

MSc thesis

Climate change in Strategic Environmental Assessment

A research on the extent of climate change incorporation in Environmental Statements belonging to Dutch structure visions and underlying explanations

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Environmental Assessment

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Abstract

Climate change is seen as one of the newest and most complicated research fields in environmental assessment. It is considered that especially Strategic Environmental Assessment (SEA) is suitable to incorporate climate change. However, research shows that SEA is struggling with the incorporation of climate change. A literature-based analysis of Dutch Environmental Statements, belonging to strategic structure visions, confirms this idea; the inclusion of climate change-related considerations in SEA is limited. A lack of political urgency to include climate change in the assessment framework of SEA largely explains this. The qualitative character of climate change considerations in SEA, the notion of climate change being a slippery and intangible subject and climate change-related uncertainties contribute to this. Guidance is missing on what is meant with climate change in the SEA context, when climate change should be assessed in SEA and how this should be done.

Keywords: Strategic Environmental Assessment, Environmental Impact Assessment, climate change, Environmental Statement, structure vision.

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Summary

Over the last years, the bodies of knowledge and research on climate change have been growing, leading to a general consensus that climate change is actually happening today. Climate change, in its broadest sense, is thereby also beginning to play an increasingly important role in spatial planning globally. The issue is now landing in the area of interplay between spatial planning and environmental science. Climate change thereby is one of the most recent fields of research within environmental assessment.

Both Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) – tools to assess the effects of a specific project or implementation of a spatial plan on the environment – are considered to include possibilities to assess climate change issues in respectively projects and strategic plans, though especially SEA is found to be suitable for doing so. Its long-term time horizon, the use of a wider range of impacts and better possibilities to cover uncertainties are regarded to better fit with climate change than EIA's characteristics do. However, SEA has been found to struggle with the coverage of climate change in its assessment of strategic plans.

The objective of this research is to determine which underlying factors constitute the extent of climate change incorporation in SEA. First, a literature study serves to provide an analytical framework to assess the extent of climate change coverage in the SEA reports; the Environmental Statements (ESs). Consequently, 47 Environmental Statements belonging to Dutch structure visions have been assessed on the extent of climate change incorporation via this framework. Although great variations between these ESs were found, the overall extent of climate change incorporation was found to be limited.

Interviews with various Dutch SEA professionals, involved with composing Environmental Statements, are used to determine the actual factors that shape the extent of climate change coverage in those ESs. It was found that two key areas are especially involved herein: politics and the characteristics of climate change itself.

It was found that generally, little political urgency exists to include climate change in SEA. The added value of considering climate change in SEA is often not acknowledged and it is considered to be expensive to research. Furthermore, the long-term influence of climate change also often does not fit with short-term political views and considering climate change has only become recent practice in environmental assessment within governmental bodies. With regard to the characteristics of climate change itself, it was found that SEA professionals find it hard to work with the qualitative data on climate, which also includes many uncertainties related to climate change. This makes climate change a slippery subject in SEA and thereby hard to grasp.

Since climate change is a relatively new field of research in SEA, more guidance is required by SEA practice on what is exactly meant by climate change in the context of environmental assessment, when it should be part of the assessment framework and how it should be assessed. With this being developed and climate change awareness rising, the road towards improved climate change incorporation in SEA lies open.

Samenvatting

In de laatste jaren zijn de kennis- en onderzoekhoeveelheden over klimaatverandering groeiende, wat leidt tot een globale consensus dat klimaatverandering daadwerkelijk nu plaatsvindt. Klimaatverandering, in de breedste zin, begint daarmee ook een steeds belangrijkere rol in de ruimtelijke planning te spelen. De kwestie is nu actueel in het gebied tussen ruimtelijke planning en milieuwetenschappen. Hierdoor is klimaatverandering één van de meeste recente onderzoeksvelden in de milieueffectrapportage (m.e.r.) geworden.

Zowel project- als plan-m.e.r. – instrumenten om de effecten van specifieke projecten of de implementatie van ruimtelijke plannen op het milieu te beoordelen – worden gezien als tools die mogelijkheden bieden om aan klimaatverandering gerelateerde kwesties in respectievelijke projecten en strategische plannen te beoordelen. Vooral plan-m.e.r. wordt hiervoor als geschikt gezien, omdat de bijbehorende langetermijnvisie, het gebruik van een groter plan- en studiegebied en de betere mogelijkheden om onzekerheden aan te wenden, beter bij klimaatverandering passen dan de eigenschappen van project-m.e.r. doen. Desondanks blijkt dat plan-m.e.r. worstelt met de opname van klimaatverandering in de milieubeoordeling van strategische plannen.

Het doel van dit onderzoek is te bepalen welke onderliggende factoren uitmaken in hoeverre klimaatverandering in plan-m.e.r. wordt opgenomen. Een literatuurstudie wordt gebruikt om een analytisch raamwerk op te stellen, aan de hand waarvan de mate waarin klimaatverandering in milieueffectrapporten wordt opgenomen, kan worden bepaald. Hiervoor zijn 47 milieueffectrapporten, behorend bij Nederlandse structuurvisies, beoordeeld op de mate waarin klimaatverandering hierin een rol speelt. Ondanks dat grote verschillen hierin bestaan, blijkt de algemene mate waarin klimaatverandering in plan-m.e.r. wordt besproken, beperkt.

Interviews met verscheidene Nederlandse (plan-)m.e.r.-professionals, betrokken bij het opstellen van milieueffectrapporten, worden gebruikt om de daadwerkelijk factoren die de mate waarin klimaatverandering in deze milieueffectrapporten wordt besproken, te bepalen. Twee belangrijke aspecten komen hieruit naar voren: politiek en de eigenschappen van klimaatverandering zelf.

Het blijkt dat in het algemeen, de politieke urgentie om klimaatverandering in plan-m.e.r. te bespreken, laag is. De toegevoegde waarde hiervan wordt vaak niet erkend en het onderzoek naar klimaatverandering wordt als duur ervaren. De lange termijninvloed van klimaatverandering ‘matcht’ vaak niet met kortere politieke termijnen en het bespreken van klimaatverandering in m.e.r. is slechts recent gebruik geworden bij overheden. Met betrekking tot de eigenschappen van klimaatverandering zelf, is gevonden dat (plan-)m.e.r.-professionals het lastig vinden om te werken met kwalitatieve gegevens over klimaat, inclusief bijkomende onzekerheden omtrent klimaatverandering. Dit maakt klimaatverandering lastig te omvatten en daarbij een enigszins ongrijpbaar onderwerp in plan-m.e.r.

Omdat klimaatverandering een relatief nieuw onderzoeksveld in plan-m.e.r. is, zijn meer richtlijnen nodig voor de plan-m.e.r.-praktijk over wat exact bedoeld wordt met klimaatverandering in de m.e.r.-context., wanneer het deel zou moeten zijn van het beoordelingskader en hoe het beoordeeld zou moeten worden. Terwijl dit ontwikkeld wordt en bewustwording omtrent klimaatverandering groeit, ligt de weg voor verbeterde opname van klimaatverandering in plan-m.e.r. open.

Acknowledgments

From the start onwards, the aim of this study has been to contribute to scientific research on climate change incorporation in environmental assessment, especially Strategic Environmental Assessment, and the underlying reasons and explanations for this incorporation. I want to aid in better environmental assessment practice. It naturally is up to the reader of this report to judge whether these goals have been achieved. I feel that I have reached these objectives and that I have contributed to scientific research on climate change in Strategic Environmental Assessment and to environmental assessment practice. All results of my thesis study and work are collected and presented in this report. However, I could not have done this alone.

My gratitude goes first of all to my Wageningen University supervisor, Gerrit Jan Carsjens, for his bright and clear supervision, constructive critiques and enlightening ideas. After all of our meetings, my motivation, spirit and focus boosted. He also helped me in ensuring the scientific character of this research.

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Furthermore, I would like to thank all interviewees for their cooperation. Unfortunately, I have agreed with all of them that they would remain anonymous, so I cannot personally thank them here. However, all interviewees will receive a digital copy of this thesis report, along with a personal thanking statement.

With the help of these people, you are now able to read this final thesis report.

Matté Egging

1. Introduction

This MSc thesis report presents the findings of a research on the incorporation of climate change in Strategic Environmental Assessment and underlying reasons for the extent of this incorporation. The first chapter will provide a general introduction (paragraph 1.1) and briefly presents the problem, the objective of this research, the accompanying research questions (paragraph 1.2) and the applied methods and the further outline of this report (paragraph 1.3).

1.1 Introduction to climate change in Strategic Environmental Assessment

In 2010, the European Union Directive “on the assessment of the effects of certain public and private projects on the environment” (85/337/EEC), referred to as the Environmental Impact Assessment (EIA) Directive, celebrated its 25th anniversary (European Commission, 2012a). Since the introduction of this EIA Directive in Europe, much experience with EIA in practice has been gained. This is particularly the case through amendments to the EIA Directive in 1997 (97/11/EC) and 2003 (2003/35/EC), as well as through Directive 2001/42/EC, referred to as the Strategic Environmental Assessment (SEA) Directive (Arts et al., 2012).

Although significant empirical research has been conducted on ‘procedural’ effectiveness of EIA and SEA, the extent to which formal procedures are followed within EIA practice (van Doren et al., 2013), less research projects have focused on the ‘substantive’ effectiveness. Two aspects are particularly interesting when it comes to this substantive effectiveness: raising environmental awareness through EIA and the incorporation of environmental values into decision-making processes (Runhaar and Driessen, 2007). The general perception is that EIA has contributed to greater environmental awareness as well as environmental protection, at least in Western countries (Arts et al., 2012).

The introduction of SEA in Europe in 2001 has brought several changes regarding EIA practice and both its procedural and substantive effectiveness. Whereas EIA’s focus is particularly on concrete spatial projects and developments, SEA refers to higher-level strategic and conceptual decision-making, referred to as policies, plans and programmes (Carroll and Turpin, 2009). Since SEA is concerned with strategic, visionary and conceptual plans, this leads to the use of more qualitative data and a higher uncertainty in impact analysis than is the case in EIA. Partly because of this, the public perception of SEA can be somewhat more vague and distant, while EIA provokes more reactive public behaviour. Generally, SEA has a more extended time horizon and issues with a larger scale of impacts than EIA does (Carroll and Turpin, 2009).

It is therefore perceived that especially SEA can contribute in tackling large-scale and uncertain environmental issues, such as biodiversity loss and climate change. This is acknowledged by a widespread consensus, both within the academic literature and various other institutions. The United Nations Economic Commission for Europe states that “SEA can be an effective tool for climate adaptation and mitigation, by introducing climate change considerations into development planning” (United Nations Economic Commission for Europe, n.d.). Also the Intergovernmental Panel on Climate Change (IPCC) concluded that considering climate change impacts in the planning stage is the key to increasing climate change adaptation: “One way of increasing adaptive capacity is by introducing the consideration of climate change impacts in development planning, for example, by

including adaptation measures in land use planning and infrastructure design” (Parry et al., 2007 p. 20). Furthermore, Wende et al. (2012) conclude that “Strategic Environmental Assessment is a particularly suitable instrument for the implementation of climate protection at the regional or local level, or in sectoral planning, such as transport planning” (p. 92).

1.2 Problem description, objective and research questions

Recent case studies across Western Europe have shown that several obstacles delay a fruitful incorporation of climate change in SEA. Wende et al. (2012) show that SEAs in two regions in Germany and the UK fail to consider climate change impacts at scales beyond the boundary of the spatial plan, while national CO₂ reduction targets were not considered at all in these SEAs. Moreover, a case study in Denmark by Larsen et al. (2012) shows that there is a lack of synergies between climate change mitigation and adaptation on one hand and between climate change and other environmental concerns on the other hand, while these synergies are needed as part of an integrated assessment and policy response. Despite sufficient knowledge and data being available on climate change and over a decade of experience in SEA has been gained, SEA is still struggling to incorporate climate change. This can be summarised in a single sentence problem statement:

There is insufficient knowledge on how climate change is and can be incorporated in SEA.

Hence, the objective of this research is to identify which factors determine the extent to which climate change is and can be incorporated in Dutch SEA. The accompanying main research question therefore is:

How can the status of attention for climate change in Strategic Environmental Assessment in the Netherlands be explained?

Since EIA and SEA procedures differ per European country, it is infeasible to research all EU Member States within the six months of this thesis research. Besides, a number of countries (Denmark, Germany, the UK) have already been the subject of such a research. Therefore, this research focuses on a country that has not been the context of a research on the incorporation of climate change in environmental assessment; the Netherlands. Another reason why the Netherlands will form the focus of this research is that *“settlements in coastal lowlands are especially vulnerable to risks resulting from climate change, yet these lowlands are densely settled and growing rapidly”* (McGranahan et al., 2007 p. 17). The Netherlands are such a coastal lowland country, with the largest settlements located close to the North Sea.

Although this research focuses on the coverage of climate change in SEA, the relation with EIA cannot be excluded. Not only is SEA directly originating from EIA, in the planning process the two types of environmental assessment are connected as well. Usually, a strategic plan with accompanying SEA is developed before concrete projects and their adjacent EIAs, being part of that plan, are implemented and realised. That explains why EIA is also part of this research and part of the research subquestions; EIA simply cannot be overlooked. This report starts rather general, with introductory texts on both EIA and SEA and gradually gains focus towards SEA, largely based on the

findings in theory that suggest that SEA is a better tool to address climate change than EIA is. The following research subquestions will be answered in this thesis report:

1. *What are the regulative, normative and cultural-cognitive factors that determine the extent of incorporation of climate change in EIA and SEA?*
2. *To what extent is climate change incorporated in SEA in the Netherlands?*
3. *What are the obstacles that hinder the incorporation of climate change in SEA in the Netherlands?*
4. *Which measures can be taken in order to improve the incorporation of climate change in SEA in the Netherlands?*

1.3 Methods

This research can be described as a descriptive, explorative and pragmatic research, largely based on qualitative data. In this study, the extent of climate change incorporation in Strategic Environmental Assessment and underlying explanations for this are explored via case-study research; all SEA reports (Environmental Statements) that have been reviewed, accompany a Dutch strategic structure vision. The results of this research can be seen as interplay between three applied methods: literature research, Environmental Statement review and interviews. These methods and the connections between them will be discussed in this paragraph. Together, they form the research framework of this research, as is showed in Figure 1.1.

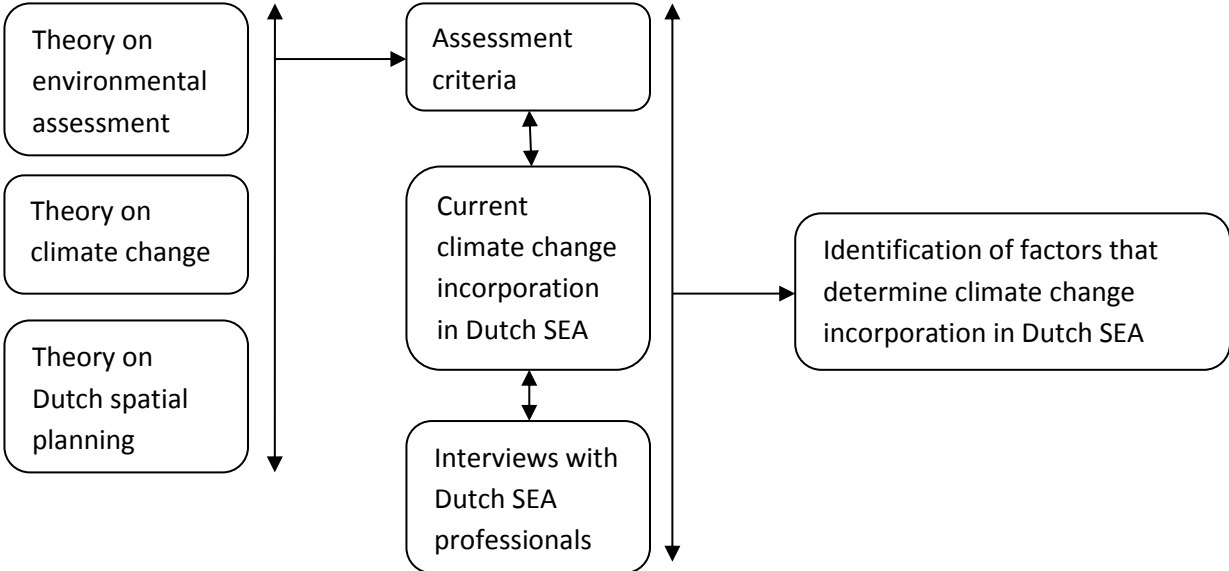


Figure 1.1. Research framework of climate change incorporation in Strategic Environmental Assessment.

In order to provide a sound academic basis for this research, a literature study was conducted at the beginning of this study. The results of this literature study represent the descriptive character of this research, since these results are used to introduce the main concepts within this research: the EIA and SEA processes, climate change and the coverage of the latter in the first. Furthermore, the used theories suggest some factors that influence the extent of climate change incorporation in SEA and thereby partially give an answer to the first research subquestion. Finally, the theoretical framework

leads to an analytical framework. Criteria have been extracted from literature and are conceptualised in such a way, that they act as parameters to determine the extent of climate change incorporation in SEA, in this case Dutch structure vision Environmental Statements. In this way, the extent of climate change coverage in Dutch SEA can be 'measured', based on sound scientific climate change review criteria. Furthermore, the literature findings have suggested the first outline for the interview questions with Dutch SEA professionals. Since not all issues derived from literature, such as EIA being better suited than SEA to address climate change issues, can be found in the reviewed Environmental Statements, these are used to form the first interview questions. These interviews at the same time can confirm the results from literature. Partial answers to the third and fourth subquestion are therefore provided by both literature and the interviews.

Once the theoretical framework had been narrowed down to an analytical framework and all climate change review indicators had been conceptualised, the review of Dutch structure vision Environmental Statements (ESs) could be conducted. However, it first needed to be made clear how Dutch spatial planning works, especially with regard to environmental assessment and strategic structure visions. Once this was done, the review of Dutch structure vision ESs could be conducted. Since these ESs are publicly accessible via the website of the Netherlands Commission for Environmental Assessment (NCEA; www.commissiemer.nl), this research can be characterised as being open and transparent; all primary data is available to everyone. The authenticity of the data is ensured, since only all reviewed ESs have been downloaded directly from the website of NCEA. Since an assessment of Dutch structure vision ESs with regard to climate change incorporation has not been conducted before, this part of the research is the explorative part, as mentioned in the first line of this paragraph. Largely based on the theoretical framework, the ESs belonging to structure visions were purposefully selected, since literature suggests those SEA documents are more suitable for climate change consideration than EIA documents (see e.g. Carroll and Turpin, 2009, in Chapter 2). Only ESs adjacent to strategic spatial plans – the structure visions – have been part of this research, which allows for comparisons between the ESs. Since these qualitative ESs have been so purposefully selected, the selection of a large number of documents was not required, as is typically found in quantitative research (Creswell, 2009). In the end, 47 ESs belonging to structure visions have been part of the review. The review of these ESs allows for concluding remarks on the extent of climate change incorporation in Dutch SEA, thereby providing direct answers to subquestion 2. Some results were considered to be specifically striking or interesting. These have got more attention in the interviews with Dutch SEA professionals than results that were more in line with the findings from literature. These interviews represent the pragmatic part of this research. The interview questions can be found in Annex 3.

Conducting the interviews with SEA professionals had several goals, with the most important being the attempt to reveal the underlying causes for a limited inclusion of climate change in Dutch SEA (as is described in Chapter 4) and possible improvements to this. Since these causes are not mentioned in the ES itself, SEA professionals involved in writing the ESs have been interviewed.

The intention of the interviews was to interview SEA professionals involved in ESs that scored the 'best' in the above described ES review, since these ESs are logically considered to incorporate climate change better in SEA than the other cases, thereby giving more valuable insights for this research. Especially the writers of the Environmental Statements were aimed at for the interviews, since they are intensively working with the content of the SEA process and the final Environmental

Statement. However, due to a number of reasons (busy agendas, holidays, people moving to other jobs), this was not completely achieved. Therefore, SEA professionals involved with less recent good-scoring ESs, a recent low-scoring ES and a professional not involved with an ES part of this research, were interviewed as well. In the end, eight interviews with Dutch SEA professionals were held. All interviewees are anonymised, to ensure they are able to speak without restrictions.

The interviews were conducted, following an interview protocol (see e.g. Creswell, 2009). All interviews started with the questions whether the interviewee was comfortable with the interview being audio recorded and whether the interviewee agreed on making him/her anonymous. After the ice-breaking introduction question was asked, the focus quickly shifted towards the topic of this research. The interviews have been conducted in a semi-structured way, meaning the most important topics to discuss were set by the interviewer (introduction and general questions, obstacles with regard to climate change in SEA, the results of the ES review in this research and concluding remarks, also see Annex 3), but with room for the interviewee to put important aspects or issues to the fore. This room was provided by various open and semi-open interview questions. The interviews have therefore provided answers to all research subquestions, though most attention during the interviews was paid to subquestions 2B and 3. A final thank-you statement was made at the end of the interview, to acknowledge the time the interviewee spent during the interview. Then, all interviews have been transcribed, e-mailed to the interviewees for confirmation on the statements made and a check for errors or misinterpretations, and summarised and translated into English. This was done, since all interviews were conducted in Dutch. During these translations, conceptual definitions might have slightly been altered. A more in-depth description of the interview summarising method can be found in Annex 4.

This thesis report will continue with the theoretical framework on environmental assessment in Chapter 2, with a mere focus on SEA rather than EIA. In Chapter 3, current practices in environmental assessment in Europe and the Netherlands will be presented, as well as the relevant spatial planning object of structure visions and environmental assessment-related climate change initiatives. Chapter 4 will cover the results of the Environmental Statement review of ESs belonging to Dutch structure visions. The results of the interviews with Dutch SEA professionals are discussed in Chapter 5. In Chapter 6, the results from the literature study, Dutch structure vision ES review and the interviews with Dutch SEA professionals will be combined. The various links between the applied methods and the results will be presented and explained. This will lead to holistic answers to each of the research subquestions. Finally, Chapter 7 presents the concluding remarks, thereby answering the main research question. This also includes a critical reflection on the applied methods in this research, and recommendations for both further scientific research and (Dutch) SEA practice.

2 Theoretical framework

This second chapter will introduce the main concepts of this research; EIA (paragraph 2.1), SEA (paragraph 2.2) and their relation with climate change (paragraph 2.3). Relevant studies and theories hereon will be introduced. Finally, this theoretical framework leads to an analytical framework (paragraph 2.4) for determining the extent of climate change in Environmental Statements belonging to Dutch structure visions.

2.1 Introduction to Environmental Impact Assessment

What is EIA

Environmental Impact Assessment (EIA) is the procedure for the assessment of likely possible impacts, either negative or positive, that a proposed project or development may have on the environment in its broadest sense. EIA serves to provide this information to local authority planners, other regulators, authorising bodies, the general public and other interested parties. Furthermore, EIA enables the developers of the proposed project, on whose behalf the procedure is generally undertaken, to facilitate the approval process and minimise environmental impacts (Carroll and Turpin, 2009). A common definition of the tool is provided by the World Bank which defines EIA as:

“an instrument to identify and assess the potential environmental impacts of a proposed project, evaluate alternatives, and design appropriate mitigation, management, and monitoring measures” (The World Bank, 1999 Annex A p. 1).

Objective of EIA

Based on this definition, the main goal of EIA is to reduce and minimise negative effects of the proposed development or project on the environment via researching alternative options and adjusting measures. Moreover, according to the International Association for Impact Assessment and UK Institute of Environmental Assessment (1999), EIA has four main objectives, which are:

- *“to ensure that environmental considerations are explicitly addressed and incorporated into the development decision making process;*
- *To anticipate and avoid, minimise or offset the adverse significant biophysical, social and other relevant effects of development proposals;*
- *To protect the productivity and capacity of natural systems and the ecological processes which maintain their functions, and;*
- *To promote development that is sustainable and optimises resource use and management opportunities”* (p. 2).

EIA was first developed in the United States as a result of the National Environmental Policy Act in 1969. The task of EIA was to consider possible impacts on the environment prior to a decision being taken on whether or not a proposal should be given approval to proceed (Wood, 2003). Nowadays, EIA is applied by governmental bodies and international institutions throughout the world (Wood, 2003, Carroll and Turpin, 2009) and the aim has not changed significantly since its introduction, as is shown in the introductory text of the codification of the European Union EIA Directive (2011/92/EU) in 2011, stating:

“[European] Union policy on the environment is based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should, as a priority, be rectified at source and that the polluter should pay. Effects on the environment should be taken into account at the earliest possible stage in all the technical planning and decision-making processes” (European Commission, 2011 p. 1).

It must be stressed however, that EIA is only a part of the wider process of decision-making on the approval of certain types of developments and projects. As the term suggests, its focus lies on environmental issues. Other decision-making dimensions, e.g. financial, cultural, political, need consideration as well. By the inclusion of environmental considerations alongside social and economic factors, an increased sustainable approach to development is achieved (Carroll and Turpin, 2009), since sustainable development requires a full integration of social, economic and environmental issues in spatial planning (Eggenberger and Partidário, 2000).

EIA process

The exact elements, stages and activities of an EIA procedure depend upon the requirements of the country in which the EIA is undertaken, reflecting the legal provisions, institutional arrangements and procedures that are in force in different jurisdictions. Despite this, most EIA processes around the world have a common basic structure. The application of the main stages is considered a basic standard of good practice (United Nations University et al., 2006b).

Before the actual EIA process is started, alternative means of achieving the objectives where the proposed project is needed for, are considered. Then, a specific proposal for the project is designed and the proposal can be guided through the EIA procedure. This starts with the screening phase, where it is determined whether an EIA is required in the particular case. The necessity of an EIA is determined, based on the potential of the project of exceeding legislative thresholds, such as a certain length for a new railway track. Once the screening phase has finished, the project moves on to the scoping phase. Here it is decided which environmental impacts are likely to be important and which are not. After the scoping stage, the actual impact analysis and the EIA report or Environmental Statement (ES) can be made. This includes a description of the project proposal, the environment affected by it and an assessment of the magnitude and significance of the impacts, with a focus on the in the scoping phase determined aspects. Despite the fact that Environmental Impact Assessment can be a time-consuming process due to e.g. the consideration of alternatives for a project or alternative locations, all the steps and phases the process goes through are important and have an influence on the final outcome; the ES, on which the approval for the project is made or not. The ES should thus include the important elements of all stages of the EIA process and acts as a reflection of this process. For potentially significant impacts, measures are to be designed to reduce or mitigate these impacts. The Environmental Statement should then be reviewed, to ensure it is adequate and meets quality requirements before being used in the decision-making process. The decision-making process then determines whether and how to proceed with the project, using the Environmental Statement and opinions about it.

EIA should then involve a follow-up phase, where a plan to minimise environmental effects is implemented and monitored, to ensure the project does not have an unacceptable impact on the environment. Throughout the EIA process, there should be open and accessible public consultation and participation, though the people and bodies enabled to comment on the proposal may vary.

Public involvement usually occurs during the scoping and EIA report review phases, but may return at various other stages in the process as well (Wood, 2003, United Nations University et al., 2006b, Carroll and Turpin, 2009). As is indicated in Figure 2.1, the EIA process is cyclical. Especially information acquired in the follow-up phase (implementation, realisation and monitoring) is valuable to predict impacts in future EIA practice (United Nations University et al., 2006b). The Strategic Environmental Assessment (SEA) process is generally of the same structure as the EIA process (Fischer et al., 2011).

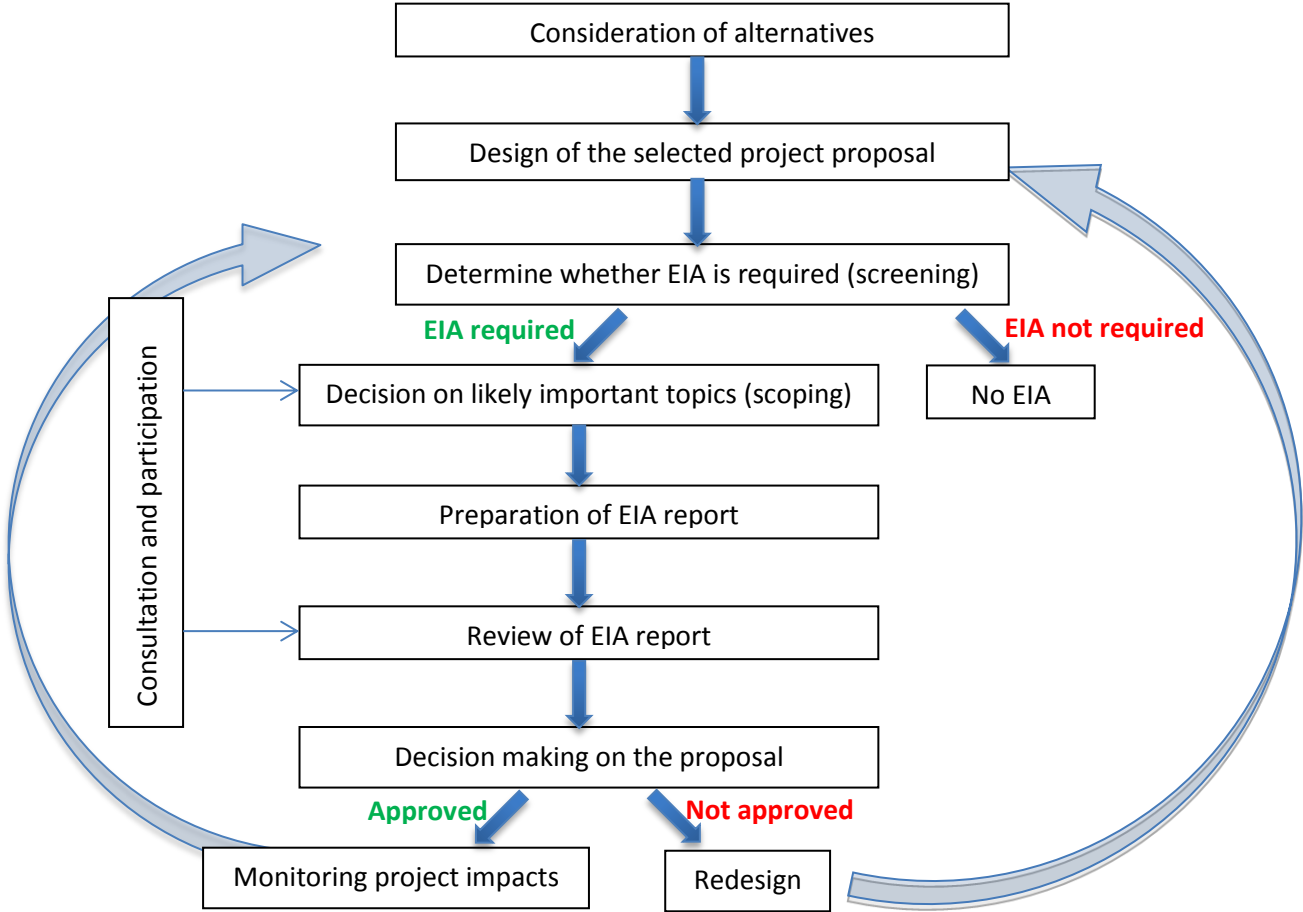


Figure 2.1. The EIA process. Based on Wood (2003) and United Nations University et al. (2006b).

Benefits, costs and effectiveness

As Sadler (1996) has pointed out, comparing the costs and benefits of EIA is subjective in itself; it depends on how the various costs and benefits are weighted. Since the aim of EIA should be to minimise environmental costs, maximise environmental benefits and minimise the costs for project proponents, the ultimate benefit of EIA should be that EIA leads to improvement of the quality of the environment generally (Wood, 2003). Since EIA is only one of many environmental management measures, it is extremely difficult to distinguish its effect from those of other measures and processes. Therefore, it is doubtful whether evidence of general environmental improvement that can be attributed to EIA can ever be adduced (Wood, 2003).

