

ENVIRONMENTAL ASSESSMENTS

OF STRATEGIC DECISIONS AND

PROJECT DECISIONS: INTERACTIONS

AND BENEFITS

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1 INTRODUCTION

1.1 Objective and approach

This report aims at analysing and describing the relationship and possible benefits between Strategic Environmental Assessment (SEA) at the level of policies, plans and programmes and Environmental Impact Assessment (EIA) for projects. It is based on an analysis of the literature and practical cases of SEA and EIA in a number of Member States (Denmark, Finland, France, Germany, the Netherlands, Sweden and the United Kingdom), relevant information provided by national experts in interviews and the results of a workshop with the participation of a small group of European experts where preliminary conclusions of this study were discussed. The study has been commissioned to DHV Environment and Infrastructure BV by the Dutch Ministry of Environment (EIA-section) with support of DG XI of the European Commission.

It should be borne in mind that this study is performed under the conceptual framework of European Community legislation, which assumes that EIA is applied at the project (last level) of decision making. The application of EIA principles to any other type of decision above the project level is SEA. However, also cases are studied which relate to sequential SEAs, all carried out at the SEA level rather than only between the SEA and EIA level.

1.2 Main findings

The literature survey revealed many possible interactions between the different levels of environmental assessment. The case studies selected for the purposes of this study identify further interactions between sequential levels of environmental assessment. The existence of a prior SEA clearly has often benefits for the subsequent SEA or EIA stage. The strongest benefits occur under a number of conditions, which possibly may be enhanced by formal arrangements. An additional benefit of SEA is, that it can be applied to policies, plans and programmes which do have environmental repercussions, but which are not followed by project EIAs (an example is the Danish SEA for a ban on certain pesticides).

The main interactions identified can be summarised as follows (more details you can find in the chapter 6 on the main outcome):

1. **SEA does not replace EIA.**
2. **SEA addresses alternatives that are not addressed at project level.**
3. **SEA can be used to refine the scope of assessment at lower tiers.**
4. **SEA consider also other types of impacts than EIA.**

SEAs may, for example, examine large scale impacts more effectively than project EIA, because large scale impacts are easier influenced by strategic alternatives than by project alternatives.

Project EIA alone is not enough to test the coherence of sectoral developments with environmental policy objectives. For this purpose SEA is needed next to EIA, but it may require a new decision-making tier.

- 5. SEA can also be beneficial for assessment at lower tiers even if its results are not binding.**
- 6. Project EIA is not always applied at the lowest level of decision-making which might give 'grey-zones' between strategic level assessment and project level assessment.**
- 7. SEA seems often to reduce the time and cost needed at the lower assessment level. SEA increases the transparency of the whole planning and assessment process for the public and for stakeholders.**
- 8. There are certain beneficial conditions for SEA needed to become most effective.**
- 9. Legal arrangements could possibly take account of sectoral differences and differences in tiering of planning in order to enable SEA to be most beneficial.**

2 COMMUNITY LEGALISLATION BACKGROUND

2.1 The EIA Directive 85/337/EEC (as amended 97/11/EC)

This directives introduces an environmental impact assessment (EIA) procedure to be applied for certain types of projects before giving an authorisation to them. These projects are listed in annexes I and II of the directive. EIA identifies, describes and assesses the likely direct and indirect effects of a project on a range of environmental factors (such as human beings, fauna and flora, soil, water, air, climate, landscape, material assets, cultural heritage and the interactions between these factors).

The main procedural steps are:

- Elaboration of an environmental report containing information on the planned project as well as a description and assessment of its likely impacts on the environment;
- Consultation of the public and environmental authorities concerned on the project and the environmental report (transboundary consultation foreseen when transboundary impacts are likely);
- Taking into account of the environmental report and the results of the consultations in decision-making;
- Information on the final decision to the parties involved.

2.2 The proposal for an SEA Directive (COM 96/511 and COM 99/73)

In order to complement the existing impact assessment system to strategic levels of decision making, i.e. the planning and programming level above the project level, the European Commission has put forward a proposal for a Directive on the assessment of the effects on the environment of certain plans and programmes (Official Journal of the European Union, Nr. C 129, 25.4.97, p.14 – 18; the so-called proposed SEA – strategic environmental assessment – Directive). The policy level of decision-making is currently not covered by the scope of the proposed Directive.

The concept and procedural steps behind this Proposal are very similar to the project EIA Directive as explained above but adapted to the planning and programming level of decision-making. In order to avoid duplication of work a provision of the proposed Directive provides for the possibility of using relevant and current information available on environmental effects of plans and programmes obtained at other levels of decision-making. Such a provision seems to already take account of certain interactions or benefits which may be gained between different decision-making levels.

Once in force and applied as Directive in the Member States, interactions and possible benefits identified in this study might occur and maybe some findings of this study are of help when facing them.

3 APPROACH

3.1 Concepts

Environmental Impact Assessment (EIA) is well established as a procedure that assists in project decision-making. However, project-level decisions are usually preceded by more strategic tiers of decision-making: policies (including laws, which are usually regarded as belonging to the policy level, plans and programmes (PPPs). Sadler en Verheem (1996), for example, define SEA as: 'a systematic process for evaluating the environmental consequences of proposed PPP initiatives in order to ensure they are fully included and appropriately addressed at the earliest stage of decision-making on par with economic and social considerations'.

The following concepts were developed by the researchers for the purposes of this study, some of which are not generally established in the countries from which case studies were taken.

Tiers of decision-making

When a policy, plan or programme (PPP) precedes and influences a project decision, the PPP and the project decision are supposed to be tiered. Decision-making may occur in several tiers. Each of these tiers may, or may not, be connected with an environmental assessment (an SEA or an EIA).

Tiering may, or may not, have a formal linkage. (Most of the available cases concern strongly and formally tiered decisions.) The decision which is made chronologically first, is the first tier and the other is the second tier. A decision which is more 'strategic' than the other decision, is the 'higher tier', and the other decision is the 'lower tier'. (See figure 1)

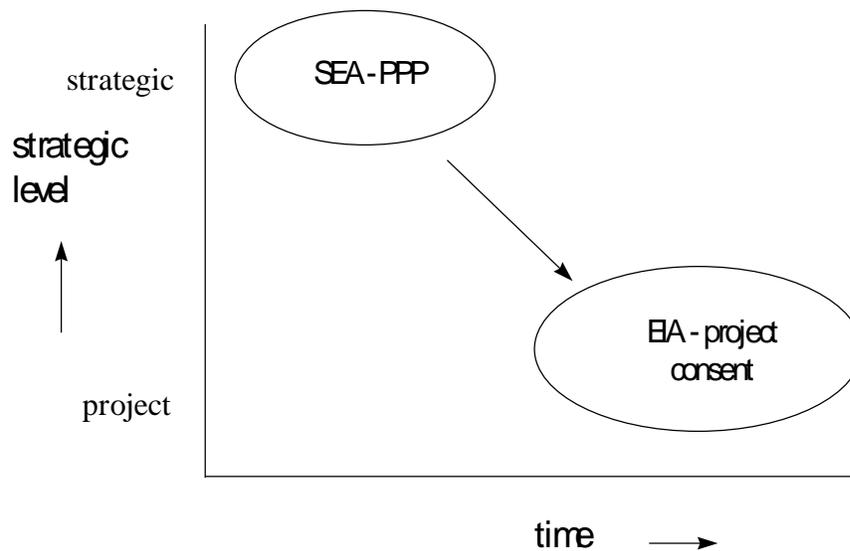


Figure 1. A typical form of tiering: a higher, earlier tier influences a lower, later tier

The distinction between SEA and EIA

In this study a broad definition of SEA is applied, to include as many situations as possible. An assessment is considered to be an SEA if it applies principles similar to the ones above mentioned to a PPP. Undertaking an SEA can be either a mandatory requirement, or voluntary. It may follow a formal procedure or an ad-hoc procedure. Also SEAs have been investigated which are not directly connected with a formal PPP, or which form part of a more general assessment, including, for example, social impacts.

EIA, according to the EIA Directive, is in some countries applied to PPPs. These PPPs are in many cases followed by more detailed decisions. To use consistent terminology and not to confuse the reader, the application of EIA principles to PPPs is in the present study considered to be an SEA. Where this differs from the national terminology, it is indicated.

Tiering of environmental assessments

Two environmental assessments are tiered to each other if one influences the other. This may take place in two ways:

- the environmental assessment which is undertaken first influences the later environmental assessment *directly*, or
- the environmental assessment which is undertaken first, is influencing the PPP for which it is made. This PPP influences the second tier and so the SEA is *indirectly*

influencing the second tier. One of the situations is that a PPP contains decisions which are influenced by an SEA, whilst the PPP influences the lower tier project EIA.

In one case of tiering of environmental assessments, both of these mechanisms could in theory occur (see Figure 2).

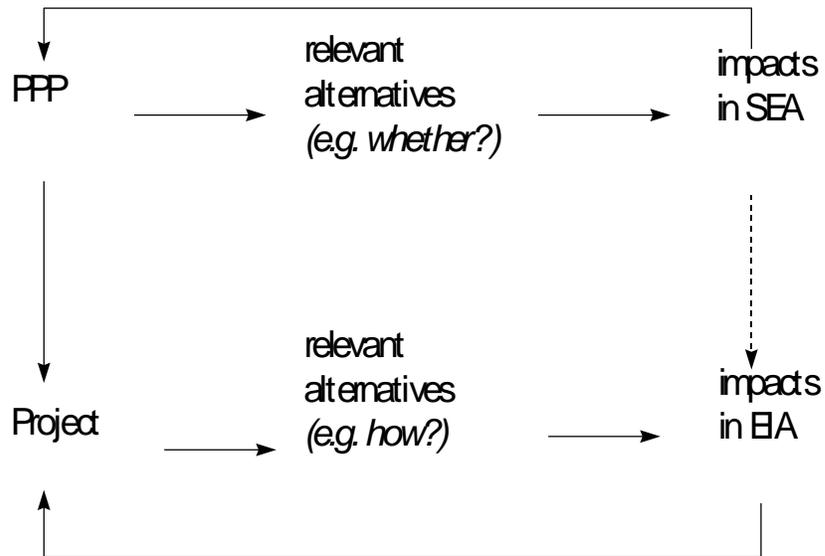


Figure 2. How SEA *indirectly* influences the scope of EIA via the planning decisions (solid arrows), or *directly* via vertical integration / co-ordination (dashed arrow)

Alternatives and impacts

The terms 'alternatives' and 'impacts' are frequently used in this report. They are defined as follows:

- 'alternatives' are the various feasible courses of action that are considered during the preparation of a PPP or a project decision and/or in the environmental assessment. This is broadly defined. At the PPP level this may include, for example, small changes to mitigate the impacts, but also additional policies, such as environmental guidance for further planning, or completely different solutions to the problem that the PPP intends to solve (e.g. reduce energy consumption instead of increasing power supply). The term 'feasible' not only relates to economical and practical feasibility, but also to legal feasibility: an alternative should be within the power or competence of the decision-maker;
- 'impacts' are the (environmental) consequences of a PPP or project decision; this includes consequences for further decision-making and behaviour that indirectly affect the environment.

Large scale impacts and local impacts

In this report, environmental impacts are commonly specified as:

- large scale impacts, divided into:
 - global impacts (affecting the whole world, such as greenhouse gas emission),
 - regional impacts (affecting a large area, such as atmospheric emission of acid compounds), and
- local impacts (affecting a small area near the project).

Strategic decisions, alternatives and impacts

If decision-making about a particular project or activity takes place in several tiers, an earlier tier is, by definition, more strategic than a later tier. The earlier tiers consider alternatives which are more strategic than the ones considered at a later tier. The environmental impact that is caused by rejecting a strategic alternative (such as transport demand management instead of increasing infrastructure capacity), is called a strategic impact.

This does not exclude the possibility that strategic alternatives (and impacts) can also be considered at project level, e.g. in the absence of tiering.

Planning and decision-making systems

A planning and decision-making system is a formalised system of tiered planning and decision-making, in several tiers from the most strategic level to the project level. Decision-making is decision-making by a competent body; planning is the preparation of proposals of plans.

It should be borne in mind that the Member States have different planning and decision-making systems. Formal decision-making is not always split-up into the same tiers. Boundaries between sectors may vary in the same way as the formal and practical competencies of the different levels of decision-making (the distribution of the decision-making process over local, regional and national governments). Strategic decisions which may seem at first to be comparable, often cover different areas and differ in detail. They may be binding in different degrees: for the authorities preparing the PPP, for other governments as well, or for the general public and private enterprises. The relationships between tiers of environmental assessment are strongly influenced by this.

Elements in the EIA and SEA process

The EIA and SEA process may be shaped in different ways, but at least the following assessment steps are considered to be universally applied (either legally or in practice):

- screening, to determine whether a project decision or a PPP requires an EIA or an SEA;
- scoping; to determine the impacts and alternatives to be considered;

- preparation of an environmental statement (an EIA report or an SEA report).

Leading principle of any SEA or EIA process is the integration of its findings into the planning and decision-making process, making use of the results of inter-agency consultations and public participation.

Linkage of SEA and EIA to the planning and decision-making process

To influence decision-making, environmental assessment should somehow be linked to the planning and decision-making process. This linkage can be observed from two perspectives (as shown in

Figure 3):

- one SEA or EIA can influence the planning process (inception, draft versions, final proposal) and decision-making about one particular PPP or project decision;
- one PPP (influenced by an SEA) can influence following tiers of decision-making, and their associated SEA or EIA.

