 goals, 50 indicators (4 indicators repeat under two or three different goals; the actual total number of aligned indicators is **43**)			Mutual benefits (⇔)	25/**19**
			Co-benefits (√)	13/**12**
			Potential benefits (Δ)	9
			TBD	3

4.2. Exploring points of alignment

This section examines the degree of alignment in the implementation of the two global agendas by identifying the linkage between the SDG indicators and MRV elements. Figure 2 illustrates the linkage between 50 indicators under 11 SDGs and MRV elements. The linkages are drawn where three types of benefits can be derived during the implementation of the two monitoring frameworks. The linkages will be further explicated by SDGs.

Figure 2. Mapping of Sustainable Development Goal indicators to measurement, reporting and verification elements
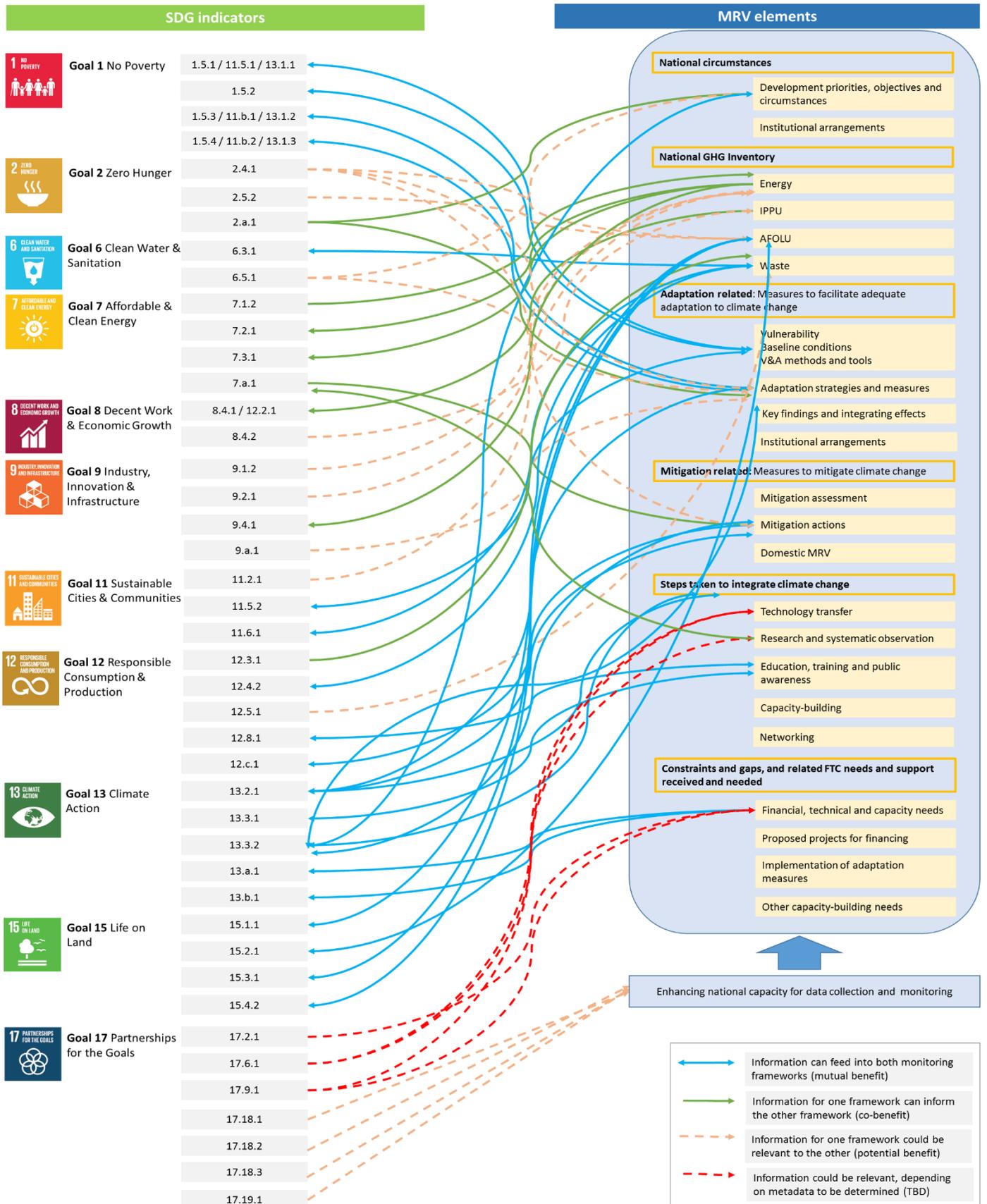
Goal 1: End poverty in all its forms everywhere

Poverty is more than the lack of income and resources to ensure a sustainable livelihood. The targets supporting the achievement of SDG 1 focus on eradicating extreme poverty for all people; reducing at least by half the proportion of men, women and children of all ages living in poverty; implementing nationally appropriate social protection systems; providing access to economic resources and basic services; and building the resilience of the poor.

In particular, target 1.5[11] addresses vulnerability to climate-related extreme events and resilience building. A set of indicators (1.5.1–1.5.4) were established to measure global progress in the implementation of the Sendai Framework. They are aligned with the implementation of the Convention and the Paris Agreement with regard to the monitoring and assessment of vulnerability (susceptibility) to climate change impacts (1.5.1 and 1.5.2) as well as the monitoring and assessment of responses to such impacts.

Specifically, the **national disaster loss database** required for indicators 1.5.1 and 1.5.2 (data on mortality and economic loss) is correlated to the information on vulnerability and baseline conditions in MRV. In reporting measures to facilitate adequate adaptation to climate change, countries are encouraged to provide information on some of the key sets of baseline conditions and their linkages, including climate-related disaster effects and response capabilities, as well as population, food security and agriculture. Further, information on disaster risk reduction strategies at the national and local levels for indicators 1.5.3 and 1.5.4 is correlated to the reporting on adaptation strategies and measures under the Convention, that is, information which may include general policies that have implications for adaptation (inclusive and more comprehensive).

Table 3. List of indicators of Sustainable Development Goal 1 that are aligned with measurement, reporting and verification elements

SDG indicators		Source		Relevant MRV elements	
1.5.1	Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	National disaster loss database	⇔	Adaptation	- Vulnerability - Baseline conditions
1.5.2	Direct economic loss attributed to disasters in relation to global gross domestic product	National disaster loss database	⇔	Adaptation	- Vulnerability - Baseline conditions
1.5.3	Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030	National progress report of the Sendai Framework Monitor	⇔	Adaptation	- Adaptation strategies and measures
1.5.4	Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies	N/A	⇔	Adaptation	- Adaptation strategies and measures

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[11] **Target 1.5**. By 2030**,** build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.

Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

SDG 2 calls for a profound change in the global food and agriculture system with a view to achieving hunger and poverty eradication, in response to the environmental degradation in soils, freshwater, oceans, forests and biodiversity and the increased pressure on resources as a result of climate change.[12] Agriculture is the single largest employer in the world, providing livelihoods for 40 per cent of today's global population. It is the largest source of income and jobs for poor rural households. At the same time, the agricultural sector is highly vulnerable to the effects of climate change, and adaptation is one of the priorities in reducing the impacts on agricultural productivity posed by the changing climate in vulnerable countries. In addition, the agricultural sector is the largest emitter of non-carbon dioxide (CO_2) GHG emissions such as methane (CH_4). Global GHG emissions from agriculture increased at an estimated average rate of 1.6 per cent per year during the period 1961–2010. GHG emissions associated with the existing food system also account for 24 per cent of total GHG emissions, according to the United Nations Environment Programme (UNEP) 2016 report *Food Systems and Natural Resources*, including 14 per cent of emissions generated by livestock supply chains.

In line with the objectives of SDG target 2.4 on sustainable agricultural practices,[13] the monitoring and assessment of the proportion of agricultural area under productive and sustainable agriculture (2.4.1) could be linked to MRV in two perspectives, although the linkage here is implicit and weak. Firstly, it could inform the measurement and reporting of mitigation and adaptation measures. The linkage is drawn when sustainable agricultural practices are encouraged to tackle climate change impacts as aligned with national development priorities, objectives or circumstances, considering that agricultural activities can influence the changes in soil organic carbon and sustainable management practices help to reduce carbon loss from agricultural soils.[14] Secondly, indicator 2.4.1 could inform GHG inventory reporting on agriculture, forestry and other land use (AFOLU). The change in the agricultural area under sustainable agriculture could influence carbon stocks in cropland. Accordingly, tracking of change in the proportion of agricultural area under productive and sustainable agriculture could inform the subcomponents of the AFOLU inventory, that is, annual area of land converted to cropland (hectare (ha)), annual biomass carbon growth (tonnes carbon year-1), and area for land-use change by climate and soil combination (ha) (category 3B2b, land converted to cropland); as well as annual harvested area (ha year-1) and (adjusted) daily emission factor for a particular harvested area (kg CH_4 ha-1 day-1) (category 3C7, rice cultivation).

With regard to SDG indicator 2.5.2, the proportion of local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction, this might not be directly linked to MRV components, but could constitute the subcomponent of the AFOLU inventory, namely, number of animals (3A1 and 3A2].

In line with the objective of SDG target 2.a on increased investment to enhance agricultural productive capacity, indicator 2.a.1 monitors the agriculture orientation index for government expenditures, defined as the agriculture share of government expenditures divided by the agriculture share of gross domestic

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[12] http://www.un.org/sustainabledevelopment/hunger/.

[13] **Target 2.4.** By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

[14] Tariyal K. 2014. Total carbon stock in agricultural system having crop rotation in Tarai region of Northern India. *Octa Journal of Environmental Research*. 2(2): pp.127–138. Available at http://sciencebeingjournal.com/sites/default/files/Total%20Carbon%20Stock%20in%20Agricultural%20System.pdf .

product (GDP). Government spending in agriculture includes spending on the sector policies and programmes; soil improvement and degradation control; irrigation and reservoirs for agricultural use; animal health management, livestock research and training in animal husbandry; marine/freshwater biological research; and afforestation and other forestry projects. The aggregated information can feed into national reporting where development priorities, objectives and circumstances in the agricultural sector are included as well as adaptation strategies and measures.

Table 4. List of indicators of Sustainable Development Goal 2 that are aligned with measurement, reporting and verification elements

SDG indicators		Source		Relevant MRV elements	
2.4.1	Proportion of agricultural area under productive and sustainable agriculture	N/A (Integrated farm survey proposed)	Δ	Mitigation; Adaptation	
				National GHG inventory (AFOLU)	- 3B2a Carbon stocks in cropland (i.e. area (ha)) - 3C7 Rice cultivation (i.e. annual harvested area)
2.5.2	Proportion of local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction	Global databank for animal genetic resources (FAO), provided by national coordinators for the management of animal genetic resources	Δ	National GHG inventory (AFOLU)	- 3A1 Enteric fermentation, 3A Livestock (i.e. number of animals)
2.a.1	The agriculture orientation index for government expenditures	NSO, Ministry of Finance and/or Agriculture, compiled by FAO	√ (→)	National circumstances	- Development priorities, objectives and circumstances
				Adaptation	- Adaptation strategies and measures

Goal 6: Ensure availability and sustainable management of water and sanitation for all

The targets for SDG 6 cover all dimensions of water use and protection of water sources from pollution. Water scarcity, poor water quality and inadequate sanitation negatively impact food security, livelihood choices and educational opportunities for poor families across the world. Water scarcity affects more than 40 per cent of the global population and by 2050, at least one in four people is likely to live in a country affected by chronic or recurring shortages of fresh water. And yet, more than 80 per cent of wastewater resulting from human activities is discharged into rivers or oceans without any treatment.[15] Additionally, the impacts of climate change, including rising sea levels that result in saline intrusion of water sources, aggravate water stress. Against such a backdrop, the efforts to improve water and sanitation systems are part of mitigation and adaptation actions and thus, the implementation of SDG 6 across all 8 targets and 11 indicators could inform MRV components of adaptation and mitigation actions in a broad concept.

For the purposes of this paper, however, two indicators under SDG 6 are linked to MRV. With the objective of achieving target 6.3 on the improvement of water quality by, inter alia, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally, SDG indicator 6.3.1 monitors the proportion of wastewater safely treated, which is directly linked to GHG inventory reporting on waste. The indicator can be tracked with the amount of wastewater treated (both domestic and

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[15] *Clean Water and Sanitation: Why it Matters*. Available at http://www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/6_Why-it-Matters_Sanitation_2p.pdf.

industrial wastewater through off-site and on-site facilities), divided by the total amount of waste produced. The data on treatment of domestic wastewater can inform reporting under category 4D1, domestic wastewater treatment and discharge, in national GHG inventories. Data on volumes of industrial wastewater for this indicator can be estimated from **inventories of industries** and the same set of information can serve category 4D2, industrial wastewater treatment and discharge, in national GHG inventories. This means that the information included in the national waste inventory can also be used in monitoring and assessing SDG indicator 6.2.1. In other words, the data set of volumes of domestic and industrial wastewater treated brings about mutual benefits.

Target 6.5 calls for the implementation of integrated water resources management (IWRM) and its indicator 6.5.1 monitors the different stages of development and implementation of IWRM. IWRM is defined as "a process which promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems." It has been accepted internationally as the way forward for efficient, equitable and sustainable development and management of the world's limited water resource.[16] By underscoring the importance of incorporated climate change adaptation in the water sector, IWRM is considered as a tool for adaptation to climate change. Thus, depending on national circumstances, the information monitored for SDG indicator 6.5.1 could be used in MRV, in the sections on adaptation strategies and measures or general description of national circumstances.

