

National Programme for Spatial Adaptation to Climate Change

Ministry of Housing, Spatial Planning and the Environment
Ministry of Transport, Public Works and Water Management
Ministry of Agriculture, Nature and Food Quality
Ministry of Economic Affairs
VROM 7222 / april 2007

Table of Contents

Summary

1. Framework
 - 1.1. Climate change
 - 1.2. Description of the problem
 - 1.3. Objective

2. Approach
 - 2.1. Three programme courses
 - 2.2. Customised, iterative, fast-paced, case studies and international
 - 2.3. Great importance of knowledge development
 - 2.4. Implementation in phases

3. Intended results
 - 3.1. Output and outcome
 - 3.2. Products of phase 1
 - 3.3. Products of phase 2
 - 3.4. Products of phase 3

4. Organisation and planning
 - 4.1. Parties involved
 - 4.2. Working method
 - 4.3. Timetable and funding

Appendix: Examples of knowledge questions on adaptation to climate change

Summary

Absolute certainty

There is no doubt that the climate is changing on a global scale and therefore also in the Netherlands. The effects can already be felt and predicted. Scientific research has shown that climate change cannot be prevented, even with all the good intentions in the world and strict mitigating measures. Therefore, we will have to learn to live with the consequences. The space in the Netherlands must be adapted such that the effects of climate change are "acceptable". After all, we cannot eliminate them. This has been termed, in short, the "climate proofing" of Dutch spatial planning.

In an effort to facilitate the climate proofing process, the State has taken the initiative to draft a National programme for Spatial Adaptation to Climate Change (ARK). This programme not only involves the State, but is also intended for and being developed in part by parties whose commitment to the cause is both necessary and desired. The State wants to work out the further details of this programme in cooperation with all relevant parties and monitor its implementation. All parties, i.e. government bodies, the business community, scientists, and civil-society organisations, will share in the responsibility for developing and implementing the programme activities. The task of climate proofing the Netherlands is a challenge which will be tackled collectively.

Table 1 lists the reasons for initiating an adaptation programme at this time (p. 4). The urgency expressed in this list was echoed in the presentations by the Prime Minister, the Minister and State Secretary of Housing, Spatial Planning and the Environment (VROM) and the State Secretary of Transport, Public Works and Water Management (V&W) during the National Conference entitled "Coping with climate change at government level in the Netherlands" ("Omgaan met klimaatverandering in bestuurlijk Nederland") (29 November 2005).

Core questions

The ultimate goal of ARK is to climate proof the spatial planning in the Netherlands. A sense of urgency will play a crucial role in this effort. Different parties have different assessments of the effects of climate change. Therefore, it is important to develop an unambiguous view of the effects of climate change for various sectors individually: transport, nature, agriculture, water, energy, public health, industry, leisure. The following are core questions for various sectors which must be answered in this context:

- What are the nature and scope of effects that can already be observed and effects that are expected to occur?
- What spatial issues does this raise?
- How can these spatial issues be tackled?
- What technical, administrative, economic and social dilemmas do we encounter when we attempt to solve these spatial issues?

Examples of knowledge questions on several subjects are included in the appendix to illustrate the nature of the effects of climate change and the type of adaptation that is called for.

Both the scope and the spatial aspects of these effects, as well as the unexpected relationships between them and the extent to which the effects reinforce each other, will be worked out further and where possible quantified in ARK. Possible adaptation measures will also be covered initially in a descriptive fashion and then later they will be assessed quantitatively for their cost effectiveness.

Missing links

The purpose of ARK is to answer the core questions set out above. These answers will not only serve to increase the sense of urgency on the part of various parties, but will also help us find a number of missing links, which are also considered essential to the process of climate proofing the Netherlands. These are the links:

- Developing a shared view with respect to the nature and scope of the effects
- Formulating a vision with respect to priority subjects
- Determining a strategy to encourage and coordinate individual initiatives
- Developing a framework for assessing adaptation measures
- Actually starting to implement the adaptation measures.

Programme courses to develop

Three "programme courses" have been identified for ARK, both to obtain answers to the core questions and to find the missing links. Within each of these programme courses, activities will be developed to actually make spatial planning in the Netherlands more climate proof. These are the courses:

Course 1: Raising awareness, forming networks and developing strategy

Course 2: Developing and disseminating knowledge, developing a common view

Course 3: Developing instruments, providing advice on measures and promoting innovation

Approach

The ARK approach can be characterised as follows: customised, iterative, fast-paced, case studies and international. "Customised" refers to the fact that activities will be carried out in areas where the need is greatest or is felt the most acutely, or where the opportunities are greatest. This will be done in a manner that is as consistent as possible with ongoing or previously scheduled spatial developments. Customised also relates to the group of parties involved, as the setting up, development and implementation of the programme can only be successful if carried out in close consultation with the relevant parties. Which parties are relevant will vary for each subject and phase.

The iterative nature of ARK manifests itself in the aim to involve different parties at different stages. All parties contribute toward the development of the various goals based on their individual possibilities and responsibilities. The iterative nature of the programme is also reflected in the aim to see the three programme courses in relation to each other and to shape them in that context.

"Fast-paced" refers to the timeframe within which ARK is expected to yield results. A National Adaptation Agenda will be complete one year after the start of the programme.

The term "case studies" relates to the fact that the development of adaptation strategies will be tested against actual practical situations throughout the duration of the project.

Lastly, "international" denotes the international focus of the programme, both with respect to research and policy.

Phase 1, 2 and 3

ARK will be implemented in phases. Phase 1 (February 2006 - February 2007) will mostly involve the drawing up of the National Adaptation Agenda 2007-2014, which will state which activities must be undertaken to climate proof the spatial planning in the Netherlands both in theory and in practice. The following activities will be carried out in phase 1 in connection with the drawing up of this agenda:

1. Communication and coordination (working sessions with local authorities, the business community and NGOs, seminars with policymakers and foreign experts)
2. Joint development of national adaptation strategy (high-priority issues and areas, outline of the approach)
3. Composition of the adaptation agenda, which sets out what has to happen first
4. Measuring the current climate proofing in the Netherlands (zero measurement)
5. Quick scan for knowledge gaps
6. Exploration of adaptation options (inventory, qualitative/quantitative arguments to substantiate short-term options)
7. Case studies (consistent with ongoing research, for example in Kampen along the IJssel river, details to be determined)
8. Analysis of current policy and investment decisions
9. Exploration of financial assessment methods for long-term issues
10. Administrative analysis

Based on the strategy and the national agenda, it is expected that the following projects will be completed in phase 2:

1. Translation of the strategy and the agenda into a proposal that sets out concrete activities for each party: options for adaptation (prospects for action)
2. Organisation of (administrative) commitment for proposed prospects for action and making implementation agreements for each party
3. Development and determination of a communication strategy
4. Modification of financial assessment framework
5. Determination of an ARK implementation programme

Phase 3 will mainly emphasise practical implementation. This phase will indicate which of the planned investments will be accelerated or modified and the development and implementation of innovative adaptation methods will be promoted. Products from phase 3 can be described as concrete projects, which will be launched in an accelerated fashion thanks in part to the implementation programme. If all goes well, these projects will be more innovative, better integrated and aimed more at the long-term than

would otherwise be the case and will therefore help bolster the Netherlands' ability to adapt its spatial planning.