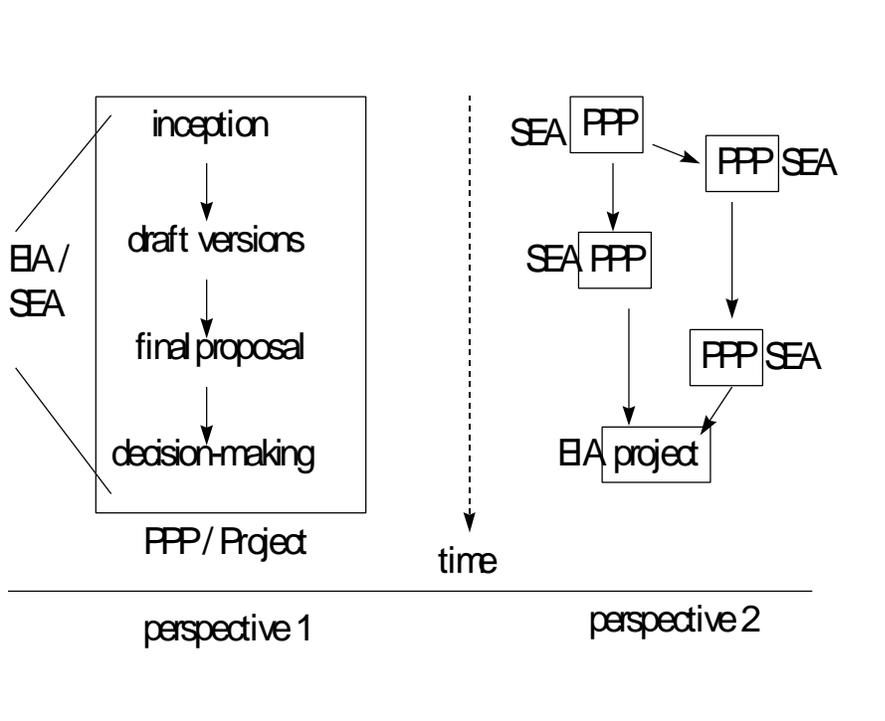


Figure 3. Two perspectives on the planning process, and how environmental assessment influences both.

3.2 Steps in the analysis

The point of departure was that experiences with SEA and EIA could produce useful information about the possible relationships and lessons to be learned between tiers of environmental assessment. The present study was performed in the following steps:

- **Literature.** A review of relevant literature can be found in Chapter 4.

- **Sectors.** It was assumed that the planning systems within one sector could lead to strong interactions between assessment tiers. In some sectors governmental decision-making is traditionally strongly tiered (national - regional - local). Spatial planning, residential development and infrastructure planning are examples of this. Other interesting sectors are mining, energy, waste management, industry, water supply and agriculture.
- **Tiered assessments.** Reports on cases of tiered assessments where interactions can be identified, can be found in the literature and were provided by national experts. Studies of existing tiered environmental assessments were identified in Denmark, Finland, France, Germany, the Netherlands, Sweden and the United Kingdom. Cases providing interesting and relevant material were selected for further analysis and are presented in this report.
- **Cases analysis.** The case analysis focus on the interactions between the environmental assessment of different, subsequent tiers of decision-making. Practical relationships between the tiers of decision-making were identified by screening the available documents for cross-references. An EIA document could, for example, state that its scope was reduced because certain impacts and alternatives had already been dealt with in the SEA. Many relationships, however, are not documented in such an explicit way. Where necessary, the contact persons were asked to give their views about this. This information is included in the Appendix.

4 LITERATURE REVIEW

The following sources have been screened for information about legal provisions and practical interactions between tiered environmental assessments:

- *Strategic Environmental Assessment Legislation and Procedures in the Community*, by Norman Lee & Joanna Hughes of the EIA Centre in Manchester, published by the European Union, DGXI in 1995. This report presents an overview of SEA legislation in the European Union.
- *Strategic Environmental Assessment. Status, challenges and future directions*, by Barry Sadler and Rob Verheem, published by the Netherlands Ministry of Housing, Spatial Planning and the Environment in 1996. This report, written for the International Study on Effectiveness of EIA, compares SEA trends in a number of countries and international organisations. It describes the state of the art of process and practice.
- *The Practice of Strategic Environmental Assessment*, by Riki Thérivel and Maria Rosário Partidário, published by Earthscan in 1996. This is a collection of case studies by different authors in planning sectors in different countries, among which Germany, the Netherlands, the United Kingdom, Sweden and by the European Commission itself. Thérivel and Rosário Partidário have added chapters on SEA regulations and practical information.
- *Case studies on Strategic Environmental Assessment*, by Mens & Ruimte Consultants, published by the European Commission DGXI in 1997. The second volume of this publication is a compilation of 18 SEA case studies in 10 European countries. A comparative analysis of these cases is presented in the first volume.
- *Environmental Impact Assessment. A study on costs and benefits*, by Land Use Consultants, published by the European Commission DGXI in 1996. This report analyses European cases of EIA and SEA, to obtain estimates of the financial and time costs and benefits associated with the EIA Directive and the estimated costs and benefits of the proposed SEA Directive (March 1994).

4.1 Strategic Environmental Assessment Legislation and Procedures in the Community, by Norman Lee & Joanna Hughes (1995)

In this study, the authors used a questionnaire to obtain comparable information about the current status of SEA legislation and procedures in the 15 EU Member States. It was concluded (see page iii in the executive summary) that formal decision-making systems for PPPs exist in each of the sectors specified in the study. However, within individual countries the sectoral coverage is not comprehensive and the provisions which do exist vary considerably between them. Some elements of environmental assessment are to be found within PPP appraisal in all of the countries surveyed. Provision is greatest in the land use planning-sector, and least in the industry and tourism sectors. The instruments

used to implement these assessment procedures are diverse. The extent to which basic SEA requirements are met, is also variable. This publication contains no section on the legal relationship between national SEA legislation and national EIA legislation.

4.2 Strategic Environmental Assessment. Status, challenges and future directions, by Barry Sadler and Rob Verheem (1996)

This publication devotes several chapters to the study of the relationship between SEA and EIA. The chapter entitled *Definition and Perspective* states on page 30 that SEA strengthens project level EIA: 'EIA is mainly focused on *how* a proposed project should take place so as to minimise adverse environmental impacts. At this stage, the prior questions of *whether*, *where* and *what* type of development should take place are either decided or largely pre-empted by earlier policy making processes. Often, these decisions will have occurred with little or no environmental analysis. This foreclosure of the range of choice is partly countered by provisions to addressing project justification and alternatives in EIA. In reality, however, prior policy, technological and location options are not open to serious re-examination; neither is project-by-project EIA an effective way of doing so. Far preferable is the use of SEA to incorporate environmental considerations and alternatives directly into policy, plan and programme design.' This is illustrated by a Canadian case study of Comprehensive Regional Assessment.

In the same chapter the authors maintain on page 31 that 'SEA addresses cumulative and large scale effects'. 'The environmental impacts of human activity are occurring at global, continental and regional scales. Wellknown examples of such large scale impacts include loss of biodiversity and climate warming. Large scale impacts result from the addition and interaction of multiple activities and stresses and are pervasive, cutting across both policy sectors and ecological boundaries. They build-up over long periods of time. The point introduced here is a 'mismatch' between the time and space scales at which many types of cumulative, synergistic and large scale effects are expressed and the narrow scope of project EIA.' (...) 'Over the last fifteen years, a considerable effort has been made to extend EIA frameworks to encompass certain types of cumulative impacts. More progressive jurisdictions have dealt reasonably well with the ancillary impacts of large scale projects (e.g. dams, transport infrastructure) and the incremental effects of numerous, small scale actions of a similar type. However, most activities and practices which have environmental repercussions still escape assessment (e.g. agricultural and residential developments). For example, the Coastal Zone Inquiry conducted by the Australian Resource Assessment Commission (1993) documents the cumulative effects associated with the 'tyranny' of small, incremental decisions, relates these to poorly coordinated, case-by-case approval processes, including EIA, and recommends taking a strategic approach to decision-making.'

On page 32: 'SEA of policies, plans and programmes serves as an 'early warning' system for anticipating and managing cumulative impacts, including global change. Where policies, plans and programmes initiate projects, SEA can address their potential impacts and interactions. Under other circumstances, it can help to understand the significant environmental issues and implications that will arise. A number of cases demonstrate the

application of environmental appraisal to UK policy making and planning, including several that deal with measures, options and costs of a national programme to reduce CO₂ emissions by 10 mtC in 2000. For all forms of policy making, SEA can help to identify development alternatives that minimise cumulative effects and, except for actions that are indivisible (e.g. taxation), it also establishes a framework against which these effects can be tracked and examined at later stage.'

The chapter on *National and international SEA systems* includes a section on the integration of SEA with project EIA (on page 86), stating, 'as complementary, sequential activities, SEA and EIA can be tiered or vertically integrated. Tiering may focus and streamline SEA and EIA. Once in place, tiering ensures that environmental implications, issues and impacts of development decision making can be addressed at the appropriate level(s) and with the degree of effort necessary for informed choice. SEA and EIA should be consistent with and reinforce each other, with the former providing a frame of reference for the latter.' 'In practice, however, varying degrees of integration are possible. Tiering is most easily achieved with SEA of plans and programmes that initiate specific projects. In the United States, for example, project Environmental Impact Statements (EISs) are routinely tiered to prior-order Programmatic EISs. As yet, however, this does not extend into higher levels of policy. By contrast, in countries with policy-level assessment systems, preliminary evidence suggests that these are difficult to tier to project EIA (e.g. Canada). For specific sectors of technical planning (e.g. energy and waste management), the Netherlands has an integrated assessment system in which SEA and EIA are tiered.' This chapter gives no information about how the interactions between SEA and EIA are defined in legal systems. On the other hand, it states, 'how SEA is applied will depend, in part, upon the type of policy and planning processes, that exist to accommodate or 'house' the approach.'

In the chapter on *Extending the analysis*, there is a section entitled *Disciplined application of SEA to cumulative effects* (page 153). 'Cumulative effects are the net result of environmental impact from a number of projects and activities. By definition, they are combined within a time and space framework established through activity-effect relationships, both direct and indirect. This is typical bio-regional in scope, but can be extended to larger scale, cross regional effects. Acid rain and the long range transportation of air pollutants are well documented examples. In addition there are truly global and pervasive cumulative effects, such as climate warming and loss of biodiversity, that are ground in the overall pattern and tempo of human activity.'

'Where policies, plans and programmes lead to projects and activities, SEA permits an early, overall look at their potential relationships and impacts. Compared to project EIA, the scope of SEA is more appropriate to time and space scales at which cumulative effects are expressed. On the other hand, however, activity-effect relationships are more uncertain at the strategic level. For example, many factors can intervene to modulate the translation of policies, plans and programmes into specific types of projects with potential impacts.'

It is also evident that many methods developed for project EIA have limitations and qualifications when used to address cumulative effects. So long as these are recognised, however, they should not preclude SEA of policies, plans and programmes from considering cumulative effects. At the very least, a qualitative analysis and preliminary identification of possible types of cumulative effects can be given. These can serve as an early warning system, signposting further requirements for project EIA, environmental monitoring, and other forms of review.' The text then continues with a description of the methods used in practice for cumulative effects assessment.

4.3 The Practice of Strategic Environmental Assessment, by Riki Thérivel and Maria Rosário Partidário (1996)

This publication states in the introduction, that one of the main reasons to conduct an SEA, is that it makes up for some of the limitations of EIA. Page 8: 'EIA largely reacts to development proposals rather than proactively anticipating them. Because EIAs take place once many strategic decisions have already been made, they often address a limited range of alternatives and mitigation measures; those of a wider nature are generally poorly integrated into project planning.' 'Consultation in EIA is limited, and the contribution of EIA to the eventual decision regarding the project is not clear.' 'Project EIAs are also generally limited to the project's direct impacts. This approach ignores such impacts as:

- the additive effects of many small projects or management schemes that do not require EIA, for instance, agricultural management schemes or defence projects;
- induced impacts, where one project stimulates other development. For instance, the construction of a new road can induce both new traffic (where there is suppressed demand) and new developments such as out-of-town shopping centres or new towns. The EIAs for power stations, which clearly cannot function without power lines, generally do not consider the environmental impacts of these lines;
- synergistic impacts, where the impact of several projects exceeds the mere sum of their individual impacts. For instance, several projects that each encroach on a wildlife site only minimally may, together, affect the site to an extent where it can no longer support certain species; and
- global impacts such as biodiversity and greenhouse gas emissions.

SEA can deal with many of these difficulties. It can incorporate environmental issues intrinsically into project planning by influencing the context within which project decisions are made. It allows the consideration of alternatives or mitigation measures that go beyond the confines of individual projects, such as different modes (e.g. train, bicycle) of getting from A to B, or the creation of wildlife corridors that affect several landowners. It could also allow consultation on these more strategic alternatives.'

In the chapter on *SEA Regulations and guidelines world-wide* the section *From project EIA to SEA* (page 17), describes the differences between the EIA process and the SEA process. It then continues, 'the argument that SEA can improve and facilitate EIA of site-specific projects has been used to support SEA since its early days. While this relationship is not always obvious, as most countries still neglect to put in place the

mechanisms that will ensure it, in some countries it is being suggested that, as a consequence of SEA, more sound and environmentally sensitive policies and plans will incorporate the necessary requirements for subsequent development of projects (e.g. the Netherlands, New Zealand, Denmark, the UK).' While this chapter states that some countries apply the same legal provisions for SEA as for EIA, and others apply EIA principles in an adjusted form to SEA, it identifies no particular formal links between tiers of assessment in any national system.