However, there are other possible benefits from EIA, which can be more direct, such as an improved design or location of a project. United Nations University et al. (2006a) state several general benefits of EIA. The first is better environmental planning and design of a project proposal. A well-executed EIA should lead to an optimal location or the use of optimal technologies for a project, which lowers

waste production. Risks and impacts on the environment and people can be minimised in a well-designed project as well, hereby avoiding associated costs. The second benefit of EIA is that a proper EIA process ensures compliance with environmental standards, thereby reducing damage and negative effects on the environment. Avoidance of penalties, fines and costs for the project proponent can thereby be achieved as well. The third benefit of EIA can be savings in capital and operating costs. Undue costs of unanticipated and unexpected impacts can be avoided by undergoing the EIA process. Generally, an 'anticipate and avoid' approach is significantly cheaper than a 'react and cure' approach. The fourth benefit of EIA can be a reduction in time and costs of approvals of development applications. Early consideration of environmental concerns before project approval only leaves minor chances of delays as a result of later demands for additional information or alterations to mitigation measures. Increased public acceptance of the project may then also be achieved (United Nations University et al., 2006a).

The costs associated with EIA seem to vary firmly between projects, but appear to range from 0.1% to 1.0% of the entire project costs (Glasson et al., 1999, Wood, 2003). Directions for costs associated with SEA have not been found in this research. Costs for EIA for The World Bank projects appear to be even lower, typically varying between 0.06% to 0.1% (United Nations University et al., 2006a). Hart et al. (1984, in: Wood, 2003) have distinguished four principles that determine the costs of an EIA process, which are the costs of:

- Document preparation, review, circulation, and administration of the law;
- Delay, which are mostly related to inflation costs and costs in terms of forgone opportunities;
- Uncertainty, which are due to the risk of failure, and;
- Mitigation, in order to moderate environmental impacts.

Since the introduction of EIA, much experience with EIA in practice has been gained (Arts et al., 2012). Although significant empirical research has been conducted on 'procedural' effectiveness of EIA and SEA, the extent to which formal procedures are followed within EIA practice (van Doren et al., 2013), less research projects have focused on the 'substantive' effectiveness. Two aspects are particularly interesting when it comes to this substantive effectiveness: raising environmental awareness through EIA and the incorporation of environmental values into decision-making processes (Runhaar and Driessen, 2007). The general perception is that EIA has contributed to greater environmental awareness as well as environmental protection, at least in Western countries (Arts et al., 2012).

2.2 Strategic Environmental Assessment

Complementing project EIA

The recognition of the global nature of environmental problems and increasing awareness of sustainable development and environmental carrying capacities, led to an emerging awareness that project EIA may occur too late in the planning process (Wood, 2003). EIA cannot ensure that all alternatives and relevant impacts for achieving sustainable development goals are achieved. Therefore, SEA was developed in the 1980s to address these issues and improve setting the context for project EIA (Carroll and Turpin, 2009). SEA's aim is to provide stakeholders and decision-makers with timely and relevant information on the potential environmental impacts of policies, plans and programmes (PPPs). Like EIA, SEA is inextricably linked to decision making. The widespread recognition of the advantages of project EIA led to a general desire of taking the environment into

account earlier in the planning process (Wood, 2003). SEA has therefore been described as the single most important direction in environmental assessment (Buckley, 1998).

In the early 1990's, a first analysis of potential benefits of SEA was already conducted. Wood and Djeddour (1992) have made a list of these potential benefits of SEA, where SEA:

- *“Encourages the consideration of environmental objectives during policy, plan and programme making activities within non-environmental organisations;*
- *Facilitates consultations between authorities on, and enhances public involvement in, evaluation of environmental aspects of policy, plan and programme formulation;*
- *May render some project EIAs redundant if impacts have been assessed adequately;*
- *May leave examination of certain impacts to project EIA;*
- *Allows formulation of standard or generic mitigation measures for later projects;*
- *Encourages consideration of alternatives often ignored or not feasible in project EIA;*
- *Can help determine appropriate sites for projects subsequently subject to EIA;*
- *Allows more effective analysis of cumulative effects of both large and small projects;*
- *Encourages and facilitates the consideration of synergistic effects;*
- *Allows more effective consideration of ancillary or secondary effects and activities;*
- *Facilitates consideration of long-range and delayed impacts;*
- *Allows analysis of the impacts of policies which may not be implemented through project”* (Wood and Djeddour, 1992 p. 7).

The most significant benefits of SEA are strengthening project EIA and the ability of taking account of cumulative effects and global change (Dalal-Clayton and Sadler, 2005). The latter can mainly be accomplished by focusing on the consequences of sectoral or regional-level developments. Project EIA can be strengthened and streamlined by:

- The incorporation of environmental goals and principles into PPPs, which shape individual projects;
- The prior identification of impacts and required information;
- The clearance of strategic issues and required information, and;
- The time and effort reductions for conducting interviews (Dalal-Clayton and Sadler, 2005).

Despite the potential benefits of SEA already being pointed out in the early 1990s, SEA was introduced in EU legislation only in 2001. This delay was largely due to the focus on EIA legislation (Carroll and Turpin, 2009). The introduction of SEA in Europe in 2001 has brought several changes regarding EIA practice and both its procedural and substantive effectiveness. Whereas EIA's focus is particularly on concrete spatial projects and developments, SEA refers to higher-level strategic and conceptual decision-making, referred to as policies, plans and programmes (Carroll and Turpin, 2009). Since SEA is concerned with strategic, visionary and conceptual plans, this leads to the use of more qualitative data and a higher uncertainty in impact analysis than is the case in EIA. Partly because of this, the public perception of SEA can be somewhat more vague and distant, while EIA provokes more reactive public behaviour. Generally, SEA has a more extended time horizon and issues with a larger scale of impacts than EIA does (Carroll and Turpin, 2009). It is therefore perceived that especially SEA can contribute in tackling large-scale and uncertain environmental issues, such as biodiversity loss and climate change. More differences and variations between EIA and SEA are shown in Table 2.1.

Table 2.1. Differences and variations between EIA and SEA. Adapted from: Wood (2003) and Fischer (2007) in: Carroll and Turpin (2009 p. 162).

	EIA	SEA
Decision-making level	Project←	Programme←Plan←Policy
Nature of action	Immediate, operational	Strategic, visionary, conceptual
Scale of impacts	Micro, localised	Macro, cumulative, unclear
Timescales	Medium-short term	Long-medium term
Alternatives	Specific locations, design, construction, operation	Area wide, political, technological, fiscal, regulative
Data	More quantitative	More qualitative
Rigour of analysis	More certain	More uncertainty
Assessment	More specific methods, legal requirements and industry standards	More professional judgement, benchmarks of objectives and criteria, industry good practice
Role of practitioner	Advocator of values and standards, user of stakeholder values	Mediator for negotiations, user of stakeholder values
Public perception	More reactive and 'NIMBY'	More vague and distant

2.3 Environmental assessment and climate change

Suitability of environmental assessment for addressing climate change

There is a widespread consensus that EIA and SEA can provide opportunities for considering climate change impacts, both within the academic literature and various other institutions. The United Nations Economic Commission for Europe states that *“SEA can be an effective tool for climate adaptation and mitigation, by introducing climate change considerations into development planning”* (United Nations Economic Commission for Europe, n.d.). Also the Intergovernmental Panel on Climate Change (IPCC) concluded that considering climate change impacts in the planning stage is the key to increasing climate change adaptation: *“One way of increasing adaptive capacity is by introducing the consideration of climate change impacts in development planning, for example, by including adaptation measures in land use planning and infrastructure design”* (Parry et al., 2007 p. 20). Furthermore, Wende et al. (2012) conclude that *“Strategic Environmental Assessment is a particularly suitable instrument for the implementation of climate protection at the regional or local level, or in sectoral planning, such as transport planning”* (p. 92). Also EIA has a role to play when it comes to addressing climate change issues, especially with regard to greenhouse gas emissions. This is underpinned in a 2009 survey, where 88% of members of the Institute of Environmental Management and Assessment (IEMA) believed that carbon emissions, where relevant, should be considered in EIA. Furthermore, 75% of the surveyed members of IEMA indicated that the inclusion of greenhouse gas emissions in the Environmental Statement, rather than as a separate report, was crucial and becoming increasingly important in EIA in the future. It is striking that 82% of respondents of the survey stated that climate change adaptation is not effectively considered in impact assessment practice, planning processes or project consent processes at the time. It was also mentioned that whilst guidance on how to consider climate change in SEA is available, there was

limited information on how mitigation and adaptation should be dealt with in EIA practice (Institute of Environmental Management & Assessment, 2013).

What is climate change?

'Climate' refers to the average meteorological conditions in a particular place over a long period of time, usually decades. Climate change addresses any changes in climate over time, either due to natural or human induced causes (Parry et al., 2007). 'Global warming' is regularly interchangeably used with climate change, but there are significant differences between the two terms. Whereas global warming only refers to an average increase in temperatures near the surface, the term 'climate change' is broader and refers to any significant change in climate measures (temperature, wind, precipitation etc.) lasting over a longer period of time, at least decades. Global warming can thus only be part of climate change and not vice versa. Climate change is known to be influenced by human activities, which significantly increase greenhouse gas emissions to the atmosphere. Well-known greenhouse gases are water vapour (H₂O), methane (CH₄), ozone (O₃) and carbon dioxide (CO₂), which generally is the greenhouse gas of greatest concern due to a long atmospheric lifetime of 50 to 200 years and has been released since the mid-Eighteenth century in large quantities by the burning of fossil fuels, deforestation and several other land use changes (Callander, 1995, Posas, 2011). It has generally been accepted that human activity significantly contributes to global climate change and scientific consensus about this exists (Miller, 2002, Byer et al., 2009, Rockstrom et al., 2009). Figure 2.2 shows the basic 'trapping' mechanism of heat by greenhouse gases, thereby causing the greenhouse effect.

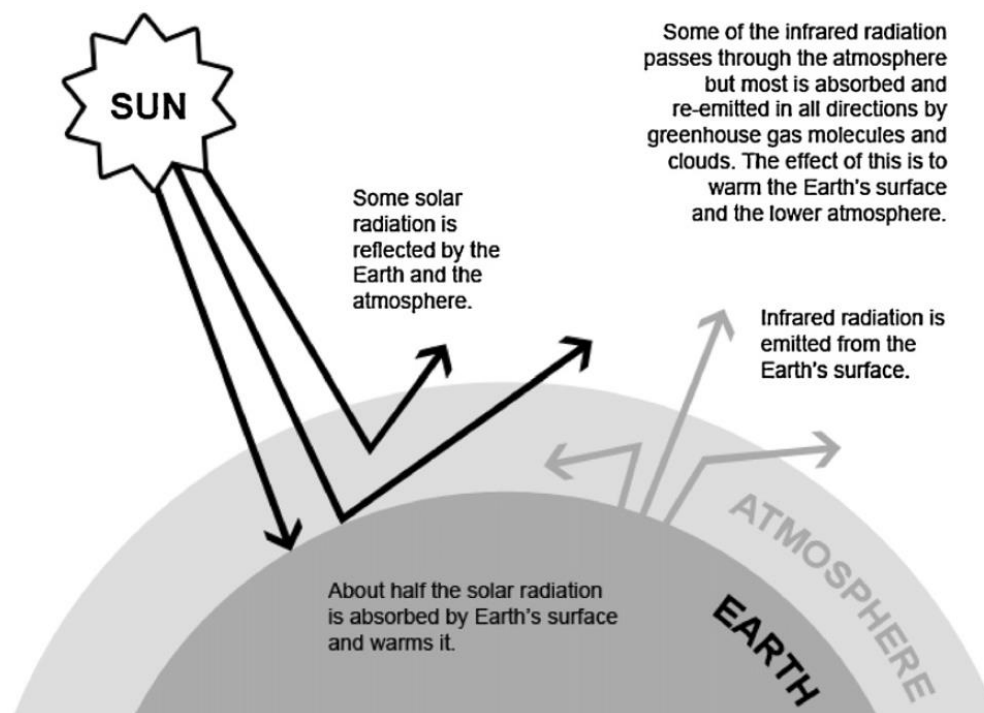


Figure 2.2. Diagram of the greenhouse gas effect. Adopted from Global Greenhouse Warming (2009) in: Posas (2011 p. 117).

The natural greenhouse effect keeps the Earth approximately 33 °C warmer than it would be otherwise (Callander, 1995). However, the amounts of heat that are currently being 'trapped' by greenhouse gases is rising at such a large pace, that climates around the globe are changing. Nine global indicators are moving into the direction of a warmer planet for years now. These are:

- Decrease in Arctic sea ice;
- Decrease in glacier mass;
- Decrease in Northern hemisphere snow cover;
- Decrease in stratospheric (more than 10 km from the Earth's surface) temperatures;
- Increase in ocean heat;
- Increase in global surface temperature;
- Increase in global sea level;
- Increase in sea surface temperature, and;
- Increase in global humidity (Blunden and Arndt, 2012).

This has several spatial consequences and impacts, often related with water issues. Average river discharges may decrease, while discharge variability and extreme discharges increase. Compared with current climate conditions, variability in extreme discharges increases as well due to climate change conditions (Booij, 2005). Lakes are shrinking and glaciers are melting, while sea levels are rising. In fact, this means that maps have to be redrawn because of these effects of climate change (Thompson, 2007). Effects on the water environment caused by climate change, particularly the rise in temperature, are shown in Figure 2.3.

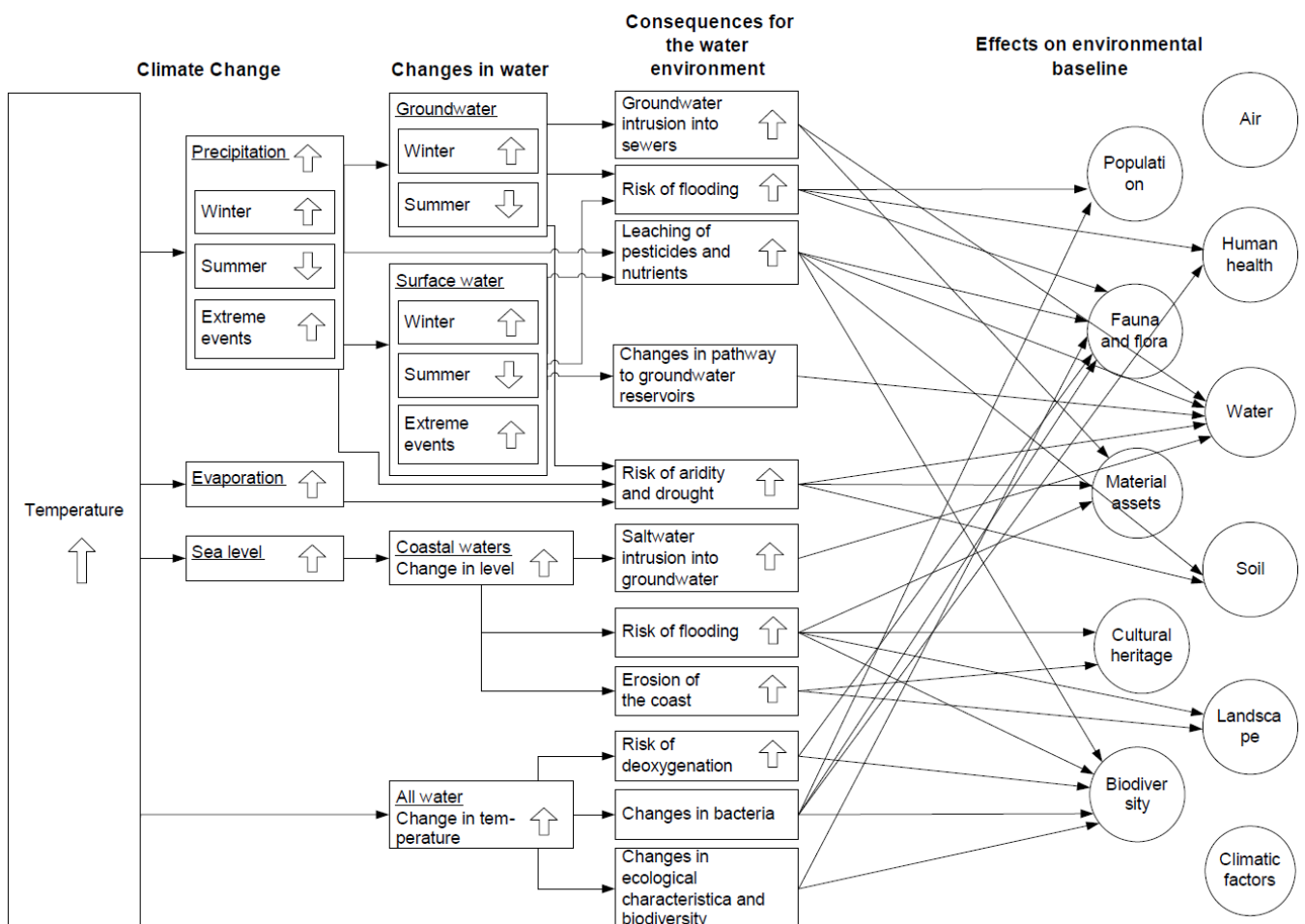


Figure 2.3. Model of the effects of climate change (in this case there is a focus particularly on the effects of temperature rise) on the water environment. Adopted from: Larsen and Kørnø (2009 p. 295).

Other fields of impact due to climate change are human safety due to floods and landslides, human health including illnesses due to air quality and disease spread changes, commercial human activity

such as agriculture, fishery, forestry, recreation and so on, and social and economic conditions such as jobs and governmental services (Byer et al., 2009).

Adaptation and mitigation

Adaptation measures can be seen as a ‘response’ to climate change, while mitigation measures are rather aimed at preventing further climate changes effects, thereby primarily focusing on reductions of greenhouse gas emissions (Larsen et al., 2012, see also Biesbroek et al., 2009). There is a growing awareness that both adaptation and mitigation measures are needed to tackle climate change impacts. However, the development of coherent climate change policies is a complex issue. In order to mainstream climate policies into sectoral and cross-sectoral policies, coordination of institutions, development of policy strategies and the search for feasible conceptual frameworks, from the international to the local level, is required. Despite the fact that evidence has existed throughout the history of climate change policy development on the need for adaptive climate change strategies, political and scientific attention was mainly paid to mitigation measures aimed at the reduction of greenhouse gas emissions (Biesbroek et al., 2009).

However, there is a growing recognition that mitigation measures alone will be insufficient to avoid serious climate change impacts. Therefore, adaptation measures are unavoidable and effective climate change policy aimed at reducing the risks of global climate change to human and natural systems requires a mix of both diverse adaptation and mitigation actions. This is strengthened by the uncertainty on whether investments in adaptation measures buy time for mitigation measures (Klein et al., 2007).

Next to the rise in awareness that both adaptation and mitigation measures are needed to combat climate change and its effects, the perception that adaptation and mitigation were falsely used as two fundamentally different approaches to the same problem, rose as well (Biesbroek et al., 2009, Klein et al., 2007). The potential of combining the two approaches has been picked up only fairly recently (Biesbroek et al., 2009, Larsen et al., 2012). A mix of short-term actions is needed to support long-term strategies. Adaptation and mitigation policies therefore need to be mainstreamed into existing and new policy strategies (Biesbroek et al., 2009), though this is not common yet (Larsen et al., 2012). The two approaches towards climate change in the light of SEA are shown in Figure 2.4.

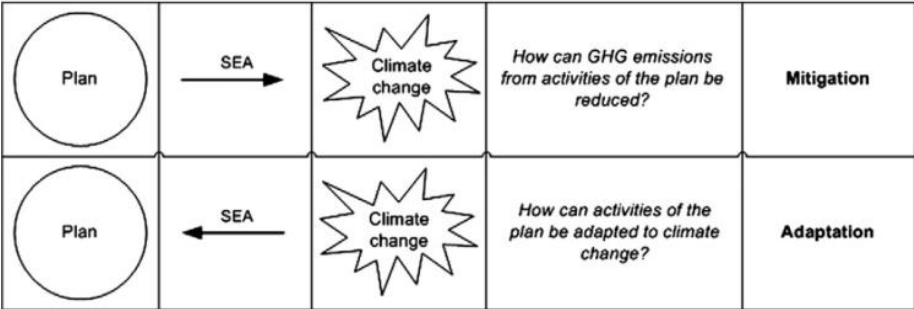


Figure 2.4. Approaches to integrating climate change into SEA. Adopted from: Larsen et al. (2012 p. 34).

Synergies between climate change adaptation and mitigation require the participation of major greenhouse gas emitters globally to mitigate climate change, while most adaptation measures take place at national or even local levels. Biesbroek et al. (2009) have argued that the dichotomy between mitigation and adaptation is mainly constructed in the minds of politicians and scientists and is strengthened by traditional knowledge-producing manners.

Despite the need for increased synergies between adaptation and mitigation, and even other environmental and policy fields (Larsen et al., 2012) and the fact that such examples exist, the opposite may also be true. Adaptation measures may increase greenhouse gas emissions and therefore work against mitigation, while mitigation measures may increase climate-related risks to ecosystems, health, lives and property and thereby work against adaptation. This counter-effectiveness can be caused by several factors, including differences in:

- Time horizons: adaptation needs are usually aimed on the short-term, while mitigation strategies have a longer time perspective (International Council for Local Environmental Initiatives, n.d.);
- Administrative scales: most adaptation measures occur on local and regional scales, while mitigation requires cooperation on national and even international scales (Biesbroek et al., 2009, International Council for Local Environmental Initiatives, n.d.);
- Stakeholders: there are wide varieties of interests at stake. Energy and transportation professionals are primarily engaged in mitigation actions, while public health and risk are more the terrain of adaptation measures (International Council for Local Environmental Initiatives, n.d.) .

An example of such a contradiction in land use planning is given by the International Council for Local Environmental Initiatives (n.d. p. 6):

“Increasing the building density of urban areas can be an effective mitigation action because it reduces vehicle miles travelled and can make public transportation more feasible and efficient. However, increasing density may lead to the loss of trees, parks and permeable surfaces, which can prevent floodwater absorption and increase flood damage”.

Climate change in SEA

As early as the mid-1990’s, it was already mentioned by Sadler (1996) that issues as ‘climate warming’ and biodiversity loss as global, piercing and cumulative effects need to be addressed in SEA. Though, during the years hereafter, literature publications on the topic have remained relatively rare (Posas, 2011). Posas (2011) summarises her main literature findings regarding climate change and SEA:

- Greenhouse gas emissions should be assessed in assessing sustainability in SEA (George, 1999 in: Posas, 2011);
- Global warming needs consideration in the assessment of alternatives in sewage sludge management (Poulsen and Hansen, 2003 in: Posas, 2011);
- Strategies exist to aid a more effective addressing of the link between biodiversity and climate change (Wilson and Piper, 2008 in: Posas, 2011), and;
- SEA has a strong potential role in reducing flood risk, which will be aggravated by climate change (Carter et al., 2009 in: Posas, 2011).

Posas (2011) then states that no single article has climate change and SEA as its main focus, but her overall literature review suggests that climate change should be considered in SEA. This goes especially for the consideration of alternatives, greenhouse gas emissions reduction and monitoring, and in relation to stakeholder involvement and biodiversity conservation. The importance of considering greenhouse gas emissions in SEA for tackling climate change issues is acknowledged by Wende et al. (2012).

Climate change in EIA

Dalfelt and Naess (1997) contrast the benefits and drawbacks of EIA and SEA in dealing with climate change in the context of energy and forestry sectors in Africa and conclude that SEA is often more appropriate in addressing climate change than project EIA is. This is explained by the nature of EIA, which is characteristically mainly reactive rather than proactive (see also Carroll and Turpin, 2009). Plus, unlike SEA, EIA does not take cumulative effects into account. Other advantages regarding the incorporation of climate change that SEA has over EIA are an earlier inclusion of climate change in the entire process, being based on a holistic approach and thereby boosting longer-term strategic thinking, linking climate change with other (environmental) policies and goals, facilitating regional cooperation and promoting an increased focus on causes rather than only on effects (Dalfelt and Naess, 1997). As Sadler (1996) pointed out before, it is perceived that SEA and EIA are complementary. SEA can be used for policy and requirements assessments and should ideally be then followed by EIA for site-specific assessment (Dalfelt and Naess, 1997).

Since the 1990's, little literature primarily aimed at the inclusion of climate change in EIA has been published. It is generally perceived that SEA has more appropriate characteristics and opportunities to include climate change in its assessment (see e.g. Kjørnø et al., 2010, Fischer et al., 2011, Posas, 2011). However, Agrawala et al. (2011), Byer et al. (2009) and Yi and Hacking (2011) have pointed out that EIA does hold opportunities for incorporation of climate change issues, but these are often limited by:

- A lack of guidance (Agrawala et al., 2011, Yi and Hacking, 2011);
- Reliance on historical climate data for climate risk assessment due to a lack of current and especially future climate data (Agrawala et al., 2011);
- Inconsistent applications of climate change impact assessment methodologies (Agrawala et al., 2011);
- High uncertainties encountered in future climate projections (Byer et al., 2009, Agrawala et al., 2011), and;
- Inappropriate choosing of temporal and spatial boundaries to accommodate climate change (Yi and Hacking, 2011).

It is especially the dealing with uncertainties and the choosing of appropriate temporal and spatial boundaries that can be improved in EIA practice when climate change is to be assessed.

Poor addressing of climate change in EIA and SEA

It has often been affirmed that a key role is reserved for EIA and SEA when it comes to assessment of climate change aspects. However, it has almost been equally often observed that EIA and SEA do not fulfil this promise fully yet. There are several indications for underlying reasons for this issue.

Wende et al. (2012) show that SEAs in two regions in Germany and the UK fail to consider climate change impacts at scales beyond the boundary of the spatial plan, while national CO₂ reduction targets were not considered at all in these SEAs. The studied SEAs stick to the content of the spatial plan, without presenting suggestions on how climate change could be dealt with on a wider, regional scale. Large scale impacts are hard to incorporate when an SEA only sticks to the boundaries of the specific spatial plan. The most significant encountered weakness is that no CO₂ reduction targets are set in the assessments, even though there is knowledge of national obligations and even some control over emissions from future land uses, such as housing, transport and energy developments.

Moreover, a case study in Denmark by Larsen et al. (2012) shows that there is a lack of synergies between climate change mitigation and adaptation on one hand and between climate change and other environmental concerns on the other hand, while these synergies are needed as part of an integrated assessment and policy response.

A growing body of literature exists on the necessity for a holistic scope whilst assessing the climate challenge, and on climate change adaptation and mitigation. However, Danish SEA practice tends to focus mostly on mitigation. Less attention is paid to climate change adaptation and the synergies between adaptation, mitigation and other environmental policy areas. Therefore, SEA's *“potential to explore and promote positive synergies whilst addressing climate change in SEA is great and unexploited”* (Larsen et al., 2012 p. 39). Categories, definitions and examples of such synergies are shown in Table 2.2.

Table 2.2. Categories, definitions and examples of synergies. Adapted from: Larsen et al. (2012 p. 34).

Categories	Definitions	Examples
Negative climate synergies	Losing mitigation benefits in return for gaining adaptation and vice versa	<p>Mitigation - mitigation</p> <p>Densification in urban areas to reduce car dependency and to increase bicycling, walking and public transport can create an increase in city temperature and thereby increase the heat island effect. The consequence can be increased use of electricity for ventilation – but also increased car transport out of the city in the summer.</p> <p>Mitigation - adaptation</p> <p>Densification can happen at the expense of rainwater drainage, and thereby increase the flooding risk.</p>
Positive climate synergies	Adaptation and/or mitigation measures interact and enhance positive effects on climate change goals	<p>Adaptation - mitigation</p> <p>Trees and other vegetation in urban areas create a carbon sink, and, due to shading and increased precipitation, reduce the temperature, whereby the necessity for ventilation is reduced.</p>
Negative environmental synergies	Losing environmental benefits in return for climate change adaptation and/or mitigation	Infrastructure for and use of electric vehicles might create the risk of an increase in cars and thereby in congestion in cities.
Positive environmental synergies	Adaptation and/or mitigation measures interact with the context and enhance other environmental aspects	Trees and other vegetation in urban areas provide climate change adaptation and, at the same, time also air cleaning and increased opportunity for recreation.

In addition to this lack of synergies, the integration of climate change into SEA must be seen as a part of the beginning of an institutionalisation process, thereby bringing several other difficulties. Firstly, climate change mitigation and adaptation were originally perceived as two different approaches.

These approaches lead to measures at local and national levels. The current transition of a focus to global issues is still lacking in SEA practice. This is somewhat comparable to what Wende et al. (2012) state about SEAs sticking to a spatial boundary and the observation by Yi and Hacking (2011) that spatial boundaries to accommodate climate change are inappropriately chosen. Secondly, the integration process between climate change and SEA is highly influenced by local institutional factors. Climate change is often managed from specialised sub-units, while the issue is perceived as interdisciplinary. Third, normative reasons explain why the integration of climate change is not closely associated with SEA (Larsen et al., 2012). The institutional elements related to climate change integration in Denmark are shown in Table 2.3.

Table 2.3. Summary of the institutional elements of relevance to climate change integration in Denmark. Adapted from: Larsen et al. (2012).

Regulative	Normative	Cultural-cognitive
Climate change included in SEA legislation	Perception of ‘climatic factors’ (as described in EU SEA Directive) as a microclimatic issue rather than global, and an issue of mitigation rather than adaptation	Silos in organisations: Different cultures
Lack of climate change guidance and support	Perception of climate change mitigation and adaptation as separate phenomena	Mimetic and recognisable organisational integration of climate change into hierarchical structures
	Silos in organisations: Different norms and values	
	Binding and accredited expectations of focus on climate change	

Another reason why SEA’s ability to manage climate change is not employed successfully, may lie in the manner in which climate change is described in an SEA. Kørnøvn (2009) shows that in Denmark, human health needs to be treated as a separate element in the SEA. The assessment of impacts on health should therefore be presented under its own heading in the environmental report. In this way, the access for politicians and the public interested in health issues, will be increased. Furthermore, Danish national guidance suggests a cross-disciplinary organisation of the SEA. It was found that representation from the health sector was lacking in the assessment of human health in SEA. A lack of dialogue with practitioners also hinders the integration of health in SEA in the UK, although SEA provides a promising framework (Burns and Bond, 2008).

Climate change aspects important for EIA and SEA

Regarding climate change in EIA and SEA, the main focus in literature lies on CO₂ reduction, greenhouse gas reduction and water issues (Byer et al., 2009, Larsen et al., 2012, Wende et al., 2012). Byer et al. (2009) state that potential environmental effects related to climate change need to be considered in project EIA in three categories: the effects of the project on climate change via greenhouse gas emissions, the effects of climate change on the project and the effects of climate change on the impacts of the project. Scoping then plays a key role in determining the degree to which impacts need to be addressed within the Environmental Statement. The main climate change related issues that should be addressed in EIA according to Byer et al. (2009) are:

- Greenhouse gas emissions. These can either increase or (indirectly) decrease as a result of the project;
- The effects of climate change on the project. Project designs are generally based on criteria and standards that have been established by use of historical data, which may not be accurate anymore;
- The effects of climate change impacts resulting from the project. Climatic conditions can cause changes in the conditions of the surrounding environment and thereby the impacts of the project (see also Figure 2.5);
- Mitigation and adaptation. Appropriate responses to mitigate greenhouse gas emissions or adapt to the effects or vulnerabilities resulting from climate change need to be identified.

Furthermore, climate change effects on a project and its impacts may be affected by other future or current projects. Addressing and assessing these cumulative effects is more a task of SEA rather than EIA.