Table 5. List of indicators of Sustainable Development Goal 6 that are aligned with measurement, reporting and verification elements

SDG indicators		Source		Relevant MRV elements	
6.3.1	Proportion of wastewater safely treated	NSOs, compiled by WHO and UN-Habitat	⇔	National GHG inventory (Waste)	- 4D1 Domestic wastewater treatment and discharge (i.e. degradable organic component); - 4D2 Industrial wastewater treatment and discharge (i.e. wastewater generated)
6.5.1	Degree of integrated water resources management implementation (0–100)	A national survey by government officials, compiled by UNEP and UN-Water partners	Δ	National circumstances; Adaptation	

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

Energy is an essential factor for both poverty eradication and climate action. It is estimated that in 2015 about 2.8 billion people had no access to modern energy services and over 1.1 billion did not have electricity. Around 4.3 billion people are dying prematurely every year owing to indoor pollution resulting from cooking and heating with unsustainable fuels (e.g. wood, charcoal, dung and coal).[17] At the same time, energy is crucial for addressing climate change, since it contributes to around 60 per cent of total global anthropogenic GHG emissions.[18]

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[16] http://www.un.org/waterforlifedecade/iwrm.shtml.
[17] https://sustainabledevelopment.un.org/topics/energy.
[18] *Affordable and Clean Energy: Why it Matters*. Available at http://www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/7_Why-it-Matters_Goal-7_CleanEnergy_2p.pdf.

SDG 7 calls attention to [promotes] a global energy transition to clean and modern resources, by ensuring universal access to energy (target 7.1), increasing the share of renewable energy in the global energy mix (7.2) and doubling the global rate of improvement of energy efficiency (7.3). Across the targets, the global indicator framework for SDG 7 includes a set of information that could inform and/or could be informed by MRV components.

SDG indicator 7.1.2 monitors the primary household fuels and technologies for cooking, lighting and heating. It is calculated as the number of people using clean fuels and technologies divided by total population reporting that cooking, heating or lighting. "Clean" is defined by the emission rate targets and specific fuel recommendations (i.e. against unprocessed coal and kerosene) as included in the World Health Organization guidelines for indoor air quality, namely, household fuel combustion. Cooking, lighting and heating represent a large share of household energy use across the low- and middle-income countries, and households typically rely on solid fuels (such as wood, charcoal, biomass) or kerosene paired with inefficient technologies (e.g. open fires, stoves, space heaters or lamps) for cooking and heating.

The information that constitutes this indicator is linked to the subcomponents of national GHG inventory reporting on energy, that is, category 1A, fuel combustion activities. In compiling an inventory, GHG emissions from fugitive combustion activity are disaggregated by different fuels, including the above-mentioned fuels that households mostly rely on. This means, although the processed data required for the two monitoring frameworks are different, the data on household fuel combustion for the SDG indicator can inform the energy inventory, given the conceptual and practical linkages.

In monitoring SDG indicator 7.2.1, data are required on renewable energy consumption (including consumption of energy derived from hydro, solid biofuels, wind, solar, liquid biofuels, biogas, geothermal, marine and waste) and total final energy consumption, which is calculated as total final consumption minus non-energy use, using **national energy balances and statistics**. Similarly, indicator 7.3.1 requires data from national energy balances in the calculation of total energy supply, as energy intensity[19] is calculated by dividing total energy supply over GDP. The energy balances make it possible to trace all the different sources and uses of energy at the national level. The process of making national energy balances and statistics can benefit from national GHG inventories, as they address total final energy consumption and energy generation. Further, both monitoring of SDG indicators (7.2.1 and 7.3.1) and compiling the energy GHG inventory at the country level could benefit from the already existing energy balances and statistics.

Lastly, SDG indicator 7.a.1 monitors international financial flows to developing countries in support of clean energy research and development and renewable energy production. Although the metadata for this indicator does not exist at the moment, the country level information can inform and be informed by reporting of constraints and gaps, and related financial, technical and capacity (FTC) needs and support received and needed. Further, information on research programmes reported in the section of steps taken to integrate climate change can also support monitoring of the indicator.

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[19] Energy intensity is defined as the energy supplied to the economy per unit value of economic output. It is an indication of how much energy is used to produce one unit of economic output; and a proxy of the efficiency with which an economy is able to use energy to produce economic output.

Table 6. List of indicators of Sustainable Development Goal 7 that are aligned with measurement, reporting and verification elements

SDG indicators		Source		Relevant MRV elements	
7.1.2	Proportion of population with primary reliance on clean fuels and technology	WHO global household energy database	√ (→)	National GHG inventory (Energy)	- 1A1a Main activity electricity and heat production (i.e. energy consumption – mass, volume or energy unit)
7.2.1	Renewable energy share in the total final energy consumption	National energy balances (provided by NSOs and compiled by IEA and UNSD)	√ (←)	National GHG inventory (Energy)	- 1A Energy can inform this indicator in terms of *total final energy consumption*. Both 1A and 7.2.1 obtain information from *national energy balances*
7.3.1	Energy intensity measured in terms of primary energy and GDP	National energy balances (provided by NSOs and compiled by IEA and UNSD)	√ (←)	National GHG inventory (Energy)	- 1A Energy can inform this indicator in terms of *total energy supply (energy generation)*. Both 1A and 7.3.1 obtain information from *national energy balances*
7.a.1	International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems	N/A	√ (→) (←)	Steps taken to integrate climate change; Constraints and gaps, and related FTC needs	- Climate change research; - Support needed and received

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

SDG 8 promotes the transition to sustainable economic growth, with emphasis on improving economic productivity and global resource efficiency in consumption and production, developing entrepreneurship and innovation, promoting sustainable tourism, and providing decent work and employment for all. In particular, with the objective of target 8.4 to improve global resource efficiency in consumption and production and to decouple economic growth from environmental degradation, the indicators 8.4.1 and 8.4.2 monitor material footprint and domestic material consumption and the required data set shows linkages with national GHG inventories at the subcomponent level.

As per indicator 8.4.1, material footprint is the attribution of global material extraction to domestic final demand of a country. The total material footprint is the sum of the material footprint for biomass, fossil fuels, metal ores and non-metal ores. It is calculated as raw material equivalent of imports plus domestic extraction minus raw material equivalent of exports. The indicator will use the **global material flows database**, based on **country material flow accounts** from the European Union and Japan and estimated data for the rest of the world, produced on the basis of data available from different national or international data sets in the domain of agriculture, forestry, fisheries, mining and energy statistics. The data required for this indicator can be supplemented by the subcomponents of national GHG inventory reporting on industrial processes and product use (IPPU). The amount of metal production in the inventory (i.e. category 2C, metal industry) can inform subcomponents of indicator 8.4.1, for example, in the sum of material footprint for biomass, fossil fuels, metal ore and non-metal ores.