In the chapter on *SEA methodology in practice*, in the section on *Setting targets and objectives* (page 30) the authors write: 'No PPP exists in a vacuum. It is influenced by higher-level PPPs and ideologies, and in turn influences other PPPs and projects. Ideally, an SEA for the relevant policy would be carried out, and its objectives and SEA would inform the subsequent preparation of first plans, then programmes and finally projects. This would have the advantages of co-ordinating decision-making, and of incorporating environmental considerations fully at all levels of decision-making. This process of SEA tiering would also be beneficial from a planning perspective: SEA can help to implement and facilitate PPP tiering, and in turn PPP-tiering facilitates SEA and increases its effectiveness.'

In the section *Identifying alternative PPPs* (page 33), we read that alternatives in an SEA are developed to fulfil the stated objectives of the PPP in a potentially more sustainable way. 'Alternatives can include:

- the 'do nothing' or 'continue with present trend' option;
- demand reduction, for instance reducing the demand for water through water metering, as well as meeting demand;
- different locational approaches, for example building new houses in existing towns or in new towns;
- provision of different types of development which achieve the same objective, for instance producing energy by gas, coal wind, etc.;
- fiscal measures such as toll roads or congestion charges;
- different forms of management, for examples waste management by recycling, incineration, etc.'

'(...) The higher level the PPP, the more strategic the alternatives are likely to be: policy-level alternatives may focus on broad approaches to a problem, whilst programme-level alternatives may consider clusters of projects which achieve the chosen policy.'

The section on *Scoping* (the phase in the SEA process where those impacts are identified which need to be assessed in the SEA), states on page 35 that 'different "scales" of PPPs (e.g. national, local) could address different types of impacts. This is implied by the UK Department of the Environment's (1993) Good Practice Guide on environmental appraisal of development plans. It suggests that an international-scale SEA could focus primarily on global issues, and a local SEA could emphasise local ones. However, larger-scale SEAs still need to address more local issues which, cumulatively, would be significant on a larger scale. (...) Similarly, local-level SEAs will need to address global

issues such as biodiversity, since it is action at these local levels that, cumulatively, leads to global-level change.'

The section *Predicting impacts* states on page 39 that 'a particular aim of SEA may be to assess indirect and cumulative impacts, which the individual, case-by-case approach in project EIAs makes difficult to do adequately. (...) A PPP's impacts usually take the form of changes to actions in the following tiering level of actions.'

In the section *Mitigation*, we read on page 42 that 'Possible mitigation measures for PPPs are (...) placing constraints on, or establishing a framework for, lower-tier PPPs. This could include requirements for SEA/EIA of lower-tier PPPs and projects, or specific requirements of projects resulting from the PPPs.'

The chapter *Learning from SEA practice*, section *Links to other SEAs and project EIA*, states on page 183 that 'Several case studies highlighted the need for coherent links between the various tiers of SEA. For instance, the Dutch waste management example identified different roles for SEAs at different tiers: at the national level SEA looks at the impacts of various approaches and options, at the provincial level it looks at alternative locations and capacities, and at the project level it looks at design and mitigation measures.' 'SEAs therefore clearly need to 'trickle down' to project EIA. Many SEA recommendations may not be implementable at the strategic level, and may instead need to be put in place at the project level. SEAs can also be an important resource for use at project EIA levels. SEAs will never replace project EIAs, but they can strongly reduce the effort and resources involved in developing project EIAs. (...) Experience shows that different SEAs, EIAs and strategic actions are, unfortunately, rarely co-ordinated and linked.'

4.4 Case studies on Strategic Environmental Assessment, by Mens & Ruimte Consultants (1997)

This study summarises the findings of 18 case studies. In the section on *SEA regulations and systems*, it states on page 28 that 'an effective environmental assessment process requires a tiered approach, i.e. a step-by-step application of environmental assessment to each planning stage. The main objective of a tiered approach in environmental assessment is to ensure that each impact is assessed at the most appropriate planning level. This means that at project level, EIA can become less stringent (reduce in scope). EIA procedures at project level should provide flexibility in a way that enhances the flow of information between the several stages, rather than becoming a simple repetition. In other words, when an SEA has been made in a previous tier, this information should not be reproduced in the project EIA.'

In the section on *Consultation and public participation*, the authors state on page 44 that 'tiering should avoid the risk of 'over-consultation' and 'over-public participation'. In cases such as the High Speed Rail and re-allotments plans, the question can be raised as to whether a similar process should be repeated for the project-EIAs. The risk being that

the population loses interest when consulted too often, which would result in a decrease of participation.'

The section *Integration into the decision-making process*, states on page 45 that 'the linkage with other tiers of decision-making (e.g. project EIA) often seems to be limited or even lacking. (...) A possible explanation is that the various assessment tiers were clearly defined within the cases' regulatory context.'

4.5 Environmental Impact Assessment. A study on costs and benefits, by Land Use Consultants (1996)

Twenty cases of SEA from six Member States were included in this study. In the chapter *Findings on project EIA* on page 21 it states, 'a major difference between Member States arises in the application of EIA to projects which are at the outline, or preliminary stages of development, and those for which full details have been prepared. (...) In Greece and Spain, for example, decision-making about individual projects occurs in (mostly two) stages. The decisions made in earlier stages (e.g. site selection) may, or may not be assessed in an EIA. In some cases, EA is only applied in the last stage of decision-making, limiting it to design of mitigation measures. Another variation is, that one single EIA covers both stages, as in the United Kingdom'. However, in the United Kingdom, 'over 60% of all major developments in the United Kingdom are covered by Town and Country Planning Legislation, and in these cases environmental protection measures are secured through the use of the planning conditions, or other authorisation procedures, rather than through EIA legislation'.

In the chapter *Principle findings on SEA* (on page 120), 'avoidance [by conducting an SEA] of subsequent delay [in further decision-making] was cited [in interviews] as a benefit in nearly half of the case studies. A public inquiry was, for example, included at the SEA stage for a [High Speed Rail] network in Wallonia, which removed the need for subsequent inquiries at project level. It is estimated that this has speeded up procedures for the project EAs by two months'. (Text in square brackets has been inserted by the author of the present report.)

'Where SEAs of development plans have taken place, the suggestion was put forward that this could, at least in theory, reduce the need for certain environmental information, or formal EAs, to be submitted for individual projects, so long as they comply with the provisions of the development plan. Whether this is possible in practice has yet to be properly tested.'

Apart from the beneficial effects of SEA on a more sustainable PPP, the report states (page 121): 'Further environmental benefits [of SEA, over EIA] were believed to include the following: the identification of alternative options, guidance on the development of mitigation proposals, the protection of areas of special environmental importance, the definition of environmental targets, which will facilitate the monitoring of environmental change.' Further on it states that one of the main benefits from the SEA process lie in: 'simplifying the process of environmental investigations at the individual project level,

and thereby reducing or possibly avoiding the need for project EIA while also accelerating the process of decision-making.'

It continues, 'the views of most practitioners who were consulted is that the benefits [including those for project EIA] will usually be of a form which do not lend themselves to financial valuation', and 'the overriding impression is that SEA is being used by the organisation in question as a logical extension to their existing strategic planning processes' (page 123).

This chapter also has a section *The relationship between project EIA and SEA*, which states on page 124 that 'although no conscious effort was made to select projects of a strategic nature, in the majority of cases the most important decisions relating to the environment had been taken *before* the project EIA had even begun. (...) In circumstances where the European Union, and governments of Member States or their agencies are developing such initiatives it is clearly desirable that the environmental consequences should be assessed at a strategic level before local authorities or private developers and contractors are asked to implement the resulting plans and programmes, thus dealing with potential constraints at source, and avoiding placing an unnecessary burden on developers, and indirectly the public taxpayer.' 'Many examples, supporting the case for strategic assessment were identified during the study, but one type of project which clearly illustrates this need (...) is the process of road-building.' 'Where projects form part of a wider plan or programme for resource, land use or infrastructure development, strategic environmental effects should be considered as part of initial policy formulation and again at the plan-making and programming stages.'

4.6 Main outcome of the literature review

All of the above publications (except that of Lee & Hughes) identify a number of interactions between tiers of environmental assessment, and many of their findings are supported with actual cases (which are not all repeated in the present report). None of the sources refer to any legal provisions for direct interactions between SEA and EIA but the benefits that SEA may have for EIA probably depend on the way EIA is implemented. As Land Use Consultants observed, some countries incorporate 'strategic' elements at the project level. The outcome of the literature review can be summarised as follows.

4.6.1 SEA addresses alternatives that are not addressed in project EIA

As we saw in the EIA cases studied by Land Use Consultants, important environmental decisions are often taken in PPPs at an earlier stage than the project level. These are often decisions about *whether* a project should be implemented, *where* it should be implemented, and *what type* of project should be implemented. The project-level is often limited to *how* the project should be implemented. These PPPs therefore form a framework for decision making at project level. They reduce the number of feasible alternatives potentially remaining to be considered at the project level. Assessment of other (more strategic) alternatives at the project EIA level is not useful, unless the PPP is

reconsidered, which is not an attractive option. These alternatives therefore should be assessed in an SEA at the PPP level.

Preparing SEAs for these PPPs allows for 'strategic' alternatives for the projects, of the kinds mentioned (different locations or types of project, or no project at all). SEA may also consider alternatives such as including in a PPP environmental guidelines for subsequent decision-making (for example, how to determine mitigation measures at the project level.).

It is generally accepted that in the ideal situation, all PPPs (as far as they have significant impacts), ranging from the most strategic down to the programmes for project decision-making, should be subjected to SEA. In this way, SEA can co-ordinate and facilitate the tiering of PPPs: the types of decisions and possible alternatives at each tier.

4.6.2 SEA addresses impacts that are not addressed in project EIA

SEA may address the impacts of strategic alternatives for projects (which may be potentially better for the environment). SEA can also address the impacts of projects and activities which do not require an EIA, since their individual impact is not considered to be significant.

These impacts can be divided into:

- *large-scale impacts*, such as emission of greenhouse gases, influencing the environment in areas far removed from the project site;
- *cumulative impacts* of a number of projects and activities; the significance of these impacts is difficult to evaluate at the level of small, incremental decisions (for example, in an EIA for a motorway it is difficult to assess the significance of an increase of carbon dioxide emission that it may cause: it has to be related to the future emission by other sources of carbon dioxide in the world);
- *synergistic impacts* of several projects and activities; a number of small impacts may interact and the total impact may then be larger than the sum of the individual impacts;
- *indirect impacts*, which are the environmental impacts of activities induced by the project requiring an EIA, such as urban development induced by infrastructure development.

Environmental impacts of many kinds (air, water, soil, ecology, etc.) can be studied at all levels. At more strategic levels, impact predictions tend to be more broadbrush, on a level with the time, scale and detail of the PPP.

4.6.3 SEAs and project EIAs can be tiered or vertically integrated

Most authors state that SEAs and EIAs can be linked directly to one another, if they are linked to sequential PPPs and project decisions, each decision setting a framework for the next. For example, the issues at all tiers of environmental assessment may be jointly planned (e.g. at the start of the sequence). This ensures that different impacts and

alternatives can be addressed at the appropriate level, and with the degree of effort necessary for informed choice: more broadbrush at the strategic level, and more detailed and quantified at the project level. This also goes for consultation and participation. Sadler & Verheem and Thérivel & Rosário Partidário both claim that SEA allows for better public participation about certain issues, whereas on the other hand Mens & Ruimte point out that there may be a risk of 'repetition' and 'over-consultation'.

EIAs and strategic actions are however rarely co-ordinated or linked (Thérivel & Rosário Partidário). 'The linkage with other tiers of decision-making (e.g. project EIA) often seems to be limited or even lacking. A possible explanation is that the various assessment tiers were clearly defined within the cases' regulatory context' (Mens & Ruimte), or as Sadler & Verheem state: 'how SEA is applied will depend, in part, also upon the type of policy and planning processes, that exist to accommodate or 'house' the approach.

4.6.4 SEA may reduce project time and cost

Most authors expect that SEA would lead to time and cost saving for EIA:

- 'SEAs can also be an important resource for project EIA levels. SEA will never replace project EIAs, but they strongly reduce the effort and resources involved in project EIAs' (Thérivel & Rosário Partidário).
- 'Avoidance of subsequent delay was cited in interviews as an advantage in nearly half of the case studies' (Land Use Consultants);
- 'At project level, EIA requirements can become less stringent (reduce in scope). EIA procedures at project level should provide flexibility in a way that enhances the flow of information between the various stages, rather than becoming a simple repetition' (Mens & Ruimte).

Time reduction appears to be a frequent benefit. Cost reduction at the EIA-level is less supported by practical examples. However, as Land Use Consultants states, 'the views of most practitioners who were consulted is that the benefits will usually be of a form which do not lend themselves to financial valuation', implying, that cost reduction may be a real benefit, but is difficult to measure.

5 CASE ANALYSES

5.1 Introduction

The Appendix contains detailed descriptions of the cases of tiering that were studied. In most of the cases, interactions between tiers of environmental assessment were found. The most obvious interactions are analysed in the present chapter. Each of the cases is split into two main sections:

Section “*The case*”

This first section contains a general presentation of the cases, so that the reader will obtain a better understanding of the background of the interactions in question.