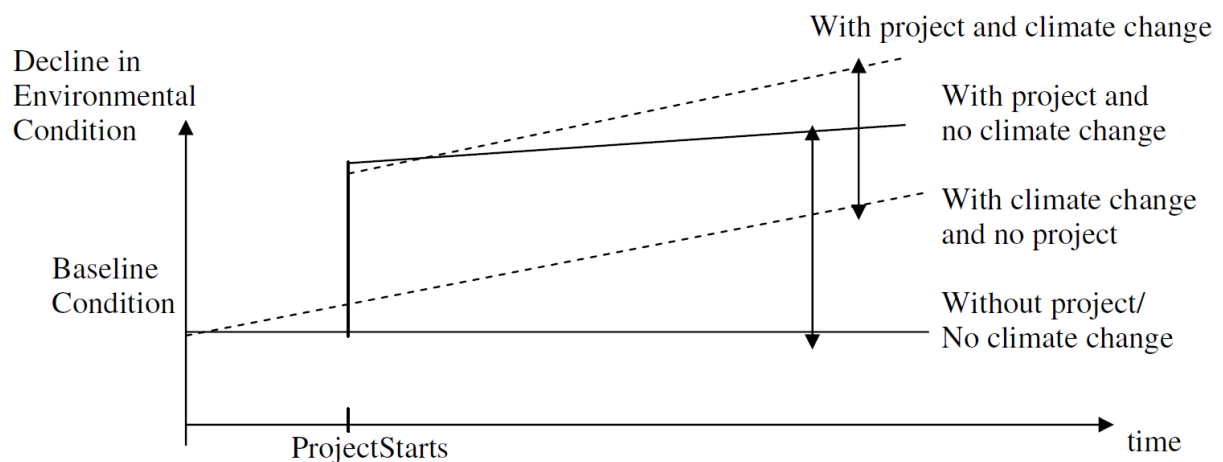


Figure 2.5. Simplification of environmental conditions with and without a project. Adopted from: Byer et al. (2009 p. 34).

Wende et al. (2012) have determined in their case study in the UK and Germany, that national CO₂ reduction targets were not considered in SEAs. No CO₂ reduction targets were set in the assessments, even though there was knowledge of national obligations and even some control over emissions from future land uses, such as housing, transport and energy developments.

Larsen and Kjørnø (2009) have described the range and varieties in the effects of climate change on the water cycle (see also Figure 2.3). The most significant aspects that EIA and especially SEA should consider in relation to climate change and water issues, are the predicted rise in sea level and increase in extreme precipitation events (more extreme and higher occurrence), though a large number of other effects is to be expected as well.

It has generally been agreed that global climate change is occurring. One of its main characteristics however, is its uncertainty. Widely differing varieties and scenarios hereon exists, such as the amount of which the sea level will rise. Therefore, uncertainty should be embedded in climate change issues in EIA and SEA in several ways. Where uncertainties exist, they should be made explicit (Byer et al., 2009, Agrawala et al., 2011).

Largely based on the above mentioned struggles in the incorporation of climate change in EIA and SEA, there is a widespread call for improvements in the EU SEA Directive. The protected asset 'climatic factors' should be defined more clearly by the EU, for the purpose of global climate protection and climate adaptation (Helbron et al., 2011). In the proposal for the amendment to the EIA Directive, published in October 2012, this is replaced by 'climate change' and climate is being significantly embedded in the Directive (European Commission, 2012b). Since this proposal is not ratified and implemented yet, there still is confusion about the consideration of climate at a micro scale. Especially for SEA, linkages between climate change and cumulative effects are interesting. In current practice, there seems to be a focus on greenhouse gas (GHG) emissions in EIA, but at a lesser extent in SEA. An example of a sector that is involved in GHG emissions are transport plans. Guidance on climate change is needed, since insufficient attention is being paid to these aspects in practice (Kjørnø et al., 2010). Concrete action guidelines need to be developed in the European Union and its member states in order to achieve a methodological implementation of climate protection in strategic assessments. Such guidance is a necessity to devolve global climate protection targets down to regional and local levels. Methodological guidelines are required which describe the data that is to be collected by authorities responsible for spatial plans and the basis on which climate protection targets are set (Wende et al., 2012).

2.4 The theory – Reviewing climate change in SEA

Environmental Assessment is seen as one of the most important fields connected to spatial planning that has the ability to address and incorporate climate change in its system and process. This goes especially for Strategic Environmental Assessment, due to its strategic, long-term character and the generally larger on scale on which it is focused, though EIA has been appointed as able to incorporate several climate change aspects as well. The character of SEA is important regarding addressing climate change issues, since climate change in itself is a relatively slow and long-term, but global process, which requires actions being taken on the generally larger scales. The most important aspects of climate change that need to be addressed in environmental assessment are water related issues, greenhouse gas emissions and CO₂ emissions. Though the latter is part of greenhouse gases in general, many governmental bodies specifically aim at reducing CO₂ emissions, since these are widely emitted and have the most significant impacts on climate change and thereby the environment. Although relevant climate change knowledge is available and experience with SEA has been gained, climate change incorporation in SEA is still struggling.

Posas (2011) has conducted one of the most extensive researches regarding the incorporation of climate change in Environmental Assessment. The results of this study are shown in Figure 2.6. She proposes nine climate change review criteria for SEAs, particularly for EU SEA Directive-based SEAs. These are shown in Table 2.4.

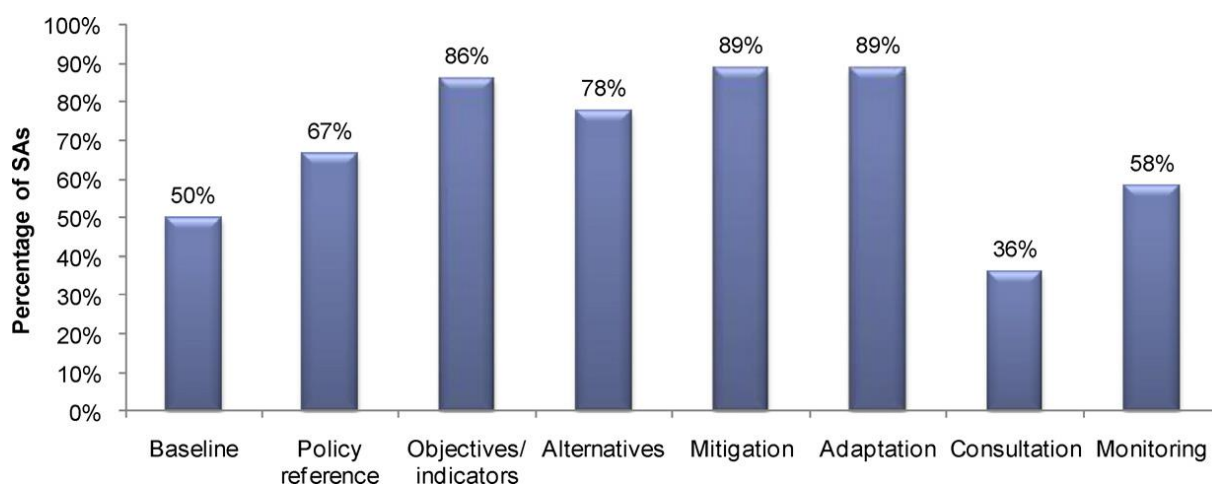


Figure 2.6. Percentage of reviewed Sustainability Appraisals that addressed the climate change criteria between 2005 and 2008. Adopted from: Posas (2011).

Table 2.4. Proposed climate change criteria for SEAs, particularly for EU SEA Directive-based SEAs. Adopted from: Posas (2011). The bold criteria are part of the analytical framework of this thesis research.

1. Include **adaptation** or risk reduction strategies and measures in the final plan
2. Describe current and expected future climate **baseline** (or scenarios)
3. Undertake **consultation** with the public and other stakeholders that allows for climate change to be discussed
4. Consider climate-related distributional impacts, **equity**, and the needs of vulnerable groups
5. Include **mitigation** strategies and measures in the final plan
6. Include provisions for **monitoring** climate-related measures
7. Develop climate change-related objectives and indicators
8. Identify relevant policy statements, agreements, or targets
9. Assess climate change-related implications of the alternatives considered

Since the EIA and SEA process resemble each other largely (Wood, 2003, Fischer, 2007) and the two are complementary (Sadler, 1996, Dalfelt and Naess, 1997), it is justifiable that factors used to determine the extent of climate change incorporation are valid for both EIA and SEA reports. There is a wide variety of such factors mentioned in literature, either focusing on EIA, SEA or both. It can therefore be stated that climate change is properly addressed in EIA and SEA, if the EIA or SEA report:

- Considers its relevance to national **CO₂ reduction** targets (Wende et al., 2012);
- Addresses climate change in a **separate chapter** (Kørnø, 2009);
- Considers climate change impacts at scales beyond the **spatial boundary** of the plan and thus does not stick to the boundary of the spatial plan (Yi and Hacking, 2011, Wende et al., 2012);
- Mentions **synergies** both between climate change adaptation and mitigation and between climate change and other environmental fields on the other (Larsen et al., 2012);
- Deals with climate change **uncertainty** (Byer et al., 2009), e.g. by implementing no-regret measures (Heltberg et al., 2009).

Analytical framework in the review of Environmental Statements

As has been illustrated, a variety of indicators that can be used to assess the inclusion or incorporation of climate change in Environmental Assessment can be derived from literature sources.

Especially Posas (2011) has been of great use, since she has proposed a list of nine climate change review criteria. The first six of these (mentioned in Table 2.4) form the first part of the analytical framework. The latter three have been eliminated, since the seventh and eight criteria from Posas are largely covered in the criterion 'CO₂ reduction'. The ninth and final criterion is found not to be relevant for Dutch SEA, since the SEA is often set up after a preliminary plan has been chosen and therefore alternatives are not always considered in the ESs. At the same time, climate change review criteria from other sources have been added. Many of these were found in studies conducted after the publication of Posas (2011) or have been mentioned by multiple sources and are thus considered relevant in the light of this research. In this way, it is perceived that an appropriate list of climate change review criteria for Dutch SEA has been composed, which together form a holistic assessment body. The following definitions of climate change review criteria in the Environmental Statements, subject to this research, are being used (in alphabetical order):

1. *Adaptation*

The Environmental Statement addresses adaptation measures. This includes not only issues of flooding and water storage, but also aspects regarding impacts on human health, natural habitats and heritage sites (Posas, 2011). Effects or vulnerabilities from climate change should be identified (Byer et al., 2009). Predictions about future climate change need to be mentioned (see also *Baseline*), since "if no predictions are made about future climate changes, it does not make sense to talk about adapting to them" (Larsen and Kjørnø, 2009 p. 297).

2. *Baseline*

The Environmental Statement contains information on the current baseline and expected future climate projections. Expectations specific to the region subject of the assessment represent better practice than those mentioning expected impacts at a national level or even none at all. Expected future climate change and key implications at the plan level contributes to good practice (Posas, 2011).

3. *CO₂ reduction*

The Environmental Statement considers national, regional or local CO₂ reduction targets. The relevance of the plan for these reduction targets is also explained and the amount of control of these emissions by the plan is elucidated (Wende et al., 2012).

4. *Consultation*

Climate change comes up in the consultations of the EIA or SEA process and has some influence already in the scoping phase, influenced by consultations in this phase. The approach to consultation is clearly described. Influences of consultation with statutory consultees and the public are to be mentioned in the Environmental Statement (Posas, 2011).

5. *Equity*

Posas (2011) identified after her review, that equity considerations are an important climate change review criterion as well in the form of social, economic, health and just issues. Everyone, including the most deprived, should benefit from and contribute to a better quality of life. Health and equality issues regarding equity and climate change are the consideration of the elderly and infirm, residents in deprived areas and poor quality housing, homeless people, inaccessibility to nearby facilities,

affordability of heating, flood risk implications for residents with limited mobility in high risk areas and the vulnerability of specific social groups to climate change (mainly extreme heat or cold) due to age, health, housing quality or income (Posas, 2011).

6. *Mitigation*

It should be made clear if and how aspects of the plan or activities are reducing the greenhouse gas emissions or increase carbon sinks (Canadell et al., 2007, Wende et al., 2012). This is needed, since both adaptation and mitigation measures are required to combat climate change (Klein et al., 2007).

7. *Monitoring*

The Environmental Statement has provisions for monitoring progress in managing causes or impacts of climate changes. Indicators for monitoring climate-related objectives can be CO₂ emissions by end user or by sector and per capita emissions, energy use – primarily gas and electricity – e.g. per household, energy efficiency of the economy, ozone depletion, road traffic growth levels, properties at risk from flood events, condition of flood defences and depletion of fossil fuels (Posas, 2011).

8. *Separate chapter*

Climate change is addressed in a separate chapter in the Environmental Statement. This increases the accessibility for decision makers, stakeholders, members of the public and other interested parties within the report (Burns and Bond, 2008, Kørnø, 2009). Issues regarding *inter alia* water storage, CO₂ and greenhouse gas reductions are mentioned in the same chapter.

9. *Spatial boundary*

The Environmental Statement should consider climate change impacts at scales larger than the boundary of the spatial plan (Wende et al., 2012). There should be acknowledgement of whether the development projects or plan should include adjacent areas associated with the project or plan regarding climate change assessment. In order to embrace all direct and indirect emissions, the spatial boundary of the studied area should be extended over the area of the plan or project itself. This depends on physical aspects such as temperature records, greenhouse gas emissions, geological factors, buildings and infrastructure, and sociocultural factors, such as lifestyle and income. Also anthropogenic factors as transport usage, household income and consumption patterns influence the spatial boundary (Yi and Hacking, 2011).

10. *Synergies*

The possible synergies – where different features ‘work together’ – between adaptation and mitigation are an important aspect of the integration of those two approaches to climate change. Furthermore, synergies are required between other environmental concerns and policy areas. The implications of different synergies are found in

Table 2.2. Investigating and revealing synergies may lead to a more holistic assessment, thereby contributing to more climate-proof planning (Larsen et al., 2012).

11. *Uncertainty*

Climate change uncertainties should be addressed in the Environmental Statement, since failing to do so may lead to inappropriate projects. It is better to understand and address the uncertainties inherent to climate change, rather than to ignore them and continue with the decision making process (Byer et al., 2009). One way of dealing with climate change uncertainty is to implement no-

regret measures. These measures would have to be implemented regardless of the degree of climate change that will occur, i.e. no-regret measures need to be implemented anyway independently from the actual climate changes (Heltberg et al., 2009).

Interviews

After the review of the Environmental Statements, the results were discussed with Dutch SEA professionals. However, not only these results were discussed; relevant literature findings presented in this chapter were covered in the interviews as well. The following findings from literature with regard to climate change in SEA were addressed in the interviews:

- SEA can better contribute in tackling large-scale and uncertain environmental issues, such as climate change, than EIA can (Carroll and Turpin, 2009). Confirming this, makes this research more solid and justifies the shifted focus from environmental assessment in general to Strategic Environmental Assessment.
- Climate change is an important aspect to cover in SEA (Posas, 2011, Wende et al., 2012). Again, the answers of the interviewees on whether climate change is an important aspect in SEA adds to the justification of the topic of this research.
- There is a lack of guidance on how to cover climate change in SEA (Kjørnø et al., 2010, Larsen et al., 2012). Literature has suggested that the lack of this guidance is one of the most crucial factors in the incorporation of climate change in SEA. Since sufficient knowledge on climate seems to be available and relevant experience with SEA has been gained, the lack of this guidance could be one of the missing links on how to use the climate change knowledge in SEA.
- All eleven climate change review criteria discussed above were briefly discussed with the interviewees, to confirm these are relevant to both SEA theory and in the interviews. Special attention was given to the climate change review criteria that have been addressed least in the reviewed Environmental Statements. These will be presented in Chapter 4.

3 Environmental assessment laws and regulations

In this chapter, a contextual framework with regard to climate change in environmental assessment is provided. This chapter will start with the European legislation on EIA and SEA (paragraph 3.1). Then, the procedures and relevant legislation on EIA and SEA in the Netherlands will be presented (paragraph 3.2). Dutch structure visions and the relation with SEA is introduced as well (paragraph 3.3). Finally, several initiatives on climate and climate change in the Netherlands are laid down as well to illustrate the importance that is attached to climate change (paragraph 3.4).

3.1 Environmental assessment in the European Union

EIA Directive

The European Union Directive “on the assessment of the effects of certain public and private projects on the environment” (85/337/EEC) came into force in 1985 and has been known as the EU EIA Directive since. The Directive has been amended three times; in 1997, 2003 and 2009 and has been codified in 2011 (2011/92/EU), which is currently valid for all EIA projects (European Commission, 2012a). It depends on the project whether or not an EIA is required. This is determined via two Annexes of the EIA Directive. The projects in Annex I are considered having significant effects on the environment and are therefore required to undergo an EIA. Examples of Annex I projects are long-distance railway lines, motorways and express roads, installations for the disposal of hazardous waste of at least 100 tonnes per day or airports with a basic runway length over 2100 meter. Annex II projects are those projects where national authorities have to decide on the need for an EIA. This is determined via ‘screening’ (see also Chapter 2), where the effects of projects on the environment are determined, based on thresholds/criteria or a case by case examination. Generally, the projects listed in Annex II are those not included in Annex I, e.g. waste water treatment plants or waste disposal installations, but also other types of projects such as flood relief works and urban developments (European Commission, 2012a). The basic EIA procedure according to the EIA Directive can be summarised in five steps:

1. The project developer announces the project proposal and may request the competent authority on advice on what the EIA information – to be provided by the developer – should cover;
2. The project developer must then provide the information on the environmental impacts of the project via the EIA report or Environmental Statement;
3. The public, the environmental authorities and any included EU Member States whose environment can be affected by the project must be informed and consulted;
4. The competent authority decides on whether or not to continue with the project, taken into consideration the results of participation and consultations;
5. The public is informed on the decision afterwards and can challenge this decision in courts (European Commission, 2012a).

SEA Directive

The European Directive “on the assessment of the effects of certain plans and programmes on the environment”, regarded as the SEA Directive, is in force since 2001. All EU Member States should have integrated SEA in their national legislation by July 2004. Plans and programmes that must undergo a SEA process have to be prepared or adopted by an authority, either national, regional or local. Different to the EIA Directive, the SEA Directive does not have a list of plans or programmes that should undergo an SEA. However, an SEA is mandatory for plans regarding agriculture, energy, fisheries, forestry, industry, land use, telecommunications, town and country planning, tourism, transport or waste and water management. The plan or programme should also act as a framework for future projects which may require an EIA, as listed in the EIA Directive. Plans or programmes that have been determined to require an assessment under the Habitats Directive must also undergo an SEA (European Commission, 2012c).

Regarding the SEA process, the plans or programmes not listed above have to undergo a screening phase – based on criteria set out in Annex II of the SEA Directive – in order to determine whether significant environmental effects are likely to occur. If this is the case, then an SEA is required. The SEA procedure according to the SEA Directive can be summarised in the following steps:

1. An environmental report is prepared, wherein the likely significant effects on the environment and reasonable alternatives of the proposed plan or programme are identified;
2. The environmental authorities and the public are informed and consulted on the draft plan or programme;
3. Any EU Member State whose environment is likely to be significantly affected by the plan or programme is to be consulted by the Member State in whose territory the plan or programme is prepared;
4. The environmental report and the consultation results are taken into account before the plan or programme is adapted;
5. Once the plan or programme is adopted, the environmental authorities and the public are informed about the decision and are gained access to relevant information.
6. Monitoring the significant environmental effects of the plan or programme is needed in order to identify unforeseen adverse effects at an early stage (European Commission, 2012c).

Though the EIA and SEA procedures are very similar, important differences between the two exist. So does SEA require the environmental authorities to be consulted during the screening phase and is scoping obliged for SEA. Furthermore, reasonable alternatives to the plan or programme need to be assessed, while under an EIA procedure the project developer chooses the alternatives to be studied. Also monitoring is required under SEA to ensure unforeseen adverse effects on the environment are recognised, thereby providing the opportunity to undertake appropriate remediation actions. In addition, EU Member States are obliged to ensure that the environmental report is of sufficient quality under SEA (European Commission, 2012c).

Guidance on climate change into EIA and SEA

In April 2013, the European Commission published two guidance documents on integrating climate change and biodiversity into respectively EIA and SEA. This guidance is not of binding nature and is aimed to improve the consideration of climate change and biodiversity in EIAs and SEAs carried out across the EU Member States (European Commission, 2013). The summary of the ‘Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment’, as presented in the guidance itself, can be found in Annex 2. The key climate change and biodiversity considerations in the SEA steps are shown in Figure 3.1.

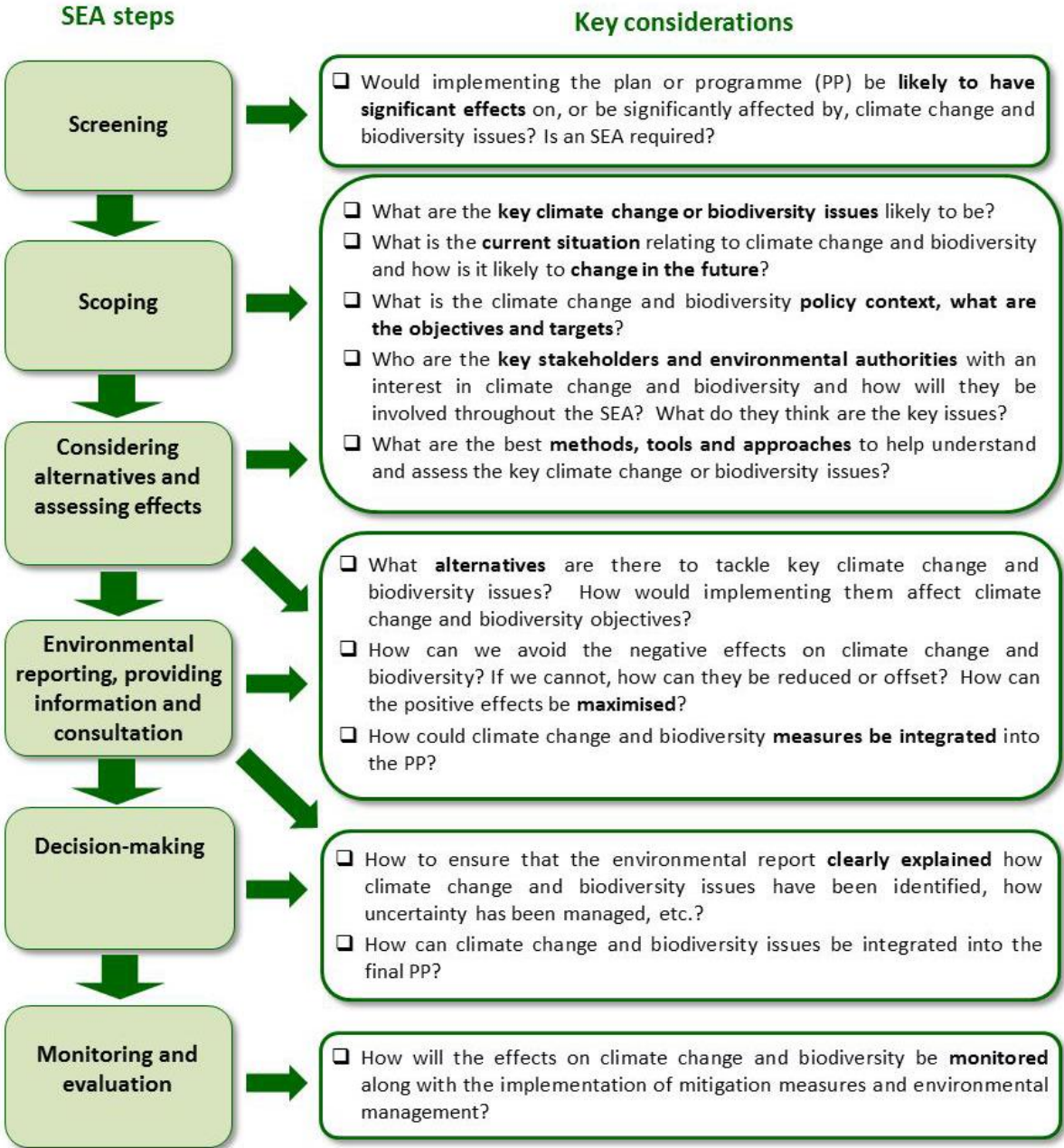


Figure 3.1. Overview of the key steps in carrying out an SEA including climate change and biodiversity considerations. Adopted from: European Commission (2013 p. 14).

This guidance is particularly interesting, since it is the first guiding document specifically aimed at covering climate change in SEA and thereby one of few documents that acknowledge the importance of climate change within environmental assessment. It also plays a role in the interviews with Dutch SEA professionals (see Chapter 5, and especially paragraph 5.2.5).

3.2 Environmental Assessment in the Netherlands

Environmental Assessment obligation for plans or projects

Since the Netherlands is a EU Member State, both the EIA and SEA Directive have been implemented in Dutch legislation and it therefore is obligatory for certain developments with likely significant environmental effects to undergo an EIA or SEA. This is laid down in the Environmental Management Act ('Wet milieubeheer'). For several spatial developments, the legislator has indicated in the Decision Environmental Assessment ('Besluit Milieueffectrapportage') that possible adverse environmental effects cannot be excluded (Dutch Ministry of Infrastructure and Environment, n.d.-b).

Generally, the obligation for an environmental assessment is valid for either plans, programmes or projects that can have important effects for and on the environment. All these activities are named separately in the Decision Environmental Assessment, such as infrastructure, water management, water housekeeping, projects in rural areas and waste processing. In the annex of the Decision Environmental Assessment, the activities are differentiated into part C and part D. Activities, plans and decisions that are obliged to undergo an environmental assessment, are mentioned in part C. Part D contains descriptions of activities, plans and decisions that are obliged to perform an environmental assessment judgment ('m.e.r.-beoordeling'). Herein, it is determined if in the specific case, important negative consequences for the environment can occur and thereby if an environmental assessment – either EIA or SEA – is mandatory. Part A of the annex contains the definitions of several concepts that are used throughout the Decision Environmental Assessment, while part B has already expired and is no longer an actual element of the Decision (Dutch Ministry of Infrastructure and Environment, n.d.-b).

Parts C and D of the Decision Environmental Assessment largely contain the same activities, plans and decisions. An important difference is formed by those cases where the concerned activity is related to. The threshold values that are mentioned in part D, are of lower values than those mentioned in part C. For the activities that are above the thresholds in part D, but below the thresholds of part C, there is an environmental assessment judgment obligation instead of a direct environmental assessment obligation. In this environmental assessment judgment obligation, the competent authority must judge if the concerned activity can have important negative effects for the environment (Dutch Ministry of Infrastructure and Environment, n.d.-b).

The concerned activity can also be below the threshold values from part D. When that is the case, it must be tested on the basis of the criteria from Annex III of the EU EIA Directive (see Table 3.1) whether important negative effects for the environment can occur, caused by the concerned activity. Three situations can then occur:

1. There are no (possible) important negative effects for the environment. It then needs to be motivated in the plan or decision why no environmental assessment (judgment) has been undertaken;
2. There are (possible) important negative effects for the environment present and the activity concerns a decision. An environmental assessment judgment should be started, or an environmental assessment is directly started;
3. There are (possible) important negative effects for the environment present and the activity concerns a plan that sets a framework. An SEA needs to be started (Dutch Ministry of Infrastructure and Environment, n.d.-b).

Table 3.1. Criteria from Annex III of the EU EIA Directive. Adopted from: European Commission (2011).

Characteristics of projects	<p>The characteristics of projects must be considered having regard, in particular, to:</p> <ul style="list-style-type: none"> – The size of the project; – The accumulation with other projects; – The use of natural resources; – The production of waste; – Pollution and nuisances; – The risk of accidents, having regard in particular to substances or technologies used.
Location of projects	<p>The environmental sensitivity of geographical areas likely to be affected by projects must be considered, having regard, in particular to:</p> <ul style="list-style-type: none"> – The existing land use; – The relative abundance, quality and regenerative capacity of natural resources in the area; – The absorption capacity of the natural environment, paying particular attention to the following areas: <ul style="list-style-type: none"> ○ Wetlands; ○ Coastal zones; ○ Mountain and forest areas; ○ Nature reserves and parks; ○ Areas classified or protected under Member States' legislation; especially those areas related to the Birds or Habitats Directives; ○ Areas in which the environmental quality standards laid down in EU legislation have already been exceeded; ○ Densely populated areas; ○ Landscapes of historical, cultural or archaeological significance.
Characteristics of the potential impact	<p>The potential significant effects of projects must be considered in relation to criteria set out in the two previous points, and having regard in particular to:</p> <ul style="list-style-type: none"> – The extent of the impact (geographical area and size of the affected population); – The trans-frontier nature of the impact; – The magnitude and complexity of the impact; – The probability of the impact; – The duration, frequency and reversibility of the impact.

The Environmental Assessment steps and involved parties

There are two procedures; the simplified and the so-called full-fledged Environmental Assessment procedures (Netherlands Commission for Environmental Assessment, n.d.-a). With regards to the simplified procedure, a number of demands from the full-fledged procedure expire. A large number

of Environmental Assessment obliged cases concerns the full-fledged procedure. This includes all plans and complex decisions (Dutch Ministry of Infrastructure and Environment, n.d.-e). The steps of both procedures are shown in Figure 3.2.

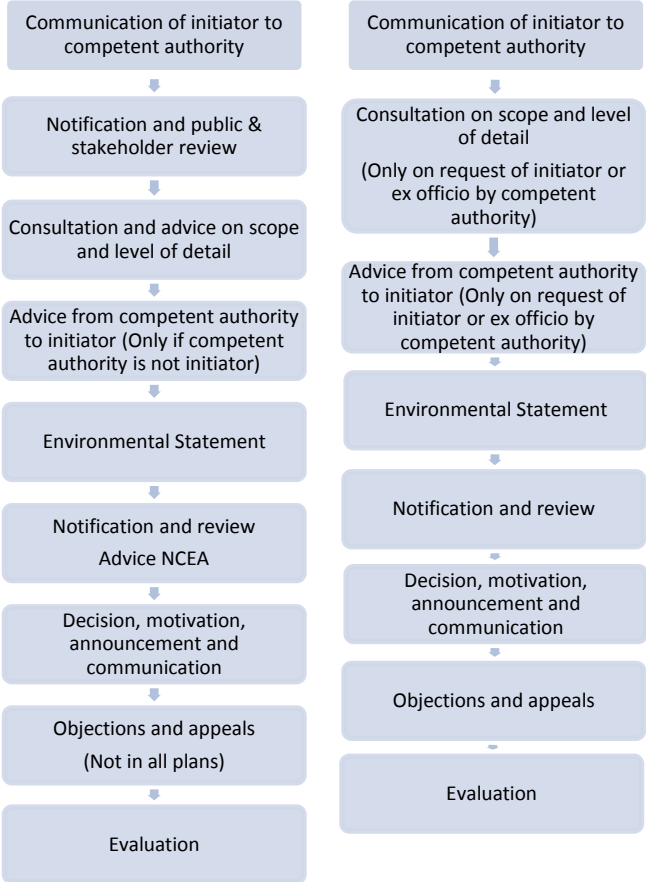


Figure 3.2. The full-fledged (left) and simplified (right) Environmental Assessment procedures in the Netherlands. Adapted from: Dutch Ministry of Infrastructure and Environment (n.d.-e).

In an Environmental Assessment process in the Netherlands, five main actors or ‘roles’ can be distinguished. The first actor is the competent authority. This is the governmental body that is competent and qualified for the preparation or determination of the concerned environmental assessment obliged plan or decision. The second actor is the initiator, which can be a public or private party, who wants to undertake the environmental assessment obliged activity and wants to file a request for a decision by the competent authority. The third role is played by consultants and administrative bodies, who must be involved in the preparation due to the legal regulations where the concerned plan or decision is based on. The fourth actor is the Netherlands Commission for Environmental Assessment (NCEA), whose role is to review the environmental report. The final group of actors is formed by citizens and other stakeholders whose interest might be at stake. The competent authority might have a say in who can be a stakeholder in the concerned case (Dutch Ministry of Infrastructure and Environment, n.d.-a).

In the full-fledged Environmental Assessment procedure, the competent authority can be the initiator, but the initiator can also be a private party, such as a housing corporation. In the simplified Environmental Assessment procedure, the Environmental Management Act assumes that the competent authority can never be the initiator (Dutch Ministry of Infrastructure and Environment, n.d.-a).