Similarly, the monitoring of domestic material consumption (SDG indicator 8.4.2) could involve data that are included in national GHG inventory reporting on IPPU. Domestic material consumption reports the amount of materials that are used in a national economy, which is either added to material stocks of buildings and transport infrastructure or used to fuel the economy as material throughout. It focuses on the consumption aspect of material stocks and can also be interpreted as long-term waste equivalent. Meanwhile, the IPPU GHG inventory focuses on the production side of material stocks and measures GHG emissions in the industrial process. The relationship between material consumption and production is not clearly drawn in the current metadata, but the database used for tracking the indicator could be relevant to subcomponents of the IPPU GHG inventory, considering the conceptual linkages.

Table 7. List of indicators of Sustainable Development Goal 8 that are aligned with measurement, reporting and verification elements

SDG indicators		Source		Relevant MRV elements	
8.4.1	Material footprint, material footprint per capita, and material footprint per GDP	Global material flows database (provided by NSOs; compiled by UNEP, OECD and EUROSTAT)	√ (←)	National GHG inventory (IPPU)	- Subcomponents of category 2C, metal industry, (i.e. amount of metal production) can inform subcomponents of indicator 8.4.1 (e.g. the sum of material footprint for biomass, fossil fuels, metal ore and non-metal ores (i.e. imports and domestic extraction – exports)
8.4.2	Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP	Global material flows database (provided by NSOs; compiled by UNEP, OECD and EUROSTAT)	Δ	National GHG inventory (IPPU)	- Material footprint (raw material consumptions) could be relevant to emissions in IPPU sector, considering the relationship between material consumption vs. production

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Economic growth, social development and climate action are heavily dependent on investments in infrastructure, sustainable industrial development and technological progress.[20] SDG 9 aims at building resilient infrastructure and promoting inclusive and sustainable industry in key economic sectors such as transport, manufacturing, energy, and information and communication technology.

Indicator 9.1.2 monitors the number of passenger and freight volumes reported for the air carriers through the International Civil Aviation Organization (ICAO) Air Transport Reporting Forms. Data for this indicator could be relevant to national GHG inventory reporting on energy, as one of the components that constitute the inventory is emissions from fuel combustion activities in transport (1A3), including civil aviation (1A3a). The major data source for the indicator, **ICAO Air Transport Reporting Forms**, collects aviation data at the country level. This could inform the calibration of emissions from air transport.

With the objectives to promote sustainable industrialization (target 9.2) and upgrade infrastructure and industries with sustainable technology and higher resource efficiency (target 9.4), the monitoring of indicators 9.2.1 and 9.4.1 could be linked to MRV components. Firstly, although the linkage is indirect, monitoring of 9.2.1, the manufacturing value added (MVA) as a proportion of GDP and per capita, could

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[20] *Industry, Innovation and Infrastructure: Why it Matters*. Available at http://www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/9_Why-it-Matters_Goal-9_Industry_1p.pdf.

be aligned with the subcomponent of the energy GHG inventory. The MVA is generally compiled as the sum of the value added of all manufacturing activity units in operation. Subcomponents required for the measurement of MVA, such as country-wide manufacturing activities by sector[21] could be used for the calibration of emissions from fuel combustion activities in manufacturing industries and construction (1A2).

SDG indicator 9.4.1, CO_2 emission per unit of value added, can be informed by the national inventory reporting on energy and/or IPPU. This indicator is currently being measured by dividing the amount of CO_2 emissions by value added (in United States dollars). It uses **energy consumption and value added data** from the United Nations Industrial Development Organization database and the United Nations Statistics Division (UNSD) energy database as well as the International Energy Agency database, and **emissions data** are directly reported by national statistics offices in many cases. A country can utilize the emissions data compiled in its national GHG inventory, namely, emissions from fuel combustion activities (energy 1A) and from industrial processes (IPPU 2).

The linkage of SDG indicator 9.a.1 on total official international support to infrastructure to MRV is relatively weak, as the international support to infrastructure could be designed and implemented for different purposes in terms of three dimensions of sustainable development. However, considering the objective of target 9.a, which this indicator supports, on facilitating sustainable and resilient infrastructure, country-level data disaggregated by sector (i.e. infrastructure) could provide relevant information in the reporting of adaptation actions and/or constraints and gaps and related FTC needs and support received and needed; or the information reported in the above-mentioned sections of national reports could inform the data constituting indicator 9.a.1.

Table 8. List of indicators of Sustainable Development Goal 9 that are aligned with measurement, reporting and verification elements

SDG indicators		Source		Relevant MRV elements	
9.1.2	Passenger and freight volumes, by mode of transport	ICAO Air Transport Reporting Forms	Δ	National GHG inventory (Energy)	- Indirect relation to MRV-GHG-1A3a (i.e. emissions from fuel combustion activities in transport (1A3) esp. civil aviation (1A3a))
9.2.1	Manufacturing value added as a proportion of GDP and per capita	UNIDO MVA database	Δ	National GHG inventory (Energy)	- Indirect relation to MRV-GHG-1A2 (i.e. emissions from fuel combustion activities in manufacturing industries and construction)
9.4.1	CO_2 emission per unit of value added	UNIDO database; UNSD energy database; IEA database; and NSOs' emissions data; compiled by UNIDO	√ (←)	National GHG inventory (Energy/IPPU)	- This can be informed by MRV-GHG-1A (energy, fuel combustion activities) and/or 2 (IPPU)
9.a.1	Total official international support (official development assistance plus other official flows) to infrastructure	OECD DAC statistics	Δ	Adaptation; Constraints and gaps, related FTC needs and support received and needed	- An indirect linkage can be drawn with the objective of target 9.a

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[21] https://stat.unido.org/content/learning-center/what-is-manufacturing-value-added%253f

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

Half of humanity – 3.5 billion people – live in cities today. By 2030, almost 60 per cent of the global population is projected to live in urban areas and 95 per cent of urban expansion in the next decades will take place in developing countries.[22] Rapid urbanization is exerting pressure on fresh water supplies, sewage, the living environment and public health. At the same time, cities and human settlements are critical to emission reductions, as well as to adaptation and building resilience to climate impacts. Cities account for 60–80 per cent of energy consumption and 75 per cent of carbon emissions due to energy generation, transport, industry and biomass use.

SDG target 11.2 addresses transport, a key sector for climate change mitigation, as it accounted for 33 per cent of 2014 global energy consumption[23] and 14 per cent of 2010 global GHG emissions.[24] Owing to the transport sector's current reliance on fossil fuels, indicator 11.2.1, which monitors the proportion of population that has convenient access to public transport, could be relevant to national GHG inventory reporting on energy, particularly as regards the emissions from fuel combustion activities in transport (1A3).