A budget of €800,000 is needed to complete phase 1 and a similar amount is foreseen for phase 2. A budget of a different magnitude than for the first two phases will be needed for the promotion and implementation of concrete activities in phase 3. The goal is to arrive at concrete agreements in this regard as part of the formation of the new government based on the results of phase 1. It is anticipated that a staff of six to eight will be needed for the ARK programme team, which will consist of employees from the various parties involved.

1 Framework

1.1 Climate change

Mitigation and adaptation

The climate is already changing as these words are written, both globally and in the Netherlands. It is becoming more severe and the weather is growing more and more extreme in terms of precipitation, temperature and aridity. At the same time, the risks are also increasing, so much so that policy already has been developed and investment decisions modified for some areas, particularly with respect to water management. In the meantime, it has become clear that today's elevated greenhouse gas concentrations will impact the climate and weather systems for many years to come. This can be attributed to the delay in the climate system's response to change. Therefore, even very dramatic reductions in current emissions would not be enough to prevent climate change. Consequently, it is essential that we adapt to climate change, while continuing mitigation efforts unabated.

Impact on countless sectors

Climate proofing the Netherlands will mean making changes in numerous sectors including water, infrastructure and transport, investment, rural areas, leisure, nature, agriculture, national reserves, urban areas, public health and energy. The predicted impact of climate change is a subject that is already firmly rooted in flood prevention policy and anti-flooding measures. However, the impact on other sectors is likely to be at least as dramatic. These sectors therefore also require adaptation measures. Adaptations should therefore serve the common good with respect to issues like public health, attractive and secure environments for housing and businesses and dependable utilities, especially electricity and drinking water.

Spatial implications

The adaptation measures will have important implications for the use of space in the Netherlands. Examples include the selection of locations for new construction, as well as the climate for establishing a business and transport and energy security. The impact of climate change on these issues will be increasingly important. The overlap between climate-related and spatial planning issues is giving rise to important new questions and challenges relating both to risks and opportunities. Once the Netherlands is climate proof, the risks posed by climate change will be acceptable and kept to a minimum by employing an intelligent combination of measures in the spatial, technical, economic, ecological and socio-administrative systems. However, society clearly cannot preclude all of the effects of climate change. The goal should be to gain clarity as to the risks and the measures taken to keep them to a minimum.

Adaptation Programme for Space and Climate

Adapting the space to climate change will be an enormous task in the spatial planning process. New objectives will be added to the list of existing ones, new spatial solutions will be devised and new assessments will be made between conflicting interests and alternative solutions. Given that a simultaneous shift will take place towards more local decision making in the area of spatial planning, there will be major questions to contend with in matters of organisation, direction and participative decision making. After all, climate change, being a global problem and having countless facets that are of national interest, must be solved on a small scale, i.e. at regional level.

In an effort to climate proof the spatial planning in the Netherlands, the State has taken the initiative to draw up the National programme for Spatial Adaptation to Climate Change (ARK) in close cooperation with other parties. The following programme document outlines the activities to be carried out in the coming years. The first sections will give a description of the problem and the objective, after which the field of activity will be defined. Then the working method, division of tasks, scheduling and budget will be covered.

1.2 Description of the problem

Adaptation as a challenge for the future

The issue of climate change is not new. Within the framework of Water Management 21st Century, many plans were developed for our adaptation to changing weather conditions. There have also been government memoranda that dealt with the impact of climate change on the Network of Protected Areas (EHS). Distilling consequences, policy and the corresponding measures for various sectors from climate scenarios will be one of the greatest challenges of the future, for scientists, the government and the economy alike. It is clear that it is neither advisable nor possible to prevent all disasters imaginable. However, the sense that "acting after the fact" is no longer a sound option either is becoming more and more painfully evident.

The State will not be able to climate proof the Netherlands on its own, neither can the other authorities, nor the business community. The government, business community, civil-society organisations and research institutes need each other to bring the issue into focus and to work collectively to climate proof the Netherlands. The specific knowledge needed to make investment decisions and policy lines more climate proof is often not available. Take for instance knowledge about local climate impacts and the cost effectiveness of adjustments to investments. The prospects for action for the government, the business community, civil-society organisations and citizens are often, for many reasons, far from clear.

Missing links

At present, a number of important things are missing, including the following:

- Awareness: there is a broad awareness of climate change in society, but this has not yet been translated into concrete actions, i.e. the sense of urgency is minimal and prospects for action are not clear
- Shared view: As of yet, there is no common idea as to the long-term situation that can be anticipated
- Vision: there is no vision as to the high-priority topics

- Strategy: there is no strategy for promoting and coordinating the individual initiatives
- Assessment framework: there is no assessment framework for adaptation measures
- Agenda: there is no concrete, financially guaranteed implementation plan

1.3 Objective

Sense of urgency

Based on the new insights summarised in table 1, the Ministries of Housing, Spatial Planning and the Environment (VROM), Transport, Public Works and Water Management (V&W), Agriculture, Nature and Food Quality (LNV) and Economic Affairs (EZ) have taken the initiative to organise a National programme for Spatial Adaptation to Climate Change (ARK).

The ultimate goal of ARK is to climate proof the spatial planning in the Netherlands. A sense of urgency will play a crucial role in this effort. Different parties have different assessments of the effects of climate change. Therefore, it is important to develop an unambiguous view of the effects of climate change for various areas individually: transport, nature, agriculture, water, energy, public health, industry and leisure. Core questions that must be answered in this connection for the various sectors are contained in the box below.