Section “Interactions”

This section contains a summary of the interactions that have been found in the case analyses. To avoid repetition, no attempt has been made to describe all the cases and all the interactions identified in the Appendix. A selection of examples will be highlighted in this section.

The following questions were considered for this study:

- Which impacts and alternatives (considered to prevent these particular impacts) were examined at each tiering level?
- Were cumulative and synergistic impacts also examined?
- Who or what determined the tiering order? Did the environmental assessment influence the decision-making system?
- Did an SEA offer a framework for decision-making or monitoring at lower tiers?
- Were there any direct interactions between SEAs and lower tiers? Did an SEA function as a 'resource' for lower tiers? How did consultation and public participation at different levels relate to each other?
- Was the scope of lower tier assessments reduced? Were there benefits at the lower level in terms of time or cost?

5.2 Garzweiler open-cast lignite mining site, Germany

The case

Lignite (brown coal) is used as an energy source in Germany. Garzweiler II is a new lignite mining area. Decision-making occurred in the following tiers.

The first tier of decision-making was the national level. Decisions had to be made on the quantity of domestic energy needed, the energy source that would be most appropriate, and, if lignite was chosen, which area should be developed. No SEA was formally conducted at this stage but environmental impacts were taken into consideration. Issues such as climate change and biodiversity were studied and as a result, the proposed boundaries of the selected mining area (Garzweiler II) were changed in order to provide a geohydrological buffer zone.

The second tier of decision-making was the mining plan for the Garzweiler II area, within well defined spatial boundaries. It has a surface area of 48.000 hectares. An environmental assessment was prepared according to the EIA legislation. Because the mining plan is not the last tier of decision-making, it is referred to as an SEA, despite it legally being an EIA.

The third tier includes several operational plans for the mining area, to be introduced one at a time. These do not require an EIA, but they do need to meet environmental

requirements which are laid down in the mining plan. The last of the operational plans will probably be approved in 50 years' time.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 National level	voluntary (informal)	whether, where, what type
2 Mining Plan	mandatory (acc. to EIA Decree)	how (common and generic)
3 Operational plan	no	How (detailed)

Interactions

Tiering of impacts

At the national energy planning level, alternatives *whether* (more energy production was needed), *what* (type of energy source), and *where* were considered. In an SEA-like process, impacts such as climate change and biodiversity were examined. These are the major impacts associated with the types of decisions made at this level. Because only Garzweiler II was suitable for lignite mining, the *where* issue at this level was limited to defining the exact boundaries of the site. This detailed location choice, however, was very relevant for the geohydrological and ecological impacts, which were therefore considered at this level.

At the level of the mining plan, decisions were made about the phasing of the mining area, location and type of common facilities, mining techniques, mitigation measures, etc. These factors provide the answers to the *how*-question. Impacts such as climate change, energy use and biodiversity were assessed again, because there were still ways to reduce these effects in the elaboration of the *how*. The SEA for the mining plan also examined local impacts such as noise disturbance, which could be affected by the mining plan.

Cumulative impacts

The mining plan-SEA has examined the cumulative and synergistic impact of the operational plans. It concentrated on:

- Common issues about the operational plans, such as boundaries and phasing as well as common facilities such as waste water treatment and infrastructure. Common environmental measures such as provision for an ecohydrological buffer zone to protect wetlands in the region were also included. The planning of these common aspects depends on the synergy between the individual operational plans. Alternative options were assessed, and impacts limited mainly to those that appeared to be sensitive to these alternatives (such as impact on groundwater and ecology).
- Generic decisions about similar operations in each of the phases, such as reduction of dust and noise at digging operations; the differential impact of alternatives was

generically assessed. Combining the assessment of a number of similar operational plans in one SEA improved consistency and efficiency.

Reduction of scope at lower tiers

The mining plan provides strict environmental rules for the operational plans. These rules are based on the mining plan-SEA. The detailed decisions on the level of the operational plans could not significantly influence the environmental impacts of the mining activities. Therefore, no issues remained for environmental assessment at that level. Thus, there was no need to conduct EIAs for the operational plans. Legally, they do not require an EIA.

This illustrates that there may be a 'grey zone' between strategic decisions and project decisions. On the one hand, the mining plan is a PPP, because it is not the last tier of project consent. On the other hand, the operational plans are limited to details, and cannot significantly have an effect on environmental impact. This seems to be caused by the strong interaction between the different operational plans. Because the mining plan is binding, none of its decisions can be reconsidered and assessed in a hypothetical EIA at the operational plan level. The mining plan is therefore more or less a PPP and a project consent decision at the same time.

Main outcome of the case analysis

- The decision-making system mainly determined the alternatives that could be considered at each level;
- The more strategic the tiers were, the greater their effect on the environment; the decision to exploit Garzweiler II was a national decision;
- Large scale impacts were considered at the national and at the mining plan level;
- The mining plan-SEA considered cumulative and synergistic impacts; this was not possible at the operational plan-level;
- The mining plan SEA also considered generic impacts of the operational plan; this would have been possible, but probably not efficient, at the operational plan-level;
- If EIAs had been required at the levels of the operational plans (the last project decision), the mining plan SEA would probably have reduced their scope completely.

5.3 Residential development in Erlangen, Germany

The case

In the first tier, a decision was made to construct a number of houses in a new housing area in a zone near the city of Erlangen. No SEA was conducted at this level.

The second tier was intended to be a first selection of possible locations for the housing area, based on a voluntary SEA. In the third tier, a final choice would be made from the first selection, based on a second voluntary SEA.

In a fourth tier, building permits would be given, and permission for certain industrial activities, some of which require an EIA at project level (e.g. mail distribution centre).

Both SEAs and the EIAs were conducted according to the EIA procedure. Nationally, the SEAs are referred to as EIAs, but in the present report the term SEA is applied to them because they are not connected with the last tier of decision making.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 Spatial plans	no	whether, where (very indicative)
2 First site selection	voluntary (acc. to EIA Decree)	where (indicative)
3 Second site selection	voluntary (acc. to EIA Decree)	where (detailed)
4 Permits	some	unknown

Interactions

Tiering of impacts

At the first tier of decision-making, with the questions *whether*, *how many* and (*roughly*) *where* houses should be constructed, no SEA was prepared.

In the second tier, where potential sites for further assessment were selected, environmental impacts were examined that could be influenced by site selection within the pre-selected zone (e.g. biotope protection, soil, water, climate change, noise, landscape).

At the third tier, one site was selected from the list of potential sites selected at the second tier. The same type of alternatives and impacts were assessed again, but in significantly more detail.

No information is available about the impacts considered at the fourth level (project EIA).

Influencing the decision-making system

A one-level decision about the housing development site would have been legally sufficient; an SEA was not mandatory either. The authorities decided however, to prepare a voluntary SEA to address the *where* question, and subsequently decided to make this decision in two tiers, in order to assess alternative sites more comprehensively. An extra PPP (and an associated SEA) was therefore voluntarily proposed, but unfortunately not approved.

Cumulative impacts

Both phases of site selection SEAs considered the cumulative impacts of the individual elements of the spatial plan, such as the total land use, acoustic impacts, groundwater, and induced traffic. The impacts of common needs such as traffic areas, green spaces, special building areas, disposal areas, were also assessed.

Vertical integration of assessments

The scoping document at the start of the first SEA ('study programme') provided a common framework for both SEAs. The same experts were involved in both assessments, which speeded up information flows between the agencies involved. The team was also able to improve the method when it was applied the second time. The results of the first assessment could be used for consultation and public participation, which further enhanced the quality of the second assessment. For example, sites that gave rise to discussion were given extra attention in the second tier. Making the first SEA enhanced the learning process on all sides (environmental department, planning department, politicians and public). The administrative work load for consultation and participation in discussions on the results of the first SEA could be combined with invitations to participate in the second tier.

Reduction of the scope at lower tiers

The aim of the Erlangen site selection for a housing area described above was to reduce the number of potential sites by making a first selection, so that the remaining options could be assessed in more detail. However, the first site selection proposal was not approved by the authorities, and all potential sites had to be assessed again at the lower tier. The scope was not reduced, because there was no (approved) PPP.

Main outcome of the case analysis

- The most important environmental decisions (*whether* and *roughly where*) were made at the highest tiering level, without conducting an SEA;
- Two tiered SEAs were used for site selection; an extra PPP was proposed to formalise the outcomes of the first site selection SEA; the aim of this approach was to improve decision-making in an efficient way;
- Both SEAs examined the same alternatives and types of impacts; some large-scale impacts but mainly local impacts;
- Because a housing development scheme is a plan with many individual projects, the assessed impacts were cumulative and synergistic; most of these projects do not require an EIA;
- The first SEA served as an important resource for the second SEA; the assessment method in the second SEA could thus be more detailed. There was a 'learning effect', which was enhanced by keeping the same team of experts for both SEAs;
- There was no repetition in consultation and public participation; efficiency improved;

- These benefits could also have been achieved by preparing one SEA in two phases, without the existence of a PPP associated with the first phase.

5.4 Road infrastructure, France

The case

In France, SEA for transport infrastructure development has received most attention. The French approach to tiering of assessments in infrastructure planning can be deduced from a paper, presented by Claude Lamure at the 4th European EIA Workshop in Potsdam in Germany on 1st of June 1997.

At present, environmental assessment (EIA) in France is only required at project level. Experience with SEA is still very limited. The paper therefore makes no reference to practical cases, but does identify the following main levels of decision-making in road infrastructure planning:

- general policy, intermodal schemes, modal schemes;
- definition of axes, insertion zones, interconnections, corridor studies;
- single actions or projects (EIA level).

At the highest tiering level, alternatives present in the current planning system were not specified in the paper, but these may be assumed to include different infrastructure links that will be pursued further at lower tiering levels.

At the second level, relevant alternatives could be compensation measures, special mitigation measures such as tunnelling (more effective than standard measures) and extra attention to design in sensitive areas. Alternative routes, alternative modes, 'the possibilities offered by environmental planning policy' can be studied in corridor studies in order to achieve 'a project decision with a very early environmental assessment related to a more general SEA for a global policy. Advantages of corridor studies are an integrated multimodal approach for travellers and goods, and an open planning procedure'. A corridor study is a combination of strategic and project decision-making.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 General policy, intermodal schemes	only for legislation (mandatory), no cases	whether, where, how (very indicative)
2 Definition of axes, insertion zones, interconnections, corridor studies	some experience (voluntary)	where, roughly how
3 Road projects	Mandatory	how (detailed)

Interactions

Claude Lamure's paper for the Potsdam workshop on SEA argues that a major rationale of SEA are its benefits at the EIA-level: the assessment of certain impacts which cannot be assessed at the project level and decision-making quality improvement at all levels. Some groups hope that SEAs may give legitimacy to projects and that SEA will reduce difficulties and controversy immediately prior to their construction.

The French are moving towards a system of coordinated indicators that may be applied at the different levels of decision-making. This would provide for a clear tiering of impacts and probably a tiering of the alternatives as well which would then contribute to a reduction of these impacts. At both network and corridor level, the following impacts could be assessed: CO₂ emission, NO_x emission, energy consumption, land surface required, length with the exception of tunnels, sound emission. At corridor and project level the following impacts could be assessed: local duration of building site, volume of earth movements and exposure to CO.

Main outcome of the case analysis

- In France SEA in infrastructure planning is expected to improve the quality of decision-making at all levels;
- The French are moving towards a system of coordinated indicators.

5.5 Nordic triangle transport corridor, Finland

The case

The Nordic Triangle is a multi-modal transport corridor in the Nordic countries. A number of rail, air, road and marine transport projects were planned to improve the infrastructure in the Finnish part of this transport corridor.

Many PPPs and project decisions with respect to these projects were still pending. All these require an SEA or an EIA.

In 1995 a generic SEA was conducted in order to improve and develop the methods of EIA, SEA, and decision-making in the Finnish section of the Nordic Triangle. The Nordic Triangle SEA was not directly connected with one particular formal PPP, but contained a number of recommendations which arose from a discussion between interest groups and experts on the environmental impact of a number of development scenarios.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 Recommendations for planning and assessment of Finnish Nordic Triangle PPPs and projects	Voluntary	different methods and approaches for planning and assessment
2 PPPs and project decisions in the Nordic Triangle	Mandatory	unknown

Interactions

The SEA for the Nordic Triangle transport corridor in Finland was not associated with a PPP, but led to recommendations with no formal status. For this reason, tiering of decision-making about real development options was not possible.

The recommendations did, however, have a significant effect on later assessments and on decisions about the development of the Nordic Triangle, possibly improving the quality and efficiency of decision-making and environmental assessment (but this is difficult to establish as a fact). It might be said that the Nordic Triangle SEA influenced most of the succeeding SEAs in the Finnish transport sector.

An important component of the Nordic Triangle SEA was an extended discussion between agencies and stakeholders at the national level. This discussion created consensus and support for the recommendations in the SEA.

One of the recommendations was to alter the planning and assessment system itself, to make it more suitable to addressing environmental issues at the right level of decision-making.

Other recommendations concerned SEA methodology in the transport sector in general, including when SEAs should be conducted, which impacts and alternatives should be examined at which levels, the assessment methods and organisation.

Main outcome of the case analysis

- Although the Nordic Triangle SEA was not associated with a PPP it is expected to have a general positive effect on the decision-making, PPPs and SEAs which followed;
- The success was mainly the result of inter-agency consultation and consensus-building;
- It also influenced the general decision-making and assessment system in this sector.