Similarly, SDG indicator 11.6.1 is aligned to MRV, as it monitors the proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated. The data for this indicator are collected in a two-stage process: on the one hand, the data constitute the summation in tonnes of all regularly collected waste for all sources and sum of all waste generated by the city or urban area, including collected and uncollected solid waste. On the other hand, the data comprise regularly collected solid waste that is reported as adequately discharged, divided by total tonnage of waste generated by the city. This indicator is established to monitor the progress in sustainable solid waste management, which includes waste reduction, reuse, recycling and composting, incineration and disposal in landfills. Thus, the subcomponents of the indicator, that is, total tonnage of waste collected regularly and adequately discharged, are aligned with the elements of national GHG inventory reporting on the waste sector, that is, data collected on emissions from solid waste disposal (4A), biological treatment of solid waste (4B) and incineration and open burning disaggregated by region and city (4C).

Many cities are also more vulnerable to climate change and natural disasters owing to their high concentration of people and their location, so building urban resilience is crucial to avoid human, social and economic losses.[25] SDG target 11.5 addresses the impacts of disasters, and indicators 11.5.1 and 11.5.2 monitor the human impact and economic loss, respectively. Thus, the data comprising indicators 11.5.1 and 11.5.2 are aligned with the information reported in the section on vulnerability and adaptation assessments in NCs (note that 11.5.1 repeats under SDG target 1.5, as 1.5.1).

SDG target 11.b reflects the importance of climate resilience and disaster risk reduction in urban areas. With the objective to "increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels", SDG indicators 11.b.1 and

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[22] Goal 11: Facts and figures. Available at http://www.un.org/sustainabledevelopment/cities/.

[23] International Energy Agency energy balances (2014). Available at http://www.iea.org/Sankey/#?c=World&s=Balance.

[24] Intergovernmental Panel on Climate Change (2014). Available at https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data.

[25] *Sustainable Cities: Why they Matter*. Available at http://www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/16-00055K_Why-it-Matters_Goal-11_Cities_2p.pdf.

11.b.2 are aligned with the reporting of adaptation strategies and measures (note that indicators are repeated under SDG target 1.5, as 1.5.3 and 1.5.4).

Table 9. List of indicators of Sustainable Development Goal 11 that are aligned with measurement, reporting and verification elements

	SDG indicators	Source		Relevant MRV elements	
11.2.1	Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities	GIS data, household surveys, compiled by UN-Habitat	Δ	National GHG inventory (Energy)	- 1A3a (i.e. emissions from fuel combustion activities in transport (1A3)
11.5.1	Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	National disaster loss database	⇔	Adaptation	- Vulnerability - Baseline conditions
11.5.2	Direct economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters	National disaster loss database	⇔	Adaptation	- Vulnerability - Baseline conditions (more focus on critical infrastructure and basic services)
11.6.1	Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities	Compiled by UN-Habitat, NSOs and city management teams	⇔	National GHG inventory (Waste)	- 4A Solid waste disposal - 4B Biological treatment of solid waste - 4C Incineration and open burning
11.b.1	Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030	National progress report of the Sendai Framework Monitor	⇔	Adaptation	- Adaptation strategies and measures
11.b.2	Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies	National progress report of the Sendai Framework Monitor	⇔	Adaptation	- Adaptation strategies and measures

Goal 12: Ensure sustainable consumption and production patterns

SDG 12 promotes sustainable consumption and production, which involves reducing resource use, degradation and pollution along the whole lifecycle, while increasing quality of life.[26] Eleven targets cover key drivers for sustainable consumption and production, including natural resource use efficiency (target 12.2), waste reduction (targets 12.3-12.5), promotion of sustainable lifestyles (target 12.8) and sustainable policy options (target 12.c), to name but a few.

With the objective to achieve sustainable management and efficient use of natural resources, SDG indicator 12.2.1 monitors material footprint (repeated in 8.4.1), a consumption-based indicator of resource use. As underscored above regarding 8.4.1, this indicator keeps track of material footprint for biomass, fossil fuels, metal ores and non-metal ores. The data can be supplemented by the

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[26] http://www.un.org/sustainabledevelopment/sustainable-consumption-production/.

subcomponents of GHG inventory reporting on IPPU, that is, amount of metal production by metal type, comprising emissions from metal industry (2C).

The food sector accounts for around 30 per cent of the world's total energy consumption and accounts for approximately 22 per cent of total GHG emissions.[27] While substantial environmental impacts from food occur in the production phase (agriculture, food processing), households influence these impacts through food-related energy consumption and waste generation. Against the backdrop, SDG target 12.3 aims to halve per capita global food waste and reduce food losses along production and supply chains and the indicator 12.3.1 monitors global food loss index. The indicator uses **agricultural food losses and waste data** collected by the Food and Agriculture Organization of the United Nations (FAO) as per the framework of the food balance sheets compilation. The represented segments of the data range from on-farm postharvest losses to losses and waste up to the retail sector of the supply chains. Waste at retail and household levels are not included in this indicator. And yet, the food losses and waste in the represented segments of the chain would incur emissions from biological treatment, that is, composting, and thus, the data can inform the estimation of CH_4 and nitrous oxide emissions from biological treatment of solid waste, in national GHG inventory reporting on waste (4B).

SDG target 12.4 addresses hazardous waste management, and its indicator 12.4.2 keeps track of hazardous waste generated per capita and proportion of hazardous waste treated. The information is directly correlated to the information required in national GHG inventory reporting on the waste sector, as the inventory collects data on the amount of hazardous waste incinerated in order to measure and report the emissions from waste incineration by type of waste (4C1).

With the objective of SDG target 12.5 to reduce waste generation through prevention, reduction, recycling and reuse, indicator 12.5.1 monitors national recycling rate in tons of material recycled. To produce this indicator, two statistics are required: total waste generation and total waste recycled. UNSD collects data on total waste generation through its **UNSD/UNEP questionnaire on environment statistics**. For total waste recycled, there is **no individual database or methodology** established but the data are collected as part of the treatment of municipal waste and hazardous waste. Consequently, there is an overlap between the data collected for the two types of waste, and non-hazardous industrial waste is not represented in this method.[28] The method could be supplemented by the data collection process for national GHG inventory reporting on waste, as the barometer that constitutes the GHG inventory, that is, the treatment (i.e. incineration and open-burning) of municipal solid waste including recyclable materials such as plastics, textiles, rubber, etc. (4C), could inform the subcomponent of indicator 12.5.1, namely, total waste recycled.

SDG target 12.8 aims to enhance awareness for sustainable development and lifestyles in harmony with nature. Indicator 12.8.1 monitors the extent to which relevant education, including climate change education, is mainstreamed in national education policies and practices. The disaggregated data focused on climate change education can inform and be informed by the elements of national reporting on steps taken to integrate climate change.