Core questions

- *What is the scope of the effects of climate change that can already be observed and the effects that are expected to occur for the various sectors?*
- *What spatial issues does this raise?*
- *How can these spatial issues be tackled?*
- *What technical, administrative, economic and social dilemmas do we encounter when we attempt to solve these spatial issues?*

Collective task

Although the State initiated ARK, the programme should by no means be interpreted as something that "exclusively concerns the national government". The programme is meant as an outline; the details and implementation of the programme will have to be agreed in close consultation with other parties. In drawing up ARK, the State hopes to mobilise all stakeholders in the effort to climate proof the Netherlands. In this way, the State is assuming the role of director in this phase. The implementation will be the responsibility of all parties: the authorities, the business community and civil-society organisations.

Reading guide

Details of the chosen approach and the planned activities to achieve the goals are given in the next chapter. The intended results of the programme are described in chapter 3. Finally, chapter 4 will cover the organisational aspects of the programme.

Table 1: Why the national adaptation programme is being launched now

First we thought that...	But now...	And so...
<i>we would be able to prevent climate change. We would make UN agreements on greenhouse gas emissions, therefore keeping the problem in check.</i>	<i>...we see that there are countries that observe the agreements, but that that is just not enough - that the climate change that is unfolding before us now will continue for the time being.</i>	<i>we are going to pursue an adaptation course (adaptation to the changing climate) in addition to the mitigation course (reduction of greenhouse gas emissions).</i>
<i>climate change would be a very gradual process that could lead to problems in the distant future.</i>	<i>...we know that it also involves more and more extreme conditions ("a freakish climate") and that that is not something that may happen in the distant future, but something that is already happening now.</i>	<i>it is time for a wake-up call; people need to have a much broader awareness of climate change.</i>
<i>we had to focus particularly on model calculations of global weather systems.</i>	<i>...we realise that we need to adapt these calculations to local conditions. We need to know what is going to happen where - we need concrete information, including at lower levels.</i>	<i>we have to link generic science to local experience.</i>
<i>later, in the distant future, we would have to take other decisions.</i>	<i>...we realise that the return to society from the investment decisions that we take now may depend for a large part on the weather and climate conditions several decades from now.</i>	<i>the policy instruments that are used to compare investment proposals (social cost-benefit analyses, etc.) will be adjusted so that long-term costs and benefits are given full consideration.</i>
<i>every department basically had its affairs in order; they would just "take on climate change as an additional task", in other words, a sectoral approach would suffice.</i>	<i>...we find that it is precisely the interactions between the different effects that cause the problems; they reinforce each other and converge in some areas. The broad range of possible combinations and complex interrelationships make it difficult to predict what will actually happen. In any case, a sectoral approach will not suffice - the hurricanes in the U.S., for example, proved this once again.</i>	<i>an integrated, "cross-cutting" approach will be taken.</i>
<i>climate change was a water problem that was related to the environment. That made it the government's responsibility in two ways.</i>	<i>...climate change is society's problem with profound socio-economic consequences.</i>	<i>it is a problem that can only be tackled by a solid partnership between the authorities, knowledge institutes, universities, the business community and NGOs.</i>
<i>climate change was a problem that would become a major problem in the long term</i>	<i>...climate change also offers opportunities.</i>	<i>it is important to make the opportunities explicit both at national and local level for the business community and the authorities.</i>

2 Approach

2.1 Three programme courses

Various kinds of activities will be carried out to answer the core questions and fill in the missing links (see chapter 1). These can be divided into the following three programme courses:

Course 1: Raising awareness, forming networks and developing strategy

- *Communication, putting the issues on the agenda, support. Involving all relevant parties in the problems to raise awareness and to increase support for measures.*
- *Encouraging coordination and interaction between various parties: private and public, policy and research, citizens and administrators.*
- *Taking stock of what is necessary to clarify the prospects for action for the various target groups, including the authorities, citizens and the business community. In the process, the fact that the ideas, wishes and possibilities for action will change over the course of time will be taken into consideration.*
- *Joint development of a national adaptation strategy (high-priority issues and areas, outline of the approach) and an adaptation agenda (what has to happen first).*

Course 2: Developing and disseminating knowledge, and developing a common view

- *Gaining insight into the consequences of climate change for the Netherlands: What is in store for us? How will the various changes affect each other? Develop a common view of the risks and responsibilities on this basis.*
- *Taking stock and articulating policy questions at the various levels of scale. What knowledge is needed to formulate the policy tasks at the various levels of scale?*
- *Disseminating existing knowledge at the level of the various parties involved. A lot of knowledge has already been developed but needs to be converted to and communicated to the level of the "user" (region, business community, citizen, NGOs, government).*
- *Answering policy questions: Developing knowledge via the programmes under the Investments in Knowledge Infrastructure (Subsidies) Decree (BSIK) in this area, via the Specialist Departments of V&W, via the Planning Offices, etc. Additionally, it is crucial that a more structural basis be arranged for the interaction between knowledge and policy in this area.*

Course 3: Developing instruments, providing advice on measures and implementation

- *Clarifying what has to happen in the short term in any event. Which "robust" measures must be taken first?*
- *Increasing the ability of natural, socio-economic and administrative systems to adapt in the longer term through concrete projects and additional policy: working together to clarify what the prospects for action are for the various parties. Linking this to promoting the development of innovative methods to increase the Netherlands' adaptive capabilities and to the acceleration and adaptation of planned policy and investment decisions.*

2.2 Customised, iterative, fast-paced, case studies and international

Together with all involved parties, this government wants to identify what has to happen to climate proof the Netherlands. The prospects for action must be clarified at the various levels of scale.

Customised

Action must be taken in a number of different areas with respect to the climate changes now underway and those expected in the future by reconsidering investments, adjusting policy, developing knowledge, sharing experiences and developing new or modified instruments and innovative practical solutions. The first challenge is to act in a manner consistent with spatial developments and processes that are already being carried out within the framework of improving adaptive ability. Customised solutions will be a necessary part of this, as not all problems can be tackled and priorities will have to be set. That will be done in close consultation with the parties involved. The nature and scope of the local impacts will be decisive, as will be the options open to the various parties to achieve solutions.

In order to provide customised solutions later, it was decided to include as many parties as possible in setting up the programme and therefore to involve them already in the issue and the development of the approach. It is our express intention to maintain that involvement in the development of the details of the programme. Acting in line with their own roles and possibilities, the authorities, the business community and civil-society organisations will all play an important part in making spatial planning in the Netherlands climate proof.