5.6 Spatial planning in Leicestershire County, United Kingdom

The case

This case concerns three levels of planning: the East Midlands region; the county Leicestershire, situated in this region; and two districts in this county (the City of Leicester and the Borough of Hinckley and Bosworth). The three authorities involved wanted to revise their spatial plans. For these revisions, SEAs were prepared. These SEAs, so-called Environmental Appraisals, were conducted voluntarily on national guidelines.

The spatial plan at district level (the Local Plan), acts as a decision-making framework for individual project development consent decisions. At each of these three scale-levels of spatial planning, decisions were made which have environmental repercussions for the City of Leicester and the Borough of Hinckley and Bosworth. These decisions mainly concern *where* new developments should be located, and the levels become increasingly detailed. Each level contains the elements for future policy planning. The Local Plans contain guidelines for approval of development proposals, which in some cases may require an EIA.

As each level of spatial planning has to take account of the decisions made at higher levels, these decisions were tiered from the highest down to the lowest level. On the other hand, the plans at the lower levels were prepared earlier than the higher-level plans, or simultaneously. Plans are developed and revised in non-standard cycles. In this case, the lower levels happened to be first (earlier in time). Basically, consistency between all levels was sought.

Within each of these planning and assessment processes, strategic objectives including sustainability objectives, were defined. These strategic objectives were elaborated into

concrete proposals, which were then adapted to SEA requirements. The strategic objectives and the proposals were mainly concerned with *where* questions.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 Regional Planning Guidance for the East Midlands	voluntary	mainly where
2 Leicestershire Structure Plan	voluntary ¹	mainly where, within boundaries of the higher plan
3 City of Leicester Local Plan and Hinckley and Bosworth Borough Local Plan	voluntary ¹	mainly where, within boundaries of the higher plan
4 Individual development consent decisions	depends on project	(project related alternatives)

¹ environmental considerations must be taken into account, however.

Interactions

Tiering of impacts

All three levels of plans and SEA were developed more or less simultaneously and the whole process was actively coordinated. However, there was no particular difference between the impacts considered at the different scales. As similar types of alternatives were compared (but of course at a different scale), similar types of impacts were assessed, at each level of comprehensive spatial planning: region, county and district. This mainly concerned the location of proposed developments, or allowable developments in different zones.

The impacts that were considered at each level of SEA included: the quality of life, local environment (e.g. open space, health (including pollution), cultural heritage), natural resources (open countryside), minerals, waste, water, land & soil, global sustainability (e.g. biodiversity, energy use, regional air quality).

Cumulative impacts

The number of assessed activities and projects was very large, and frequently one planning decision affected another (if they were located at a short distance). In the UK, the method of consistency analysis is generally used to identify any conflicts (environmental and others) between the elements in a comprehensive plan proposal. In this way, cumulative impacts are automatically included.

Vertical integration of assessments

SEAs were undertaken at three geographic scales of spatial planning. SEA methods were first employed at the local level (Local Plans of Leicester City and Hinckley and Bosworth Borough), and then similar methods were applied one level higher (Leicestershire County). Finally they were applied at still one scale higher, the East Midlands region.

The SEAs were coordinated by coordinating the environmental impacts which were assessed at each level in advance. This increased the transparency of the SEAs, since the stakeholders, in particular the population of Leicester City and Hinckley and Bosworth Borough, were already familiar with the method when it was applied again. More in general it created mutual understanding and learning between the levels of administration. For example, uncertainties which were indicated in the local plan SEAs, were part of the discussion at higher levels. (Since the PPPs at lower geographic scale were prepared before the PPPs at higher scale.)

Vertical integration was also enhanced by the availability of a national planning guidance note on the environmental appraisal of spatial plans; the approach which it suggests (mainly characterised by consistency analysis) can be used at any planning level.

The Hinckley and Bosworth Local Plan gave guidance for screening projects for EIA. It indicated that EIAs will be required for development proposals which need a screening examination because they are located in the vicinity of certain specified valuable sites and also if they are likely to have significant impact on the environment.

Reduction of scope at lower tiers

In these cases undertaking an SEA for the higher tier spatial plan did not take impacts and alternatives out of the scope of the lower tier SEA, as contact persons pointed out. Mutual agreement between administration levels was informally reached before proposals were included in draft plans, and at each level the same checklists were applied.

Main outcome of the case analysis

- There was no clear tiering of impacts in decision-making and assessment. The same types of impacts and alternatives were considered at regional, county and district level;
- The timing of the planning and SEA at all three levels overlapped; by coordinating and frequently communicating between the different levels of administration, the transparency, consistency and quality of environmental assessment and decision-making could be enhanced at all levels;
- The SEAs focused on the cumulative and synergistic impacts of many projects and activities, most of which do not require an EIA;
- The local plan SEA made screening for possible future project EIAs in some cases easier. It is also expected to reduce the scope for impacts in such EIAs.

5.7 High Speed Rail (HSR) Zuid, The Netherlands

The case

The HSR Zuid is the new high speed rail line from Rotterdam to the Belgian border, linking it with the Belgian and French HSR networks. Decisions concerning its route through the Netherlands were made in the following tiers.

Indirectly, decision-making about High Speed Rail in The Netherlands began with the approval of a plan for the development of the national airport (the so-called PKB Schiphol, which was based on an SEA). The airport plan was partly based on the assumption that, part of the increase of medium-range travelling should be accommodated by a new HSR system, and it increased the feasibility of an HSR.

Environmental assessment of the HSR-Zuid began through an international SEA of the regional High Speed Rail network, between Paris, Brussels, Köln, Amsterdam and London (PBKAL-project). A document entitled 'Thematic study of the PBKAL project' was prepared on behalf of the Belgian railway company, and co-financed by the European Commission (this case is described in Mens & Ruimte Consultants, 1997). This SEA considered the impacts of transport (modal) alternatives for an HSR. It was not directly connected with a PPP.

Government policy on allowable impacts, also operating at the highest level, is aimed at reducing the environmental impacts of railways. Noise standards have been introduced together with compensation for local impacts on biodiversity. Many of these policies had been subject to some form of environmental assessment and participation.

The first level of actual decision-making about the HSR-Zuid was the Spatial Planning Key Decision (PKB) about the HSR in the Netherlands. In this decision, it was decided *whether* rail capacity between the Netherlands and the South was necessary, and *what mode* was most appropriate. There was a choice between making use of the existing railway network at normal speed, constructing a new high speed railway, or a completely different mode.

The information in the PKBAL SEA was used again in a mandatory SEA for the PKB. The proposed route of the HSR was roughly determined (*where*), and the impacts of many indicative routes were compared. The vertical alignment was also taken into account.

In a second tier of decision-making (Route Decision, TB), the selected route was developed in detail. Detailed alignment and the design of mitigation and construction methods were determined. A voluntary EIA was undertaken at this level.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 Spatial Planning Key Decision (PKB)	Mandatory (acc. EIA Decree)	whether, what type, where, how (indicative)
2 Route Decision (TB)	voluntary (acc (EIA Decree)	where, how (detailed)

Interactions

Tiering of impacts

The international SEA for the Paris-Köln-Brussels-Amsterdam-London (PBKAL) HSR network considered the generic impacts of modal alternatives for an HSR on large-scale and global impacts such as energy use, emissions and land encroachment. Since at that level no binding decisions had been made with respect to the HSR-Zuid, the SEA for the first tier of decision-making (the Spatial Planning Key Decision, PKB), concentrated again on all possible strategic alternatives: *whether* rail capacity was necessary, what mode. Because decisions to reject such strategic alternatives have consequences for large scale and global impacts, these were assessed at this level. However, the effort was limited because the assessment could make use of the results of the PBKAL SEA.

The *whether* question needed information on the significance of local impacts, depending on the route of the HSR. It was therefore necessary to decide at the same time roughly *where* the HSR should be routed, and impacts of many indicative routes were compared. This was limited to the impacts that could be affected by the routing decision (local impact, such as noise nuisance, impact on ecosystems of local importance). The vertical alignment was also considered to some extent on locations where this affected the trade-off between routes. However, it was not necessary, to develop the route and its design in detail, in view of the trade-offs to be made at this level of decision-making.

At the Route Decision level, the EIA did not consider global impacts which are not influenced by routing and alignment. It considered the same type of spatial impacts and alignment alternatives as those that were considered in the SEA at the PKB-level, but in more detail for the parts of the route with particular conflicts of land use. For the first time, certain relatively less significant impacts, such as the impacts of the use of construction materials during their whole life cycle were considered (large scale impacts such as resources depletion, in particular sandfill and energy). Other routes or modes, or the zero-alternative (*whether*), were not developed in the EIA, because the PKB-decision was binding, and therefore these alternatives were not feasible anymore.

Vertical integration of assessments

As mentioned above, the generic international SEA for the Paris-Köln-Brussels-Amsterdam-London (PBKAL) HSR network was not associated to a PPP that had a

formal status in the Netherlands. It provided information that was used again in SEA for the indicative routing decision for the part of the HSR connection Rotterdam - Brussels passing through Dutch territory (the PKB). The SEA at the PKB-level could therefore concentrate on the routing and the associated spatial effects. It was not necessary to reproduce the analysis that was made in the PBKAL-SEA; just the conclusions.

At the level of the PKB, the SEA identified indicative routes and alignment for the HSR, and identified 'bottlenecks' or 'difficult situations' that served as focal points in the subsequent EIA for the detailed alignment (the Route Decision). In general, the information gathered and assessment methods developed in the PKB-SEA could be used again in the Route Decision-EIA helping to solve conflicts and assess impacts.

It was in particular beneficial for the interaction between the PKB-SEA and the Route Decision-EIA, that both assessments were carried out by the same team of experts. Environmental experts worked together with transport experts and engineers in a 'project office' that was set up especially for the planning and assessment of the HSR Zuid. Roughly the same group of environmental experts was involved in this work for about 8 years.

Reduction of scope at lower tiers

The PBKAL-SEA was not associated with a PPP, and could therefore not formally reduce the scope of the PKB-SEA. The PKB-SEA, however, supported the binding decisions in the PKB. Strategic alternatives were not, therefore, in the scope of the Route Decision-EIA. If no SEA at the PKB-level had been made, these alternatives would have to be approached at the Route Decision -level, which is clearly less efficient. However this situation could not occur, because the decision-making procedures were designed to take environmental impacts into account at the strategic level.

Main outcome of the case analysis

- The general tiering order followed the existing decision-making system;
- Large-scale, local and global impacts were assessed at each level, since they could be influenced by feasible alternatives at each level;
- The most important decisions in environmental terms were made at the higher tier;
- The international SEA kept its validity and was useful again at national level thus reducing the assessment efforts to be made at that level;
- The PKB-SEA clearly reduced the scope of the Route Decision-EIA. By tiering of impacts, the overall time and cost of decision-making and assessment were considerably reduced;
- Efficiency and quality were further improved by setting-up a project office that was responsible for the whole process.

5.8 Wind Energy Planning Zeeland, The Netherlands

The case

The first tier of this case study was the Structure Scheme Electricity Supply (SEV). The decision-making process of the SEV followed a procedure defined in physical planning legislation, the 'spatial planning key decision' (PKB). The EIA Decree required an EIA (it is referred to as an SEA in this report, because it is not the last (project) tier of decision-making: the formal EIA procedure is applied on a PPP).

The main decisions and alternatives in the SEV with respect to wind energy were:

- a production target of 1000 MW of wind energy in the year 2000 and 2000 MW in the year 2010. The Province of Zeeland, for example, was given a target of 250 MW. These figures were based on an assessment of alternative power supply scenarios;
- alternative site selection strategies for wind energy parks and turbines.

The second tier was the Regional Plan of the Province of Zeeland, which provides for a wind power capacity and legally requires an SEA (according to the EIA procedure). The SEA was to assist in site selection for wind energy parks. This SEA was still being conducted early in 1998.

The third tier involved the development of future individual wind energy projects. Installation of wind turbines requires a municipal local plan for the site, as well as an environmental permit. Wind energy parks require an EIA if the number of turbines or their capacity exceed the legal limit.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 Structure Scheme Electricity Supply	mandatory (acc. to EIA procedure)	whether, how (generic)
2 Regional Plan of Zeeland	mandatory (acc. to EIA procedure)	where
3 Local Plans	voluntary (acc. to EIA procedure)	where (detailed), how
4 Environmental Permits	no	not applicable

Interactions

Tiering of impacts

The most strategic tier generically compared wind energy with other energy sources, examining cumulative impacts at a national level. This included global and regional impacts (emission of greenhouse gases, emission of acid compounds), but also local impacts (e.g. safety).

Different scenarios for power supply, including wind energy, were compared. In the Structure Scheme Electricity Supply (SEV), this resulted in a target for wind energy capacity development in the Netherlands, and the recommendation to consider only spatial impacts (impacts sensitive for site selection) at lower tiers of decision-making about these wind energy locations. Once the energy source has been selected, site selection hardly has an effect on global and regional impacts. The SEV stated: 'Projects requiring EIA could be focused on aspects relevant to the site selection. In this way, the SEA contributes to speeding-up of the permit application procedure for site selection and construction of wind turbines.' This recommendation was followed-up in the regional plan SEA for Zeeland.

The SEV-SEA also compared two alternatives for site selection for wind energy parks: a small number of large wind energy parks or a large number of small parks (or individual wind turbines). Basing their judgements on a generic assessment of spatial impacts and taking cumulative and synergistic impacts of the individual turbines in one park into account, the SEV recommended a deconcentration policy.