Participation

Next to the objective of environmental assessment in the Netherlands to promote transparency in decision-making, environmental assessment also strives to promote participation in the planning and decision making process (Netherlands Commission for Environmental Assessment, n.d.-a). In order to obtain opinions from the public and other stakeholders, the competent authority should make sure pieces of work are 'laid to inspection': it must be made clear where, when and how the public and other stakeholders can review the various documents and make their comments heard. In the Environmental Management Act, no requirements are recorded for this. The competent authority may determine which pieces of work are laid to inspection, for how long, who can file their reviews and in which way. However, in an earlier amendment, examples of pieces that can be laid to inspection are mentioned: pre-studies or explorations for the in the plan or decision provided activities, decisions of principle or notes from governing bodies or official notes. In the full-fledged Environmental Assessment procedure, this step can be no more than simultaneously executed with the next step, which is advice and consultation on the scope and level of detail. Hereby, the opportunity exists to lay the findings regarding the scope and level of detail to inspection, in order to obtain reviews (Dutch Ministry of Infrastructure and Environment, n.d.-c).

3.3 Structure visions in the Netherlands

Under the Dutch spatial planning Act ('Wet ruimtelijke ordening'), all governments – on municipal, local and national level – are required to set up a structure vision for their territory for the purpose of a proper spatial planning. This structure vision contains the trunk lines of the intended development of that specific area. Next to this, structure visions can be set up for specific aspects of the spatial policy, such as recreation (Dutch Ministry of Infrastructure and Environment, n.d.-f).

A structure vision has no legal status in the context of the spatial planning Act, though it is a binding and guiding document for the competent authority itself (Dutch Government, 2006). Spatial strategies in structure visions usually have a time frame of ten to twenty years. This is up to the competent authority to determine. On the basis of the spatial planning Act, the content of the structure vision is not bound to many rules and regulations. The territory-targeted structure visions need to include the main lines of the intended development of the area, and the main affairs of the spatial policy as to be implemented by the governmental body. An aspect-targeted structure vision requires the main lines of the intended development of the specific aspect(s) targeted in the structure vision. In both cases, the structure vision needs to address the method(s), thought of by the council, to realise the intended development (Dutch Ministry of Infrastructure and Environment, n.d.-g).

Compulsory SEA for structure visions

In two cases, a SEA procedure is legally required for a structure vision. The structure vision is always to be regarded as a plan that sets a framework. For most activities and accessory cases of parts C and D of the Decision Environmental Assessment ('Besluit Milieueffectrapportage'), the structure vision is mentioned in column 3 and an SEA is therefore mandatory (Dutch Ministry of Infrastructure and Environment, n.d.-g). In column 3 are the plans mentioned that require a compulsory SEA, which makes an SEA belonging to the structure vision mandatory in those cases (Dutch Ministry of Infrastructure and Environment, n.d.-d). The second case which requires a SEA for a structure vision,

is when activities mentioned in the structure vision may have significant effects on Natura 2000 areas (Netherlands Commission for Environmental Assessment, n.d.-b).

On the basis of the environmental assessment regulations, no extra obligations for structure visions that require an SEA are included with regard to the content. However, in the Environmental Management Act ('Wet milieubeheer') minimum demands are included that the ES, belonging to the structure vision, needs to meet. These demands for an ES, which refers to a plan, are:

- A description what the intended activity is aimed at;
- A description of the intended activity and the alternatives that reasonably should be taken into consideration and the motivation of the choice of the alternatives;
- An overview of earlier determined plans that pertain the intended activity and the described alternatives;
- A description of the current condition of the environment, as far as the intended activity or the described alternatives can have effects on that environment, and the development of the environment that is to be expected when the activity nor the alternatives will be undertaken;
- A description of the effects on the environment that the activity or the described alternatives can have, and a rationale of how these effects have been determined and described;
- A comparison of the expected development of the environment with the described effects on the environment of the intended activity and of the described possible effects of the alternatives;
- A description of the measures to prevent, limit or to the utmost void important negative effects on the environment caused by the activity,
- An overview of the gaps in the descriptions of the current condition of the environment and the effects on the environment because of a lack of necessary data;
- A summary that gives sufficient insight for the review of the Environmental Statement for a general public (Dutch Ministry of Infrastructure and Environment, n.d.-g).

The final scope and level of detail of the Environmental Statement naturally needs to be in line with the content of the structure vision, since the ES gives insight in the effects on the environment for the choices that are made in the structure vision for a certain area or specific aspect.

The above mentioned demands imply that the minimum content of the Environmental Statement shows large similarities with the practical content of the structure vision. With regard to the ES, complementary conditions are set to the research of the alternatives, the comparison of the alternatives and a sensitivity analysis of the content of the ES (Dutch Ministry of Infrastructure and Environment, n.d.-g).

A structure vision that legally requires an SEA is generally followed by a zoning plan that needs environmental assessment. Although the procedures of both spatial instruments are not linked to each other, this can be taken into account when the ES is being composed, e.g. by using a larger level of detail in the ES belonging to the structure vision, which possibly allows it to be used also in the environmental assessment process of the zoning plan (Dutch Ministry of Infrastructure and Environment, n.d.-g).

3.4 Climate change initiatives in the Netherlands

“Settlements in coastal lowlands are especially vulnerable to risks resulting from climate change, yet these lowlands are densely settled and growing rapidly”(McGranahan et al., 2007 p.17). The Netherlands is an example of such an area; the most densely populated areas of the country are located mostly in the western part of the country – close to the North Sea – and are often situated below sea level. This partially explains why several initiatives have been set up to tackle climate change issues in the Netherlands. An overview of such initiatives is given in this paragraph. Though not all of these are directly linked to environmental assessment, these initiatives have been mentioned by the interviewed Dutch SEA professionals.

‘Space for Climate’ (‘Ruimte voor Klimaat’)

In December 2011, a ‘fieldbook for climate-proof planning and organisation’ was published: ‘Space for Climate’ (‘Ruimte voor Klimaat’). This publication was especially mentioned for environmental professionals, policy makers and decision makers who want to make sure that the people in their town, city or region can stay working, living and recreating comfortably and safely, even if the temperature rises, sea level rises and too much or even too little precipitation falls. The fieldbook shows examples of projects in the Netherlands, where adaptation to climate change has already been put in practice. Furthermore, it introduces a variety of instruments that can support climate-proof planning and organisation (Climate for Space [Klimaat voor Ruimte], 2011b).

The online fieldbook is a result from the knowledge and experience gained from the two research programmes ‘Climate for Space’ (‘Klimaat voor ruimte’) and ‘Knowledge for Climate’ (‘Kennis voor Klimaat’) over six years during the application of scientific knowledge in practice. Experiences within other programmes such as ‘Living with Water’ (‘Leven met Water’) have been used as well (Climate for Space [Klimaat voor Ruimte], 2011b).

The online fieldbook describes a set of twenty case studies, which have led to a series of lessons, tips and suggestions. The used instruments are described as well. These are developed to analyse which climate factors are of importance in the project area and what professionals should keep in mind when planning and organising climate-proof. SEA is one of the tools that is mentioned to possibly address climate change issues (Climate for Space [Klimaat voor Ruimte], 2011b).

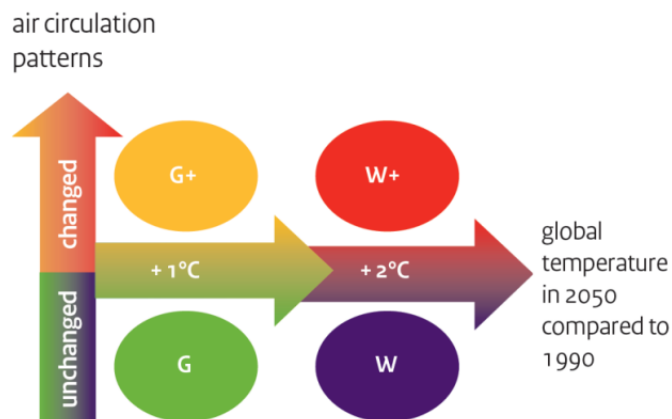
‘Climate guider’ (‘Klimaatwijzer’)

The ‘Climate guider’ is a publication by the Dutch ministry of Infrastructure and Environment. It consists of factsheets with relevant knowledge, insights, instruments and examples of how to deal with the effects of climate change in spatial (plan) processes. It thereby offers an insight in existing knowledge that is required to be able to make climate-aware and climate-proof spatial considerations. ‘Climate guider’ is not a manual, but rather contains information that parties involved in spatial (plan) processes can use to give climate change a place. Factsheets contain information on climate scenarios, the layer approach, deployment of instruments for the purpose of the exploration of tasks and problems, how to generate solution directions and to make spatial considerations. Environmental assessment is specifically mentioned as one of the tools that is useful to get a picture of the consequences of climate changes for spatial plans (Dutch Ministry of Infrastructure and Environment, 2011).

Royal Netherlands Meteorological Institute (KNMI) Climate scenarios

In 2006, the Royal Netherlands Meteorological Institute (KNMI) set out four climate scenarios that paint a picture on changes in temperature, precipitation, evaporation, wind and sea level as consequences of the increased emission of greenhouse gases. The scenarios are consistent and plausible images of a possible future climate. KNMI has made these scenarios for the Netherlands to use in impact and adaptation studies (Royal Netherlands Meteorological Institute, 2008, Climate for Space [Klimaat voor Ruimte], 2011a). After their publication in 2006, they have been amended and ratified in 2009 (Royal Netherlands Meteorological Institute, 2009, Climate for Space [Klimaat voor Ruimte], 2011a), wherein it was mentioned that warming is occurring faster than expected in the Netherlands and that therefore the scenarios W and W+ are most likely to occur.

The four KNMI'06 scenarios are chose in such a way, that the four 'corners' of the spectrum include a large portion of the uncertainties regarding the future climate. Climate scenarios are no long-term weather predictions, they only make statements regarding possible changes in the average weather conditions and the chances of extreme weather events in the future (Climate for Space [Klimaat voor Ruimte], 2011a). They have two main variables: the amount of temperature rise and the change in air circulation patterns. The four scenarios are presented in Figure 3.3.



G	Moderate*	1°C temperature rise on earth in 2050 compared to 1990 no change in air circulation patterns in Western Europe
G+	Moderate +	1°C temperature rise on earth in 2050 compared to 1990 + milder and wetter winters due to more westerly winds + warmer and drier summers due to more easterly winds
W	Warm	2°C temperature rise on earth in 2050 compared to 1990 no change in air circulation patterns in Western Europe
W+	Warm +	2°C temperature rise on earth in 2050 compared to 1990 + milder and wetter winters due to more westerly winds + warmer and drier summers due to more easterly winds

Figure 3.3. The four KNMI'06 climate scenarios. Adopted from: Royal Netherlands Meteorological Institute (2009, above) and Royal Netherlands Meteorological Institute (2008, below).

The publications containing the KNMI'06 scenarios and the amendments from 2009 include various climate changes in the Netherlands around the years 2050 and 2100 compared to climate of the past decades. The scenarios can be used for a first exploration of the influence of climate change, where it can be sufficient to use only one scenario. In this way it can be determined whether climate change

has an impact on a sector and if more extensive research is required. Regarding impact and adaptation studies, it is especially valuable to use all four scenarios in order to make better mutual comparisons. By comparing the scenarios, the robustness of adaptation measures can also be determined. Especially those measures that work well in all four scenarios are of high interest for policy makers and decision makers. Ideally, the results of impact and adaptation studies play a role in policy and strategy making (Climate for Space [Klimaat voor Ruimte], 2011a).

3.5 Suitability of SEAs belong to Dutch structure visions for this research

As is described in this chapter, structure visions present the vision on the spatial policy of a certain administrative region, such as a municipality, province or even state. The document has no juridical status as such, but it is binding and guiding for the composer of the vision itself (Dutch Government, 2006). The spatial strategy in structure visions is generally aimed ten to twenty years in the future, but this may vary. Before the spatial planning Act ('Wet ruimtelijke ordening') entered into force in 2006, only municipalities set up structure visions for their territory. Since the provinces have lost their task to approve zoning plans in the current spatial planning Act (Dutch Government, 2006), provinces have been searching for other policy instruments. Therefore, also provinces compose structure visions; provincial structure visions. Even partnerships between several provinces or municipalities have also been set up, resulting in interprovincial or intermunicipal structure visions. The structure vision plays an important role in the spatial development policy. Despite this, structure visions generally remain a document with a high abstract level, only initiating and stimulating spatial developments in a general way.

Since these structure visions often require an SEA and are comparable amongst each other, they – and especially their adjacent SEA – are suitable to act as the context of this research. It is therefore that Environmental Statements belonging to Dutch structure visions are reviewed on the extent of climate change in the next chapter.

4. Climate change in SEAs belonging to Dutch structure visions

This chapter summarises the findings of the review of SEAs belonging to Dutch structure visions regarding climate change. First, the review itself and the reviewed SEAs will be shortly introduced (paragraph 4.1). Then, the main findings will be presented (paragraph 4.2) and this chapter continues with an overview of good practices per climate change criterion (paragraph 4.3). Finally, concluding remarks on the ES review will be presented (paragraph 4.4)

4.1 Introduction to the review

The analytical framework from Chapter 2 is used in the review of Dutch SEAs, with the climate change review criteria derived from various sources of literature. To recap, these are the eleven climate change review criteria:

1. The Environmental Statement addresses *adaptation* measures;
2. Describes current and expected future climate *baseline*;
3. Considers *CO₂ reduction* targets and the relevance of the plan for these targets;
4. Undertakes *consultation* with statutory consultees and the public and climate change plays a role herein;
5. Considers *equity* in the form of social, economic, health and just issues;
6. Includes *mitigation* plans and measures aimed at reducing greenhouse gas emissions or increasing carbon sinks;
7. Includes provisions for *monitoring* climate-related measures;
8. Addresses climate in a *separate chapter*;
9. Considers climate change impacts at scales larger than the *spatial boundary* of the plan;
10. Includes *synergies* between adaptation and mitigation, as well as between climate and other environmental policy fields;
11. Addresses climate change *uncertainties*.

The structure vision Environmental Statements examined in this review have all been reviewed by NCEA, except the ES belonging to structure vision ‘Rijksstructuurvisie Almere-Amsterdam-Markermeer (2013)’ of the ministries of Economic Affairs and Infrastructure & Environment, which was still subject of NCEA review at the time when this research was conducted. This means that 47 Environmental Statements are subject of this research, together with 46 NCEA reviews. Not all of them were considered by NCEA to contain sufficient information on the environment to proceed with the decision-making process, but this was not related to any climate issues and was therefore considered not to be of significant interest for this research.

The adjective year to the Environmental Statement mostly represents the year in which the ES is published, but this is not true for all cases. This is caused by the fact that the year in which the Netherlands Commission for Environmental Assessment (NCEA) has published her review was chosen as the year of reference. Some SEA procedures have required amendments to the ES and some procedures have taken significantly longer than other SEA procedures and therefore the year of NCEA review was chosen as reference year, since this is generally seen as the ‘end’ of the SEA procedure. Based on NCEA’s advice, the competent authority can then continue with the decision-making process. In accordance with the described method for determining the adjective year of the

ES, Environmental Statements from 2008 to 2013 have been subject of this review. Table 4.1 shows the reviewed Environmental Statements.

Once all these Environmental Statements were found online, they have been reviewed for the eleven climate change review criteria. In order to determine whether the criteria were addressed in the ES, several keywords have been searched in the document and relevant paragraphs or chapters have been read carefully. None of the Environmental Statements were read entirely, since this was too time-consuming. The same method was applied for the reviews of NCEA to determine whether ESs containing insufficient information on the environment to proceed with the decision-making process, was related to any climate issues. As has been mentioned above, this was not the case. A description of the review method, including keywords searched for, can be found in Annex 1.

Table 4.1. Reviewed Dutch structure vision Environmental Statements.

1.	Structuurvisie Dordrecht 2020, 2008.	25.	Noordoostcorridor Provincie Noord-Brabant, 2011.
2.	Structuurvisie Randstad 2040, 2008.	26.	Rijk van Bommel en Aa, 2011.
3.	Omgevingsvisie Overijssel, 2009.	27.	FlorijnAs & Park Diepstroeten, 2011.
4.	Structuurvisie Nieuwkoop 2040, 2009.	28.	Structuurvisie Infrastructuur en Ruimte, 2011.
5.	Structuurvisie gemeente Woerden, 2009.	29.	Actualisering Provinciale Structuurvisie – Visie op Zuid-Holland, 2011.
6.	Provinciale Structuurvisie - visie op Zuid-Holland, 2009.	30.	Ruimtelijke Structuurvisie Zaanstad, 2011.
7.	Provinciaal Omgevingsplan Groningen, 2009.	31.	Ontwerp Structuurvisie 2012-2015 gemeente Maassluis, 2011.
8.	Structuurvisie Kampen , 2009.	32.	Gebiedsopgave Grenscorridor N68, 2012.
9.	Ruimtelijke structuurvisie Delft 2030, 2009.	33.	Structuurvisie Den Helder, 2012.
10.	Interimstructuurvisie 2009 Eindhoven, 2009.	34.	Structuurvisie Lingemeren, 2012.
11.	Structuurvisie Nieuwegein, 2009.	35.	Structuurvisie Haarlemmermeer 2030, 2012.
12.	Lansingerland ontwerpstructuurvisie, 2009.	36.	Structuurvisie Buitengebied gemeente Dalfsen, 2012.
13.	Structuurvisie Amsterdam 2040, 2010.	37.	Intergemeentelijke Structuurvisie Bleizo, het Kwadrant en omgeving, 2012.
14.	Structuurvisie Noord-Holland, 2010.	38.	Structuurvisie Vianen, 2012.
15.	Concept Omgevingsvisie Drenthe Duurzaamheidsbeoordeling, 2010.	39.	Structuurvisie Ruimte voor Wensen 2040 Leidschendam-Voorburg, 2012.
16.	Katwijk Structuurvisie, 2010.	40.	Structuurvisie Brouwersdam-Zuid, 2012.
17.	Structuurvisie Rijnenburg, 2010.	41.	Omgevingsplan 2012-2018 provincie Zeeland, 2012.
18.	Intergemeentelijke Structuurvisie Nieuw Stroomland, 2010.	42.	Structuurvisie Arnhem, 2012.
19.	Structuurvisie Ruimtelijke Ordening Noord-Brabant, 2010.	43.	Ontwerp Provinciale Ruimtelijke Structuurvisie 2013-2028 Utrecht, 2012.
20.	Stadshavens Rotterdam, 2011.	44.	Structuurvisie gemeente Veere, 2012.
21.	Toekomst Afsluitdijk, 2011.	45.	Structuurvisie Harderwijk 2031, 2012.
22.	Structuurvisie Maasdriel, 2011.	46.	Rijksstructuurvisie Almere-Amsterdam-Markermeer, 2013.
23.	Structuurvisie Tilburg Zuidwest 2020, 2011.	47.	Structuurvisie Windstreek 2012 provincie Friesland, 2013.
24.	Zuidas – de Flanken, 2011.		

4.2 Review findings

Out of the 47 Environmental Statements, 23% of them focused on a municipality in the province of Zuid-Holland or the entire province itself. All other provinces, or municipalities in these provinces, formed the context of an ES less often. The province of Limburg incidentally is the only province that was not part of this research, while the province of Flevoland was only mentioned in a combination with the province of Noord-Holland in 'Rijksstructuurvisie Almere-Amsterdam-Markermeer'. The regional distribution of the ESs is shown in Figure 4.1. Most of the ESs were dated 2012 (30%) and 2011 (26%). Environmental Statements dated 2009 formed 21% of the research, while 15% were dated 2010 and reviews dated 2008 and 2013 comprised both 4%. The large majority (89%) of ESs was prepared by consulting firms, the remaining 5 were prepared by the competent authorities themselves. The consulting firms that prepared the ESs were Oranjewoud (7), DHV (6), RBOI (6), Witteveen+Bos (6), Tauw (5), Arcadis (4), Royal Haskoning (3), Grontmij (3), SAB (1) and one collaboration between DHV and RBOI. In 28 cases, the competent authority was a municipality in one of the provinces and in 12 cases the province itself acted as the competent authority. In three cases, the competent authority consisted of multiple municipalities. In the same amount of ESs, a national ministry was the competent authority. It was only recorded once that multiple ministries had this function.

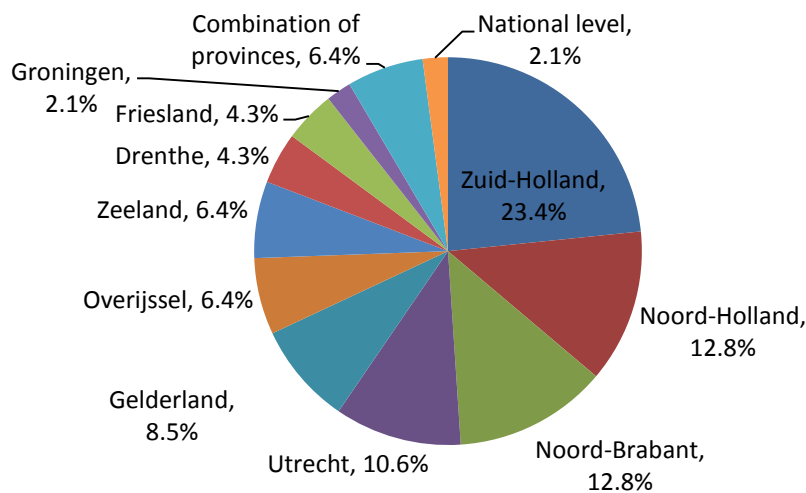


Figure 4.1. Regional distribution per Dutch province of Environmental Statements.

The 47 reviewed ESs addressed an average of 4.1 climate change review criteria and ranged from addressing zero to ten out of the eleven criteria. It is interesting to observe that only a quarter of the Environmental Statements addressed six criteria or more, thereby incorporating over half of the available eleven criteria. This is in line with existing perceptions that although SEA is considered being a useful tool for addressing climate change issues, this characteristic is exploited far from fully. Within the reviewed Dutch set of structure vision ESs, there seems to be a rather inconsistency when it comes to addressing climate change criteria; there are little differences between the 'pieces of the pie'. Figure 4.2 tends to confirm the general opinion from literature that SEA can be a very useful tool to communicate climate change, since there are Environmental Statements addressing eight or even ten of the climate change review criteria. Simultaneously, the figure also indicates that SEA's opportunity to consider climate change is far from utilised fully, since many ESs address only a small number of indicators.

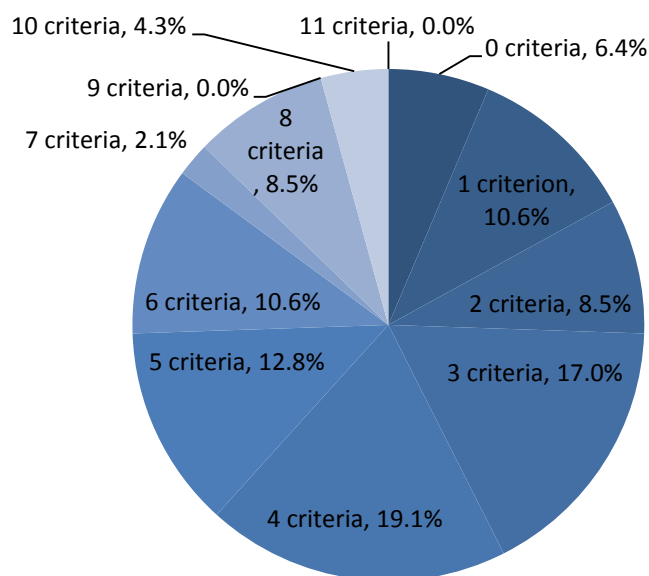


Figure 4.2. Percentage of reviewed Environmental Statements that addressed 0-11 of the climate change criteria.

The average percentage of addressed climate change criteria by region is shown in Table 4.2 and the percentages of Environmental Statements by region addressing the eleven climate criteria are shown in Table 4.3. There are significant variances between the regions; Environmental Statements covering (municipalities in) the provinces of Zeeland and Overijssel only addressed 24% of the available climate change criteria, while ESs covering (municipalities in) the province of Drenthe and on a national level addressed over half of the criteria. It must be noted however, that several of the mentioned regions are represented only by a very limited number of Environmental Statements and might therefore not provide an accurate reflection of the importance that is being given to climate change in those specific regions.

Table 4.2. Average percentage of addressed climate change criteria by region.

Drenthe (<i>n</i> =2)	59.1%
Friesland (<i>n</i> =2)	31.8%
Gelderland (<i>n</i> =4)	27.3%
Groningen (<i>n</i> =1)	45.5%
Noord-Brabant (<i>n</i> =6)	36.4%
Noord-Holland (<i>n</i> =6)	48.5%
Overijssel (<i>n</i> =3)	24.2%
Utrecht (<i>n</i> =5)	43.6%
Zeeland (<i>n</i> =3)	24.2%
Zuid-Holland (<i>n</i> =11)	33.1%
Combination of provinces (<i>n</i> =3)	45.5%
National level (<i>n</i> =1)	54.5%

As can be seen in Table 4.3 and Figure 4.3, much attention in the reviewed Environmental Statements is being paid to adaptation (85%), mitigation (77%) and CO₂ reduction (66%). This is comparable to English Sustainability Appraisal reviews, where adaptation and mitigation were found to be the most commonly addressed climate change criteria, both being mentioned in 89% of the cases (Posas, 2011 p. 130). The province of Gelderland is the only region whose Environmental Statements did not take CO₂ reduction into account, all other ESs have taken these criteria into account in at least one of the ESs covering (municipalities in) their territory. The data suggest that in general, the most significant ‘missed opportunities’ lie in the fields of considering consultation, equity and monitoring issues, as well as the consideration of climate change impacts at scales larger than the spatial boundary of the structure vision. Although these are the least addressed climate criteria, this does not imply that the other criteria are not open for possible improvements. Only climate change adaptation, mitigation and CO₂ reduction are broadly speaking well addressed and therefore require less attention regarding improvements in SEA practice than the other criteria. The identification of various good practice principles is presented in paragraph 4.3.

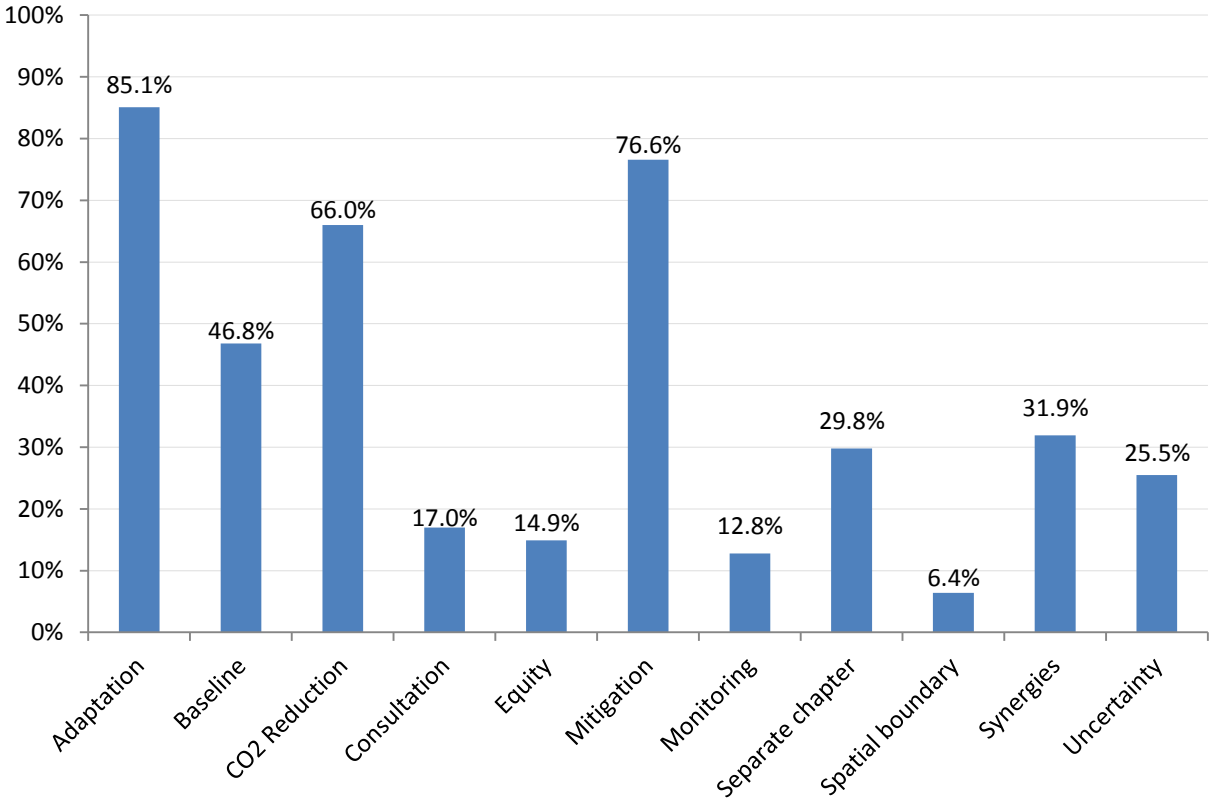


Figure 4.3. Percentage of reviewed Environmental Statements that addressed the climate change criteria between 2008 and 2013.

Table 4.3. Percentage of Environmental Statements by region covering each of the climate change criteria.

	Adaptation	Baseline	CO ₂ reduction	Consultation	Equity	Mitigation	Monitoring	Separate chapter	Spatial Boundary	Synergies	Uncertainty
Drenthe (n=2)	50%	100%	100%	50%	50%	100%	50%	50%	0%	50%	50%
Friesland (n=2)	50%	50%	100%	0%	0%	100%	50%	0%	0%	0%	0%
Gelderland (n=4)	75%	25%	0%	0%	25%	75%	0%	25%	25%	25%	25%
Groningen (n=1)	100%	100%	100%	100%	0%	100%	0%	0%	0%	0%	0%
Noord-Brabant (n=6)	100%	33%	83%	0%	17%	50%	0%	33%	0%	50%	33%
Noord-Holland (n=6)	83%	67%	100%	17%	0%	100%	17%	67%	17%	33%	33%
Overijssel (n=3)	67%	33%	33%	0%	0%	67%	0%	0%	33%	0%	33%
Utrecht (n=5)	80%	80%	60%	40%	20%	60%	40%	40%	0%	40%	20%
Zeeland (n=3)	67%	33%	33%	0%	33%	67%	0%	0%	0%	0%	33%
Zuid-Holland (n=11)	100%	18%	64%	18%	9%	73%	9%	27%	0%	36%	9%
Combination of provinces (n=3)	100%	67%	67%	33%	33%	100%	0%	33%	0%	33%	33%
National level (n=1)	100%	100%	100%	0%	0%	100%	0%	0%	0%	100%	100%

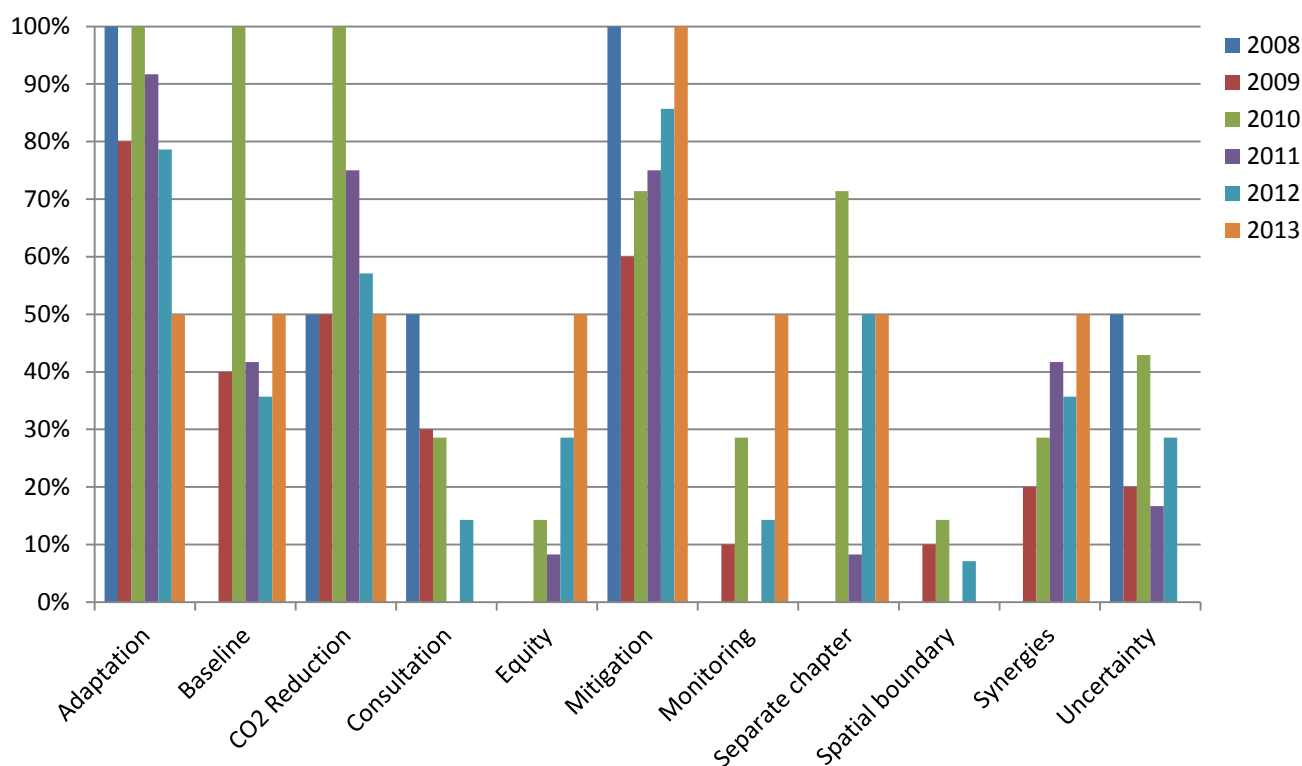


Figure 4.4. Climate change criteria covered by reviewed Environmental Statements, shown by year of NCEA's review publication. N.B.: ES from 2008 and 2013 give somewhat distorted results, since from both years only two ES were reviewed.