Iterative

Involving many parties in the process will increase the likelihood of success, i.e. that practicable adaptation strategies will be developed. Each party will play a different, unique role. For instance, the national government will shoulder a different responsibility and have different powers and therefore a different role than provinces or water boards. In this case, involving market parties is expressly at issue, given their influence on the spatial planning in the Netherlands in the form of large and small investments in the physical infrastructure. Based on their own possibilities and responsibilities, all parties will help further the search for the desired administrative and physical measures that are deemed necessary. That means that the different parties will be involved in the implementation of ARK in different ways and at different stages. The key word is differentiation, whereby the State will be the primary director.

Fast-paced

ARK will develop at a very sharp pace. A National Adaptation Strategy and Agenda will be ready one year after the start of the programme. Various sub-projects will have to be completed for this purpose. To this end, a strict timetable and intensive cooperation will be needed. Work in the subsequent years (2007-2014) will centre on the development and implementation of concrete outline solutions.

Case studies

To further clarify what the role and the added value of ARK should be, a number of practical situations were examined as part of the preparation of this programme document, namely the safety measures

taken to protect against flooding in the IJssel delta, climate proof construction in the forelands of the Thames, green-blue veining to combat infestations in the Hoeksche Waard area, improving leisure facilities while reinforcing weak points in flood barriers off the coast, changes in the acquisition of land for the network of protected areas and dealing with water shortages due to drought. The results were used to develop the approach described above and to develop that approach into the three courses. A number of practical examples will also be set out in the programme itself. These examples play an important role in raising awareness, demonstrating the possibilities and ensuring that the adaptation strategies developed are also consistent with the concrete situations in practice.

International

The international focus is very important for the ARK programme, both in terms of the development of knowledge and policy. Knowledge will be developed in a manner consistent with international programmes and initiatives such as Climate Impact Research Coordination for a Larger Europe (CIRCLE), Biodiversity Requires Adaptation in Northwest Europe under a Changing Climate (BRANCHE) and European Spatial Planning: Adaptation to Climate Events (ESPACE). The projects of the EU's Sixth Framework Programme will also be involved. In addition, the work undertaken will be coordinated with the climate research programmes of the Ministry of Foreign Affairs.

It is also extremely important to track developments abroad with respect to policy. The need for national adaptation strategies is being considered within both the UN and the EC. One question is which frameworks can we expect, both generic frameworks (e.g. the Green Paper on adaptation due to be published by the EC in late 2006) and specific frameworks (e.g. EC directives in relation to maximum surface water temperature, which is an important aspect of the cooling problem). Another question is what we can learn from the adaptation strategies drawn up by others. Finland and California have already drawn up an adaptation strategy and other countries have already begun doing so. Finally, the possibility of using area visions that extend beyond national borders to increase our ability to adapt will be considered.

2.3 Great importance of knowledge development

Ongoing research

The dissemination and development of knowledge is an important part of the Adaptation Programme for Space and Climate. Research into adaptation is already being conducted, notably within the context of the BSIK programmes Climate for Space (Klimaat voor Ruimte), Living with Water (Leven met Water) and Innovative Use of Space (Vernieuwend Ruimtegebruik). These research programmes receive grants from the Economic Structure Enhancing Fund (FES) under the BSIK. The initial results of this research were used in designing the ARK programme.

BSIK institutes work together on 'route planner'

The first year of the ARK programme will include the development of the national adaptation strategy and agenda. In the interest of generating useful content for this first year, agreements were made concerning the three BSIK programmes. These programmes are now part of a partnership. The path that they will jointly follow within the framework of ARK has been dubbed "Route Planner". The research projects planned for the first year of the knowledge development course of ARK (Course 2) will constitute the work package for the 2006 Route Planner.

Integrating, combining, accelerating

In addition to specific adaptation research, a great deal of knowledge will be developed in relation to the broader subject of climate change and its impact. Parties researching this subject include the National Institute for Public Health and the Environment (RIVM), the Royal Netherlands Meteorological Institute (KNMI), the Netherlands Environmental Assessment Agency (MNP), the Netherlands Organisation for Applied Scientific Research (TNO), the Specialist Departments of V&W and LNV, the University of Amsterdam, Utrecht University, Wageningen University and the Delft University of Technology. At present, knowledge development in this broader area is fragmented and compartmentalised. In order to create a solid, substantively consistent basis for climate proofing the Netherlands, it is essential that these research efforts not only be integrated and combined, but also accelerated because thanks to new insights, the subject of adaptation has been placed much higher on the agenda of politicians, public administration and civil-society organisations (see table 1 for a brief explanation). In their presentations during the National Conference entitled "Coping with climate change at government level in the Netherlands" (29 November 2005), the Prime Minister, the Minister and State Secretary of VROM and the State Secretary of V&W underlined the urgency of the problems. The message was that we must quickly clarify the prospects for action of the various parties and that research will have to be intensified considerably in the short term to achieve this aim.

To achieve the intended goal of integrating, combining and accelerating, the organisations that initiated the development of a national adaptation programme (i.e. the four "spatial departments" at VROM, V&W, LNV and EZ and the knowledge institutes Alterra and the Institute for Environmental Studies of VU University Amsterdam that play a key role in the three BSIK programmes) decided to join forces to tackle this action point. A more programmed approach is being considered in the interest of increasing and monitoring the degree to which knowledge development in this area takes place in a consistent and

demand-driven manner and is based on high-quality science. The possibility of setting up a separate provision within the ARK programme for this purpose is being examined. One idea under consideration is setting up a special office that would be staffed by five people and would be in charge of articulating questions (particularly with the local authorities) and directing the research questions in a targeted manner to the best groups within the knowledge infrastructure (particularly with the knowledge institutes). In addition, the coordination of the climate research must be broadened, not only as regards adaptation research, but also mitigation research and research into the climate system itself, particularly where these two research areas play an important role in adaptation research. The details of this coordination will be worked out in the near future. In any event, the coordinating body will be responsible for providing an outline of the research programmes in the three areas previously mentioned (adaptation, mitigation and system knowledge), safeguarding the relations between the research programmes and involving all Dutch knowledge institutes in the area of climate research in the activities. Finally, the coordinating body will steer the process by which FES funds for climate research are gradually replaced by structural grants from government departments and research institutes. These developments will not play a role in the implementation of the first phase of the ARK programme.