Site selection itself was postponed to lower tiers, such as the Zeeland Regional Plan, which followed the guidance given in the SEV. The SEA for the regional plan was focused on the site selection of only small and middle-sized scale wind energy parks (15-20 MW).

The Zeeland Regional Plan-SEA, which had not been completed at the time of writing, considered the impacts of individual wind parks. The Province of Zeeland recognised that environmental issues also have to be considered at project-level. The provincial authorities wanted to include environmental guidance in the regional plan for the development plans of individual wind energy parks. The SEA was to play a role in the formulation of the criteria. This guidance was expected to increase the quality and the efficiency of project decision-making, and eventually make project EIAs superfluous.

Main outcome of the case analysis

- There was a clear tiering of impacts; at the national level, the *whether* and *how much* questions were addressed and linked to cumulative global, regional and local impacts, and at regional level the *where* and *how* questions were addressed and linked to the individual local impacts only;
- The SEA at the regional level aimed at making project EIAs superfluous by providing an environmental framework for decision-making at project level.

5.9 VAM Bioreactor, The Netherlands

The case

The first tier was the second Ten-Year Programme Waste Management (10JPA). This is a national level, non-binding plan. It included policies and guidelines for the planning of

waste management projects. A voluntary SEA (using the EIA procedure) was undertaken (1996).

The SEA studied the following alternatives:

- scenarios for reduction of waste processing needs with a relatively adverse environmental impact (prevention, recycling);
- scenarios for development of waste treatment and disposal capacity. Several technological systems were compared.

The second tier was a proposal by the largest waste treatment company in The Netherlands, the VAM (1997). It concerned a plant for composting the green fraction of household waste. The VAM preferred the so-called Bioreactor-technique. An EIA was required, which focused on alternative waste treatment technologies.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 Ten-Year Programme Waste Management	voluntary (acc. to EIA procedure)	whether, what type
2 Environmental permit Bioreactor project	mandatory (acc. to EIA procedure)	what type

Interactions

In the SEA at the Ten-Year Programme Waste Management (10JPA)-level, the Life Cycle Analysis method was applied to identify the generic impacts of different techniques for the composting of household waste. All relevant kinds of impacts were assessed (large-scale, local, cumulative, local). The Bioreactor technique was seen to have a relatively adverse environmental impact and was not recommended in the 10JPA.

If it had followed-up the recommendations made in the 10JPA, the VAM could easily have referred to the information in the SEA at the project level. However, it preferred an alternative treatment method: the Bioreactor system. One of the reasons for this was that technological improvements had been made after the 10JPA appeared and the Bioreactor system had become more environmentally compatible. In other words, a quick technological development had outdated the recommendations made in the 10JPA. In the EIA, exactly the same assessment method (Life Cycle Analysis) was applied as in the SEA at the 10JPA-level, only this time the outcomes were different: the Bioreactor system had become a superior environmentally compatible system.

Main outcome of the case analysis

- Tiering of impacts was intended, but could not be maintained due to rapid technological development in the period between the two tiers: the same types of alternative had to be assessed at both levels, and therefore the same impacts were relevant;

- The assessment method at SEA-level was applied again at the project level thus facilitating the EIA.

5.10 International Business Park Friesland (IBF), The Netherlands

The case

In its desire to stimulate economic development and employment, the Province of Friesland has decided to establish a large scale business park to attract internationally operating companies: the International Business Park Friesland (IBF).

The Provincial authorities selected a site in the Municipality of Heerenveen and the local authorities informally approved the plan. The industries admitted to the business park included chemical manufacturers, automobile supplies companies and consumer goods producers. No SEA was conducted.

At the municipal level the local plan (bestemmingsplan) for the site had to be approved. Its contents are binding for private enterprises, the general public and the municipality itself. According to the EIA Decree, the local plan required an SEA (because the IBF covered more than 200,000 square metres). After the legal procedures for Local Plan for the site and SEA had been started, local residents started to make objections to the site and, supported by politicians, threatened to delay decision-making at the local level. One of their objections was that no SEA had been conducted for site selection, and other sites could in fact be more suitable.

The Province of Friesland was not willing to negotiate on alternative sites within the framework of the SEA at a local level. It would be more efficient to select a site, set up an SEA, applying the same legal procedures as for EIAs, formalise the selected site by the regional plan and then continue at a local level with development of the details of the selected site. The procedures at local level were therefore suspended until the regional plan had for this site had been approved. It was not a legal obligation to do that before approval of the Local Plan for the site.

In the site selection SEA, four sites were compared. The site in Heerenveen ranked second on environmental criteria. However, overriding arguments with no connection to possible environmental impacts, led the Province to stick to the original site at Heerenveen, and not to select the location that ranked first on environmental criteria.

Once the IBF was approved, the individual enterprises might also require project EIAs. At the time, however, names of companies candidate for admittance to the IBF were unknown.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 Industrial development policy Friesland	no	not applicable
2 Regional plan	voluntary (acc. to EIA procedure)	where
3 Local plan	mandatory (acc. to EIA procedure)	what, how (whole business park)
4 Environmental permits	some mandatory (acc. to EIA procedure)	how (individual industries)

Interactions

Tiering of impacts

The decision to establish an IBF was taken at the highest level of decision-making and no SEA was conducted; a decision with significant impact for the environment. Even at the best location, the IBF would produce adverse environmental effects that could not all be mitigated.

The site selection SEA, associated with a regional plan for the site, only examined spatial impacts; the impacts influenced by site selection. These impacts included large-scale impacts such as energy use and emissions by transport (routes were affected by site selection), as well as site dependent impacts on biodiversity.

The local plan SEA examined local impacts mainly. A noise zone was prepared and the impacts of lay-out of the IBF on noise levels in the surrounding area were investigated. Traffic impacts were assessed and alternative routes to the IBF were compared. Common facilities such as green belts, water management and waste management were included. The SEA also studied alternative admission regulations to specify the types of industries permitted in the IBF. At this level, the cumulative and synergistic local impacts of the individual company were also assessed.

Scope reduction and efficiency

Individual companies in the IBF normally require an environmental permit. Industries have to comply with the admission regulations that are part of the local plan as well as national environmental standards and regulations. Some of the companies may also require an EIA, which then will probably focus on the local impacts that could not be foreseen in national legislation or in admission regulations. It is therefore likely that the SEA at local plan level will reduce the scope of these EIAs and increase the efficiency of

decision-making at the level of individual enterprises to decide whether they need EIA or only an environmental permit.

The regional plan and the site selection SEA were to set up for the single purpose of legitimising the strategic choice of the Heerenveen site. The alternative sites could also have been assessed in the local plan SEA but this would have meant:

1. each of the site alternatives would have had to be developed in detail to assess its impacts, or
2. the SEA would have to be phased: first making an indicative assessment of the alternative sites, selecting a site, and developing only the selected site in detail.

The first option was not considered to be efficient because of the extra SEA workload involved. The second option was rejected because it meant that site selection would have been a decision made by the initiator only and there was a risk that the decision-makers at Local Plan level would not agree with this choice. That could cause serious delay: site selection would have to start all over again.

The best option was to suspend the local plan and its SEA, and select a site in a democratically approved PPP. This PPP, the regional plan, would serve to counteract the local population's objections to the construction of the IBF. When the SEA at local plan level resumed, the residents joined in the effort to make the IBF more environmentally compatible instead of fighting it.

It could be argued, that the site selection SEA was only set up to legitimise a choice that had already been made, and not in order to choose the site with the least environmental impact. It did, however, ensure that the public was involved since the regional plan procedure includes public participation. Decision-makers at regional plan-level could of course have made another decision based on the SEA and the draft regional plan.

Main outcome of the case analysis

- The decisions which probably had the most significant environmental impact were made at the highest level and were not environmentally assessed in a formal procedure;

- There was a clear tiering of impacts between regional plan, local plan and project level. At each level large-scale and local effects were assessed, with an increasing emphasis on local effects and in increasing detail and probably with diminishing environmental significance (the project level is not known yet);
- The regional plan for the site was proposed to achieve an environmental assessment of the *where* question more efficiently than at local plan level and to save time and costs at that level; an ongoing EIA procedure was suspended to get more time;
- The regional plan SEA and the local plan SEA only considered cumulative and synergistic impacts of the individual industries; it would have been difficult to examine these impacts (or alternatives to reduce them) at the project level since not all of them require an EIA;
- The local plan SEA helped to develop criteria for the admission of industries and issue of environmental permits; these criteria were formalised in the local plan, making project EIA much easier as well as probably reducing time and cost.

5.11 Policy Plan Drinking Water Supply (BDIV), The Netherlands

The case

A national water supply policy was formulated in the (third) 'Policy plan drinking water and industrial water supply' (BDIV). This is the highest tier of decision-making in this case study. The BDIV preparations followed a legal procedure defined in spatial planning legislation, the 'spatial planning key decision' (PKB). An EIA was required (in this report referred to as an SEA, because the formal EIA procedure was applied on a PPP). When finally the initiator decided that the BDIV would not need the status of a PKB, he continued the SEA on a voluntary basis.

The final BDIV includes the following main policies:

- sustained priority for production of sufficient drinking water of good quality;
- continuation of strict requirements for drinking water production;
- enforcement of quality assurance and environmental management systems and procedures during production and distribution;
- use of a number of policy instruments to curb the increase of water demand in order to reduce the environmental impact of water supply activities;
- avoidance of natural areas in site selection to minimise impact of land use and soil dehydration;
- revision of the formal planning system for water supply (tiered system and methods for trade-off).

At the second tier, the Water Supply Company Midden Nederland (WMN) had to shift its water intake from groundwater to surface water (this was in response to a provincial target to reduce soil dehydration by 20% in 2000). The seven projects that were necessary to realise this shift were jointly submitted to an EIA procedure. WMN conducted the EIA (OEDI-EIA) in three phases:

1. assessment and decision with regard to the method for water extraction (*how* question);
2. assessment and decision with regard to the site selection for (a) extraction of riverbankfiltration, (b) infiltration and extraction of surface water and (c) reduction of present ground water extraction (*where* question), and
3. assessment and decision with regard to the design of chosen sites (*how* question).

The intermediate decisions, after stage 1 and 2, were made internally by the WMN. Only the result was in the form of permit applications and the EIA submitted to the provincial authority for approval. External parties were consulted in all three EIA phases.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 National Policy Plan Drinking Water Supply	Voluntary (acc. to EIA procedure)	whether, what type, how
2 Seven environmental permits for water production facilities (OEDI)	Mandatory (acc. to EIA procedure)	whether, what type, how, where

Interactions

Tiering of impacts

There was no direct tiering of the impacts between the national SEA for the Policy Plan Drinking Water Supply (BDIV) and the EIA for seven water production sites in Utrecht (the OEDI-EIA), except possibly that the national SEA was more concerned for a safe water supply (in terms of public health), and the OEDI EIA more involved in minimising impacts on biodiversity. The main concern of both tiers was impacts on wetlands while a number of smaller impacts were also examined. The types of alternatives were about the same at both levels:

- reduction of drinking water consumption;
- comparison of technical drinking water production systems;
- environmental management and nature management systems.

Therefore, the impacts influenced by the decisions were also similar. The study of these issues was generic at a national level while at the EIA-level it was directed to a particular water production system.

The OEDI-EIA itself was internally tiered in three phases of decisions and assessment. In each of the phases, the WMN (the initiator) explicitly made use of the methods that had been developed in the national SEA. The main reason for this was that these methods had become known and accepted, through ample consultation and participation at the national level. The internal tiers examined different impacts and alternatives:

- in the first phase all available technical systems were compared environmentally, using the 'building blocks' which had been developed at the national level. Bank filtration and depth infiltration were selected. (The technological systems compared at the national level had not become outdated but a new system had been developed in the period between both tiers. Bank filtration was new, but it could easily be added to the existing set. At the same level, future water demand was assessed and options to reduce this demand were included in the assessment
- in order to clarify the potential new production sites selection, and existing ground water wells where extraction should be reduced (to maximise the benefit for wetlands in the area), the EIA made use of evaluation criteria that had been formulated in the national SEA;
- detailed design of the facilities at the selected sites also partly made use of criteria which had been developed at the national level (e.g. environmental management systems).

Vertical integration of assessments

The national SEA has generated a useful database of methods, knowledge and experience that could be applied in the OEDI-EIA (including, for example, a national geographic information system (GIS) with biodiversity in wetlands). These were explicitly used again in the OEDI-EIA. It was not necessary to develop a number of methods and using them again increased the acceptance of the results. It also led to a more efficient EIA preparation which can be seen if we compare this EIA with a similar EIA set up by the water supply company DZH in Zuid-Holland. At DZH, the EIA procedure started before the BDIV was available, which meant that the methods later developed in the SEA could not be used. DZH spent much time and effort on the EIA to avoid the risk of rejection and the EIA procedure eventually took twice as long as the OEDI-EIA. The difference can mainly be attributed to the development of the national SEA. The lessons learned at the national level have improved not only the OEDI-EIA, but probably all other later EIAs in this sector. However, this was not the main objective of the national SEA.

The development of the SEA also stimulated scientific discussions and research efforts especially in the areas of hydro-geology and biology of wetlands.