Figure 4.4 indicates some minor trends when looking at the Environmental Statements by year of NCEA's review publication, which generally is published six weeks after the ES has been made public and therefore shortly after completion of the ES. A number of criteria appear to be become more consistently addressed over time. These are equity, synergies and monitoring, although the latter is

rather addressed somewhat unevenly over time. Also mitigation can be added to this small list, since only two ESs from 2008 were reviewed in this research, thereby not providing a fully reliable image of ESs from that year. 2008 is the only year that breaks with the subjected trend of increased addressing of mitigation. Adaptation, baseline and CO₂ production are generally addressed consistently over time, with all three having a strong peak in 2010. Consultation and uncertainty seem to be in relative decline, although the latter differs significantly per year. It seems unjustified that uncertainty should be decreasing whilst although increasingly more knowledge on climate change is being produced, the bandwidths of the likely effects are still relatively large and the effects on either side of those bandwidths can vary greatly. This was mentioned in one of the interviews, presented in Chapter 5.

Figure 4.5 displays the average number of climate change criteria addressed by Environmental Statements per year. The trend line (power type) suggests that overall climate change consideration in SEA is increasing. However, the statistical Spearman’s rank correlation coefficient is 0.6, indicating there is no strong statistical link. No explanation was either found on the high number of criteria addressed in 2010.

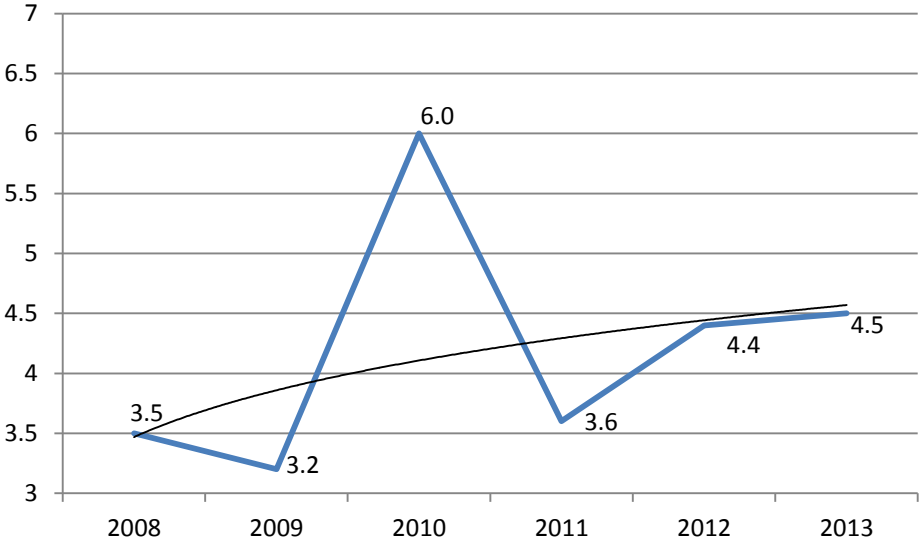


Figure 4.5. Average number of climate change criteria addressed by Environmental Statements per year, including a trend line.

4.3 Overview of good practices per climate change criterion

The following paragraphs present a brief overview of general and good practices noted during the review of Environmental Statements. This is described per climate change review criterion. When an ES is considered to present a good practice and thereby might be seen as an example for future Environmental Statements, the page number of the specific statement(s) is mentioned.

4.3.1 Adaptation

Adaptation to climate change is mentioned in 85% of reviewed Environmental Statements and is thereby the single most addressed climate change review criterion. Generally, adaptation to climate change is mostly described in forms of increased water storage – either required to adapt to

increased and heavier (peak) precipitation or increased river discharges – adapting to expected sea level rise and adaptation measures to respond to higher temperatures, where especially the urban heat island effect plays an important role. Often, these measures are not described in much detail. However, the Environmental Statement belonging to ‘Provinciale Structuurvisie - visie op Zuid-Holland (2009)’ already mentions adaptation measures, or these are said to be researched. The adaptation measures include flexible water level management, deep polder policies, restraints on the urbanisation of deep polders and the continuation of no-regret measures. The ‘Structuurvisie Nieuwegein (2009)’ ES states that sufficient storage water should be available due to climate change (p. 11). In the Environmental Statement belonging to ‘Concept Omgevingsvisie Drenthe Duurzaamheidbeoordeling (2010)’, various climate change adaptation measures are described more specifically, especially aimed at water issues (p. 20). More space will be made available for water in stream valleys, whereby as much water as possible is tried to be retained upstream and capital intensive functions are averted in the stream valleys. Per stream valley, it is described which measures are thought to be suitable and why. When retaining water is not sufficient, water storage areas suitable for storing large quantities of water are established downstream, limiting damages caused by floods. To further prevent floods, regional water weirs are raised to sufficient heights. Further adaptation measures aimed at ground water usage, minimising water shortage, water in relation with nature and agriculture are presented in the ES as well. In the ES belonging to ‘Intergemeentelijke Structuurvisie Nieuw Stroomland (2010)’, it is stated that more storage water capacity is required because of the expected increase in precipitation. Water issues are directly related to climate change: *"because of climate change, there has to be handled differently with ground- and surface water"* (p.61). In the ‘Structuurvisie Arnhem (2012)’ Environmental Statement, adaptation measures are specifically aimed at water and heat. Both are treated in a separate chapter; precipitation overloads caused by heavier rain showers and peak discharges in chapter 5 and urban heat islands in chapter 8.

4.3.2 Baseline

Almost half of the reviewed Environmental Statements (47%) included information on the current baseline and expected future climate projections. This ranges from copies of direct national policy statements regarding general statements on sea level rise and temperature rise, to specific maps presenting future heat effects. Therefore it is striking that in the ES belonging to ‘Structuurvisie Tilburg Zuidwest 2020 (2011)’ it is mentioned that *"no autonomous developments are known"* (p.110) concerning climate. In the ES belonging to ‘Structuurvisie Arnhem (2012)’, a so-called ‘heat-attention-map’ is presented (p. 173). On this map, areas within the municipality are given a colour, based on the urgency to prevent further warming in those areas. At the same time, the various spatial developments presented in the structure vision are shown on the map and their influence on heating or cooling of the areas is explained. In the ES, it is mentioned that this is a new way of presenting such aspects. In the ES belonging to ‘Omgevingsvisie Overijssel (2009)’, flooding is not expected to become a problem the next 100 years. Future predictions regarding sea level rise, water level rise in the IJsselmeer and drought are presented, as well as water storage in extreme events and widening of discharge capacity. Furthermore, it is acknowledged that climate changes are not fully understood and predictable yet. One of the best baseline and expected climate prediction descriptions are found in the ES adjacent to ‘Structuurvisie Haarlemmermeer 2030 (2012)’. ‘Climate-proof or climate constancy’ plays an important role in this ES, especially in the form of the use of

sustainable energy, but even more so in flood risk, water nuisance, fresh water inlet and heat constancy. The amount of peak rain showers is expected to increase, sewage and storage capacity measures are required. As a result of sea level rise and lower river discharge, increased salinization is expected, just as higher temperatures.

4.3.3 CO₂ reduction

Two-third of all reviewed Environmental Statements (66%) included statements on CO₂ reduction. Although many of these ESs mentioned measures regarding sustainable energy production and/or usage, not all ESs explained to what extent these measures would then contribute to national, regional or local CO₂ reduction targets. Some Environmental Statements presented calculations, showing the avoided CO₂ emissions. The ES belonging to 'Provinciale Structuurvisie – visie op Zuid-Holland (2009)' is one of very few Environmental Statements mentioning that CO₂ emissions are not only to be limited, but that CO₂ is also aimed at to be stored in the soil, thereby creating a carbon sink. CO₂ reductions, savings and avoided emissions are calculated for different alternatives in the Environmental Statement belonging to 'Toekomst Afsluitdijk (2011)'. The ES belonging to 'Noordoostcorridor Provincie Noord-Brabant (2011)' presents similar calculations, relates CO₂ emissions caused by increased traffic flows to climate and various relevant policies are described in the Annex 'themadocument woon- en leefmilieu', herein is climate almost solely linked to CO₂ emissions. In the ES belonging to 'Zichtbaar Zaans - Ruimtelijke Structuurvisie Zaanstad (2011)', the avoided emissions for CO₂ are calculated and it is thereby made very explicit how these will contribute to the local reduction policies (p. 87). The ES belonging to 'Structuurvisie Haarlemmermeer 2030' clearly describes CO₂ reduction policies and ways of achieving the goals described in those policies.

4.3.4 Consultation

Only 17% of the reviewed Environmental Statements mentioned climate-related results of consultation. Most of the ESs explain the Dutch SEA procedure, but do not include the results of public review and participation. This can be due to the stage wherein the ES was published; public review could have been organised after the reviewed ES was published. In that case, no consultation results would have been available yet. Only few ESs showed the received opinions and views from citizens. This was confirmed by a member of NCEA, who stated that little public reviews concerning climate are generally submitted. Public reviews are listed in the 'Provinciale Structuurvisie - visie op Zuid-Holland (2009)' ES, some of which are related to climate change issues. It is mentioned if and how these reviews are incorporated in the final ES. The ES appurtenant to 'Structuurvisie Rijnenburg (2010)' mentions that consultation and review have not played a role in the ES process yet, so it is only mentioned that reviews of the public will be taken into account. However, it is extensively described how the Climate Atelier has played an important role in this ES and how this process was organised, but no citizens were directly involved herein. The ES belonging to 'Structuurvisie Den Helder (2012)' mentions that public review has influenced the assessment framework, though it is not made clear if any climate has played any role herein. In an Annex of the ES belonging to 'Structuurvisie Haarlemmermeer 3030 (2012)', the participation process is clearly described. As part of this, a Water Congress was organised, where it was stated that alignment with climate developments should be given time (p. 10 of 'Verslag participatie en publieksreacties structuurvisie Haarlemmermeer 2030'). In Annex 5 of the ES belonging to 'Ontwerp Provinciale Ruimtelijke

Structuurvisie 2013-2028 Utrecht (2012)', the reactions of organisations on the report on scope and level of detail of the ES, are presented, in which the consequences of climate change, including extreme weather events, came to the fore (p. 91).

4.3.5 Equity

Equity considerations were presented in 15% of the reviewed Environmental Statements, thereby being the third-least considered climate change review criterion. As Posas (2011) points out, the concern for equity is implicitly addressed in the EU SEA Directive, since one of its objectives is to promote sustainable development. Few of the reviewed ESs relate economic, social, health and just issues to climate change and its impacts. The ESs that do address equity considerations, mostly do not address these in much detail and state that certain land uses, especially nature and agriculture, are more vulnerable for climate change, mainly due to water impacts. The ES belonging to 'Intergemeentelijke Structuurvisie Bleizo, het Kwadrant en omgeving (2012)' identifies which areas are vulnerable to climate change effects (p. 134-135), but specific citizen groups are not mentioned. The Environmental Statement belonging to 'Structuurvisie Arnhem (2012)' is one of the ESs that states specific citizen groups are more vulnerable to climate changes (heat) than others: elderly people in heat-vulnerable areas (p. 173). In the Environmental Statement adjacent to 'Rijksstructuurvisie Almere-Amsterdam-Markermeer (2013)', it is mentioned that some specific neighbourhoods/districts are more vulnerable to climate change effects than others. This goes especially for especially water and heat issues.

4.3.6 Mitigation

Over three-quarters (77%) of the reviewed Environmental Statements present climate change mitigation measures, aimed at reducing greenhouse gas emissions from activities within the plan or increasing carbon sinks. Mitigation thereby is the second-most addressed climate change review criterion. The far majority of ESs presenting mitigation measures do this by presenting sustainable energy production methods, especially wind energy. Thermal energy storage is also mentioned in the ESs frequently. In the ES belonging to 'Ruimtelijke structuurvisie Delft 2030 (2009)' more focus on public transport is seen as a way of mitigation, since less greenhouse gases and CO₂ will be emitted. In the ES for 'Interimstructuurvisie 2009 Eindhoven (2009)', people are persuaded to travel by public transport rather than by car. Specific mitigation opportunities as solar panels are mentioned in the ES belonging to 'Noordoostcorridor Provincie Noord-Brabant (2011)'. Climate change mitigation is mentioned to be specifically linked with transport in the ES adjacent to 'Structuurvisie Infrastructuur en Ruimte (2011)'. Solution directions can be shifts in modalities, the use of cleaner and quieter vehicles, to avert traffic in certain circumstances, increased working from home and a quieter infrastructure. The Trias Energetica (reduce energy demand - energy exchange - use of sustainable energy sources) is one of the pillars of the sustainability ambition of Haarlemmermeer in the ES appurtenant to 'Structuurvisie Haarlemmermeer 2030 (2012)' (p. 97) and is thereby seen as a way of climate change mitigation.

4.3.7 Monitoring

Monitoring measures were presented in only 13% of all reviewed Environmental Statements. It thereby is the second-least addressed climate change review criterion. Although almost half of the

reviewed ESs presented the current baseline and expected future climate projections, only a small number of ESs included measures for monitoring climate change causes and impacts. This is striking, since the 'Nationaal Samenwerkingsprogramma Luchtkwaliteit' [National Collaboration Programme Air Quality] was introduced in 2009 by the Dutch government and local authorities. This programme is aimed at improving the air quality for health purposes and annually monitors NO₂ and PM₁₀ concentrations (Dutch Government, n.d.), which are considered greenhouse gases (Bernard et al., 2001). A small number of Environmental Statements mentions that on-going climate change research is being watched. In this way, more climate knowledge can be obtained.

The Environmental Statement belonging to 'Structuurvisie Amsterdam 2040 (2010)' mentions that CO₂ emissions are being monitored, but it is not made clear whether the actual climate changes are being monitored as well. In the 'Concept Omgevingsvisie Drenthe Duurzaamheidsbeoordeling (2010)' ES, intentions are mentioned to monitor climate changes and climate research (p. 23). Furthermore, few of the reviewed Environmental Statements present specific monitoring measures. The ES adjacent to 'Structuurvisie Vianen (2012)' states that part of the monitoring package is to monitor if the water storage capacity remains sufficient (p. 10). In the Environmental Statement belonging to 'Ontwerp Provinciale Ruimtelijke Structuurvisie 2013-2028 Utrecht (2012)' it is stated that more research is needed regarding the effects of different climate change scenarios on flora and fauna, and that the progress in sustainable energy should be monitored (p. 65). In the 'Structuurvisie Windstreek 2012 Provincie Friesland (2013)', it is stated that the contribution to the energy supply and the share of sustainable energy hereof is going to be monitored (p. 142).

4.3.8 Separate chapter

In 30% of the reviewed Environmental Statements, climate change was addressed as an environmental issue in a separate chapter, thereby increasing the accessibility for both policymakers and those of the public and other parties interested in the subject. The majority of reviewed Environmental Statements wherein climate change was addressed in a separate chapter, related climatic issues to sustainable energy and sustainability in general. Several reviewed Environmental Statements included climate change in the chapter on autonomous developments, though most of the ESs did not. In the Environmental Statement belonging to 'Structuurvisie Amsterdam 2040 (2010)', there is a focus on making the municipality more climate constant, therefore climate change is clearly addressed in paragraph 6.4 'Sustainable energy and CO₂ reduction - climate constancy' and 6.5 'Water - climate constancy'. In the 'Concept Omgevingsvisie Drenthe Duurzaamheidsbeoordeling (2010)' Environmental Statement, climate change is separately mentioned in the chapter 'Autonomous developments' under paragraph 2.2 'Climate change and water' and the entire third chapter 'Climate change and water'. The Environmental Statement belonging to 'Katwijk Structuurvisie (2010)' gives special attention to climate change in chapter 10 'Sustainability and climate', but this contains mainly policy descriptions and climate response measures are not explained in this chapter clearly. In the ES adjacent to 'Structuurvisie Ruimte voor Wensen 2040 Leidschendam-Voorburg (2012)', climate is specifically treated in two paragraphs, under chapter 3 'Current situation and autonomous developments' in 3.9 'Climate and energy' and in chapter 5 'Environmental effects' in 5.10 'Climate and sustainability'. In the 'Structuurvisie Arnhem (2012)' Environmental Statement, climate change adaptation comes to the fore in two main occurrences: water (too much precipitation caused by heavier rain showers and peak discharges in chapter 5) and heat (urban heat islands, chapter 8). In the ES for 'Ontwerp Provinciale Ruimtelijke Structuurvisie

2013-2028 Utrecht (2012)', climate change is specifically and extensively addressed in chapter 3 'Climate change'. This includes both statements on how the climate is likely to change and how to react to this on a spatial scale.

4.3.9 Spatial boundary

Only three out of the 47 (6%) reviewed Environmental Statements considered climate change impacts at scales larger than the boundary of the spatial plan itself. This is thereby the single-least addressed climate change review criterion. It needs to be mentioned however, that several other ESs were prepared by collaborations of multiple municipalities, or were aimed at a provincial or even national level, thereby addressing a larger plan and study area than the area of a single municipality. In the Environmental Statement belonging to 'Omgevingsvisie Overijssel (2009)', climate related issues such as people moving out of the Randstad due to water issues and water level rise in the IJsselmeer are mentioned. The 'Structuurvisie Amsterdam 2040 (2010)' ES especially presents water issues such as flood risks on a larger scale than just the plan area (p. 99 onwards). In the Environmental Statement adjacent to 'Structuurvisie Arnhem (2012)' it is made clear that national park 'De Hoge Veluwe' has significant cooling impacts on the municipality (p. 171), but the effects of the developments in the structure vision are not projected outside the plan area.

4.3.10 Synergies

Synergies between adaptation and mitigation or between climate and other environmental policy fields are addressed in 32% of the reviewed Environmental Statements. This leads to a more holistic assessment, thereby contributing to more climate-proof planning (Larsen et al., 2012). In most cases where synergies have been described, these synergies were rather between climate and other environmental policy fields, such as ecology and biodiversity issues and water policies, than between climate change adaptation and mitigation. The latter two are regularly mentioned in Environmental Statements, but the importance of and reasons behind this are not explained frequently in the reviewed ESs. In the 'Concept Omgevingsvisie Drenthe Duurzaamheidsbeoordeling (2010)' ES, no concrete statements on the necessity for synergies are mentioned, though it made is clear that climate change has many effects and impacts and is intertwined with other policy and environmental issues. In the Environmental Statement belonging to 'Structuurvisie Infrastructuur en Ruimte (2011)', the assessment framework in the ES clearly indicates that climate change adaptation and mitigation are required as reaction to climate change. The ES adjacent to 'Toekomst Afsluitdijk (2011)' gives special attention to the relation between water policies and climate change effects, though synergies between adaptation and mitigation are given little attention. In the 'Rijk van Bommel en Aa (2011)' Environmental Statement, it is mentioned that water storage is most likely to be realised at the cost of nature areas, which is likely to go against the stakes of nature managers. Climate change issues are thus passed on to nature areas and it is thereby made clear that climate change policies cannot exist on themselves, but need synergies with other environmental policy areas. In the Environmental Statement belonging to 'Structuurvisie Arnhem (2012)', one of the nine main themes is '6. sustainable, climate neutral and water constant', which is translated into heat, water and energy issues. There is a clear mix of adaptation and mitigation, where different links to other environmental fields are made clear and a holistic approach is being strived for (p. 38-39).

4.3.11 Uncertainty

Just over a quarter (26%) of the reviewed Environmental Statements addressed climate change uncertainties. In several ESs, climate scenarios were used, almost solely those from the Royal Dutch Meteorological Institute (KNMI). Other practices included the description of the most basic climatic changes, being increased peak precipitation and temperature rises, adding minor statements on the large bandwidths of those and other climatic changes. In the 'Structuurvisie Randstad 2040 (2008)' Environmental Statement, uncertainties regarding bandwidths of the development of the climate, sea level rise and large river discharge are shortly addressed and it is stated that the models used may be inaccurate. A list of uncertainties, including climate change uncertainties and its impacts, is provided in the ES belonging to 'Omgevingsvisie Overijssel (2009)' (p. 41). In the 'Concept Omgevingsvisie Drenthe Duurzaamheidbeoordeling (2010)' ES, it is acknowledged that there is uncertainty on the nature and magnitude of climate change and the consequences for agriculture and nature in the plan area. The Environmental Statement adjacent to 'Structuurvisie Ruimtelijke Ordening Noord-Brabant (2010)' specifically gives attention to uncertainties regarding the pace and the extent to which causes contribute to the effects. In the 'Structuurvisie Arnhem (2012)' ES, it is acknowledged that climate change is seen as a *"difficult, not defined, but radical component in integral water management"* (p. 108). Furthermore, more research on heat is required (p. 176).

4.4 Environmental Statement review conclusions

The review of Environmental Statements belonging to Dutch structure visions confirms the findings presented in Chapter 2 that SEA can be an appropriate tool to address climate change considerations. This is based on the observation that multiple ESs address many climate change review criteria. The review also indicates that SEA's opportunity to consider climate change is far from utilised fully, since many ESs address only a small number of criteria, though practice seems to be improving over the last years.

Furthermore, there is a wide variety in which criteria are addressed in the ESs. Whereas adaptation, CO₂ reduction and mitigation are often addressed, criteria as equity, considering climate change impacts beyond the boundary of the spatial plan and monitoring are rarely addressed. Conducting interviews with Dutch SEA professionals opens up the opportunity to determine underlying explanations for this.

5. Interviews with Dutch SEA professionals

This chapter summarises the key findings of interviews held with Dutch SEA professionals. First, the interviewees and the main interview questions will be introduced (paragraph 5.1). Then, the findings of these interviews will be discussed (paragraph 5.2).

5.1 Introduction to the interviews

At the beginning of this research, the intention was to interview professionals – especially the writers of the Environmental Statements, since they are intensively working with the content of the ES – involved by the preparation of the most recent best-scoring ESs of this research; i.e., the Environmental Statements part of this research that showed the best incorporation of climate change, based on the eleven climate change review criteria from Chapter 2. However, due to multiple reasons, this was not completely achieved. Therefore, SEA professionals involved with less recent good-scoring ESs, a recent low-scoring ES and a professional not involved with an ES part of this research, were interviewed as well. In the end, eight interviews with Dutch SEA professionals were held. All interviewees are anonymised. Table 5.1 shows a profession description of all interviewed Dutch SEA professionals.

Table 5.1. Profession description of the interviewed Dutch SEA professionals.

1.	Work group secretary at the Netherlands Commission for Environmental Assessment, reviewer of structure vision Environmental Statements
2.	Counselor spatial planning at one of the Dutch provinces, author of a structure vision Environmental Statement
3.	Counselor space & environment at a consultancy and engineering firm, author of a structure vision Environmental Statement
4.	Project leader spatial planning & environmental assessment at a consultancy and engineering firm, author of a structure vision Environmental Statement
5.	Area developer at one of the Dutch provinces, author of a structure vision Environmental Statement
6.	Consultant environmental assessment at a consultancy and engineering firm, author of a structure vision Environmental Statement
7.	Town planner at the Spatial Planning Service of a Dutch municipality, author of a structure vision Environmental Statement & Chief urban planner at the Spatial Planning Service of a Dutch municipality, , author of a structure vision
8.	Consultant spatial development at a consultancy and engineering firm, author of a structure vision Environmental Statement

Conducting the interviews had several goals, with the most important being the attempt to reveal underlying causes for a limited inclusion of climate change in Dutch SEA (as is described in Chapter 4) and possible improvements to this. Since these causes are not mentioned in the ES itself, SEA professionals involved in writing the ESs have been interviewed. The basic outline of the interview questions can be found in Annex 3. The questions in the Annex are in Dutch, since the interviews were held in Dutch. An English translation of the interview questions is provided in the Annex as well. In order to clearly compare the interview results, the interviews were summarised. The used

interview summarising method is described in Annex 4. The interview summaries can be found in Annex 5. The most important interview questions can be divided in two categories; related to either theory and the analytical framework, or related to the outcomes of the ES review. Some overlap between these two naturally exists, since the ES review is based on the analytical framework. The questions related to theory are:

1. To what extent should climate change be discussed in SEA, according to you?
2. Which indicators are the most relevant or important for taking climate change into consideration and discussing it in SEA?
3. Which problems or obstacles hinder the incorporation of climate change in SEA?
4. Do you know whether climatic aspects described in the structure vision actually get through to the concrete (zoning) plans and projects?
5. What could be possible improvements to better incorporate climate change in SEA?
6. Do you feel sufficient guidance/guidelines for the incorporation of climate change in SEA exists?
7. Whose responsibility would it be to make sure these guidelines are present?
8. Does NCEA give sufficient attention to climate change during their review?
9. Would SEA be more suitable to treat climate change than EIA? Why do you think so?
10. Do you know the EU guidelines for climate change in SEA and EIA, published in April 2013?

The interview questions that are more related to the outcomes of the ES review are:

11. What are your thoughts on this research and the indicators?
12. Do you know how it can be explained that generally relatively little attention is being paid to equity with regards to climate change (e.g. whether weak population groups are hit harder by climate change) in SEA?
13. How could it be explained that ESs in general barely consider climate change its impacts at scales larger than the boundary of the spatial plan?
14. Why is little attention being paid to monitoring climate change in SEA?
15. Could you briefly summarise, why and how addressing climate change in SEA is important, what the current situation is and how this could be improved?

It is important to note that the interviews have been conducted after the Dutch structure vision Environmental Statement review. This has opened up the opportunity to discuss the most important results of the ES review during the interviews, as is showed in the interview questions above. Furthermore, several aspects that have been found in literature, have shortly been discussed during the interviews. In this way it was made possible to either confirm the findings from literature, or to oppose these. The following aspects derived from literature have been part of the interviews (see also Chapter 2):

- SEA can better contribute in tackling large-scale and uncertain environmental issues, such as climate change, than EIA (Carroll and Turpin, 2009) (paragraph 5.2.1);
- Climate change is an important aspect to cover in SEA (Posas, 2011, Wende et al., 2012) (paragraph 5.2.2);
- There is a lack of guidance on how to cover climate change in SEA (Larsen et al., 2012) (paragraph 5.2.5);

- And all climate change review criteria (see paragraph 2.4), with special attention to:
 - SEA fails to consider climate change impacts at scales beyond the boundary of the spatial plan (Wende et al., 2012);
 - SEA should include equity considerations with regard to climate change (Posas, 2011);
 - SEA should include climate change-related monitoring measures (Posas, 2011), since these three criteria have been addressed least in the reviewed Environmental Statements (all in paragraph 5.2.6).

5.2 Interview findings

This paragraph presents the recapitulatory remarks that are extracted from the interviews. Most of the information below is from the interview summaries in Annex 5. Quotes are being used to present examples or illustrations and to support specific arguments. In paragraphs 5.2.1 and 5.2.2, the interviewees thoughts on the most important findings from literature are discussed. Problems perceived by the interviewees in climate change incorporation in SEA are presented in paragraph 5.2.3. In paragraphs 5.2.4 and 5.2.5, possible solutions mentioned by the interviewees for these problems are given. Finally, the interviewees' reflections on the climate change review criteria are presented in paragraph 5.2.6.

5.2.1 SEA is more suitable to address climate change than EIA

Seven out eight interviewees believe that SEA is better suited to address climate change than EIA is. This has several reasons. Firstly, it is mentioned that the timeline of climate change suits SEA better than EIA. Climate changes occur over years and decades, while SEA at the same time is part of the planning process of strategic plans and programmes that often share similar timelines. EIA is generally more focused on the direct impacts of specific projects on the environment and therefore uses a smaller timeframe.

Another reason why SEA is seen as the more appropriate tool to address climate change, is that SEA offers more space for uncertainties than EIA. Uncertainty is one the main characteristics of climate change and spatial plans need to include flexibility in order to deal with this. This is less possible in EIA, since the framework and principles of the plan are more determined than is the case in SEA. SEA offers more possibilities and solutions and has larger bandwidths and a more coherent approach than EIA does.

A third argument why SEA is seen as the more suitable tool to address climate change than EIA, is that strategic plans and SEAs are focusing on larger spatial areas than EIAs and concrete projects. There is a general consensus that climate change needs to be dealt with on the highest possible scale, therefore SEA is considered to be more suitable than EIA. This does not imply however, that SEA offers the best scales to address climate change. Several interviewees have mentioned that climate change needs to be on national, continental and even global agendas.

The fourth reason why SEA is preferred to deal with climate change over EIA, lies in the nature of assessing climate change. According to the interviewees, this is often only possible in a qualitative manner. EIA is generally seen as a more quantitative assessment tool, while SEA uses more qualitative assessments. It is considered to be difficult to use quantitative data in SEA, since this gives less space for administrative weighing and consideration of alternatives. Quantitative data are more steering and forcing a decisions into a direction, while qualitative data preserves the space politicians

need to make a decision. At the same time, the use of qualitative data on climate change makes it harder for Environmental Assessment practitioners to include it in the ES, since it includes more uncertainties and is therefore harder to assess. Fewer crystal-clear facts can be derived from qualitative data.

The final reason why SEA is seen as more suitable to incorporate climate change than EIA, is a consequence of the planning process. Normally, a strategic plan – including SEA – is made, before concrete projects – including EIA – are realised. EIA thereby is an execution of an earlier made decision and thus more concrete, as is mentioned by the second interviewee:

“EIA and SEA work on completely different scale levels and it therefore differs which aspects of climate change are taken into consideration. I think that EIA rather is the execution of an earlier made decision. I think that climate change should be treated in plans on the highest abstraction level and that it should therefore be covered in an SEA belonging to a structure vision”.

Multiple interviewees mentioned that it is difficult to talk about climate change in projects, when the topic is not already discussed in higher and more abstract plans. When climate change is part of the assessment in SEA, chances are higher that this leads to climate considerations on project level. However, this does not automatically mean that discussing climate change in SEA leads to climate considerations in EIA and projects.

5.2.2 Climate change is an important aspect in SEA

Six interviewees firmly state that climate change is an important aspect in SEA. One person states that it should become an important aspect in Environmental Assessment, especially SEA, and the final interviewee states that climate change is not more important than the other aspects in SEA. All eight interviewees thereby (in)directly state that climate change needs to be part of SEA. It also is a topic of this time, according to the sixth interviewee:

“I believe that climate change is an important theme in SEA, since it very clearly is an issue of this time which we have to respond to. Especially by considering it on a strategic level, one gets forced to appoint it as an issue early in the planning process and to use it as a starting point in the actual spatial organisation of the city or area. This generally goes for SEA”.