FES claim: incentive for increasing research efforts

The more aware people become of the importance of climate proofing the Netherlands, and the clearer it becomes that this will require the commitment of many parties, the greater the need will be for knowledge. A major research effort will be required to tailor climate models as regards instruments and substance. Local authorities, businesses and civil-society organisations are also experiencing an increasing need for quantitative data about local climate effects and the cost-effectiveness of possible adaptation measures. An FES claim is being prepared in order to meet this quickly growing need for knowledge. The purpose of the FES incentive is not only to generate knowledge for adaptation issues, but also to integrate and reinforce the knowledge infrastructure with concentrations of knowledge and skills that will form a solid basis for the sizeable tasks facing the Netherlands, including in the longer term.

2.4 Implementation in phases

ARK will be implemented in phases. The first phase is actually the definition phase, which will involve exploring and determining the requirements with respect to adaptation in the area of space and climate in the coming years. In other words, the strategy and agenda will be decided in this phase. Next, phase 2 will explore and determine how the various activities that are considered necessary will be implemented and by whom. This phase will centre on making agreements as to who will take on what tasks. Finally, the actual implementation will begin in phase 3. Chapter 3 will give a more detailed description of which products will be completed in which phase.

3 Intended results

3.1 Output and outcome

Commitment is crucial

ARK will be implemented in three phases. The "what" and "how" will be determined in phases 1 and 2, respectively, and in phase 3 activities will be initiated in subsequent years to make the spatial planning in the Netherlands climate proof. The most important "output" of the first phase of ARK will be the national adaptation strategy and agenda. Both of these products will provide direction for the adaptation process. The actual result of ARK, the "outcome", should be climate proof spatial planning in the Netherlands. The three courses described in this programme should all provide the necessary details to achieve this outcome. An explanation is given in the box below of the "usefulness and need" with regard to the three courses. A description is provided as to the outcome if the courses are not carried out successfully.

Raising awareness, cooperating and developing strategy are crucial

If course 1, which centres on raising awareness, cooperating and developing strategy, is not carried out successfully, the most that will happen is that isolated activities will be undertaken here and there to limit the risks at the local level. The problem will be ignored, whether consciously or unconsciously. Decreasing agricultural yields, increasing insurance costs (which presently double every ten years due to storm damage), decreasing biodiversity and more frequent flooding of city centres will be constantly attributed to different causes. There will be no sense that the problem needs to be tackled systematically and in mutual consultation; everyone will solve their own problems as well as possible at the local level without seeing the bigger picture.

Knowledge is vital

If course 2, the knowledge course, falls short of expectations, risks will either be over or underestimated based on simplistic speculation. A common view of what is happening and what we could do about it will not develop, which will result in water boards and provinces and municipalities and the national government sending out conflicting messages. Citizens will no longer understand what is going on. The majority of the population will be under the erroneous impression that the government will "take care of it all", while the rest of the population lives in fear unnecessarily. A feeling of uncertainty will prevail in businesses and particularly internationally oriented businesses will relocate to countries where there are fewer risks or where they can insure themselves better. The Netherlands will lose its international image as the water expert.

Adaptation through concrete measures

If course 3, the measures course, is not successfully completed, ultimately nothing will happen in the Netherlands with respect to adaptation. A great deal of money and energy will have been devoted to developing strategies and new knowledge, but the goal of climate proofing the spatial planning in the Netherlands will remain theoretical. Anticipating events based on what we know will happen ends up being an unattainable ambition. We accept that investments made today will lead to a return for society

later that falls way short of expectations. We passively wait for the first real disaster before taking action, which will be extremely expensive.

3.2 Products of phase 1

The most important product of phase 1 will be the National Adaptation Agenda itself. The following activities will be carried out in phase 1 to compile this agenda:

Course 1: Raising awareness, forming networks and developing strategy

- *Coordinating, communicating, putting the issues on the agenda (1)*
 - Working sessions will be held with local authorities, the business community and NGOs with the aim of increasing their involvement, generally speaking in the problem of adaptation to the climate and more specifically in the ARK programme. In the initial phase, efforts will be focused mainly on determining as a group which direction the development of the various activities should take, as regards both the content and the process. Next, the results will be discussed and ultimately they will be used to jointly build the strategy and the agenda.
 - A more general communication line will have to be employed in addition to the "targeted line" because the awareness as to the need for action is still very varied. This will be done in a manner consistent with the BSIK communication projects, amongst others.
 - The international context will play an important role in the Dutch adaptation strategy. What should the Netherlands do as a country and what should we leave to neighbouring countries or other Member States, for example in the area of water management, nature development, changes in agriculture, etc? Explicit attention will be paid to international coordination as part of this course.
- *National adaptation strategy (2)*

The high-priority issues and areas will be named in the national adaptation strategy and the main features of how they can best be approached will be indicated. The strategy is a first "taste", a "living document" that will be modified as scientific insight and practical experience evolve. The strategy will cover raising awareness, developing knowledge, cost-effective adaptation options and the division of the responsibilities amongst the various parties.
- *Adaptation agenda (3)*

The adaptation agenda will indicate which concrete measures must be taken first.

Course 2: Developing and disseminating knowledge, and developing a common view

- *Zero measurement to determine the current climate proofing in the Netherlands is and quick-scan of knowledge gaps (4 and 5)*

The zero measurement and the quick scan will be carried out based on available knowledge. MNP will help estimate the economic aspects of adaptation. The long-term development of cooling water capacity will be examined as part of the zero measurement.
- *Exploration of adaptation options (6)*

First an inventory will be made of adaptation options - of a purely theoretical nature and those that have been tested in practice - both in the Netherlands and abroad. Next, qualitative arguments will be provided to substantiate the robust adaptation measures that can/must be taken in the Netherlands in

the short term (within the next 10 years), the adaptation measures for the medium term (in 10 to 20 years) and/or the adaptation measures for the long term (after 2025). The analyses will be conducted based on available information and knowledge. Finally, quantitative arguments will be provided to substantiate these short-term options focusing not only on direct costs, but also on the claim on space, effectiveness, costs and benefits for society, and social acceptance.

- *Case studies (7)*

To get a sense of what is feasible in concrete terms, a number of practical situations will be 'investigated'. This will be done in a manner consistent with ongoing research, for example along the IJssel river near Kampen, the Veenweide area and the Westergouwe district. The details of the practical situations will be determined at the beginning of the project. The urgency will play an important role in this context: where are large-scale spatial developments or investments planned in the short term that will be significantly affected by climate change.