Lastly, SDG target 12.c reflects the importance of policy in reconciling the economy with human fulfilment and environmental preservation, by rationalizing inefficient fossil-fuel subsidies that encourage wasteful consumption and restructuring taxation and phasing out those subsidies. Indicator 12.c.1 monitors the amount of fossil-fuel subsidies per unit of GDP and proportion of total national expenditure on fossil fuels.

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[27]As footnote 26 above.

[28] As footnote 9 above.

The country-level data for this indicator are aligned with reporting on mitigation measures. Further, a closer look at the relationship between the change in fossil-fuel subsidies at the country level and change in the fugitive emissions from fuels (in national GHG inventory reporting on energy, 1B) can inform the assessment of the effectiveness of mitigation actions and the calibration of potential emission reduction.

Table 10. List of indicators of Sustainable Development Goal 12 that are aligned with measurement, reporting and verification elements

SDG indicators		Source		Relevant MRV elements	
12.2.1	Material footprint, material footprint per capita, and material footprint per GDP	Global material flows database (provided by NSOs; compiled by UNEP, OECD and EUROSTAT)	√ (←)	National GHG inventory (IPPU)	- Subcomponents of category 2C, metal industry, (i.e. amount of metal production) can inform subcomponents of indicator 8.4.1 (e.g. the sum of material footprint for biomass, fossil fuels, metal ore and non-metal ores (i.e. imports and domestic extraction – exports)
12.3.1	Global food loss index	Agricultural food losses and waste data, collected by FAO	√ (→)	National GHG inventory (Waste)	- 4B Emissions from biological treatment of solid waste
12.4.2	Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment	N/A (under development)	⇔	National GHG inventory (Waste)	- 4C Waste incineration (i.e. amount of hazardous waste incinerated)
12.5.1	National recycling rate, tons of material recycled	UNSD/UNEP questionnaire on environment statistics for waste generated; no individual database for waste recycled	Δ	National GHG inventory (Waste)	- Method for collecting data on waste recycled can be supplemented by MRV elements (i.e. treatment of MSW including recyclable materials)
12.8.1	Extent to which (i) global citizenship education and (ii) education for sustainable development (including *climate change education*) are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment	National reports submitted to UNESCO	⇔	Steps taken to integrate climate change	- Information on education, training and public awareness
12.c.1	Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels	N/A (under development)	⇔	Mitigation	- Mitigation measures - Mitigation assessments (a comparison between change in fossil-fuel subsidies vs. fugitive emissions from fuels (1B)

Goal 13: Take urgent action to combat climate change and its impacts

SDG 13 underlines the need for urgent action to combat climate change and its impacts, and specifically acknowledges the UNFCCC as the primary international, intergovernmental forum for negotiating the global response to climate change. Further, the global indicator framework acknowledges NCs and BURs as useful sources of the information required to track and monitor the achievements of SDG 13.

With the objectives of target 13.1 to strengthen resilience and adaptive capacity to climate-related hazards and natural disasters, indicators 13.1.1–13.1.3 monitor the impacts (13.1.1) and measures taken to address them (13.1.2 and 13.1.3). These indicators repeat under other goals (SDG 1 and 11). Data for these indicators are aligned with the information reported in the section on vulnerability and adaptation assessments, i.e. vulnerability, baseline conditions and adaptation strategies and measures.

Target 13.2 aims to integrate climate change measures into national policies, strategies and planning. Correspondingly, indicator 13.2.1 keeps track of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan that increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low GHG emissions development. The indicator makes specific reference to NCs and BURs as part of the data source. The information reported in the sections on adaptation and mitigation measures and steps taken to integrate climate change can not only feed into but also be complemented by the monitoring of SDG 13.2.1.

With the objective of target 13.3 to build human and institutional capacity, indicator 13.3.1 monitors the extent of education and awareness-raising on climate change mitigation, adaptation, impact reduction and early warning at the country level. The information for this indicator is interrelated to the information reported in NCs and BURs, steps taken to integrate climate change, especially regarding information on education, training and public awareness. Similarly, SDG indicator 13.3.2, which monitors the degree of institutional capacity-building to implement adaptation, mitigation and technology transfer, and development actions, is aligned to MRV, throughout the sections on national circumstances (especially development priorities and objectives), adaptation and mitigation measures, and steps taken to integrate climate change (in particular information on technology transfer, capacity-building, etc.).

Target 13.a aims to implement the commitment by developed countries to mobilize, by 2020, USD 100 billion annually in climate finance from public and private sources and its indicator 13.a.1 monitors the mobilized amount per year between 2020 and 2025 accountable towards the commitment. Among the multiple data sources identified for monitoring this indicator, the section in the national reports on constraints and gaps, and related financial, technical and capacity needs, including a description of support needed and received is highlighted. Similarly, with the aim of promoting mechanisms for capacity-building for effective climate change-related planning and management in the least developed countries (LDCs) and small island developing States (SIDS) (target 13.b), the SDG indicator 13.b.1 monitors the number of LDCs and SIDS that are receiving specialized support and amount of support. Data are collected through extracting information from the official reports and documents from Parties to the Convention and/or mandated activities under the Convention and the Paris Agreement, including NCs, BURs, nationally determined contributions and national adaptation plans.

Table 11. List of indicators of Sustainable Development Goal 13 that are aligned with measurement, reporting and verification elements

SDG indicators		Source		Relevant MRV elements	
13.1.1	Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	National progress report of the Sendai Framework Monitor	⇔	Adaptation	- Vulnerability - Baseline conditions
13.1.2	Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030	National progress report of the Sendai Framework Monitor	⇔	Adaptation	- Adaptation strategies and measures
13.1.3	Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies	National progress report of the Sendai Framework Monitor	⇔	Adaptation	- Adaptation strategies and measures
13.2.1	Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low GHG emissions development in a manner that does not threaten food production (including a NAP, NDC, NC, BUR or other)	Multiple components from different data sources (e.g. NDC, NC, BUR, NAP)	⇔	Adaptation; Mitigation; Steps taken to integrate climate change	- Special reference made to MRV (i.e. national reporting through NC and BUR)
13.3.1	Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula	Sources under UNFCCC process, e.g. NC, BUR	⇔	Steps taken to integrate climate change	- Information on education, training and public awareness
13.3.2	Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions	Sources under UNFCCC process and other relevant organizations	⇔	National circumstances	- Development priorities, objectives and circumstances
				Adaptation	- Adaptation strategies and measures
				Mitigation	- Mitigation actions
				Steps taken to integrate climate change	- Information on technology transfer; - Information on financial, technical and capacity needs
13.a.1	Mobilized amount of United States dollars per year between 2020 and 2025 accountable towards the USD 100 billion commitment	Sources under UNFCCC process, in consultation with OECD	⇔	Constraints and gaps, and related FTC needs	- Constraints and gaps, and related FTC needs; support needed and received
13.b.1	Number of LDCs and SIDS that are receiving specialized support, and amount of support, including finance, technology and capacity-building, for mechanisms for raising capacities for effective climate change related planning and management, including focusing on women, youth and local and marginalized communities	Sources under UNFCCC process, in consultation with OECD	⇔	Constraints and gaps, and related FTC needs	- Constraints and gaps, and related FTC needs; support needed and received