There are several climate change indicators that are often addressed in SEA, according to the interviewees. The aspect most mentioned by the interviewees is water. This includes water safety, floods and droughts. CO₂ (reductions), (sustainable) energy and heat stress are also often treated in SEA. Water, CO₂ and energy are also the three aspects that are most often mentioned as important aspects to discuss in SEA. Other relevant climate change aspects in SEA include adaptation measures, biodiversity, extreme precipitation events, greenhouse gases, mitigation measures and sea level rise. Furthermore, two interviewees stressed the importance of taking uncertainties with respect to climate change into consideration, especially since climate change is no “clear issue”. This is also related to the idea that climate change should already be discussed in SEA, in order to pay attention to it on project level, as is illustrated by the third interviewee:

“It is important to already cover climate change in the SEA belong to the plan ‘prior’ to EIA and concrete projects, otherwise it is difficult to consider it in these projects. Now, one reviews concrete projects that are soon to be realised with an EIA, and it is highly likely that in this EIA less attention will be paid to climate change because of uncertainties. When one can be flexible in the plan ‘prior’ to this project, I think this is the best way to respond to the future that is not quite certain yet”.

It was also stated that the most important aspects of climate change to describe, are those that are the most certain and likely to occur, since it is easier to adapt to those effects and measures against certain-to-happen effects yield the most benefit.

5.2.3 Multiple problems restrict a full climate change incorporation in SEA

The interviewees mention a wide variety of possible problems and obstacles for a full incorporation of climate change in SEA, that lead to the limited incorporation of climate change in SEA as is discussed in Chapter 4. The problems mentioned by the interviewees seem to be divided in two focus areas; politics and the character of climate change itself.

Regarding politics, the problem mentioned most is a lack of political importance attached to climate change and urgency to deal with climate change. This is partially related to financial motives; it simply costs money to research climate change effects and impacts in a SEA and this is not often desired by politicians, decision-makers and the competent authority. This feeling seems to be strengthened by the current economic situation, whereby many governmental institutions and bodies, including provinces and municipalities, have to deal with savings and budget cuts. This is illustrated by the third interviewee:

“Climate is regularly seen as a luxury product in SEA at this moment. There is no feeling that it is needed yet. If there is any money available, this is rather spend on things that have to be done anyway”.

Furthermore, most climate change effects are expected to occur in years and decades from now, far beyond the political 4-year time horizon a number of politicians seem to have. Another reason mentioned by an interviewee is that climate is simply not (yet) in the working habits of many municipalities and therefore is an unfamiliar aspect to the people who should be working on it. Last, NCEA’s review on the ES is not legally binding. If NCEA asks for more information on climate change in the ES, the competent authority does not have to comply. A combination of these reasons is very likely to lead to a low political urgency for including climate change in SEA and thereby can be seen as one part of the explanation why climate change is limitedly incorporated in Dutch SEA.

The second part of this explanation lies in the character of climate change and the way it is described in SEA itself. First of all, climate change is a large concept and includes many aspects, as was already illustrated in paragraph 5.2.2 regarding what the interviewees think are important climatic aspects and which aspects often are discussed in SEA. Climate change has links with water, energy, biodiversity and so on, which seems to make it hard to grasp. Furthermore, climate change is one of the themes in Environmental Assessment that is hard to quantify, in contrast to e.g. noise and air quality. The added value of quantitative data is explained by an interviewee:

“Everything that can be made concretely measurable, naturally convinces. For example, sea level rise largely is about the far future. Some scenarios are more concrete and ominous, and then the topic becomes more vivid. This goes for example, when you ask how the future will look like when the sea level indeed rises 20 centimetres”.

Since climate change is yet hardly quantifiable, the topic is considered to be not concrete, not tangible and rather slippery to work with. This leads to the fact that no clear legislative norms regarding climate are set, as also is acknowledged in the Environmental Statement belonging to ‘Structuurvisie Haarlemmermeer 2030’ (p.113):

“Regarding the climate constancy of an area, there are no legal requirements or standards, unlike the standards regarding water safety, flooding and quality”.

Together with the long-term effects of climate change, this leads to a relatively high amount of uncertainty attached to climate change. Next to this, several interviewees mentioned that climate change is a relatively new topic in Environmental Assessment and not many people have experience with it. One interviewee also mentioned that Environmental Assessment practitioners and competent authorities tend to stick to the more ‘classic’ assessment themes as soil, water, ecology etc. The final problem that contributes to a limited incorporation of climate change in Dutch SEA is that there is insufficient guidance on how to incorporate climate change in SEA. When asked, over half of the interviewees confirmed they see this as a problem (see also paragraph 5.2.5).

5.2.4 Possible solutions and improvements for climate change incorporation in SEA

Apart from addressing a series of problems that contribute to a limited incorporation of climate change in SEA, the interviewees also mention several possible solutions to this problem and propose possible improvements in different people’s perspectives on how to deal with climate change in Environmental Assessment.

The most mentioned measure for improving climate change incorporation in SEA is to introduce some sort of guide or guidance on how to treat climate change in SEA, since many interviewees already mentioned this currently is lacking. This is illustrated by the fourth interviewee:

“It would be nice if a guide would be developed that would mention that in specific plans – so regional, provincial or national structure visions and those kind of plans with large movements – climate can be included, since on that level we can do something about it. In such a guide, demands can be set, or at least guidelines can be developed for this. In municipal structure visions, attention could be paid to, for example, CO₂. It would help, I think, environmental assessment practitioners in the Netherlands to give directions on how to deal with climate change”.

Other proposals from the interviewees involve a non-obligatory list with points of attention and guidance regarding in which cases climate change in SEA is required and which aspects then need to be covered. Furthermore, uncertainties need to be eliminated as much as possible in order to create a more coherent, concrete and solid story about climate change. The political urgency to deal with climate change needs to be increased as well, though they interviewees found it difficult to come up with concrete measures to do so. One interviewee stated that it would probably work best to tell

politicians what would happen in the future if nothing was done about climate change, i.e. it must be made clear what the consequences of climate change can be. This is also related to the wish to eliminate uncertainties as much as possible. Furthermore, the communication and cooperation between different governmental levels and bodies can be improved in certain cases as well. It is agreed that climate change needs to be addressed on the highest scales possible, so this requires intensive cooperation between those different levels and bodies. Another interviewee mentioned that discussing climate change with other Environmental Assessment colleagues can help to better understand the topic and how to address it in SEA. Finally, a small number of interviewees point at the fact that climate change is a relatively new and unknown aspect in SEA. Together with the need for increased political urgency and less uncertainty about climate change and the requirement of clear guidance, it probably needs time for climate change to be fully incorporated in SEA.

Seven out of the eight interviewees mention that NCEA pays sufficient attention to climate change, while one interviewee was not sure on this. This indicates that NCEA does acknowledge the urgency to incorporate climate change in SEA. One interviewee mentioned that it might help to involve NCEA earlier in the planning process, since the interviewee believes NCEA has sufficient knowledge on climate and is willing to help to put this into practice in the SEA process and eventually in the ES. Another interviewee mentioned that NCEA has to deal with their 'problem' that their review on the ES is not legally binding, so involving them only in the ES review phase is too late for climate change to be incorporated fully.

5.2.5 Guidance on climate change incorporation in SEA

As was mentioned in paragraph 5.2.3, most of the interviewees – six out of eight – believe there is a lack of useful guidance on how to incorporate climate change in SEA. According to the interviewees, this guidance should deal with multiple aspects. First, it should be made clear in which plans, programmes or policies climate change needs to be part of the SEA assessment framework. Second, the guidance should explain what is meant with climate or climate change and thereby which topics need to be assessed. Third, it should be explained how these climate change topics need to be assessed. This all is quite unclear to Dutch SEA professionals today. Despite the lack of guidance on the incorporation of climate change in SEA, all interviewees believe sufficient information and knowledge on climate and climate change is available. Therefore, the issue SEA practitioners struggle with is not how to obtain the required information, but how to use the available climate change information.

NCEA is mentioned mostly as the institution that should be responsible to provide the required guidelines. Potentially, this could be done in cooperation with the ministry of Infrastructure and Environment and/or governmental levels as municipalities, since the latter deals most with SEA belonging to structure visions. Furthermore, scientific research is mentioned to be potentially helpful in designing these guidelines.

Only one out of the eight interviewees knows the EU 'Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment' published in April 2013. This is striking, since in this EU guidance, it is clearly explained what climate change in SEA implies, what the key climate change issues and challenges are and how effects related to climate change can be assessed in SEA. Although the EU guidance is naturally written at a European level and therefore must be valid for all EU Member States, many aspects of this guidance are valid for Dutch SEA and address climate

change issues that are relevant in the Netherlands. The summary of the EU ‘Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment’ is given in Annex 2.

5.2.6 Interviewee reflection on climate change review criteria

The climate change review criteria presented in paragraph 2.4 have been subject to a critical review by all interviewees, in order to ensure this research is acknowledged and supported not only by theory, but also by Dutch SEA practitioners.

Seven out of eight interviewees state the climate change criteria used in this research are logical and/or make sense to them. It is mentioned by multiple interviewees that CO₂ reduction can be seen as a part of mitigation. One interviewee mentions that more attention can be paid to energy and raw materials in relation to climate change. Another interviewee believes the criteria are somewhat irregular, since there are leaps in level of thinking between the criteria.

Several explanations for the lack of equity considerations in SEA (see Chapter 4) are given by the interviewees. The most mentioned reason for a lack of equity statements in SEA is that this simply is not a task of SEA. Environmental Assessment should focus on environmental effects, while equity is considered to be a more social effect. Furthermore, a part of the equity considerations is referred to as health effects treated in the ES, according to two interviewees. Next to this, equity is considered to be difficult to address, mostly because the spatial plan is seen as barely dealing with the issue, according to two interviewees. Two other interviewees also question whether it is (politically) desired to present equity issues in an ES. Last, one interviewee mentions that an Environmental Statement is made by people and is meant for people, so the social aspect is already interwoven in the Environmental Assessment process.

The interviewees mention multiple reasons that contribute to a marginal consideration of climate change impacts at scales larger than the boundary of the spatial plan in SEA. First, the spatial boundary used in an Environmental Statement is mostly determined by the boundary of the spatial plan which the ES is belonging to. Though environmental impacts beyond the spatial plan area should be researched, this is often considered (too) difficult to do. Considering climate change impacts beyond the boundary of the spatial plan requires cooperation with e.g. water boards and other municipalities. The fact that every municipality has its own budget, makes it even harder to research impacts beyond the scale of the spatial plan, especially when those municipalities do not always see the added value of this research and the cooperation with other municipalities. Another reason mentioned by two interviewees is the continuing decentralisation in the Netherlands; more responsibilities are laid down at local governments, but those cannot always carry these responsibilities.

Regarding the lack of climate change monitoring in SEA, the interviewees present a clear image of the current Dutch Environmental Assessment monitoring status. Six interviewees mention that monitoring generally is often lacking in Environmental Assessment practice, not just regarding climate change. The third interviewee simply mentions:

“Honestly, the monitoring chapter is often seen as an obligation. I believe that monitoring is generally not done well in practice anyway”.

This problem is thereby not only related to climate change, but general Environmental Assessment. The interviewees give several explanations for this. First, people can feel monitoring might have little

effect, since the spatial plan is already implemented. Together with the fact that monitoring costs money, this leads to little (political) urgency to monitor environmental effects. Monitoring is often seen as an obligation, which leads to low-quality monitoring, or is not even conducted because of the lack of urgency felt or even laxity, according to one interviewee. Regarding climate change monitoring, it was mentioned that the monitoring term can be too short for climate changes and their effects to become clear. Another interviewee mentions that it also is already difficult to determine climate change effects and it would be even harder to monitor those.

The next chapter will present the discussion of this research and thereby gives answers to the research subquestions. Links will be presented between the theoretical framework, the Environmental Statement review and the conducted interviews of this research. This will put the results of the interviews, as discussed in this chapter, in context with the other findings of this research.

6. Discussion

This chapter links the main findings from this research to those of other scientists. Crosslinks between the theoretical framework, the review of 47 Environmental Statements in this research, and the conducted interviews will be presented. The structure of this chapter will be in line with the research subquestions, as presented in Chapter 1. The first research subquestion will be answered in paragraph 6.1, the second and third research questions will be answered in paragraph 6.2 and the fourth research subquestion will be answered in paragraph 6.3. Small text boxes provide direct answers to the research subquestions at the beginning of the paragraphs, further explanations will be presented hereafter.

The theoretical framework from Chapter 2, the results from the Environmental Statement review in Chapter 4 and the results from the interviews in Chapter 5 will be linked, thereby providing the answers to the subquestions. The answers to the main research question and the conclusion will be presented in this chapter. To recap, these are the research subquestions:

1. *What are the regulative, normative and cultural-cognitive factors that determine the extent of incorporation of climate change in EIA and SEA?*
2. *To what extent is climate change incorporated in SEA in the Netherlands?*
3. *What are the obstacles that hinder the incorporation of climate change in SEA in the Netherlands?*
4. *Which measures can be taken in order to improve the incorporation of climate change in SEA in the Netherlands?*

6.1 Factors that determine the extent of climate change incorporation in EIA and SEA

This paragraph will discuss the various factors that determine the extent of incorporation of climate change in EIA and SEA and will thereby answer research subquestion 1: *What are the regulative, normative and cultural-cognitive factors that determine the extent of incorporation of climate change in EIA and SEA?* It needs to be mentioned that, in line with this research, a focus lies on SEA, though literature has given relevant insights with regard to climate change in EIA as well.

What are the regulative, normative and cultural-cognitive factors that determine the extent of incorporation of climate change in EIA and SEA?

Regulative factors that determine the extent of climate change incorporation in EIA and SEA are legislation and (a lack of) guidance and support. Normative factors herein are the mitigation-adaptation dichotomy and the perception that climate change considerations are plan- and project-specific. Cultural-cognitive factors that influence the climate change incorporation in EIA and SEA are the existence of various professional silos in public organisations that hamper horizontal coordination and cooperation, a low political urgency to deal with climate change in environmental assessment and the perception of smaller governmental bodies being less able to deal with climate change because of lower access to financial and knowledge resources.

SEA is more suitable to address climate change issues than EIA

In paragraph 2.3, it has been explained that SEA is generally perceived to have more appropriate characteristics and opportunities to include climate change in its assessment than EIA does (see e.g. Dalfelt and Naess, 1997, Carroll and Turpin, 2009, Kjørnørv et al., 2010, Fischer et al., 2011, Posas, 2011). It can be stated that this has been confirmed by the environmental assessment professionals that have been interviewed for this research, since seven out of eight interviewees believe that SEA is more suitable to address climate change than EIA is. Multiple reasons for this have been mentioned in literature (see also paragraph 2.3). The interviewees have mentioned five particular reasons, four of them have been described in literature. The following reasons that explain why SEA is better suited to address climate change than EIA, which have already been addressed in literature, have been mentioned by the interviewees and can therefore be seen as confirming the academic findings:

- Long-term timeline of SEA better suits long-term climate change effects than EIA's timeline (see also Wood, 2003, Fischer, 2007 in: Carroll and Turpin (2009));
- SEA's larger scale of plan area and study area better suit climate change than EIA's focus on smaller-scale projects (see also Wood, 2003, Fischer, 2007 in: Carroll and Turpin (2009));
- SEA is better suitable to deal with uncertainty than EIA, because of the two above-mentioned reasons (see also Kjørnørv et al., 2010, Fischer et al., 2011, Posas, 2011);
- Climate change inclusion in SEA results in a generally earlier climate change inclusion in the planning process than in EIA, since SEA is earlier in the planning process (see also Dalfelt and Naess, 1997).

The fifth reason why SEA is more suitable to address climate change than EIA, given by the interviewees, is that climate change can often only be assessed qualitatively. EIA is generally perceived as being a more quantitative tool, which explains SEA to be preferred over EIA in considering climate change. Although the interviewees have mentioned that SEA uses more qualitative data than EIA, which is also stated by Carroll and Turpin (2009), it has not been explicitly described in literature that this contributes to SEA being a more suitable tool to address climate change than EIA is.

Climate change aspects in SEA

Regarding climate change in EIA and SEA, the main focus in literature lies on CO₂ reduction, greenhouse gas reduction and water issues (Byer et al., 2009, Larsen et al., 2012, Wende et al., 2012, see paragraph 2.3). From the eight interviews, it was determined that water, CO₂ and energy are the three aspects that are most often regarded being important aspects to discuss in SEA in the light of climate change. Greenhouse gases were also mentioned in the interviews, but not as often as these three aspects. Multiple interviewees regarded CO₂ as being part of greenhouse gases. Indirectly, (sustainable) energy is also related to greenhouse gases and the reduction hereof. Although not entirely, it can thus be stated that the interviewees and literature sources regard similar climate change aspects being important in SEA. Other relevant climate change aspects in SEA that are both mentioned in literature and by the interviewees include (the link with) biodiversity loss (Sadler, 1996, Wilson and Piper, 2008 in: Posas, 2011), climate change uncertainties (Byer et al., 2009, Heltberg et al., 2009, Agrawala et al., 2011), adaptation (Klein et al., 2007, Larsen and Kjørnørv, 2009, Posas, 2011, Larsen et al., 2012, Wende et al., 2012), mitigation (Klein et al., 2007, Larsen et al., 2012, Wende et al., 2012), sea level rise (Larsen and Kjørnørv, 2009), urban heat island effect (Larsen et al., 2012) and changing precipitation patterns (Larsen and Kjørnørv, 2009, Larsen et al., 2012).

SEA can be an appropriate tool to address climate change considerations

The results from the Environmental Statement review, presented in Chapter 4, suggest that SEA can be an appropriate tool to address climate change, since multiple ESs addressed a large number of climate change review indicators. This was confirmed by the results of the interviews, wherein it was mentioned by the interviewees that SEA offers opportunities to address climate change issues and that climate change actually is an important aspect in SEA (see paragraph 5.2.2). As was mentioned earlier, the ES review also showed that many opportunities for an improved climate change consideration in SEA exist, since the majority of ESs address a limited number of review indicators. Similar notions were mentioned by multiple interviewees, who have mentioned that current climate change consideration in Dutch SEA is still limited and can be improved.

Institutional elements of relevance for climate change integration in SEA

In paragraph 2.3, several institutional elements of relevance for the integration of climate change in Danish SEA were presented, based on the study by Larsen et al. (2012). The two regulative elements mentioned by Larsen et al. have largely been confirmed in this research. The first element that determines whether or not SEA is legally obliged, is whether SEA legislation is in force. Since the Netherlands is a Member State of the EU, this is the case. The second regulative element mentioned by Larsen et al. (2012) is a lack of climate change guidance and support. This element also is of relevance in the Netherlands, since it has been confirmed by the majority of the interviewed Dutch SEA professionals that the right guidance on climate change in SEA is lacking. Sufficient knowledge on climate change and guidance on the EIA and SEA process is available, but the link between these two appears to be missing. However, it needs to be mentioned that actual EU guidance on climate change integration in both EIA and SEA has been published in April 2013, thereby providing some support for SEA professionals in all EU Member States. As has been mentioned in paragraph 5.2.5, the far majority of the interviewees did not know of this guidance at the time of the interview (June/July 2013) yet.

Larsen et al. (2012) mention that several normative elements are relevant for climate change integration in SEA. The finding of Larsen et al. that there is a perception of 'climatic factors' (as described in EU SEA Directive) as a microclimatic issue rather than global, and an issue of mitigation rather than adaptation, has not been researched in this study. The same goes for their 'silos in organisations', which result in different norms and values with regard to climate change, and the binding and accredited expectations of focus on climate change. As Biesbroek et al. (2009) have made clear, there seems to be a so-called 'mitigation-adaptation dichotomy', which is the general perception of climate change mitigation and adaptation being two separate phenomena (see also paragraph 2.3). In this research, it was found that such a dichotomy still exists in SEA in the Netherlands. Though 32% of the reviewed Environmental Statements addressed synergies between adaptation and mitigation, or between climate change and other relevant environmental policy fields, the far majority of the ESs addressing such synergies only mentioned those between climate change and other relevant environmental fields. Another normative element of relevance for climate change integration in SEA found in this research, is the perception of SEA professionals that it depends on the spatial plan (or project in the case of EIA) which climatic aspects are important and should thus be considered in the environmental assessment. This seems to cause confusion, since no general guidelines hereon are available, which on its turn explains the call for guidance (see paragraph 6.3). Therefore, other, non-environmental issues, such as political budgets, urgency and willingness can rather determine what is being assessed in the SEA process than the knowledge and

expertise of environmental professionals, since there is no general-supported consensus on what to assess and what not to assess.

Finally, cultural-cognitive elements explain the extent of climate change integration in SEA. Larsen et al. (2012) have identified that the municipal organisational structure in Denmark consists of different professional silos with their own internal cultures and procedures that may hamper the horizontal coordination across the professional sectors, while such horizontal coordination is needed for a response to a wicked and broad issue as climate change. Similar feelings have been mentioned by a number of Dutch SEA professionals, who stated that cooperation between different administrative levels, and internal cooperation within administrative bodies, can be problematic as well. Another cultural-cognitive element mentioned by the interviewees is that there generally exists a low political urgency to deal with climate change in SEA and that little responsibility is felt to integrate the issue in environmental assessment. Last, the interviewees demonstrate a feeling that larger administrative bodies in general attach more value to climate change and thereby have a higher urgency to deal with climate change than smaller administrative bodies: the larger a municipality is, the more attention is being paid to climate change, not only in SEA. Naturally, this is closely related to the easier access to resources (time, money, expertise) these larger administrative bodies have.

6.2 Climate change incorporation in SEA

The following paragraphs discuss to what extent climate change is incorporated in Dutch SEA and which obstacles hinder this incorporation. Again, the focus lies on SEA rather than EIA. First, the extent of climate change incorporation found in the review of Dutch structure vision Environmental Statements in this research will be discussed, including links with the findings of other scientists, thereby giving an answer to research subquestion 2: *To what extent is climate change incorporated in SEA in the Netherlands?* Then, multiple problems that limit the incorporation of climate change in SEA in the Netherlands will be discussed. Special attention is hereby given to those climate change review criteria that were least addressed in the ES review in this research. Hereby, answers are provided to research subquestion 3: *What are the obstacles that hinder the incorporation of climate change in SEA in the Netherlands?*

To what extent is climate change incorporated in SEA in the Netherlands?

Climate change is considered to be incorporated limitedly in Dutch SEA. The reviewed ESs on average address 4.1 out of eleven climate change review criteria. However, climate change consideration in SEA seems to be increasing and a number of little-addressed criteria (consultation, equity, monitoring) can be appointed as restraining factors for a higher number of climate change review criteria to be addressed. When this is taken into account, the extent of climate change incorporation can be considered decent.

What are the obstacles that hinder the incorporation of climate change in SEA in the Netherlands?

The most important obstacles that hinder climate change incorporation in Dutch SEA are lying in the fields of politics and the characteristics of climate change (in environmental assessment) itself. Furthermore, a lack of guidance on how to cover climate change in SEA is perceived.

SEA practice confirms SEA's abilities to consider climate change

From the theoretical framework of this report, it was derived that SEA can provide opportunities for considering climate change impacts. The United Nations Economic Commission for Europe (n.d.), Parry et al. (2007) and Wende et al. (2012) (see paragraph 2.3) imply that SEA, as a tool of spatial planning, can be an effective instrument to present climate change considerations.

With a reasonable certainty, it can be stated that it has been confirmed that SEA can be an effective tool to address climate change considerations, by the review of 47 Environmental Statements belonging to Dutch structure visions. The ESs in this review ranged from addressing zero to ten out of the eleven climate change review criteria (see paragraph 4.2). The observation that multiple ESs addressed seven, eight or ten out of the eleven criteria, strongly suggests that SEA offers the possibility to include many climate change considerations. This was confirmed by the results of the interviews, wherein it was mentioned by the interviewees that SEA offers opportunities to address climate change issues and that climate change actually is an important aspect in SEA (see paragraph 5.2.2). Furthermore, all eleven climate change review indicators have been addressed in the reviewed ESs several times. This implies that the tool SEA provides opportunities to incorporate those climate change considerations.

The findings mentioned above do not imply however, that SEA indeed is a spatial planning tool that addresses climate change considerations effectively. It is important to mention that SEA *can* be an effective tool, but it does not always *is* or act so. Though examples are shown in the ES review of ESs addressing many review criteria and are thereby considered to address climate change effectively in the light of this research, this often is not the case. Only a quarter of the Environmental Statements addressed six climate change review criteria or more – thereby incorporating over half of the available eleven criteria – and the reviewed ESs on average only addressed 4.1 out of eleven review criteria (see paragraph 4.2). This is in line with existing perceptions that although SEA is considered being a useful tool for addressing climate change issues, this characteristic is exploited far from fully. Larsen et al. (2012) and Wende et al. (2012) have already showed in their studies that environmental assessment in Denmark, Germany and the UK has not fully fulfilled the promise of being an effective tool in considering climate change issues yet (see paragraph 2.3). Comparable notions were mentioned by multiple interviewees, who mentioned that current climate change consideration in Dutch SEA is still limited and can be improved.

Similar results have been presented in a 2009 Institute of Environmental Management and Assessment (IEMA) survey, with regards to EIA. Over 88% of members of IEMA believed that carbon emissions, where relevant, should be considered in EIA and 75% of the surveyed members of IEMA indicated that the inclusion of greenhouse gas emissions in the Environmental Statement, rather than as a separate report, was crucial and becoming increasingly important in EIA in the future. However, 82% of respondents of the survey stated that climate change adaptation is not effectively considered in impact assessment practice, planning processes or project consent processes at the time (Institute of Environmental Management & Assessment, 2013, see also paragraph 2.3).

The observation that the reviewed Dutch ESs address 4.1 out of eleven review criteria and the accompanying interpretation that climate change consideration in Dutch SEA is limited, is subject to more discussion. First, equity was mentioned in the interviews as actually not being a specific task of SEA and therefore seems to be less relevant than other review criteria, despite the fact that it has

been proposed by Posas (2011). Apparently, a gap exists here between English and Dutch practice, though the limited six-month period for this research did not offer the opportunity to research this further. Next to equity, is the issue that monitoring is a general problematic issue in environmental assessment practice and is thus not only limited to aspects related to climate change (also see Table 6.2). Furthermore, multiple reviewed ESs had not been subject to consultation yet and therefore did not ‘score’ on this criterion. Moreover, climate change consideration in SEA in general seems to be increasing, as is shown in Figure 4.5. Finally, the indicators that are addressed the most in the ESs, are those that focus on the content of the topic (adaptation, CO₂ reduction and mitigation), rather than the SEA process (consultation) or the way or presenting results (separate chapter). When all this is taken into consideration, the average of 4.1 climate change review indicators being addressed in the Dutch ESs can be considered decent.

Addressing of literature-derived climate change review criteria in Environmental Statements

Several climate change review criteria that have been used in this research, were based on climate change criteria for EU SEA Directive-based SEAs, proposed by Posas (2011, see also Table 2.4 in paragraph 2.4). This not only supports the scientific basis of this research, but also offers opportunities to compare the results of Posas with the results of this research. It must be kept in mind however, that Posas’ research included English core strategy Sustainability Appraisals from 2005 to 2008, while this research included Dutch Environmental Statements from 2008 to 2013. Apart from this, Dutch structure visions (see paragraph 3.3) are relatively comparable to English core strategies, since a “core strategy sets out the long-term (15–20 year) spatial vision for a local planning authority area, the spatial objectives, and strategic policies to deliver that vision” (Posas, 2011 p. 127). SAs were used by Posas in her research, since the English SEAs intended for the research, were often not available online. Since SAs are also required by law to comply with the EU SEA Directive, SAs function as SEAs for all intents and purposes (Posas, 2011). Therefore, the comparison between English core strategy SAs and Dutch structure vision ESs is justified. The comparison between the two studies is shown in Table 6.1.

Table 6.1. Comparison of climate change review criteria being addressed in English Sustainability Appraisals in Posas’ (2011) research and Dutch Environmental Statements this research.

Climate change review criterion	Percentage of core strategy SAs that address the criterion in Posas’ research	Percentage of ESs that address the criterion in this research
Adaptation	89%	85%
Baseline	50%	47%
Consultation	36%	17%
Mitigation	89%	77%
Monitoring	58%	13%

Especially addressing adaptation, baseline and mitigation issues with regard to climate change are quite comparable between the two studies, with having only minor differences in the percentage of respectively English core strategy Sustainability Appraisals and Dutch structure vision Environmental Statements. Both studies show a relatively low percentage of respectively SAs and ESs that address consultation with regard of climate change, while addressing monitoring is the only review criterion that is largely differently addressed in both studies. There are explanations for these differences. First, many consultation processes had not been completed when the Dutch ES was published, which

explains the lower percentage of Dutch ESs addressing consultation with respect to climate change. From the interviews with Dutch SEA professionals, it was made clear that monitoring is a general problem in Environmental Assessment, which may explain the large differences between Posas’ results and the results from this research with regards to climate change monitoring. Dutch SEA practice failing to monitor climate change impacts is not the only entity doing so. According to Wood (2003), monitoring seems to have been a general environmental assessment problem around the world for years now, not only in SEA. This is illustrated in Table 6.2.

Table 6.2. Performance of Dutch EIA impact and system monitoring compared to other international EIA systems.
Adapted from: Wood (2003).

EIA performance - Evaluation criterions met in jurisdictions		
	Impact monitoring	System monitoring
Netherlands	○	✓
US	–	○
UK	–	–
Canada	○	✓
Australia	○	✓
New Zealand	–	–
South Africa	–	–

✓ Yes
○ Partially
– No

In paragraph 2.3, it is proposed that, based on Kørnø (2009), climate change should be treated as a separate element in SEA, in order to make the topic more accessible. Of the reviewed Dutch ESs, 30% address climate or climate change in a separate chapter. When it is credible that addressing climate change in an ES in a separate chapter truly contributes to a full incorporation of climate change in SEA, this is a relatively low score. However, it is not fully confirmed that climate change should indeed be treated in a separate chapter, since Kørnø’s research was about human health instead of climate change. The suggestion that addressing climate change in a separate chapter in the ES helps to incorporate climate change better in SEA is therefore not fully supported by literature.

Where uncertainties exist, they should be made explicit in environmental assessment (Byer et al., 2009, Agrawala et al., 2011, see paragraph 2.3). The review of Dutch ESs shows that only 26% of the reviewed Environmental Statements explicitly address uncertainties with regard to climate change and that thereby the far majority of the reviewed ESs ignore the important climate change uncertainties.

Posas (2011) identified after her review, that equity considerations are an important climate change review criterion as well in the form of social, economic, health and just issues (see paragraph 2.4). The reviewed Dutch ESs do not confirm that this is considered to be important in SEA. Posas presents multiple examples of English core strategy Sustainability Appraisals addressing equity issues, including “*climate-related vulnerabilities of the poor, elderly, farmers, and marginalised groups, as well as the needs of those whose geography makes them particularly vulnerable to climate-related impacts such as flooding*” (Posas, 2011, p. 134), but those considerations are only marginally presented in Dutch ESs. As is mentioned in paragraph 5.2.6, most of the interviewees believe it is not the task of SEA to consider equity issues. Other interviewees see equity as difficult to address, since

the spatial plan is barely dealing with it. It also is questionable whether it is (politically) desirable to present equity issues in an ES.

Furthermore, it was noted in literature that several aspects are problematic in climate change incorporation in SEA. Partially, these findings have been confirmed by the review of Dutch ESs in this study.

Wende et al. (2012) showed that SEAs in two regions in Germany and the UK fail to consider climate change impacts at scales beyond the boundary of the spatial plan, while national CO₂ reduction targets were not considered at all in these SEAs (see paragraph 2.3). The failing to consider climate change impacts at scales beyond the boundary of the spatial plan is also shown in the review of Dutch ESs, since only 6% of the Environmental Statements do so (see paragraph 4.2 and Figure 4.3). However, CO₂ reduction targets are considered in 66% of the ESs. It needs to be mentioned however, that not only national CO₂ reduction targets, but also regional and local reduction targets were taken into consideration in this research. Had this not been done, then the percentage of ESs addressing CO₂ reduction targets would very likely have been lower, thereby being more in line with the findings of Wende et al. (2012).