Influencing the decision-making system

One of the results of the national SEA was general acceptance that the provincial (regional) level is the 'right' level for the environmental assessment of water production projects, since this is the natural scale of hydrogeological relationships. The competency of the provincial authorities should therefore become larger than that of national authorities. The BDIV included a proposal to amend the Water Supply Act, to re-organise the system of tiered decision-making. This proposal linked decision-making in the water supply sector with the environmental decision-making systems (regulations for environmental policy, SEA and EIA, and environmental permits). This was mainly driven

by a general privatisation and decentralisation movement, but it was also believed to be better for the environment, as the SEA had shown.

Cumulative impacts

The SEA at the national level, as well as the OEDI-EIA, has been concentrated on cumulative and synergistic impacts of a large number of water production projects. The hydrogeological impacts of groundwater extraction may have an impact on wetlands far away. Each wetland is influenced by the cumulation and synergy of the effects of many wells. At both levels, a hydrogeological model of the area of influence (the Netherlands respectively the province of Utrecht) was developed, and this was linked to an ecological model that could estimate the impacts on vegetation and biodiversity. Only in this way, could scenarios for trading-off technological systems be environmentally compared. At the national level, the assessment was more broadbrush, and at the provincial level, it was more detailed.

Main outcome of the case analysis

- There was no direct tiering of impacts between the national and the regional level;
- The regional level (OEDI) EIA was internally strongly tiered, stepwise answering the *what, where, and how* questions;
- The national SEA spontaneously led to method and database development that significantly increased acceptance and efficiency at the regional level. Support for the internal intermediary decisions was won by involving affected groups in every phase;
- At the national level the planning system itself and the appropriate level to consider environmental impacts and alternatives, were assessed and this contributed to a change of the decision-making system;
- At the regional level, an assessment was made of the synergistic effects of all water production sites in the region on the hydrological regime and wetland biodiversity. This would not have been possible in an EIA for each water extraction site individually.

5.12 Ministerial Order about Manure Storage, Denmark

The case

The first tier was a Ministerial Order, which specified standards for environmentally sound manure storage systems. The purpose of the Ministerial Order was to limit the emissions from manure storages to the environment, and to improve the efficiency of decision-making at project-level, by offering exemption from requirements in the scope of the EIA if general environmental rules were obeyed concerning manure storage. The Ministerial Order had been integrated into a Guidance document on EIA for livestock farming.

The second tier are the manure storage projects at the level of individual livestock farms.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 Ministerial Order about Manure Storage	Voluntary (acc. to Ministerial Order)	different types of general rules for manure storages
2 Manure storage projects	Mandatory (acc. to EIA procedure), but exemption is possible	unknown

Interactions

This Ministerial Order is a very clear example of tiering of impacts. All relevant environmental impacts and alternatives were generically assessed at the national level. The SEA for the Ministerial Order estimated the impact on the quality of surface water, the quality of ground water, and on health and welfare of the population. All that is needed at the project level is a verification that the manure storage facility satisfies the general requirements. It is possible, however, that a tiering of this kind would also have been possible without an SEA for the Ministerial Order.

Main outcome of the case analysis

- environmental impacts of manure storage were generically assessed at the national level, and individual manure storage can be limited in the content - the scope- of mandatory EIA process if they meet national standards which are based on the generic SEA.

5.13 Ban on certain pesticides, Denmark

The case

The Act on Chemical Substances and Products was a ban on pesticides that contained certain harmful active ingredients. Its purpose was to reduce the impacts of pesticide use on the quality of surface water, the quality of ground water and on health risk in food, drinking water or the handling of toxic substances. An SEA was prepared for this Act. The Act created an administrative framework for the admission of the sale and use of certain pesticides. There were no lower tiers of decision-making, because the sale and use of pesticides by enterprises and individuals are activities that do not need consent.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 Act on Chemical Substances and Products	mandatory (acc. to Ministerial Order)	different types of Act
2 Sale and use of pesticides	no	not applicable

Interactions

In this case, the polluting activities (the sale and use of certain harmful pesticides, for example retail enterprises and farms) did not need individual consent. Therefore, the only level of governmental decision-making where environmental impacts could be controlled, was the admission of these pesticides onto the market. The SEA studied the expected effectiveness of the ban on certain pesticides in terms of reduced emission and benefits for the environment. These are generic and cumulative impacts of a large number of activities.

Main outcome of the case analysis

- the national SEA considered only generic and cumulative effects of small activities that require no EIA.

5.14 Spatial plans, Sweden

The case

In Sweden, municipalities now have to prepare comprehensive spatial plans, covering the whole municipality. Sometimes 'in-depth comprehensive plans' are prepared, usually covering only a limited area of the municipality, or a highlighted specific issue. These are followed by detailed development plans. All of these plans may need different kinds of environmental assessment. This may, theoretically, provide for two levels of tiered decision-making and assessment. As of the Planning and Building Act (PBA) amendments in 1996, the consequences of comprehensive plans must be stated clearly in plan documents, and the consequences must be clear during the public participation process. These consequences encompass environmental, social and economic impacts. At the detailed plan level, the PBA requires SEA to be carried out when the plans brings about significant environmental effects (referred to in Sweden as EIAs).

The comprehensive plan and its SEA are not binding and thus alternatives may still be open for consideration at the detailed planning level. The comprehensive plan is nevertheless the instrument showing the municipality's goals. In the comprehensive plan and its SEA the municipality outlines the alternatives for meeting the municipal goals. At this planning level there should be a discussion and description about *whether* an alternative, project or establishment should be realised in the municipality and *where* in the municipality. Alternatives or measures in detailed plans and development projects which are not compatible with the comprehensive plan should not be realised. Moreover, if a detailed plan is not compatible with the comprehensive plan, the differences have to be explicitly incorporated in the detailed plan and thoroughly motivated. Questions generally answered at the comprehensive plan or detailed plan level are:

- *Whether (comprehensive plan):* Is this specific alternative/project of interest or value to the municipality? Should the municipality aim at fulfilling this alternative/project?

Can the municipality supply the requirements for this alternative/project? Can the demand for the alternative/project be satisfied by other measures?

- *Where (comprehensive plan)*: Is there a choice of sites? Which site is most suitable?
- *How (detailed plan)*: How can we ensure that the location of the alternative/project will add to its quality and at the same time minimise the environmental or other impact?

The following cases were reviewed.

Comprehensive plan for the municipality of Lund (1997)

The plan includes two impact assessment documents; one describing the impacts at a municipal level, and the other describing the impacts on the larger region. In the planning process, two other assessment documents were prepared, to be used as background information for the comprehensive plan. The first document, 'A study of the expansion of Lund in a long-term perspective' describes the impacts of different expansion alternatives. The other document is called 'Expansion of the municipality of Lund with minimised land-use conflicts' and it discusses one specific alternative that in the long term will minimise land-use conflicts and negative impacts.

Comprehensive plan for the municipality of Helsingborg (1997)

This plan aims at creating a society where public transport has replaced private transport. People live close to public transport facilities, such as local train and bus stations, and the green areas are of utmost importance. This was one of the first wide-scope impacts assessments in Sweden, and as such also serves as a test of methods and approaches. The plan's SEA addresses the following environmental aspects: water, biodiversity, national interests, landscape, life cycles of materials (town and country), transportation, cultural heritage.

The municipality has also adopted guidelines for the work with SEA in comprehensive planning and EIA in detailed planning.

Environmental checklists, Gislaved Municipality

The municipality of Gislaved has produced a planning tool for carrying out SEAs and EIAs. Guidelines for working with SEA and EIA are also available. A standard form which can be used for assessing the impacts of a plan includes the following environmental aspects: nature, cultural heritage, relics of antiquity, health and safety, and aesthetics.

In-depth Comprehensive Plan for Reftele, Gislaved Municipality (1996)

This plan focuses mainly on future exploitation and traffic issues. In this plan-SEA, the municipality made explicit statements about those development alternatives which may be realised and those which will not.

Environmental checklists, Luleå Municipality

In Luleå, an operational team for EIA and SEA has developed check-lists for SEAs and EIAs (for comprehensive plans and detailed plans). These check-lists have recently been revised and adapted to current demands and decision-making trends.

Summary

Tier	Environmental Assessment	Considered Alternatives
1 Municipal comprehensive plans (Lund, Helsingborg, Reftele)	mandatory (Planning and Building Act 1996)	whether, what type, where
2 Detailed plans (no cases reviewed, but there has been methodology development)	mandatory in case of significant environmental impacts (Planning and Building Act 1996)	good reasons needed to reconsider decisions made at level 1; remaining issues: how, where in the smaller area

Interactions

Tiering of impacts

Knowledge about tiering of impacts in municipal comprehensive planning in Sweden is still limited because the impact assessment provisions are of recent date. Municipalities have not yet prepared detailed plans which could be explicitly linked to the intentions in the comprehensive plans but detailed plans are being drafted.

This analysis is therefore partially theoretical. The strategic questions *whether* and *what type* are asked at municipal comprehensive plan level (see section 4.1.13). The detailed plan levels mainly focus on the *how*. The types of impact to be considered at these levels may be completely different, or, as in Luleå, differ only slightly.

- Comprehensive plan of Lund:
 - impacts in the municipality: natural resources, landscape, housing, environment and circulation of materials, green areas traffic, energy, risks and vulnerability, social affairs, economic affairs;
 - impacts at regional level: large-scale environmental problems, management of natural resources, regional green areas.
- Comprehensive plan of Helsingborg:
 - water, biodiversity, national interests, landscape, circulation of materials (town and country), transportation, cultural heritage.

- Comprehensive plan-level of Luleå:

<p>Is the use of energy reduced/more effective?</p> <p>Is there a move towards renewable sources of energy?</p> <p>Is the use of materials reduced/more effective?</p> <p>Is there a move towards renewable materials resources?</p> <p>Is the use of persistent compounds reduced?</p> <p>Is re-use and recycling enhanced?</p>	<p>Are the functions and the capacities of nature and eco-systems being preserved?</p> <p>Is biodiversity being preserved?</p> <p>Is long-term health a major item?</p> <p>Is the cultural heritage being preserved?</p> <p>Is the community developing towards sustainability?</p> <p>Is the so-called 'precautionary principle' being used?</p> <p>Is there a need for continued EIA work?</p>
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- Detailed plan-level in Luleå:

land and substance circulation, water, air and climate, energy flows, flora and fauna, town and countryside visual impact, technical infrastructure, health and safety, living, work/employment, services, traffic and communications, agriculture, forestry, fishery, cultural heritage protection, recreation, nature conservation, total energy use, use of renewable sources of energy, total use of materials, use of renewable material, use of persistent substances, degree of recycling or reuse, the functions and capacities of nature, biodiversity, the community's total sustainability. The final question to be answered is: Is there a need for continued EIA work?

One of the comprehensive plan-SEAs (Lund) explicitly considers large scale (indirect?) impacts in the region to which the municipality belongs. Another municipality (Luleå) uses an identical checklist at detailed plan and at project level.

The reviewed checklists illustrate that the municipalities handle these issues very differently. Assessment questions and issues at the municipal-wide comprehensive planning level in Sweden are often directed towards rather unspecified goals such as 'sustainable development of the community' and differ from the questions and issues at the detailed plan level. Reasons are seldom given for the inclusion or exclusion of certain aspects or issues in the impact assessments. In some cases, the detailed plans 'seem to live their own life', as one municipal representative expressed it.

There is some indirect information however, indicating that SEAs may have an effect on the type of impacts considered at the lower tiers: the comprehensive plan-SEA for Lund states that an expansion in the northern part of Lund will not cause any negative impacts on the countryside. This could imply that potential impacts will not be analysed further. The same expansion alternative could, however, lead to increased air pollution and a higher level of noise disturbance because of the proximity to major traffic routes. The detailed plan-EIA will possibly contain a further analysis of this specific issue.

The detailed plan should be based on the intentions in the comprehensive plan; the impact assessment in the detailed plan could then be a follow-up and specification of the comprehensive plan assessment. In some cases the detailed plan is used for only individual projects in which case the plan will resemble a project proposal and its environmental assessment a project-EIA. In other cases, however, the detailed plan may be more of a specification of land use containing a description of the general impacts only since the final use of the area has not been determined. Although the detailed plan-environmental assessment may be reminiscent of a 'traditional' project-EIA, these two should not be confused: the detailed plan-EIA describes the impacts of the regulations in the detailed development plan and not the impacts of a proposed project.

Cumulative impacts

The purpose of the SEA in comprehensive planning in Sweden is to describe the total impacts including the cumulative and synergistic impacts. The comprehensive plan often contains a number of different building areas, protection areas etc. In this way, an overview is provided, and the total impacts of minor projects can be assessed.

This kind of overview is not possible at the detailed planning and environmental assessment-level (and project EIA level) as these plans or projects mostly involve limited spatial areas. If the cumulative impacts are analysed in the SEA, it can serve as a guidance to detailed plan-environmental assessments. Impacts that were not detected in the detailed plan-EIA may reveal that a project or a plan does or does not satisfy the requirements of the municipality.

The regional plan-SEA for Lund contains a description of the impacts in which the municipality states that the total exploitation area will require about 800 hectares of high quality agricultural land. It makes no mention of any other consequences of the expansion. In the same assessment it is also stated that an expected increase in population, will cause an increase in eutrofication and acidification problems. These effects together with the effluent and leakage of nitrogen from agriculture and traffic will increase the need for specific measures against acidification and eutrofication.

The local plan-environmental assessment for Lund also discusses a summary of the impacts in the different exploitation areas including, for example, the impacts of certain alternatives on green areas ('the green structure'). Some of the alternatives emphasise re-vegetation activities, while others do not.