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

SDG 15 addresses the protection, restoration and promotion of sustainable use of terrestrial ecosystems, including forests, wetlands, mountains and drylands. Forests cover nearly 31 per cent of the planet's land area and play a key role in providing livelihoods and stabilizing climate and water cycles. Around 1.6 billion people depend on forests for their livelihood, including about 70 million indigenous people; and forests are home to more than 80 per cent of all terrestrial species of animals, plants and insects.[29] Biodiversity and the ecosystem services it underpins can increase the resilience of people to the impacts of climate change. Further, forests and other landscapes are both sinks and sources of GHG emissions. GHG emissions from forestry and other land uses accounted for 12 per cent of global GHG emissions from 2000 to 2009. Emissions are caused by deforestation and landscape degradation, while reforestation or forest growth can increase sequestration of carbon.[30]

Recognizing the importance of forests to both mitigation and adaptation, the SDG indicators underpinning targets 15.1–15.4 are strongly aligned with MRV elements. First, monitoring forest area as a proportion of total land area (SDG indicator 15.1.1) can inform and be informed by subcomponents of the national GHG inventory in the AFOLU sector, specifically in collecting country-level data on the area (ha) of forest land remaining forest and land converted to forest land (3B1).

Similarly, monitoring progress towards sustainable forest management (SDG indicator 15.2.1) is aligned with compiling the AFOLU inventory. The indicator is composed of five sub-indicators, two of which are closely linked to subcomponents of the AFOLU inventory: 1) forest area net change rate; and 2) above-ground biomass stock in forest.[31] The first sub-indicator focuses on trends in forest area in terms of direction of change (whether there is a loss or gain in forest area) and how the change rate is changing over time. The second sub-indicator monitors change in biomass stock due to forest growth and losses attributable to wood removals, natural losses, fire, wind, pests and diseases. Data for these sub-indicators can inform and be informed by the AFOLU inventory, categories forest land area and annual increase in carbon stocks in biomass (in forest land remaining forest land and land converted from other land uses; biomass growth/loss/conversion above- and below-ground (3B)).

SDG indicator 15.3.1, proportion of land that is degraded over total land area, involves multiple data sources, including **country database and joint survey compilation** with national agencies and international entities. The sub-indicators such as land productivity and carbon stocks are directly correlated with subcomponents of the national GHG inventory in AFOLU, that is, annual decrease in carbon stocks due to biomass loss (3B1a); area of organic soils on converted land; and annual carbon loss from organic soils (3B1b).

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[29] *Life on Land: Why it Matters*. Available at http://www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/15_Why-it-Matters_Goal15__Life-on-Land_3p.pdf.

[30] Smith et al. 2014. Chapter 11 in: *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Available at https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf.

[31] The other three sub-indicators are: 1) proportion of forest area located within legally established protected areas; 2) proportion of forest area under a long-term forest management plan; and 3) forest area under an independently verified forest management certification scheme. (Source: Metadata for SDG indicator 15.2.1, available at https://unstats.un.org/sdgs/metadata/files/Metadata-15-02-01.pdf.)

SDG indicator 15.4.2, Mountain Green Cover Index, measures the changes in the green vegetation in mountain areas (i.e. forest, shrubs, trees, pasture land, cropland, etc.). The indicator results from the juxtaposition of land cover data extracted from the **FAO Collect Earth tool** and the **global map of mountains produced by FAO/Mountain Partnership Secretariat in 2015** based on the UNEP-World Conservation Monitoring Centre mountain classification.[32] The data can feed into national the GHG inventory in the AFOLU sector, that is, forest land remaining forest land (3B1a), land converted to forest land (3B1b), and initial forest land converted to other land uses (cropland (3B2b), grassland (3B3b), wetlands (3B4b) and settlements (3B5b)). Further, the data compiled in the AFOLU inventory can also supplement the database managed by international entities for the SDG indicator.

Table 12. List of indicators of Sustainable Development Goal 15 that are aligned with measurement, reporting and verification elements

SDG indicators		Source		Relevant MRV elements	
15.1.1	Forest area as a proportion of total land area	Country report submitted to FAO	⇔	National GHG inventory (AFOLU)	- 3B1 (i.e. area of forest land remaining forest land; land converted to forest land)
15.2.1	Progress towards sustainable forest management	Country reported data, compiled by FAO	⇔	National GHG inventory (AFOLU)	- Two sub-indicators could inform and be informed by the AFOLU inventory (3B, area of forest land; change in carbon stocks in biomass)
15.3.1	Proportion of land that is degraded over total land area	Multiple data sources, e.g. national official data, surveys, UNCCD national reports	⇔	National GHG inventory (AFOLU)	- Data on land cover, namely, sub-indicators on land productivity and carbon stocks could be informed by and/or could inform subcomponent of 3B (emissions from forest land) in AFOLU - One of the subcomponents of 3B1a is "annual decrease in carbon stocks due to biomass loss" - Subcomponents of 3B1b (land converted to forest land) include area of organic soils on converted land; annual carbon loss from organic soils
15.4.2	Mountain Green Cover Index	FAO Collect Earth; global map of mountains produced by FAO/MPS, compiled by FAO	⇔	National GHG inventory (AFOLU)	- This could inform and/or could be informed from subcomponents of 3B (including 3B1 and 3B2-5, land converted to forest land)

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[32] Metadata for SDG indicator 15.4.2. Available at https://unstats.un.org/sdgs/metadata/files/Metadata-15-04-02.pdf.

Goal 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

SDG 17 aims to strengthen means of implementation and revitalize the Global Partnership for Sustainable Development. It includes 19 targets, 12 of which are means of implementation in four categories: finance, technology, capacity-building and trade; and 7 of which address systemic issues such as policy and institutional coherence, promotion of multi-stakeholder partnerships, and data, monitoring and accountability.

The finance targets (SDG 17.1–17.5) aim to strengthen resource mobilization, assist developing countries in attaining long-term debt sustainability, and promote and implement investments in sustainable development projects. Among the 7 indicators underpinning the finance targets, the indicator 17.2.1 could be relevant to reporting of constraints and gaps, and related financial, technical and capacity needs, including support needed and received. Monitoring the financial flow of official development assistance involves a broader concept of international development finance, and thus, the relevance of this indicator to MRV elements would depend on disaggregation by subsector and definition of climate finance.