Spoor 3: Course 3: Developing instruments, providing advice on measures and implementation

- *Analysis of current policy and investment decisions (8)*

The insight acquired from course 2 and the support from course 1 will indicate which of the participating parties want to take a closer look at which policy lines and investment decisions with respect to climate change. Depending on the themes and the political/administrative setting, the decision may be made to have an analysis carried out as part of the BSIK programmes, or by other parties, such as the Specialist Departments of V&W, the planning offices, TNO, etc.

- *Exploration of financial assessment methods for long-term issues (9)*

A system will be sought for conducting social cost-benefit analyses – possibly consistent with the Economic Integration Agreement (OEI) system – that can play a role in the determination and assessment of adaptation measures. For this purpose, a study will be conducted into the possibilities for factoring the *long-term* costs and benefits of investments more effectively into investment decisions. In the process, the methods used in other countries will be examined. The planning offices will clearly play an important role in these activities.

- *Administrative analysis (10)*

The "administrative pressure" (difficulty in decision-making resulting from confusion over the division of powers and responsibilities) that exists in spatial planning *and* crisis management is a focal point for the climate proofing of the Netherlands. These problems will be studied further in this project and lines of thinking will be developed for possible future configurations.

3.3 Products of phase 2

Before the actual projects can be carried out, a number of matters will have to be properly organised during phase 2. It must not only be clear to everyone *what* is needed, but in particular also *how* the necessary activities can be completed: who will provide funding, who will implement, monitor, etc. For this purpose, the following activities are planned for phase 2 based on the national adaptation strategy and agenda developed in phase 1:

1. Translation of the strategy and the agenda into a proposal that sets out concrete activities for each party: options for adaptation (prospects for action)
2. Organisation of (administrative) commitment for proposed prospects for action and making implementation agreements for each party
3. Development and determination of a communication strategy
4. Modification of financial assessment framework
5. Determination of an ARK implementation programme

In addition, the Social Centre of Excellence for Climate and Space will work at full capacity during this phase.

3.4 Products of phase 3

Phase 3 will centre primarily on the actual implementation of measures: courses 1 and 2 will definitely continue, but course 3 will receive the most attention.

The goal of the implementation programme is to accelerate or adjust planned investments and to promote the development and implementation of innovative methods that will increase the ability to adapt. The products of phase 3 can be described in terms of concrete projects. If all goes well, these projects will be more innovative, better integrated and aimed more at the long-term than would otherwise be the case and will therefore help bolster the Netherlands' ability to adapt its spatial planning.

The goal is to have achieved the following by the end of phase 3:

- The hotspots have been tackled. These are locations where climate effects reinforce each other, the risks – and opportunities – are greatest and the adaptive ability must be improved in the short term.
- Innovative methods and processes for increasing the Netherlands' ability to adapt have been developed and implemented.
- A financial assessment method in which long-term costs and benefits are fully considered is being used systematically in comparing large-scale investment proposals.
- The Netherlands is climate proof. Conscious decisions have been made on areas that are still high-risk.
- The Netherlands occupies a solid position in terms of coordination and negotiation with respect to adaptation at the EU, UN and bilateral level.

4 Organisation and planning

4.1 Parties involved

Authorities, business community and civil-society organisations

Provinces, municipalities and water boards will be closely involved in shaping and implementing the various ARK programme activities. The aim is to expand the current ARK Steering Committee, which now consists of directors representing the four ministries most involved in ARK - V&W, LNV, EZ and VROM - to include representatives from the Association of Provincial Authorities (IPO), the Association of Netherlands Municipalities (VNG) and the Association of Water Boards (UvW). Consultations with these organisations are now underway to discuss the specific details of this expansion.

The business community and civil-society organisations will also be invited to play an active role in the ARK programme. The best form of cooperation will be considered together with individual businesses and organisations (DuraVermeer, Shell, the Netherlands Water Partnership (NWP), the Netherlands Society for Nature and the Environment, the Red Cross, etc.) and trade associations (Confederation of Netherlands Industry and Employers (VNO-NCW), HERE, etc.).

The involvement of these parties will play an important role in the communication plan to be written within the framework of course 1.

Knowledge providers

Knowledge development is an important objective of ARK. Therefore, the most important research bodies and programmes will be closely involved in ARK. Initially, these will be the BSIK climate change programmes, the planning offices and the Specialist Departments of V&W and LNV. Depending on the content that is the focal point in the knowledge projects, TNO and the Delft University of Technology and Utrecht University may also be asked to participate.

The collaboration between the BSIK programmes with respect to space and climate will take shape in a separate path: "Route Planner 2010-2050". For subsequent phases of ARK, an effort will be made to achieve greater coherence within the area of climate research and more demand-driven knowledge development. Additionally, an FES claim will be prepared to increase the research budget.

Communication experts

Because communication and raising awareness are vitally important, an attempt will be made to form an alliance with organisations such as the Rathenau Institute and the Expertise Centre for Risk and Crisis Communication (ERC), which has been in operation within the Ministry of the Interior and Kingdom Relations (BZK) since May 2005. Where relevant, alliances can also be forged with "new initiatives", such as "De Nieuwbouw", which encourages young people to contribute ideas for the long-term view of a climate proof Netherlands and the "Klimaatmagazine", a magazine about the climate that was started within the framework of the BSIK programme Space for Climate. All in all, a rich patchwork of parties is emerging that will carry out a broad range of activities in the form of projects, programmes and (policy) processes. This image is very dynamic. The pursuit of climate proof spatial planning in the Netherlands is in an exploratory phase. Parties are getting acquainted with the subject, evaluating whether there are

major risks or opportunities involved for them and then deciding whether or not they will participate more intensively. In the process, it should become clear which subjects are high-priority, which outline solutions have potential and which parties and partnerships are suited to them.