The case study conducted by Larsen et al. (2012) in Denmark (see paragraph 2.3) showed that there is a lack of synergies between climate change mitigation and adaptation on one hand and between climate change and other environmental concerns on the other hand, while these synergies are needed as part of an integrated assessment and policy response. Again, similar results are found in the case of Dutch ESs, since only 32% of the reviewed ESs addressed at least one of those synergies. This means that the percentage of ESs addressing both types of synergies is highly likely to be even lower. The synergy most mentioned in the Dutch ESs was the one between climate change and water issues.

Multiple problems restrict a full climate change incorporation in SEA

In the interviews, one of the most-mentioned obstacles for a full incorporation of climate change in SEA was a lack of political urgency or importance attached to climate change in SEA (see also paragraph 5.2.3). This has not been described explicitly in literature and is therefore considered to be one of the 'new' findings of this research. The same goes for an underlying explanation for the lack of political urgency; it simply costs money to research climate change effects for a SEA and this is not often politically desired. The moderate current economic situation of many competent authorities seems to strengthen this idea, according to several interviewees. Furthermore, it was mentioned in the interviews that most climate change effects are expected to occur in years and decades from now, far beyond the political 4-year time horizon several politicians seem to have. All these aspects seem to be rather typical for Dutch SEA practice, since no literature sources presenting similar findings, have been found.

With regard to the character of climate change and the way it is described in SEA itself, multiple issues were addressed by the interviewees as well. One of those issues concerns the fact that climate change is related to many other (environmental) aspects, which makes it hard to grasp. This is comparable to what Larsen et al. (2012) mentioned about Danish municipalities working habits; those municipalities have established climate change as the task of a sub-department in a single professional silo, while climate change is an issue that requires a cross-sectorial approach. Together with the usual qualitative approach of assessing climate change and its impacts, this leads to a higher

uncertainty within the assessment. This is not a problem per se, as long as it is acknowledged. As has been presented in Chapter 4, this often is not the case. Although the relevance of identifying and presenting climate change uncertainty in SEA is made clear (Byer et al., 2009, Heltberg et al., 2009), practice does not explicitly recognise, acknowledge and present those uncertainties with regard to climate change (see also Larsen et al., 2013). Finally, it was mentioned by multiple interviewees that climate change is a rather new topic in SEA, which partially may cause a lack of incorporation of the topic in SEA. Similar findings were found by Larsen et al. (2012). They have explained that Danish municipalities function best in a stable environment, using usual procedures and workflows. This results in efficient municipal functioning. If a new situation occurs, including shadiness and uncertainties, this may demand a reconsideration of methods and thereby challenges the organisation. This is exactly what is happening with the introduction of climate change in SEA, since:

- The consequences of climate change cannot be predicted;
- No national requirements or guidelines on the integration of climate change into spatial planning and SEA exist in Denmark;
- Climate change planning is interdisciplinary and cross-sectorial and therefore affects multiple municipal sectors. Generally, municipalities do not seem to be used to the requirement of this coordinating role (Larsen et al., 2012).

Based on the interviewees' statements, the above described Danish situation is rather comparable to the Dutch SEA situation with regard to the incorporation of climate change in SEA. It is a new phenomenon with high uncertainties, which is accompanied by indistinctness with regard to how to describe and assess it in SEA and many municipalities – especially the smaller municipalities with lower budgets and less resources – are not yet fully able to deal with the issue.

Limited consideration of equity, monitoring and effects beyond the boundary of the spatial plan

With regard to climate change, the ES review showed that equity and monitoring are marginally addressed in ESs. The same goes for considering climate change impacts and effects beyond the boundary of the spatial plan. Since no explanations for this are presented in the ESs themselves, the interviewees were asked to provide their thought on these issues.

Concerning equity, most interviewees do not believe this is a task of the ES to address. Moreover, equity is regularly seen as a health issue, thereby not belonging in the SEA process. It is also doubted whether presenting equity considerations in an ES is politically desirable.

The spatial boundary used in an Environmental Statement is mostly determined by the boundary of the spatial plan which the ES is belonging to, which largely explains why the lack of climate change considerations beyond the boundary of the spatial plan. Though environmental impacts beyond the spatial plan area should be researched, this is often considered (too) difficult to do. Continuing budget costs and competent authorities struggling to meet their responsibilities further explain this.

Finally, monitoring is regarded as practice generally not performed at all in Dutch environmental assessment practice, both in EIA and SEA, not just with regards to climate change. The interviewees mentioned that people can feel monitoring might have little effect, since the spatial plan is already implemented. Together with the fact that monitoring costs money, this leads to little (political) urgency to monitor environmental effects. Monitoring is often seen as an obligation, which leads to low-quality monitoring, or is not even conducted because of the lack of urgency felt or even laxity, according to one interviewee. Regarding climate change monitoring, it was mentioned that the monitoring term can be too short for climate changes and their effects to become clear.

6.3 Measures to improve climate change incorporation in SEA

Now that it has been made clear what current obstacles and problems with regard to the incorporation of climate change in SEA are, possible improvements can be presented. These have been extracted both from theory and the interviews with Dutch SEA professionals.

Which measures can be taken in order to improve the incorporation of climate change in SEA in the Netherlands?

Clear guidance on when and how to cover climate change in SEA is required by SEA professionals. The political urgency towards climate change (in environmental assessment) needs to grow as well. When climate change is to be dealt with on the highest possible levels, the cooperation between various governmental bodies, such as municipalities, provinces and water boards, needs to be improved. NCEA can be involved earlier in the process as well to ensure a better consideration of climate change issues in SEA.

Possible solutions and improvements for climate change incorporation in SEA

Multiple possible improvements, aimed at a better incorporation of climate change in SEA, have been mentioned by the interviewees. Most of these recommendations have already been proposed in literature. The most important possible improvement mentioned by the interviewees is to publish some sort of guidance on how to deal with climate change in SEA. Since this is perceived as such a big issue, this is addressed in the following paragraph. Furthermore, uncertainties need to be eliminated as much as possible in order to create a more coherent, concrete and solid story about climate change in SEA. The high amount of uncertainties with regard to climate change has already been discussed multiple times in recent history (see, amongst others, Byer et al., 2009, Heltberg et al., 2009, Larsen et al., 2013). This may also help in gaining political awareness and urgency for climate change, since one of the interviewees mentioned that it would probably work best to tell politicians what would happen in the future if nothing was done about climate change, i.e. it must be made clear what the consequences of climate change can be. Furthermore, the communication and cooperation between different governmental levels and bodies can be improved in as well. With regard to what Larsen et al. (2012) have presented in their study, their seem to be various silos in Dutch institutional bodies which restrict the so-required cooperation in dealing with climate change. Finally, NCEA may be involved earlier in the process to ensure an early consideration of climate change issues. NCEA is perceived as having much knowledge on the topic and appears willing to help.

Insufficient guidance on climate change incorporation in SEA

Largely based on the previously mentioned struggles in the incorporation of climate change in SEA, there is a widespread call for improvements in the EU SEA Directive. The protected asset 'climatic factors' should be defined more clearly by the EU, for the purpose of global climate protection and climate adaptation (Helbron et al., 2011). In the proposal for the amendment to the EIA Directive, published in October 2012, this is replaced by 'climate change' and climate is being significantly embedded in the Directive (European Commission, 2012b). Since this proposal is not ratified and implemented yet, there still is confusion about the consideration of climate at a micro scale. Especially for SEA, linkages between climate change and cumulative effects are interesting. In current practice, there seems to be a focus on greenhouse gas (GHG) emissions in EIA, but at a lesser extent

in SEA. An example of a sector that is involved in GHG emissions are transport plans. Guidance on climate change is needed, since insufficient attention is being paid to these aspects in practice (Kørnøv et al., 2010). Concrete action guidelines need to be developed in the European Union and its member states in order to achieve a methodological implementation of climate protection in strategic assessments. Such guidance is a necessity to devolve global climate protection targets down to regional and local levels. Methodological guidelines are required which describe the data that is to be collected by authorities responsible for spatial plans and the basis on which climate protection targets are set (Wende et al., 2012).

The above mentioned call for guidance also represents the current Dutch situation of climate change incorporation in SEA. The majority of the interviewees believe there is a lack of useful guidance on how to incorporate climate change in SEA. In line with the findings of Wende et al. (2012), the interviewees mention that especially methodological guidance is needed on which cases or plans require climate change considerations and how this should be done. As is mentioned in paragraph 5.2.5, all interviewees believe sufficient information and knowledge on climate and climate change is available, despite the lack of guidance. Therefore, the issue SEA practitioners struggle with is not how to obtain the required information, but how to use the available climate change information in SEA.

As has been previously mentioned, guidance on integrating climate change and biodiversity issues into SEA has been published by the European Commission in April 2013. It is interesting to notice that the has overlap with this research, whit regard to the climate change review indicators. Critical challenges for incorporating climate change in SEA, as mentioned in the guidance, include considering adaptive management, baseline information, climate change objectives and uncertainty. These issues are in this research covered in the indicators 'adaptation', 'baseline', 'CO₂' and 'uncertainty'. Furthermore, the guidance gives directions on how to identify climate change issues in SEA. Links with other environmental issues, the interaction between adaptation and mitigation and considering the local, regional and national context are important herein. This is covered in the review indicators 'spatial boundary' and 'synergies'. Finally, the guidance stresses the importance of monitoring the effectiveness of adaptive management, which is covered in the indicator 'monitoring' in this research. In total, seven of the eleven review indicators in this research are covered by the guidance of the European Commission.

7. Conclusion and recommendations

This chapter brings the most important results of this research together. First, the concluding remarks on this research will be presented (paragraph 7.1). These will touch upon the scientific objective and will answer the main research question: How can the status of attention for climate change in Strategic Environmental Assessment in the Netherlands be explained? Then, the applied methods within this research will be critically reflected upon (paragraph 7.2). This will lead to recommendations for future research on climate change and environmental assessment, with a focus on SEA (paragraph 7.3). Finally, the implications and recommendations of this research for SEA practice will be discussed (paragraph 7.4).

7.1 Conclusions

The objective of this research was to identify which factors determine the extent to which climate change is and can be incorporated in Dutch SEA. A review of environmental assessment and climate change literature validated the necessity of incorporating climate change in SEA. This was confirmed by the interviewed Dutch SEA professionals. The literature review has brought up ideas of how to determine the extent of climate change addressing in SEA.

The extent of climate change coverage in SEA, based on the literature review, was found to be limited. Adaptation and mitigation received most attention of all parameters, followed by CO₂ reduction. All other indicators were addressed in less than half of the reviewed Environmental Statements.

Multiple explanations for the limited extent of climate change incorporation in SEA in the Netherlands were provided by the interviewees. A number of these lie within the area of climate change assessment itself. First, the extent of climate change incorporation in SEA is influenced by the extent to which it is possible to actually assess, predict and describe climate change and its effects. The interviews have pointed out that it is found hard to work with qualitative data on climate change. Little quantitative data is available, and only using qualitative descriptions and expert judgment on climate change makes the topic hard to grasp, slippery and intangible. This leads to weak and general and abstract statements on climate change, which have little in-depth content and are often of low quality. This is strengthened by the experienced lack of guidance on how to assess climate change in SEA. Together with high uncertainties related to climate change and the topic being fairly new in the field of environmental assessment, this often leads to moderate climate change considerations in SEA.

Next to this, another aspect seems to be rather influential on the extent of climate change incorporation in Dutch SEA: politics. It was found that climate change is often not placed high on the competent authority's agenda of environmental aspects to be assessed. It is conceived that either cheap climate change assessment leads to the above mentioned low quality assessment, thereby not contributing to the goal of SEA to aid in decision-making, or that more in-depth and valuable climate change assessment leads to expensive research. Either way, administrative (especially municipal) budgets often do not seem to be large enough to seriously include climate change considerations in environmental assessment. Together with the long-term time horizon of expected climate change effects to occur, opposed to the often noticed short-term political view, the only relative recent emerging of the thought of climate change being a political affair and thus being a new issue, and the

experienced struggles in cooperation with other administrative bodies when it comes to managing climate change and its effects, this leads to few political incentives to consider climate change in SEA.

However, the situation might not be as negative as is described above. A number of little-addressed criteria can be appointed as restraining factors for a higher number of climate change review criteria to be addressed. When this is taken into account, the extent of climate change incorporation can be considered decent. The ES review suggests that climate change is gaining attention in SEA. More climate change indicators seem to be addressed in the Environmental Statements over time. It was mentioned that especially the larger municipalities appear to pay more attention to climate change, mostly thanks to the availability of larger budgets and more resources. This may inspire smaller municipalities to do so as well. Furthermore, efforts have been made by the EU to publish guidance on how to integrate climate change in both EIA and SEA and experience in considering climate change in SEA is continuously being gained. This justifies the expectation that climate change incorporation in SEA will keep improving, but still needs attention.

7.2 Reflections on methods

This paragraph presents a critical reflection on the used methods within this research. The reflective statements refer to all stages of this research. The extent to which the findings might have been influenced by the chosen methods (e.g., possible shortcomings and special circumstances) will be discussed as well.

In the theoretical framework, the concept 'climate change' has only been introduced and explained briefly, wherein only three main aspects have been addressed: water, greenhouse gases and CO₂. Naturally, climate change is much larger than only these aspects. However, these three aspects were mentioned most in literature on environmental assessment and have therefore been perceived as being the most relevant climate change aspects in the light of this research. It was found that the used introduction was sufficiently in-depth for this research, while still being able to understandably introduce the subject to the less-informed reader of this report. Adaptation in the reviewed ESs was mainly found covering the need for increased water storage, and measures against sea level rise and increased precipitation. Adaptation, mitigation and CO₂ reduction were found to be the most-addressed climate change review criteria in the ES review, thereby confirming suggestions from literature that especially water issues, greenhouse gases and CO₂ reductions were found to be important climatic aspects in SEA.

With regard to the Environmental Statement review from Chapter 4, it needs to be mentioned that none of the Environmental Statements was read completely, because this would take too much time. Therefore, all ESs were scanned for relevant chapters, paragraphs and even words. A detailed description of the SEA review method is presented in Annex 1. This method has the risk of certain issues to be missed or overlooked. Since it was found more important to review a large number of ESs in order to be able to make careful statements and conclusions, rather than to examine a low number of ESs very detailed, the ES scanning method has been applied. The observation that similar methods have been used in other academic studies, justifies the applied method in this research.

The theoretical framework has 'delivered' the eleven climate change criteria that have been used for the Environmental Statement review. No weights have been identified to these eleven climate

change review criteria, so no difference in importance between them exists. This could have been done, since it is likely that the eleven criteria might not be equally important with regard to considering climate change in SEA. For example, climate change adaptation measures might be more important than addressing climate change in a separate chapter of the ES when it comes to climate change consideration in SEA, since this is more linked to direct in-depth information in contrast to a way of presenting that information. It may also depend on the specific spatial plan which criteria are considered to be more important. No weights were attached to the review criteria, since no literature was found on this. It might be up to environmental assessment professionals and competent authorities to determine what might be important in a specific case.

While most of the eleven climate change criteria were thought of by the interviewees to make sense in the light of this research, some of those criteria can seriously be reconsidered. With regard to equity, which was proposed by Posas (2011) as climate change review criterion, there seems to be little support for covering the issue in SEA, based on the conducted interviews. This is underlined by the poor addressing of equity in the ES review. This is striking, since it has been made clear that the English study by Posas has a similar character as this research. It is therefore assumed that the difference might be explained in the character of (environmental) assessment between England and the Netherlands. In the Netherlands, equity with regards to climate change is perceived rather as a social issue than an environmental issue. A specific case-study may provide answers on how these differences can be explained.

Concerning synergies between adaptation and mitigation or other environmental concerns and policy areas, this could have been made more explicit in the review of ESs. An ES was considered to address synergies when either of the two kinds of synergies was covered. A distinction between the two types of synergies would have led to twelve possible climate change review criteria for ESs, thereby making the difference in coverage in ESs more clear. It can still be researched further which type of synergies is addressed more in SEA, and why. This also is in line with the research by Larsen et al. (2012).

Another issue with regard to the synergies used in this research, is that climate change is often related to water (storage) issues, as has been made clear before. When an ES addressed such an issue, this was not seen and accounted for as a synergy between climate and water, but rather as an adaptation measure. In this way, it was made sure that the same element did not 'score' twice.

Little data was found with regard to public review and consultation on climate change in the SEA process. This may be explained by the fact that the public review is often held after the publication of the Environmental Statement and is therefore not known yet when the ES is published (see paragraphs 2.1 and 3.2 for the general environmental assessment process). It therefore is questionable whether the results found on consultation in this research are realistic and reliable, although multiple interviewees have mentioned that little public interest exists in the SEA process in general, and probably even less interest is present with regard to considering climate change in SEA, since the issue is too 'big' and difficult to understand for laymen.

At the beginning of this research, the intention was to interview professionals – especially the writers of the Environmental Statements, since they are intensively working with the content of the ES – involved by the preparation of the most recent best-scoring ESs of this research; i.e., the Environmental Statements part of this research that showed the best incorporation of climate

change, based on the eleven climate change review criteria from Chapter 2. This was not achieved, however. Therefore, SEA professionals involved with less recent good-scoring ESs, a recent low-scoring ES and a professional not involved with an ES part of this research, were interviewed as well. An issue that got less attention due to the fact that almost solely ES writers have been interviewed, is the impact of considering climate change in SEA onto considering climate on project level and EIA. This would have been interesting to study as well, but has not been possible to include in this research.

7.3 Recommendations for further research

The reflections on the applied methods have served as inspiration for suggestions for future research, which will be presented in this paragraph. It should be clear by now, that this study is not the final study focusing on climate change in environmental assessment, but is rather one of the first, especially when it comes to considering climate change in SEA. Based on this conducted research, opportunities are discovered that are highly relevant and interesting to further research.

This study has evolved from focusing on environmental assessment in general, to only Strategic Environmental Assessment. It might therefore be valuable to further research whether the incorporation of climate change is indeed, as both literature and the interviewees in this research suggest, considered to be better in SEA than EIA.

As has been explained before, this research has not focused on a specific aspect of climate change, but rather on the concept in general. It can be very interesting to conduct a more in-depth research on one of climate change's relevant aspects, such as water. Water issues have been found most relevant in terms of considering climate change in SEA in the Netherlands. It could therefore also be practically interesting to study how water issues related to climate change are covered in environmental assessment.

The results from the review of Environmental Statements suggest that climate change consideration in SEA in the Netherlands is slowly growing. Since it has repeatedly been made explicit that an important role is reserved for SEA when it comes to considering climate changes and its effect, further research in the future is needed to 'monitor' whether climate change consideration in SEA keeps growing, or whether this has stagnated and if the latter is found, it needs to be made clear what could and should be done about this.

Most interviewees have been asked whether they think climate change considerations in SEA add to a better incorporation of climate change in projects and their EIA processes. The answers to this question vary per interviewee, so no clear conclusions can be drawn with regard to whether climate change incorporation in SEA in the end leads to better climate change considerations at the project level. This is highly interesting to further research, since it are the final projects, rather than the plans, that have a direct influence on climate change. Differences might be noticed between different types of projects (e.g., road and rail infrastructure and housing developments), which might be valuable for practical recommendations on whether climate change consideration could be improved. For such a research, it would also be interesting to interview people from competent authorities, to study their views on e.g. considering climate change in environmental assessment costing too much money and not being politically prioritised.

One of the interesting findings of this research was that as well as in literature, as in practice (based on the interviews), there seems to be a call for guidance on how to incorporate and integrate climate change in environmental assessment, while the EU has already published such guidance months before the interviews have been conducted. It could be valuable to research how it can be ensured that environmental assessment professionals are better up-to-date on relevant guidance and guidelines, such as those of the EU. Although this might be a task of a ministry, NCEA or even the competent authorities and the consulting agencies setting up the SEA process, other possible improvements may be sought for, since the current SEA professionals were unaware of the existing guidance. Naturally, it also needs to be ensured that the published guidance is meets the quality standards. Hints and directions for this could be researched as well.

Multiple interviewees have shared their ideas of larger administrative bodies have more resources and therefore being better able to include climate change considerations in their SEA processes. This has not explicitly been part of this research, and therefore this theory can be researched more in-depth. Continuing such a research could possibly lead to ideas for smaller administrative bodies, i.e. smaller municipalities, how to better incorporate climate change in their environmental assessment. Most of the interviews have mentioned that monitoring of climate change and its effects in SEA is not just missing, but that monitoring in general is a problem in environmental assessment. It seems to be the case that monitoring only is done in the very large projects. This is not a new phenomenon, since it already has been addressed a decade ago (see paragraph 6.2). It could therefore be beneficial to research why monitoring is done so little in environmental assessment, to reconsider its importance and to present measures to change current practice. This could very well be an international study, since it appears to be an international issue.

7.4 Practical recommendations

Next to hints for future research, this research has its practical implications. Since this study is undertaken in collaboration with the Netherlands Commission for Environmental Assessment, these implications are valuable to explain here. These will start with some minor issues relevant for NCEA, and will also touch upon environmental assessment, particularly SEA, in general.

As has been mentioned earlier, the results of public reviews in the assessed Environmental Statements in this research, mostly remained unclear, unknown or not present at all. It would be interesting to open these up, in order to gain an insight in what aspects are considered to be important by the public.

In their review on ESs, the Netherlands Commission for Environmental Assessment only addresses the issues that are reviewed as being insufficient. When climate change is considered to be sufficiently addressed, then it may not be mentioned in NCEA's review. Thereby, an opportunity is missed to present a good example on how to cover climate change in an environmental assessment process for both competent authorities and environmental assessment practitioners. In only one or two sentences, it could be mentioned that the reviewed ES might be seen as an example for properly considering specific aspects of climate change.

It has been made clear that monitoring appears to be a part of the environmental assessment process that is often not undertaken. NCEA might play a more dominant role in counteracting this in the future, perhaps in cooperation with a research on the lack of monitoring, proposed in the

previous paragraph. Increased (law) enforcement on monitoring could be a way of ensuring monitoring is done, but it would probably be more useful to convince competent authorities of the value of monitoring, since several interviewees have stated that many competent authorities do not see the added value of monitoring the environment in general once a plan or project has been finalised.

Finally, NCEA should make clear that climate change is considered to be an important aspect in environmental assessment, especially with regard to the future. Most of the interviewees have mentioned that NCEA already asks for climate considerations in the scoping phase. However, it was mentioned that their ES reviews often do not include climate change notions, even when the ES has paid little attention to it. This could be done more consequently by NCEA. NCEA could also play a role in increasing the importance and urgency attached to climate change by administrative bodies as provinces and municipalities, by making possible future consequences of not considering climate change clear.

The possible improvement most mentioned by the interviewed SEA professionals for considering climate change in SEA, is to provide guidance hereon. This guidance should explain in which cases (specific aspects of plans or projects) climate change should be part of the assessment framework, what is meant with climate or climate change and thereby which topics need to be assessed and how these topics need to be assessed. Again, a first step in this guidance has been taken by the European Union, but national guidance would also be much appreciated. The interviewees have mentioned that NCEA could play a role in developing such guidance, possibly in cooperation with the ministry of Infrastructure & Environment, consulting agencies, environmental assessment professionals, competent authorities, academic society or a combination hereof.

The general notion of climate change with regard to SEA that has been put forward by the interviewees, is that it is a slippery, intangible and not concrete topic that is largely assessed via qualitative expert judgment. This includes high levels of uncertainty. It would be helpful for SEA professionals to have an overview of what the current and expected climate changes are, in order to better determine the bandwidths and cover the topic in the final Environmental Statement. An overview of methods to deal with the vague and uncertain character of climate change in SEA, could be helpful as well. This could include the KNMI climate scenarios and an overview of possible no-regret measures. It should then also be explained how to use these methods, since this is often still unclear to the interviewed SEA professionals.

All eleven climate change review criteria have been addressed multiple times by ESs being part of this research. A brief description of how to address these criteria in SEA is given below. For examples of ESs addressing the criteria, please see paragraph 4.3. In general, all criteria should be explained very clearly, to make sure the data is understood by the final decision-makers. Brief descriptions of good practices per criterion are given below.

Climate change adaptation measures should be presented in the ES. Especially increased water storage and flood protection require consideration. It should be made clear which areas are specifically vulnerable to climate change effects. No-regret measures are a good example of dealing with uncertainty in climate change.

The adaptation measures need to be based on factual data in order to be reliable. It is therefore important to present a solid baseline on current and expected climate projections. Plan area-specific

projections are more valuable than general assumptions. These could be divided in multiple timeframes. Although the longest time horizons include most uncertainty, there are valuable to look beyond the nearer future. Key implications of the expected climate change for the plan area are very useful for determining adaptation measures.

CO₂ reduction targets and measures to achieve this should be presented in the ES. This could include carbon sinks for 'capturing' CO₂. The relevance of the plan for achieving the reduction targets should be made explicit, e.g. by calculating avoided CO₂ emissions. The relevance and importance of this should be explained clearly, in order for decision-makers to be useful.

The ES should mention climate-related results of consultation. Not only the public review results should be made clear, but also the consultation of other climate-related parties, such as the water board, should be made explicit. The influence of consultation on the content of the ES needs to be explained as well.

Equity considerations could be presented in the Environmental Statement, but are often not required. These should then include which social groups, land uses and locations are especially vulnerable to which aspect of climate change and how this is incorporated in the assessment framework.

Climate change mitigation measures need to be presented in the Environmental Statement. It should be made clear how activities within the plan reduce greenhouse gas emissions or whether carbon sinks are introduced or expanded. It should then be made explicit to what extent this contributes to achieving greenhouse gas reduction targets.

With regard to monitoring, two steps are important for performing good practice. First, measures should be described to monitor climate change and its impacts. This could be done by measuring urban temperatures (urban heat island) or precipitation levels and determining whether the amount of water storage remains sufficient. Secondly, these measures should then also be truly done and a monitoring report should be published, to present the results.

Climate change could be described in a separate chapter, though this is not a must. In any case, it should be made clear which environmental issues are related to climate change, how they are related and how this is part of the entire assessment, e.g. when an increased water storage capacity is required, it should be mentioned if and how this is due to the changing climate.

The Environmental Statement should not only present a plan area and a study area, but should also make relevant climate effects beyond the plan area clear. This can be effects from the plan area on the study area, or vice versa. Collaboration with neighbouring administrative bodies is seen as good practice when it comes to considering climate change.

Both mitigation and adaptation measures are needed to combat climate change. It should be made clear if and how adaptation and mitigation influence each other. This can be either positive, whereby adaptation and/or mitigation measures interact and enhance positive effects on climate change, or negative, whereby mitigation benefits are lost in return for adaptation gains and vice versa. The same synergies should be made clear with other environmental fields.

Finally, uncertainties in climate change should be addressed and acknowledged. Uncertainties can get attention by using climate scenarios or can be dealt with via no-regret measures. In any case, it is better to understand and address the uncertainties inherent to climate change than to ignore them and continue with the decision making process. It can be mentioned that more specific research is required.

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Annex 1. Description of ES review method

The review of the 47 Environmental Statements, based on the eleven indicators extracted from literature was conducted in a structured manner. None of the Environmental Statements were read entirely because of time-constraints: most ESs consisted of over 100 pages, while some exceeded even 300 pages. Instead, several keywords addressing the climate change review criteria have been searched for in the documents.

The first step in the review of all Environmental Statements, was to determine whether the document had reserved space for a specific chapter or paragraph for climate or climate change. This could logically be determined by examining the tables of contents. The following step was then to determine whether the word 'climate' ("*klimaat*" in Dutch) was used in the ES. This often was the case, although 'climate' was regularly referred to as the working or living climate of an area, thereby being less relevant for this review than in terms of 'climate change'. Therefore, a next search for the word 'climate change' ("*klimaatverandering*" in Dutch, sometimes wrongfully mentioned as "*klimaatsverandering*") was performed. In this way, relevant sentences, paragraphs and sections could be distinguished from other parts of the Environmental Statement. Naturally, these relevant parts of the ES were read attentively.

With regards to the remaining climate change review indicators extracted from literature, the keywords searched for in the Environmental Statement are presented in Table A.3. When relevant, plural forms of the keywords were also searched for.

Table A.3. Keywords searched for in the Environmental Statements.

Climate change review criterion (Chapter 2)	Keywords and Dutch translations searched for in Environmental Statements
Adaptation	'adapt' (" <i>aanpassen</i> "); 'adaptation' (" <i>adaptatie</i> "); 'heat' (" <i>hitte</i> " / " <i>temperatuur</i> "); 'measure' (" <i>maatregel</i> "); '(sea level) rise' (" <i>zeespiegelstijging</i> "); '(water) storage' (" <i>(water)berging</i> ")
Baseline	'climate' (" <i>klimaat</i> "); 'climate change' (" <i>klimaat(s)verandering</i> "); 'heat' (" <i>hitte</i> " / " <i>temperatuur</i> "); 'precipitation' (" <i>neerslag</i> ")
CO ₂ reduction	'CO ₂ ' (" <i>CO₂</i> "); 'emission' (" <i>emissie</i> " / " <i>uitstoot</i> "); 'reduction' (" <i>reductie</i> " / " <i>afname</i> "); 'target' (" <i>doel(stelling)</i> ")
Consultation	'consultation' (" <i>consultatie</i> "); 'opinion' / 'way of thinking' (" <i>zienswijze</i> "); 'participation' (" <i>participatie</i> ", " <i>inspraak</i> ")
Equity	'equity' (" <i>billijk(heid)</i> "); 'justice' (" <i>rechtvaardig(heid)</i> "); 'vulnerable' (" <i>kwetsbaar</i> ")
Mitigation	'counteract' (" <i>tegengaan</i> "); 'energy' (" <i>energie</i> "); 'measure' (" <i>maatregel</i> "); 'mitigation' (" <i>mitigatie</i> ")
Monitoring	'monitor' (" <i>monitoren</i> " / " <i>monitoring</i> ")
Spatial boundary	'plan area' (" <i>plangebied</i> "); 'plan boundary' (" <i>plangrens</i> "); 'study area' (" <i>studiegebied</i> ")
Synergies	'interplay' (" <i>wisselwerking</i> "); 'relation' (" <i>relatie</i> ")
Uncertainty	'uncertainty' (" <i>onzekerheid</i> ")

Several aspects are related to each other. For instance, climate (change) monitoring can be done via monitoring urban centre temperatures, CO₂ concentrations or ground water levels. Whether the ES addressed climate aspects beyond the spatial boundary of the plan, could occasionally be determined by the use of maps presented in the Environmental Statement. Minor differences between the Environmental Statements may have occurred, since the review was spread out over multiple weeks, wherein different keywords came to the fore.

Annex 2. Summary of European Commission ‘Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment’

Summary

*Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment*¹ (‘Strategic Environmental Assessment’ — ‘SEA Directive’) requires certain public plans and programmes (PPs) to undergo an environmental assessment before they are adopted.

The aim of this *Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment* is to improve the consideration of these issues in strategic environmental assessments (SEAs) carried out across the EU Member States. This summary gives an overview of the guidance and distils the advice on how to integrate these issues into SEAs.

The guidance is arranged in a way that will encourage users to think about how important climate change and biodiversity — as assessment issues — are likely to be for a specific SEA (see box right).

Section 1 contains an introduction and detailed user guide, including a navigation aid to help to decide when and how to use the guidance. Sections 2 and 3 explain why climate change and biodiversity are so important for SEAs, including an explanation of the issues and the policy background at the international/EU level. Section 4 helps to scope the climate change and biodiversity issues, and Section 5 explains how to assess climate change and biodiversity throughout the SEA process. The annexes provide sources of further reading and links to other relevant guidance, information, data and tools.

The summary boxes overleaf distil the main points of the guidance on how to integrate climate change and biodiversity into SEAs.

How important are climate change and biodiversity for your SEA?