The technology targets (SDG 17.6–17.8) aim to promote access to science, technology and innovation, especially environmentally sound technologies, through enhanced North–South, South–South and triangular regional and international cooperation. Although its metadata are under development, monitoring indicator 17.6.1, the number of science and/or technology cooperation agreements and programmes between countries, could be relevant to reporting measures taken or envisaged to implement the Convention (i.e. adaptation and/or mitigation measures) or steps taken to integrate climate change (i.e. activities relating to technology transfer, climate change research and systematic observation, etc.), depending on the disaggregation by subsector.

The capacity-building target (SDG 17.9) aims to facilitate the implementation of effective and targeted capacity-building in developing countries to support national plans to implement all the SDGs. Its indicator, 17.9.1, monitors dollar value of financial and technical assistance committed to developing countries. This indicator can be disaggregated by type of flow, by donor, recipient country, type of finance, type of aid, sector, etc. Data are reported by donors through the Creditor Reporting System. Depending on disaggregation by sub-sector, monitoring of indicator 17.9.1 might be relevant to reporting constraints and gaps, and related financial, technical and capacity needs, including support needed and received; and/or steps taken to integrate climate change (i.e. activities relating to technology transfer or climate change research and systematic observation).

The data, monitoring and accountability targets (SDG 17.18 and 17.19) aim to enhance national statistical systems and support statistical capacity-building in developing countries to measure progress on sustainable development with reliable data. Reflecting the emphasis on the efforts to improve national reporting mechanisms and to obtain comparable and standardized national data in the Secretary-General's report on the global indicator framework,[33] the indicators underpinning targets 17.18 and 17.19 are crucial for the MRV systems, although the information monitored for the indicators may not directly feed into MRV elements. The monitoring of indicators SDG 17.18.1–17.19.1 addresses the progress made in national capacity for data collection, management and monitoring, which is fundamental for countries to better implement MRV on a continuous basis.

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[33] As footnote 3 above.

Table 13. List of indicators of Sustainable Development Goal 17 that are aligned with measurement, reporting and verification elements

SDG indicators		Source		Relevant MRV elements	
17.2.1	Net official development assistance (ODA), total and to LDCs, as a proportion of the OECD DAC donors' GNI	Creditor Reporting System, compiled by OECD	TBD	*Depending on disaggregation by subsector; definition of climate finance, etc.*	
				Constraints and gaps, and related FTC needs	- Constraints and gaps, and related FTC needs; support needed and received
17.6.1	Number of science and/or technology cooperation agreements and programmes between countries, by type of cooperation	N/A (under development)	TBD	*Depending on disaggregation by subsector*	
				Mitigation Adaptation	- Adaptation strategies and measures
				Steps taken to integrate climate change	- Activities relating to technology transfer - climate change research and systematic observation
17.9.1	Dollar value of financial and technical assistance (including through North–South, South–South and triangular cooperation) committed to developing countries	Creditor Reporting System, compiled by OECD	TBD	*Depending on disaggregation by sub-sector*	
				Constraints and gaps, and related FTC needs	- Constraints and gaps, and related FTC needs; support needed and received
				Steps taken to integrate climate change	- Activities relating to technology transfer - climate change research and systematic observation
17.18.1	Proportion of sustainable development indicators produced at the national level with full disaggregation when relevant to the target, in accordance with the Fundamental Principles of Official Statistics	N/A (under development)	Δ	- Data, monitoring and accountability in general - Relevant to national capacity for data collection and monitoring	
17.18.2	Number of countries that have national statistical legislation that complies with the Fundamental Principles of Official Statistics	Survey conducted by Partnership in Statistics for Development in the 21st century (PARIS21)	Δ	- Data, monitoring and accountability in general - Relevant to national capacity for data collection and monitoring	
17.18.3	Number of countries with a national statistical plan that is fully funded and under implementation, by source of funding	PARIS21 country progress report	Δ	- Data, monitoring and accountability in general - Relevant to national capacity for data collection and monitoring	
17.19.1	Dollar value of all resources made available to strengthen statistical capacity in developing countries	OECD CRS; PARIS21	Δ	- Data, monitoring and accountability in general - Relevant to national capacity for data collection and monitoring	

5. Conclusion

The analysis presented in this paper demonstrates the high degree of alignment that exists between the SDG global monitoring framework and the MRV framework. The linkages between the two open up more opportunities for countries to readily engage in the monitoring of the progress in the achievement of the two global agendas. For developing countries, in particular, where resources may not be sufficient to carry out data collection and processing for all MRV provisions and/or SDG monitoring at the desired level of detail and frequency of monitoring, this mapping exercise can serve as an example to explore a potential synergistic approach to reinforce mutual benefits based on their distinct national circumstances.

Most data can be collected at different levels of aggregation. The more disaggregated, the more resource intensive is data collection. Thus, the mutual benefits can be even more reinforcing when the data for both SDG indicator and MRV elements are required to be disaggregated at the municipal level. For example, the data for monitoring indicator 6.3.1 on wastewater treatment, 11.6.1 on urban solid waste management, and 12.4.2 on hazardous waste management can be mutually beneficial for compiling national the GHG inventory in the waste sector, as per their respective subcomponents. Similarly, subcomponents of four specific indicators underpinning SDG 15 on forest management are interchangeable with subcomponents of the national GHG inventory in the AFOLU sector and thus the data collection process can be incorporated.

In addition, at the country level, it will be useful to revisit the established database and monitoring systems, and compare the MRV provisions and SDG global monitoring framework with already existing data. For example, national databases such as national energy balances and national disaster loss databases can be used in the process of and the preparation of NCs/BURs, as well as inform SDGs monitoring. As such, identifying opportunities to leverage the existing systems in order to maximize information and knowledge-sharing should be a priority. This will enable the MRV arrangements, as a tracking tool, and the SDG monitoring framework to dovetail well into the existing national monitoring and evaluation frameworks, and to be an integral part of successful implementation of national systems.

While synergies exist between the two monitoring frameworks for sustainable development and climate agendas, the recognition may not be comprehensive enough to capture the full potential benefits. Furthermore, understanding the alignment between the SDG global monitoring framework and the MRV framework is only the first step in grasping the benefits of approaching monitoring and implementation in an integrated and mutually reinforcing manner.

Much work remains to be done at the national level to achieve the kind of integrated approach that is called for. Ensuring the continuous flow of data from the data custodians, including the public and private sectors, to national statistics offices and the designated entity responsible for national reporting initiatives, will continue to be an important task. This is an overarching task for the post-2015 implementation agenda, which the SDGs themselves highlight, to foster policy and institutional coherence and multi-stakeholder partnerships as well as enhance the capacity of developing countries to increase the availability of high-quality, timely and reliable data. Linking the ways in which monitoring and reporting are undertaken for climate action and sustainable development to achieve the SDGs can be a critical tool in linking the two agendas and facilitating country-level implementation more broadly in a coherent and comprehensive manner.