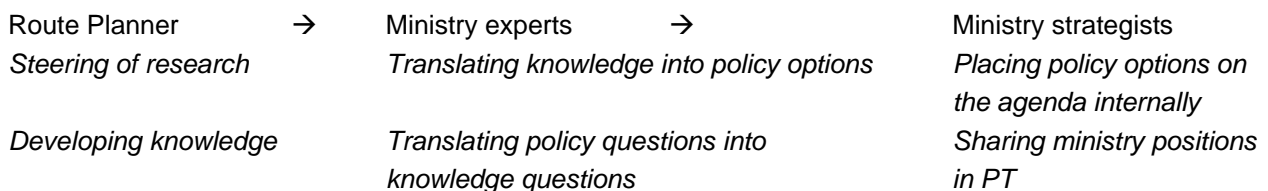
4.2 Working method

ARK Programme Team responsible for implementation

The ARK Programme Team will implement the project. This team will be put together over the course of spring 2006 and will ultimately consist of six to eight employees from the ministries involved, IPO, VNG, UvW and the Route Planner. A strategic adviser from each ministry will be a member of the Programme Team. The strategic adviser will be responsible for placing items on the agenda within the ministry in question from the ARK programme, including the ministry's view of the path taken by the programme and of the results. The strategic adviser will represent the ministry within the ARK Programme Team. He or she will share the positions, questions and responses of the ministry with respect to the results of the programme.

In addition, each ministry will appoint technical experts that will maintain direct ties with the Route Planner project. These experts will be the technical contact persons for the external (Route Planner) project managers of the research projects, particularly those planned within the framework of Course 2. Depending on the breadth of the research projects and how expertise is distributed within the ministry, multiple experts may be appointed within a given ministry. The experts will be expected to act as knowledge brokers. They will be able to respond on the technical content of draft research reports and where necessary advise the ARK Programme Team (PT) about adjusting research lines. They will be able to translate the research results into policy options and to help the Route Planner project managers to translate policy questions into knowledge questions.

Expressed schematically:



The Coordinator of Course 2 will represent the Route Planner in the ARK Programme Team. To date no concrete agreements have been made regarding the specific contributions from IPO, VNG and UvW to the Programme Team.

The members of the Programme Team may be employed by the National Spatial Planning Agency (DGR) at VROM for a shorter or longer period, depending on their roles and availability. In any event, "team-wide" coordination meetings will be held periodically. The Programme Manager provided by DGR will be in charge of the day-to-day management of the ARK Programme Team.

Steering by the ARK Steering Committee

The ARK Steering Committee will direct the programme in general matters. Directors from the four ministries (V&W, LNV, EZ and VROM) will be represented on the Steering Committee. There will also be representatives from IPO, VNG, UvW and the Route Planner. The business community and NGOs will also be involved in shaping and implementing the ARK programme activities. Consultations are still in progress regarding the most suitable form for doing so. The results of the ARK programme will be submitted periodically to the National Land Use Planning Commission (RPC). Table 4 shows when feedback opportunities are planned for the first year.

Route Planner to provide substantive support

Given the importance of the substantive support to be provided by the Route Planner, agreements about the collaboration between ARK and Route Planner are described in a separate document. In short, the Route Planner's role is threefold.

In Course 1 (Raising awareness, forming networks and developing strategy), members of the Route Planner project will actively contribute ideas regarding the form that the activities should take and will contribute to their implementation. The role in this case is "co-designer, co-implementer". As part of this course, the ARK Programme Team can also call on the services of external communication agencies, process coaches and consultancies in the area of strategy development, in addition to the services of the members of the Route Planner project.

The projects planned for Course 2 (Developing and disseminating knowledge and developing a common view) will be implemented by the Route Planner in an integrated fashion. The knowledge institutes affiliated with the Route Planner will, in principle, be "in the driver's seat" for the implementation of these projects. The Route Planner's role in this course is that of "project manager".

Finally, in Course 3 (Developing instruments, providing advice on measures and promoting innovation), the Route Planner will play the role of expert and can be called in depending on the nature of the specific project.

Contribution by planning offices in the thought process

First, the planning offices will be asked to consider critically the path taken by the ARK programme and the interaction between science and policy. Separate requests for advice may be submitted for this purpose. One possibility might be an "ex ante" evaluation of the adaptation agenda, partially based on the long-term scenarios to be provided by the planning offices, which will be ready in the course of 2006. Additionally, the planning offices will be expected to take on the role of expert, particularly with respect to the products planned for course 3. The concrete details of these two roles will be worked out jointly in the short term.

Separately from these activities, the Route Planner institutes may ask the planning offices to contribute to the projects in Course 2 as a technical expert, data administrator or model expert, etc.

4.3 Timetable and funding

Phase 1

The task of defining the programme will be concentrated in the first phase and will take one year (February 2006-February 2007) to complete. During the first phase, the outline of the adaptation strategy and the first adaptation agenda will be drawn up. These will form the basis for formulating the activities for phases 2 and 3 (2007-2014).

The work budget for the first phase of ARK (early 2006 - early 2007) amounts to € 800,000. The three ministries that are most closely involved will together contribute € 300,000. Per ministry, this amounts to € 100,000, which will be taken out of the regular ministry budgets. The Route Planner will contribute the remainder in the amount of € 500,000. This sum will be generated by doubling the "in-kind" ministry contributions to the ARK programme (totalling 4.6 FTEs). Tables 2 and 3 provide an indication of the budget and the distribution amongst the various products and parties. Table 4 shows the timetable and the most important connections between the various ARK activities.

The € 300,000 to be contributed by the ministries will be used by the ARK Programme Team for hiring organisations to prepare and supervise workshops, for drawing up and implementing communication plans (particularly Course 1 activities) and for employing consultancies or other research institutes not affiliated with the Route Planner that will contribute specific expertise (particularly Course 3 activities). Therefore, this budget will not be used to finance any Course 2 activities; the assumption is that these will be paid for with BSIK funds by doubling the "in-kind" ministry contributions to the ARK programme.

The amounts shown in table 2 are approximations of the funds needed and are meant as an indication. A more detailed check is underway of the projects in progress or planned in connection with the BSIK programmes affiliated with the Route Planner and of the products that are required within the framework of the first phase of the ARK programme.

Of course, it is also expected that the Route Planner will contribute to the activities in Courses 1 and 3. The assumption is that any costs incurred by the Route Planner institutes will be covered by the contributions to Course 1 activities by doubling the "in-kind" contributions of the ministry employees. The ARK programme will provide funding separately in cases where it calls on the expertise of the Route Planner institutes for Course 3 activities that cannot be 'worked into' projects in progress that have already been financed.