- How will PP influence climate change and biodiversity and how it will be influenced by climate change and biodiversity?
- What is it about climate change and biodiversity that poses a challenge to the assessment process?
- How does that affect the information needs — what type of information, what sources and what stakeholders will hold information and specific knowledge in these areas?
- What are the key aspects to cover in the detailed assessment and how important will those issues be in decision making?

¹ Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment, OJ L 197, 21.7.2001, p.30.

HOW TO ADDRESS BOTH CLIMATE CHANGE AND BIODIVERSITY EFFECTIVELY IN SEAs:

- Build them into the assessment and PP from the earliest stage and follow them throughout — start at the screening and scoping stages to build these issues into the mindset of all the key parties: competent authorities and policymakers, planners, SEA practitioners and other stakeholders. The SEA can be used as a creative process to support learning amongst all these parties.
- The consideration of biodiversity and climate change issues must be tailored to the specific context of the PP. It is not simply a checklist of issues to tick off. Each SEA can potentially be different.
- Be practical and use your common sense! When consulting stakeholders, avoid drawing out the SEA procedure and leave enough time to properly assess complex information.
- Use the SEA as an opportunity to address key issues regarding different types of projects or specific infrastructure projects. At this time, many options are still open (e.g. the location of motorways versus Natura 2000 network sites) and you can avoid problematic situations at the EIA/project level.

CRITICAL CHALLENGES FOR ADDRESSING CLIMATE CHANGE AND BIODIVERSITY IN SEAs ARE TO:

- Consider long-term trends both with and without the proposed PP and avoid 'snapshot' analyses.
- Assess the PP against the future baseline and key trends and their drivers taking into account other PPs.
- Consider the impact that predicted changes in the climate and biodiversity will have on the proposed PP, potentially over a long timescale, and its resilience and capacity to cope.
- Manage complexity; consider whether implementation of part of a PP e.g. climate change mitigation, that might otherwise be positive in its impact, could have a negative impact on climate change adaptation and/or biodiversity.
- Consider what existing climate change and biodiversity objectives and targets need to be integrated into the PP.
- Consider the long-term and cumulative effects on climate change and biodiversity of PP as these will be potentially significant given the complex nature of these topics.
- Be comfortable with uncertainty. Use tools such as scenarios to help deal with the uncertainty inherent within complex systems and imperfect data. Think about risks when impacts are too uncertain and factor this into monitoring to manage adverse effects.
- Develop more resilient alternatives and solutions based on 'win-win' or 'no regret'/'low regret' approaches to PP development, given the uncertainty inherent in climate change and predicting impacts on biodiversity.
- Prepare for adaptive management and monitor to improve adaptive capacity.
- Base your recommendations on the precautionary principle and acknowledge assumptions and limitations of current knowledge.

HOW TO IDENTIFY CLIMATE CHANGE AND BIODIVERSITY ISSUES IN SEAs:

- Identify key climate change and biodiversity issues early in the process, but be flexible and review them as new issues emerge.
- Identify and bring together all the stakeholders and environmental authorities to help identify the key issues.
- Investigate how climate change and biodiversity interact with each other and with other environmental issues.
- Remember to consider both the impacts of the PP on climate and climate change and biodiversity and the impact of a changing climate and natural environment on the PP.
- Investigate how climate change mitigation and adaptation interact with each other (e.g. remember that a positive effect on climate change mitigation may lead to negative effects on adaptation, etc.).
- Consider the national, regional and local context as appropriate, depending on the scale of the PP. You may also need to consider the European and global context.
- Consider the objectives, commitments and targets set in policy and how to integrate them into the PP.
- Use ecosystem services to provide a framework for assessing the interactions between biodiversity and climate change.

HOW TO ASSESS THE EFFECTS RELATED TO CLIMATE CHANGE AND BIODIVERSITY IN SEAs:

- Consider climate change scenarios at the outset. Include extreme climate situations and 'big surprises' that may either adversely affect implementation of the PP or may worsen its impacts on biodiversity and other environmental factors.
- Analyse the evolving environmental baseline trends. Include trends in key issues over time, drivers for change, thresholds and limits, areas that may be particularly adversely affected and the key distributional effects. Use vulnerability assessments to help assess changes to the baseline environment and identify the most resilient alternative(s).
- Take an integrated, 'ecosystems' approach to planning and examine the thresholds and limits.
- Look for opportunities for enhancement. Ensure that the PPs are consistent with other relevant policy objectives, and priority actions for climate change and biodiversity.
- Assess alternatives that make a difference in terms of climate change and biodiversity effects — review the need, the process for its implementation, locations, timings, procedures, etc. and alternatives that enhance ecosystem services.
- First seek to avoid biodiversity and climate change effects and then mitigate. Seek 'no-net-loss' of biodiversity.
- Assess climate change and biodiversity synergistic/cumulative effects. Causal chains/network analysis may be helpful to understand interactions.
- Monitor the effectiveness that adaptive management has been built into the PP and whether it is being delivered.

Annex 3. Basic outline of the interview questions

Dutch

Algemeen

Wat zijn uw ervaringen met klimaatverandering in plan-m.e.r.?

In hoeverre zou klimaatverandering besproken moeten worden in plan-m.e.r. volgens u?

Welke indicatoren zijn het meest relevant of belangrijk voor het meenemen en bespreken van klimaatverandering in plan-m.e.r.?

Zou dit kunnen verschillen per plan of project? Waarvan zou dit dan afhangen?

Zijn er aspecten die juist niet belangrijk zijn voor klimaatverandering in plan-m.e.r.?

Heeft u zelf klimaatexperts in uw team gehad van wiens diensten u gebruik heeft gemaakt tijdens het opstellen van het MER?

Is genoeg klimaat kennis beschikbaar voor u?

Hoe komt u in het bezit van kennis over klimaat en klimaatverandering, relevant voor het MER?

Obstakels en verbeteringen

Welke problemen of obstakels hinderen de opname van klimaatverandering in plan-m.e.r.?

Kunnen deze ook per plan of project verschillend zijn?

Heeft u een idee of klimaataspecten uit de structuurvisie ook daadwerkelijk doordringen tot meer concrete (bestemmings)plannen en projecten?

Wat zouden mogelijke verbeteringen kunnen zijn om klimaatverandering beter terug te laten komen in plan-m.e.r.?

Heeft u gebruik gemaakt van klimaatverandering richtlijnen voor de opname ervan in het MER?

Vindt u dat er genoeg begeleiding is/richtlijnen zijn voor het opnemen van klimaatverandering in plan-m.e.r.?

Wiens verantwoordelijkheid zou het moeten zijn om deze richtlijnen te voorzien?

Kent u de EU richtlijnen voor klimaatverandering en plan- en project-m.e.r. van april 2013?

Resultaten

Denkt u dat er veel verschillen zijn tussen project- en plan-m.e.r. wat betreft het behandelen van klimaatverandering?

Zou plan-m.e.r. hiervoor geschikter zijn dan project-m.e.r.? Waarom denkt u dat?

Vindt u dat klimaatverandering in het algemeen een belangrijk aspect in plan-m.e.r. is?

Geeft de Commissie m.e.r. voldoende aandacht aan het klimaatverandering tijdens de advisering?

Heeft u een idee of bepaalde gemeenten of provincies meer aandacht aan klimaatverandering besteden?

De beoordeling van de 47 milieueffectrapporten in dit afstudeeronderzoek is gebaseerd op 11 indicatoren, die uit wetenschappelijke literatuur zijn gehaald, te weten:

- *Adaptatie*; het MER beschrijft maatregelen voor klimaatadaptatie;
- *Basislijn*; het MER beschrijft het huidige en verwachte toekomstige klimaat;
- *CO₂ reductie*; het MER beschouwt (politieke) CO₂ reductie doelen en de relevantie van het ruimtelijk plan voor deze doelen;
- *Consultatie*; het MER beschrijft de consultatie van wettelijk verplichte adviesorganen en burgers waarin klimaatverandering een rol speelt;
- *Rechtvaardigheid*; het MER gaat rechtvaardigheidsbeginselen na in de vorm van sociale, economische, gezondheids- en rechtvaardigheidsaspecten (zoals de kwetsbaarheid van minder mobiele bevolkingsgroepen ten opzichte van impacts van klimaatverandering zoals overstromingen);
- *Mitigatie*; het MER beschrijft klimaat mitigatie maatregelen gericht op broeikasgasreductie en het vergroten van *carbon sinks*;
- *Monitoring*; het MER beschrijft bepalingen om klimaatgerelateerde maatregelen te monitoren;
- *Apart hoofdstuk*; klimaatverandering wordt in een apart hoofdstuk in het MER beschreven, om zo de toegankelijkheid hiervan voor geïnteresseerden te vergroten;
- *Ruimtelijke grens*; het MER beschouwt impacts van klimaatverandering op een schaal groter dan die van het plangebied zelf;
- *Synergie*; het MER beschrijft de synergie tussen adaptatie en mitigatie, en tussen klimaat en andere gerelateerde milieubeleidsvelden;
- *Onzekerheid*; het MER beschrijft onzekerheden met betrekking tot klimaatverandering en erkent deze.

Wat vindt u van dit onderzoek en de indicatoren?

Vindt u dat deze indicatoren de belangrijkste aspecten van klimaatverandering in plan-m.e.r. dekken?

Missen er bepaalde indicatoren? Of zijn er juist te veel gebruikt?

Heeft u een idee hoe het zou kunnen komen dat er relatief weinig aandacht aan rechtvaardigheid en gelijkheid met betrekking tot klimaatverandering (bijv. of zwakke bevolkingsgroepen harder worden getroffen) wordt gegeven in plan-m.e.r.?

Hoe zou het kunnen komen dat MERen in het algemeen amper klimaatverandering en de impacts hiervan buiten het plangebied meenemen?

Waarom zou er weinig aandacht aan het monitoren van klimaatverandering worden geschonken in plan-m.e.r.?

Zou u kort samen kunnen vatten, waarom en hoe het aan bod komen van klimaatverandering in m.e.r. belangrijk is, wat de huidige stand van zaken is en wat verbeterd zou kunnen worden?

English

General

What are your experiences with climate change in SEA?

To what extent should climate change be discussed in SEA, according to you?

Which indicators are the most relevant or important for taking climate change into consideration and discussing it in SEA?

Could this differ per plan or project? Where would this depend on?

Are there any aspects that are not important for climate change in SEA?

Did you have any climate experts in your team, whose services you have used during the composing of the ES?

Is sufficient climate knowledge available to you?

How do you gain knowledge on climate and climate change, relevant for the ES?

Obstacles and improvements

Which problems or obstacles hinder the incorporation of climate change in SEA?

Can these problems or obstacles differ per plan or project?

Do you know whether climatic aspects described in the structure vision actually get through to the concrete (zoning) plans and projects?

What could be possible improvements to better incorporate climate change in SEA?

Did you make use of climate change guidelines for the incorporation of it in the ES?

Do you feel sufficient guidance/guidelines for the incorporation of climate change in SEA exists?

Whose responsibility would it be to make sure these guidelines are present?

Do you know the EU guidelines for climate change in SEA and EIA, published in April 2013?

Results

Do you think there is much difference between EIA and SEA when it comes to treating climate change?

Would SEA be more suitable to treat climate change than EIA? Why do you think so?

Do you feel that climate change in general is an important aspect in SEA?

Does NCEA give sufficient attention to climate change during their review?

Do you have an idea whether certain municipalities or provinces pay more attention to climate change than others?

The assessment of the 47 Environmental Statements in this thesis research is based on eleven indicators derived from scientific literature:

- *Adaptation*; the ES described climate adaptation measures;
- *Baseline*; the ES describes the current and project future climate;
- *CO₂ reduction*; the ES considers (political) CO₂ reduction targets and the relevance of the spatial plan for these targets;
- *Consultation*; the ES describes the consultation of statutory consultees and the public wherein climate change plays a role;
- *Equity*; the ES considers equity principles in the form of social, economic, health and just issues (like the vulnerability of less mobile population groups with respect to climate change impacts such as floods);
- *Mitigation*; the ES describes climate mitigation measures aimed at reducing greenhouse gases and increasing *carbon sinks*;
- *Monitoring*; the ES describes provisions to monitor climate related measures;
- *Separate chapter*; climate change is described in a separate chapter in the ES, in order to increase the accessibility of the topic for interested people and parties;
- *Spatial boundary*; the ES considers climate change impacts at scales larger than the boundary of the spatial plan;
- *Synergies*; the ES describes the synergies between adaptation and mitigation and between climate and other related environmental policy fields;
- *Uncertainties*; the ES describes uncertainties with regard to climate change and acknowledges those.

What are your thoughts on this research and the indicators?

Do you feel that these indicators cover the most important aspects of climate change in SEA?

Are certain indicators lacking? Or are too many indicators used?

Do you know how it can be explained that generally relatively little attention is being paid to equity with regards to climate change (e.g. whether weak population groups are hit harder by climate change) in SEA?

How could it be explained that ESs in general barely consider climate change its impacts at scales larger than the boundary of the spatial plan?

Why is little attention being paid to monitoring climate change in SEA?

Could you briefly summarise, why and how addressing climate change in SEA is important, what the current situation is and how this could be improved?

Annex 4. Description of interview summarising method

The summaries of the eight conducted interviews with Environmental Assessment professionals were made in a clear and structured manner. All interviews were recorded with permission of the interviewee. These audio recordings were typed out shortly after the interview was conducted. The interview on paper was then e-mailed to the interviewee, in order to make sure that he/she would still agree with his/her statements and to ensure that no crucial misunderstandings had occurred. In three cases, some minor adjustments had to be made. The final typed out interviews ranged from six to twelve pages.

In order to extract useful information from that amount of quantitative data, all interviews were summarised along the same line. The most important questions that the summary would need to answer were:

- Does the interviewee think SEA is more suitable than EIA to address climate change?
- Is climate change an important aspect in SEA?
- Which aspects of climate change are important to the interviewee in SEA?
- What are the most important problems that hinder a full incorporation of climate change in SEA?
- What could be possible solutions to overcome these problems?
- Does the interviewee know about the EU guidelines on climate change in EIA and SEA?
- What does the interviewee think of the indicators from this thesis research?
- Can the interviewee explain the lack of equity, monitoring and the consideration of climate change impacts on scales larger than the boundary of the spatial plan in Environmental Statements?
- What are the thoughts of the interviewee concerning the current situation of climate change in SEA and future improvements?

Although significant differences in interview length existed, the summaries needed to be comparable with each other. That is the reason why all summaries were written in the same format, drastically reducing the length differences. Examples of specific cases, excess details and communication between the interviewer and the interviewee are omitted. It was aimed that the summary would consist of not more than 10% of the word count from the original interview. The summaries of the conducted interviews range from approximately 420 to 570 words.

Annex 5. Interview summaries

Summary interview 1

There are not many differences between EIA and SEA when it comes to the consideration of climate change. SEA deals more with general climate goals, while projects and EIA focus more on concrete measures. The climate change aspects that are considered the most in SEA are adaptation, mitigation, CO₂, energy and high water safety. Climate is important to consider in Environmental Assessments. Aspects that I think are important, are greenhouse gases and sustainable energy supply. This deals with decreased emissions, sustainable energy, sustainable traffic solutions, high water level problems and the relation to biodiversity. Climate change is hard to capture in a separate chapter, since it includes many aspects. Climate is an important, but very difficult subject in SEA, also because it deals with long-term issues, while governors and politicians mostly have a 4 year horizon. In combination with the current economic crisis, it is hard for them to invest in climate measures, since there are still many uncertainties. I think it is important to make climate change tangible, in order to deal with it. Good stories and examples, including no-regret measures, help to put climate on the agenda. This also is a task of NCEA, especially in the phases of scoping and level of detail, where NCEA has the most control in the process. I believe that climate is winning attention in the Environmental Assessments over the last years, partly because NCEA asks for it. They definitely pay attention to it. There is a lot of knowledge on climate and climate change, but there are no clear guidelines on how to incorporate climate change in SEA. This could also be a task of NCEA. I do know the EU guidelines.

Concerning the eleven indicators from your research, adaptation and mitigation are always very vague for me and I see CO₂ as part of mitigation. Monitoring is very important, especially because of the uncertainties and long-term aspects of climate. The indicators seem somewhat irregular, since there are leaps in the thinking level of them. I think the indicators mostly lack concrete subjects, I would have expected these. This is probably due to uncertainties, predictions and methodology.

Concerning equity, it is true that little attention is paid to vulnerable citizen groups when it comes to climate. The link is often not made to social justice. I do not think it is a specific task of SEA to do so, but it can be informative and important in specific cases. When it comes to addressing climate within a spatial boundary larger than the boundary of the spatial plan, I think it lies in the character of Environmental Assessment not to do so, although it is better to address climate change on a higher level. Climate monitoring is often not mentioned in ESs, because people feel it has little effect and I think EIA is more suitable to address monitoring measures than SEA.

Personally, I think climate change can be treated more structured than happens today. What I search for, is when a number of topics is described, it is also made clear that certain aspects of climate are also covered thereby. If you address all those topics, you do not have to do much more for climate in SEA. Many aspects in an Environmental Statement are very clear, but climate is harder to grasp. It should be explained which aspects in the ES are linked to climate and how. Overall, climate remains a difficult subject.

Summary interview 2

It is important to give attention to the effects from spatial plans on climate change and how to answer to climate change. However, we only have a minor influence on climate change via sustainable energy and CO₂ reductions. Therefore, we use climate scenarios and their effects on spatial policies. Knowledge on climate change is relatively easy to obtain, since we have access to

several experts, although climate change in Environmental Assessments is still starting up. Aspects of climate are addressed in many ESs, but it is the question whether SEA has become a full assessment tool in that sense. I think climate is relatively new as focus point in structure visions and Environmental Assessment. It needs time, partly because we need more certainty on the future climate. It is now also unclear what needs to be addressed concerning climate in an ES. I believe there is insufficient guidance hereon, but the different climate scenarios are helpful and stimulate to think about the effects of climate change. I do not know the recently published EU guidelines.

I think EIA is an execution of an earlier made decision and that an abstract plan is more suited to pay attention to climate change. Therefore, it should already be addressed in an SEA belonging to a structure vision. The addressing of climate change should take place at a high abstraction level and therefore thus with structure visions. I do not notice that it then also works through onto lower plans, such as zoning plans or specific projects. This still needs time. Climate change should become an important aspect in Environmental Assessment, especially SEA. NCEA pays sufficient attention to this.

Concerning the indicators from your research, I think they certainly make sense. Mitigation is difficult, since – especially on project level – it is hard to influence this. Adaptation offers more possibilities. I would place CO₂ under mitigation. The spatial boundary of an ES is being determined by the spatial plan, so that is difficult to expand. It lies in the character of Environmental Assessment, but a province can play an important role here.

I think equity is part of social liveability. It is an important aspect, but I think it is difficult to address in spatial plans and SEA, since the plan itself barely deals with it. I cannot explain why climate monitoring is barely mentioned, when climate itself is part of the ES. Maybe the monitoring term is too short for climate, since climate changes occur over a longer period of time. I do not think climate change should be presented in a separate chapter, since this leads to too many chapters and climate acts as an umbrella for many aspects. Climate must not be forgotten though.

Climate is still described limitedly in ESs. A list including points of attention for climate change, could be useful. This should not be binding or compulsory however, since otherwise aspects can be left out or forgotten. NCEA or the ministry could do this. Climate is still a new subject, it needs time to be addressed better. The climate scenarios are important herein.

Summary interview 3

Very often, we offer climate as an extra research area, but the client does not always want climate to be treated in the ES. This is often related to money issues; it costs money to research climate effects and the client does not always want to spend this money on climate. I believe climate change is an important aspect in Environmental Assessment, but only for those plan areas where it makes sense to talk about it. The most important aspects of climate to describe, are those that are the most certain to occur, like heavier precipitation and temperature rise. For uncertain aspects, a worst-case approach would fit better. Knowledge on climate is relatively easy to obtain, although the knowledge fades away slightly, mostly because of the current economic times.

The importance that the competent authority attaches to climate is one of the main problems for a poor incorporation of climate change in ESs. It depends on whether climate and sustainability are high on the political agenda, if climate gets attention in the ES. To improve this, the political urgency for climate must increase. On this moment, there also still is too much climate change uncertainty. Treating climate change is often seen as a luxury product in ES and sometimes therefore as a waste of money.

I am not sure if there is sufficient guidance on climate for SEA, NCEA does provide specific factsheets. I do not know the recently published EU guidelines. It is hard to estimate whether addressing climate on high abstraction levels, work through to lower levels.

EIA can describe climate aspects more precisely than SEA, but the timeline of climate change suits SEA much better. It is difficult to talk about climate change in projects when it is not already discussed in higher and more abstract plans. It is therefore important to address climate already in SEA.

NCEA pays sufficient attention to climate, but it is to their disadvantage that their review is not legally binding. I believe that generally, smaller municipalities pay less attention to climate than larger ones. This is mostly because of a lack of budget.

Concerning your indicators, I think they are quite good. Uncertainty is quite important. Social aspects are addressed in an ES, but this is rather referred to as health than as equity. It is difficult to address climate change beyond the boundary of a spatial plan, since every municipality has its own budget. The province could play an important role in this case. Climate monitoring is often lacking, because the effects appear really slowly, over decades. The monitoring chapter is also often seen as an obligation and monitoring is not done well in practice.

Climate change may be addressed more often than is happening now. Budgets determine whether or not it is treated in an ES, while it is an important theme. An improvement could be to better tell and show what climate is, what the effects are and what we can do about it. You need to have a clear story, also about what is uncertain and what is not. If you do this smartly, you can incorporate climate into spatial developments. Opportunities are everywhere.

Summary interview 4

Climate change is a difficult part of Environmental Assessment. Especially with studies on the provincial and national level, you can give attention to climate. For me, the most important climate change aspects are aspects like CO₂ and reduction hereof, sea level rise, increased drought and precipitation increase. Climate is not a standard aspect yet, which makes it difficult.

Addressing climate in SEA is useful, climate in EIA has no value. It needs to be addressed on a high abstraction level. Climate is an important theme, for me and also for council members, but it is not concrete enough. It is not susceptible and tangible. Guidance hereon could be a task of the government, NCEA and municipalities. It should be made clear in which plans you should pay specific attention to climate. I do not know the EU guidelines. NCEA often asks for climate in the ES.

Climate knowledge is accessible, but the difficult part about climate is that it is not really framed yet. It is not introduced in a certain system, it is unclear what we mean with it, how to deal with it and what possible solutions are. It is a slippery subject and it is therefore hard to put the correct information in the ES. As solution, the Environmental Assessment practitioners, together with NCEA and the ministry, should determine in which cases we should address climate and what the aspects of climate are that we should treat in an ES. I do not know if any specific provinces or municipalities pay more attention to climate, but one would expect that a larger province pays more attention to it. Concerning the indicators from your research, they all make sense to me. I think more attention can be paid to energy and raw materials. Equity barely is addressed in ESs, because it is a difficult aspect. I also doubt whether it is politically desired to assess equity. Many aspects are already described as health issues, though global statements on climate-vulnerable land uses are useful to me. I think that the lack of climate assessment beyond the boundary of the spatial plan can be explained by the continuing decentralisation. Responsibilities are laid down at local governments, but those cannot

always carry these responsibilities. Climate change is a problem that needs solving on a provincial, national, European and actually global scale. Monitoring is barely done in the entire Environmental Assessment practice. The only actual solution would be more law enforcement, since monitoring is legally obliged. There also is little political urgency to monitor, it only costs money.

The current situation of climate change in SEA is moderate. There is too much discussion on what climate should embrace and which aspects should be reviewed. It does not play a key role in decision-making. It also has long-term effects, which makes it hard to work with. We need more support and guidance on when we should address climate in an ES, in which plans and projects and what to describe, including all uncertainties. That is not possible yet. It is not tangible enough.

Summary interview 5

It is more important to address climate change in Strategic Environmental Assessments than in other, local plans. Even though it may be more concretised in EIA, attention should be paid to climate change in strategic plans, such as structure visions. Climate change is often not really in the working habits of municipalities yet, they are more looking for economic incentives. Water is rather seen as an aesthetic value than a climate issue.

Water shortage and flooding are the main indicators we have used in our SEA. In urban areas, heat stress and possibilities for escaping the hot city can be important. Climate knowledge is easy to obtain, especially from water experts.

One of the causes for a problematic incorporation of climate change in SEA, is that it is not susceptible what climate change exactly is. Models have a long time horizon, it is a slippery subject. A guide on how to treat climate in an ES could help, this could be done via NCEA or this research. There are sufficient handles and directives available, but they are mostly on strategic level and therefore not really concrete. This could be a task of NCEA. I do not know the EU guidelines.

SEA is better suited to address climate change than EIA, since it is more philosophic and more general than EIA. This fits better with climate change, although climate change is not more important than the other Environmental Assessment topics. I do not know whether NCEA gives sufficient attention to climate, but I do know that climate is not placed high on the political agenda in many municipalities.

The indicators from your research are logical to me, I do not miss anything. Certain stakes are looked at in an ES, so I am not sure if equity is addressed so little. I think it is especially important in urban areas. It goes further than mentioning vulnerable land uses, but it is true that this cannot be seen in the ES itself. Municipalities do not look further than the boundary of the spatial plan, because it is too difficult for them. There definitely is a role reserved for the province here, but responsibilities are also moved on to lower governmental bodies as municipalities. Monitoring is a general Environmental Assessment problem, not just regarding climate. People feel no urgency to monitor.

It is important to take no-regret measures concerning climate change, but this barely happens nowadays. We are busy repairing earlier mistakes. With these insights, we should prevent such mistakes in the future.

Summary interview 6

Climate usually is part of the assessment framework of SEAs, both on municipal and provincial level, and it is addressed on a high level of abstraction. Climate in Environmental Assessment is only from the last three years or so. It is often translated into heat stress, flooding, safety, but also energy and CO₂. Especially in the Netherlands, water safety is an issue. Energy efficiency and sustainability are

today's challenges. It is an important theme in SEA, it is an issue of today and it needs attention on a strategic level. Knowledge on climate is obtained from several experts, mostly from water experts. The moderate addressing of climate change in SEA can be caused by people's habit to stick to the classical environmental themes, which do not include climate. Clients do not always ask for it, probably because of budget constraints. People also wonder if they can give enough information on this high level of abstraction. Climate is hard to quantify, which makes it a slippery subject. It might be easier to work with in specific projects on EIA level. NCEA has sufficient knowledge on climate and is willing to help, so involving them earlier in the process could help to address climate better in the ES. I do not know whether addressing climate on higher abstraction levels, works through into concrete projects. I think this is also depends strongly on politics.

Municipalities often have created their own guidance or handles via climate adaptation plans, but I do not think sufficient national or European guidelines for climate change in SEA are available, though I do not miss them. I do not know the EU guidelines.

Addressing climate issues in EIA leads to more quantitative assessment than in SEA, but I think it is more important to incorporate it in SEA, since this is a more strategic and coherent approach. NCEA always asks for climate, so they give sufficient attention to it. I think provinces pay more attention to climate than municipalities, especially than the smaller ones. Those municipalities have smaller budgets and probably also lower necessities. Large municipalities are surely working on climate.

The indicators you used in your research are quite interesting. Equity in relation to climate change does not come to the fore in ESs, because we primarily focus on environmental effects rather than social effects. Humans are indirectly treated in the ES, since all environmental standards and norms are based on us. I wonder whether it would be desirable to treat equity in an ES. Monitoring is a general problem of Dutch Environmental Assessment. Politicians nor citizens seem to find it important. The province can play a role when it comes to including climate effects beyond the boundary of the spatial plan. The cooperation between water boards and municipalities can be improved as well.

Climate and climate adaptation, energy and CO₂ goals are included in SEA, but it depends per case and client. The current situation is quite positive, but the awareness within municipalities about what climate change can mean for them, can be improved. Environmental Assessment does not have to be the tool to address climate per se, as long as it gets the attention it deserves. There should be more alignment about the way climate is being shaped by municipalities and how it can be made more quantitatively.

Summary interview 7

In most SEAs, climatic aspects are taken into consideration as themes to be researched. Over the last years, especially energy issues and CO₂ reduction have become more important in policies and thus Environmental Assessment. Climate is by definition an important subject in SEA. The Netherlands has been overtaken by other countries regarding the realisation of a climate neutral society.

Climate in SEA is more important in urban than rural areas, especially when it comes to energy. It is also economically important: not being dependent on fossil fuels, because solar and wind energy are free, and to improve the quality of life in the city and thereby attract new people to work and live there. Economy and sustainability are extensions of each other.

Knowledge on climate is very easy to obtain. This then has to be combined with urban development principles in order to come to climate friendly solutions, such as to minimise the amount of movements by people.

One of the problems that lead to a moderate incorporation of climate change in SEA probably is the fact that the research costs money, while the use of the outcomes are often questionable. Much can already be accomplished by just thinking logically, for SEA a qualitative expert judgment is often already sufficient. Quantitative calculations can be made on the project level. NCEA surely pays enough attention to climate. I do not know the EU guidelines, but NCEA is willing to help.

SEA is the appropriate tool when it comes to addressing climate change, since there is more space for possible solutions and options. I think that these SEAs do not always work through into specific projects however. Communication and cooperation between different governmental levels and bodies can still be improved.

Most of your indicators are logical to me. Equity is not a task of the ES, some social aspects are already described. Eventually, an ES is for people, so the social aspect is already interwoven. Monitoring is often lacking, because of laxity of the involved people. Including climate effects beyond the boundary of the spatial plan is difficult, because cooperation of many parties on different levels is required. People just do not always work together well.

Generally, putting climate in SEA is more a process of awareness rather than Environmental Assessment needs changes itself. We have to realise how to deal with our energy needs and elaborate on this on a high level of abstraction. The concrete effects will flow out of this, as long as you have a good and solid story about why climate is important. It all begins with a firm foundation, in this case the structure vision.

Summary interview 8

Climate is sometimes treated in an ES under sustainability. Climate is indirectly addressed in ESs, but not really concrete, since it is a fairly new subject. It is definitely important to include climate in SEA though, especially in relation with water issues and greenhouse gases and CO₂. Water safety, extreme precipitation events, drought, sea level rise and heat stress are the most common topics.

One of the difficult aspects for a better incorporation of climate change in SEA, is that is very abstract and not tangible. Dose-effect relations are not clear. Clients also do not always see the added value of taking climate into consideration in an ES. This combination explains why climate gets little priority. It is also questionable whether it adds to the decision-making process.

It differs per plan what is relevant concerning climate. Many people know something about climate or related fields, so there is much information available. I believe that larger municipalities are more concerned with climate change, logically because they have more time, space, knowledge and budget.

NCEA does a good job pointing at climate in their review guidelines, they surely pay sufficient attention to climate change. They need to keep doing so. It also helps to talk with colleagues and other professionals about climate, in order to better understand how to incorporate it in SEA. It probably also still needs time, since it is a new topic. We have to prevent norms being determined based on uncertainties, which are still omnipresent. Therefore it will require time for a proper incorporation of climate change in SEA.

Many guidelines are available, but they all focus on a single aspect as water or CO₂, while the KNMI scenarios are vague. I do not know the EU guidelines. It could be a task of NCEA to provide guidance on how to interpret and use these EU guidelines.

On the one hand, SEA is better suited to address climate, because this is still in the early phase of the planning process. On the other hand, EIA is more concrete and gives more certainty. Eventually SEA is better, I think, but it also is more difficult to give attention to climate here. I do not have an

overview whether including climate in SEA works through onto the project level, but it is always good to put it on the agenda early.

Concerning the indicators from your research, most of it is known to me and makes sense in the light of this research. I do not think it is a task of an SEA to say something about equity, this goes too far. It is really hard for municipalities to consider climate effects beyond the boundary of the spatial plan. They also might not see the added value of a regional approach and think it will be more expensive. Monitoring in general is often lacking in Dutch Environmental Assessment practice. Climate is a vague concept and it is difficult to determine effects, so it is even harder to monitor properly.

Attention is being paid to climate change in SEA, but it is often spread out over several environmental themes. People are certainly looking towards the future, but as long as there are no concrete norms – which are hard to determine because of large uncertainties – it is hard to describe climate concretely in an ES. NCEA, consulting agencies and governmental bodies could work together in order to establish more concrete guidelines or indicators.