Table 2: Phase 1 budget

Courses	Activities and products	Indication of budget (in 1000s of euros)	Funded by	Completion
Course 1: Raising awareness, forming networks and developing strategy	1 Coordinating, communicating, putting on the agenda	80	Ministry (*)	Ongoing
	2 Adaptation Strategy	50	Ministry (*)	Oct 06
	3 Adaptation Agenda	50	Ministry (*)	Jan 07
Course 2: Developing and disseminating knowledge, developing a common view	4 Determination of the zero measurement of climate proofing	120	RP (**)	Apr 06
	5 Quick scan for knowledge gaps	40	RP (**)	Apr 06
	6 Adaptation options	240	RP (**)	Oct 06
	7 Case studies	100	RP (**)	Oct 06
Course 3: Developing instruments, providing advice on measures and promoting innovation	Analysis of current policy and investment decisions	40	Ministry (*)	Aug 06
	9 Funding system for long-term investments	40	Ministry (*)	Jan 07
	Administrative analysis (10)	40	Ministry (*)	Jan 07
Total		800		

(*) ministries, from the regular budget

(**) Route Planner, by doubling "in-kind" ministry contributions

Table 3: Distribution of ministry contributions to phase 1

	VROM	V&W	LNV	Total
Direct contrib. (in 1000s of euros)	100	100	100	300
Personnel capacity	0.4 FTE - strategic adviser 0.8 FTE – technical expert 0.4 FTE - programme manager 1.2 FTE - programme employee	0.4 FTE - strategic adviser 0.5 FTE – technical expert	0.4 FTE - strategic adviser 0.5 FTE – technical expert	4.6 FTE

Phases 2 and 3

In phase 2, which is expected to last for one year, agreements will be made with various parties about the implementation of the national adaptation agenda and a preview will be given of the third phase, which will occupy the next six years. During the course of the third phase, the goal will be to bring climate change into the mainstream in terms of decision-making on policy and investments, the citizens' behaviour and the research programming of knowledge institutes. ARK will play an important role in this effort with respect to promoting, providing advice and monitoring. ARK itself will not have the task of steering any concrete implementation projects. Instead, this responsibility will be left to the parties involved in the programme.

For the time being, the budget for the second phase (2007) is assumed to be comparable to that of the first phase (0.8 million euros). There is no budget indication available at this time for the third phase (2008-2014). Given that this phase will focus on realisation, i.e. developing and implementing innovative methods and accelerating and modifying large-scale planned projects, it goes without saying that a budget of a different magnitude will be required than for the first two phases. The goal is to arrive at

concrete agreements in this regard as part of the formation of the new government based on the results of phase 1.

Funding for the third phase could come from the "regular" budgets of the parties involved in ARK, from FES, investment programmes such as the Investment Budget for Rural Areas (ILG), the Investment Budget for Urban Regeneration (ISV) and the Innovation Programme for Urban Regeneration (IPSV) or the EU.

Table 4. Timetable and interrelationship between the phase 1 activities

Timetable for ARK, Route Planner and parallel developments, version 3, 9 March 2006																
	PM (*)	2005					2006									
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
ARK programme	M															
Development of programme doc.		[Bar from Oct 2005 to Jan 2006]														
Approval in RPC/RMC					[Bar from Jan 2006 to Feb 2006]											
Steering Committee meetings			✧		✧		✧		✧		✧		✧		✧	
<i>Course 1: Raising awareness, forming networks and developing strategy</i>																
1 Coord., commun., placing on agenda	M	[Bar from Oct 2005 to Dec 2006]														
2 Adaptation Strategy	M															
3 Adaptation Agenda	M															
<i>Course 2: Developing knowledge and common view</i>																
4 /Zero meas. of climate proofing	R															
5 Quick scan of knowledge gaps	R															
6a Identifying strategies	R															
6b Qual. substantiation of S.T. options (**)	R															
6c Quant. substantiation of S.T. options(**)	R															
7 Case studies	R															
<i>Course 3: Developing instr., advice on measures, implementing (***)</i>																
8 Anal. current policy en invest. dec.	M															
9 Funding system. L.T. invest. (**)	M															
10 Administrative analysis	M															
Parallel developments	M															
Preparing and submitting FES claim																
RMNO knowledge arena																
VRM Council advice																

(*) P=project manager; M=ministries; R=Route Planner (** S.T. = short-term L.T.= long-term (***) involvement of planning offices

Appendix: Examples of knowledge questions on adaptation to climate change

For each subject, information is needed about the effects of climate change and possible adaptation measures. Examples of thematic knowledge questions:

Transport: To what extent are the Dutch road system ("traffic infarction" ('verkeersinfarct'), 25 November 2006) and the Dutch rail system prepared for the increasing severity of the weather conditions? What impact will the changing wind directions and the increasing frequency of heavy storms have on Schiphol airport? How can we prepare for this?

Nature: The National Ecological Network and nature reserves are arranged based on the species of plants and animals found there. It has already been demonstrated that many species are migrating to the north. How can you organise nature conservation so that these movements are taken into account?

Agriculture: Crop yields in Spain, Portugal, Italy and Greece will decrease due to increasing summer temperatures and water shortages. What opportunities does this offer the Netherlands? New plant diseases will appear in this country. Is there anything we can do about that?

Water: The hot summer of 2003 will be an average summer in 2050. The dikes and peat dikes proved unable to withstand these conditions. What role do low water tables play in safety, river transport, drinking water supplies, and blue-green algae growth? In 2003, low ground water tables led to non-uniform settlement, which caused damage to buildings and pipelines. How can we prevent this from happening during the next hot summer?

Energy: Based on research, it is expected that there will be up to 30% less cooling water capacity available in 2050 as compared to 2003. However, the summers then will be a lot warmer, which means that the need for cooling will be a lot greater. What can we do to keep the cooling of power stations and industrial plants from becoming a problem within several decades?

Public health: The warming effect will be "magnified" in cities. In 2003, several tens of thousands more senior citizens died than usual in Europe's large cities. At the same time, Europe's population is aging at a fast rate. Green veining has already been ordered for large-scale construction in the London area (120,000 homes on the flood plains of the Thames) in order to maintain a tolerable microclimate. What can we do in the existing urban areas?

Housing: Should the regulations for thermal and other insulation be tightened? Are new guidelines needed for flat roofs so that large amounts of precipitation (rain, snow) can be collected at one time? How can inner-city sewer systems be modified?

Industry: The Netherlands wants to become more climate proof, but at the same time avoid scaring off investors with doom scenarios. The insurance sector has not yet expressed much enthusiasm at the prospect of offering guarantees - this seems to be better organised in other countries. How can we maintain a level playing field in relation to other European countries?

Leisure: Once the Spanish Costas have become too hot and the Swiss glaciers have melted, the potential of the Netherlands as a tourist destination could greatly increase. How can we stay ahead of this development through spatial planning?