Offering a framework for decision-making

The comprehensive plan and its SEA may contain guidelines on whether, and in what cases further impacts assessments need to be carried out in the detailed planning stage or in subsequent development projects. The comprehensive plan for Lund contains a provision for in-depth municipal Comprehensive Plans and SEAs for the stone-quarries and gravel-pits in the municipality (gravel is a limited resource in this region).

The detailed development plan has to be based on a programme in which the starting point and objectives of the plan are indicated. In this programme, the municipality has to indicate whether the detailed plan needs an environmental assessment. The programme can include the higher level of the comprehensive plan and its SEA. The comprehensive plan-SEA for Helsingborg contains guidelines, earlier adopted by the municipality, for SEA and EIA. In this framework for SEA at comprehensive planning level and EIA at detailed planning level, the municipality states that if the comprehensive plan provides an adequate description of a project and its impacts there is no need to prepare a programme for the detailed plan. On the other hand, if the comprehensive plan does not provide an adequate description of the impacts an environmental assessment at detailed planning level will be necessary.

The comprehensive plan may contain mitigating measures or alternatives.

- The plan-SEA for Lund contains examples of mitigating alternatives. The regional-level SEA contains an alternative for Lund; a more cautious approach to expansion. This alternative is to be used as a discussion point and not as a 'real alternative', and is therefore not presented in detail. According to the assessment, such an approach would probably result in increased segregation in the region, and increased expansion strain outside the region.
- The local-level environmental assessment (municipal comprehensive plan) for Lund outlines mitigating measures for different expansion alternatives. For instance, one specific alternative involving an expansion in the north part of the municipality implies that new buildings would be exposed to rough climatic conditions, which would in turn affect the housing environment, energy, and the need for heating. Mitigating measures aimed at reducing these impacts include the use of vegetation as wind-shelter. Another example of mitigating measures in this plan is the designation of restricted areas along roads and railways aimed at minimising the risk of accidents with dangerous goods transports.

The comprehensive plan can also help in choosing possible alternatives for subsequent detailed planning environmental assessments and project EIAs:

- The comprehensive plan for Lund contains information on alternatives to be considered in subsequent planning; the re-location of a golf-course in the area, for example. The comprehensive plan states that subsequent planning should include a conclusive assessment of different interests in order to decide which of the two alternatives is the most preferable in the long-term view.
- The plan-assessment for Helsingborg also contains information on alternatives to be analysed in subsequent planning. The municipal guidelines for SEA and EIA recommend a programme including an EIA for those cases where the detailed development plan differs from the comprehensive plan.

Vertical integration of assessments

It is hoped in Sweden that the lower tier environmental assessments should benefit from knowledge acquired at the higher level. In Luleå, for instance, the municipal council recently supported an extensive 'EIA improvement package' encompassing both staff training and revised EIA and SEA materials; checklists, matrices and other tools.

When an SEA has been prepared at the comprehensive-plan level, municipal staff will become experienced in assessment work and methods. This should lead in time to increased efficiency and improved impact assessment if the same staff members are involved in the work, or if there are some other forms of learning and feedback. Analysis of the Swedish case studies does not, however, verify this. Assessments have been prepared by different staff members or consultants at both the SEA and EIA-level.

The comprehensive plan SEA may make lower tier environmental assessments and EIAs easier by throwing light on the issues and impacts the municipality considers important or significant. Impacts which need further analysis can be identified and information provided by the SEA can be used in conducting the lower tier environmental assessment.

An example of the role of the SEA in choosing the right alternatives is the in-depth comprehensive plan for Reftele in Gislaved municipality. This plan-SEA describes the impacts of several different expansion area alternatives. The assessment also provides suggestions for final decision-making. In several of the cases, it is suggested that certain alternatives should not be chosen because of unfavourable geo-technical conditions, proximity to industrial areas, conflicts with national interests, and so on.

Reduction of scope

It is not clear whether SEAs for comprehensive municipal plans and detailed plans could reduce the scope at lower tiers. Comprehensive plans, including those without a SEA, may directly or indirectly limit the alternatives to be considered in detailed plans, and examples of this can be found in the comprehensive plan for Lund:

- the municipality declares that it will not allow any big shopping-centres in the municipality because of the expected increase in traffic and the adverse impact on the character of the very old city centre;
- the municipality will protect land or water areas from activities potentially harmful to the natural environment;
- the municipality states that it will be restrictive against land uses other than agriculture within high-quality agricultural land areas.

In the SEA for Helsingborg, recommendations were made for several preliminary SEA/EIA studies, to be used also in municipal (political) decision-making. In most of the alternatives there does indeed appear to be a need for further assessment work, but it is uncertain if further, more detailed, assessments will be made since the comprehensive plan including its SEA results are not legally binding. Nevertheless, it is hoped that SEAs

will lead to improvements in the overall quality of decision-making, and perhaps reduce time and cost at detailed plan level.

6 MAIN OUTCOME

6.1 Introduction

The case studies identify many interactions between sequential levels of environmental assessment. The interactions that are mentioned in the literature proved to also happen in practice. The existence of a prior SEA clearly often has benefits for the subsequent EIA or SEA stage. The strongest benefits occur under a number of conditions, which possibly may be enhanced by formal arrangements. An additional benefit of SEA is, that it can be applied to PPPs which do have environmental repercussions, but which are not followed by project EIAs (an example is the Danish SEA for a ban on certain pesticides). The main outcome of the analyses is summarised as follows.

- 1 **SEA does not replace EIA.** At least, the available cases give no clear evidence of that.
- 2 **SEA addresses alternatives that are not addressed at project level.**
- 3 **SEA can be used to refine the scope of assessments at lower tiers.**
SEA can help to identify and set a framework for the important issues to be considered at subsequent levels.
- 4 **SEA considers also other types of impacts than EIA.**
Some impacts can better be considered at the strategic level, and others better at project level. SEA can examine large scale impacts more effectively than project EIA, because large scale impacts are rather more influenced by strategic alternatives than by project alternatives. Project EIA alone is not enough to test coherence of sectoral developments with environmental policy objectives; for this purpose SEA is needed next to EIA, but it may require a new decision-making tier.
- 5 **SEA can also be beneficial for assessment at lower tiers even if its results are not binding.**
An SEA will, however, not always not lead to a limination of the environmentally harmful alternatives open for consideration at the lower level, nor of the impacts associated with these alternatives.
- 6 **Project EIA is not always applied at the lowest level of decision-making which might give ‘grey-zones’ between strategic level assessment and project level assessment.**
Sometimes, a prior level is acting as the consent level which may sufficiently set boundaries for the environmental impacts; however, there can also be a ‘grey-zone’.

- 7 **SEA seems often to reduce the time and cost needed at the lower assessment level. SEA increases the transparency of the whole planning and assessment process for the public and for stakeholders.**

The time and costs benefit was difficult to quantify.

- 8 **There are some beneficial conditions for SEAs needed to become most effective.**

The identified benefits, such as good communication between players involved or good timing, did not occur in all cases but helped a lot where found.

- 9 **Legal arrangements could possibly take account of sectoral or sequential differences in order to enable SEA to be most beneficial.**

The benefits of SEA might be enhanced by formal arrangements, which contents will depend on the specific features of planning sectors.

Finally, the main findings of this study are subject to some limitations. In the first place, the number of cases in this study is limited compared to the number of situations that is theoretically possible, and therefore it may not be fully representative. Also, in order to provide “indisputable” evidence of interactions between assessment tiers, the lower tier performance after a prior SEA would have to be compared with the situation *without* a prior SEA. This is not possible (the same assessment process cannot be undertaken a second time). The conclusions drawn about the cases are for that reason not only based on available documentation, but also on views of people involved in the cases.

The arguments given in these conclusions need to make use of terms for which no common international definition exists, such as ‘alternative’, and ‘strategic’. In case of doubt, the reader is recommended to consult chapter 2 where the approach of this study of these terms is explained.

6.2 SEA does not replace EIA

In none of the cases, lower tier EIAs have become unnecessary through the prior availability of an SEA. From a legal viewpoint, this could only happen if the EIA falls under screening provisions. In practically all of the examined cases, however, the undertaking of an EIA was mandatory: there was no screening, and thus there was no opportunity to reject the need for an EIA. Nonetheless, many important environmental issues were considered in these EIAs; they were useful and certainly not unnecessary. It cannot be concluded that, if screening had been provided for, the rejection of the need for undertaking these EIAs had become more likely.

Only in one case (wind energy planning in The Netherlands), an SEA at regional planning level was undertaken with the explicit aim to prevent the necessity to undertake EIAs for individual wind turbines. However, at the time of writing it is not known whether this approach was successful.

6.3 SEA addresses alternatives that are not addressed at project level

The case studies show either that other types of alternatives are considered at different levels or that alternatives are worked out in different level of details in different tiers of decision-making. The highest tier of decision-making generally addresses alternatives on whether a development should take place (thus include a do-nothing alternative) and where such development should take place in a (very) indicative way (alternative areas). Lower levels of decision-making then look at alternatives on the type and modalities of such development and look into more details to the siting and operating conditions.

6.4 SEA can be used to refine the scope of assessments at lower tiers

The interaction

In several of the cases that were studied, strategic tiers have refined or reduced the scope of the environmental assessment at the lower tier (the impacts and alternatives that were considered). This is to say, it was easier to identify the issues that the lower tier should consider, and the lower tier could be more focused on the impacts that really can be influenced by decision-making at that level.

The mechanisms

There are three ways how this benefit may occur:

- SEAs can influence the PPP for which they are made. The PPP, by rejecting certain strategic alternatives, determines the remaining alternatives that can be taken into consideration for decision-making at the lower tier. The project EIA considers only the impacts of the remaining alternatives, since the impacts of the strategic alternatives have already been considered in the prior SEA. This can be called a ‘**funnelling effect**’.
- SEAs can be used to develop an **environmental planning framework**, against which the effects of decisions at lower tiers could be identified, monitored and evaluated. The environmental conditions for further elaboration of the project are in this situation given.
- The more common way is that the SEA simply provides information and experience that gives the lower tier a ‘head start’ compared to the situation without an SEA.

The first and second way can only occur if the SEA is linked to a PPP. This condition, and others, is more fully developed in section 6.9.

The funnelling effect

The funnelling effect occurs, for example, in the following cases:

- High Speed Rail Zuid, where alternatives for the route decision tier could be limited to detailed development of one selected route (see also the box);
- the International Business Park Friesland, where a special site selection tier enabled the mandatory SEA for the park to be limited to one selected site.

In theory, these PPPs may also have excluded certain strategic impacts and alternatives for consideration at lower tiers *without* a preceding SEA. There are, nevertheless, strong indications that the SEA played a crucial role: with no SEA, either the PPPs may not have been approved, or alternatives that were rejected in the PPP may have been assessed at lower tiers.

Refining the scope: the case of the HSR Zuid

In the case of the High Speed Rail Zuid in The Netherlands, energy use and noise were assessed at several levels, but in a different way.

- Energy use, a typical large scale impact, is studied at the highest level because it is significantly influenced by the modal choice (e.g., high speed rail versus aeroplane). Energy use is also assessed at the lowest level, because it is sensitive to the choice of construction methods (energy saving is part of the 'sustainable building' initiative in the transport sector in The Netherlands). Construction materials were not assessed at the higher tiers, probably because these have much less environmental impact than impacts and alternatives which were assessed at the higher levels (e.g. modal choice).
- Noise nuisance, a typical local impact, is subject to national standards, and at the time of the preparation of the relevant legislation the generic effectiveness of such rules was thoroughly evaluated and discussed with stakeholder groups, before it was approved. (A formalised SEA procedure was not used). Noise nuisance also played a role in assessment of the modal split (e.g. aircraft noise versus railway noise), and routing (number of residents and peaceful areas near the route). It was also an important consideration in routing and in the design of mitigation measures.

Environmental planning frameworks

Environmental frameworks for further decision-making (sometimes called environmental action plans, environmental policies or environmental guidance) were found in the following cases:

- the Local Plan of the Leicester City included environmental guidance for making development consent decisions;
- the Zeeland Wind Energy Plan included environmental guidance for decision-making about individual wind energy sites;
- the Garzweiler II mining plan included environmental guidance for the operational plans;
- the Danish Ministerial Order of manure storage was in itself an environmental planning framework for the individual manure storage installations.

Impacts and alternatives for projects were generically assessed at the SEA level, and at the EIA level, the assessment could be limited to a check whether conditions did not

change over time, and whether the environmental planning framework was properly applied.

Information transfer

The more common way is the transfer and reuse of information from the SEA stage to the EIA stage. In certain cases, the scope of the lower tier assessment was not really reduced, but it was more refined:

- In the case of the Erlangen housing area, all potential sites and their impacts were assessed at both tiers. The scope of the second environmental assessment benefited from the first SEA (assessment methods were improved and refined).
- Spatial planning in Leicestershire and in Sweden are both examples of a situation in which the type of impacts considered at each level was the same. The same types of impact checklists were used at every level. At higher tiers they were more broadbrush than at lower tiers, where they were more refined.

This is more fully developed in section 6.9.

6.5 SEA considers also other types of impacts than EIA

The interaction

The impacts and alternatives considered at strategic and project level are often different. Certain environmental issues are more typical for the strategic level and more appropriately considered at that level. Others are more appropriately considered at project level. While the types of impacts of the project under consideration are the same at all levels, the potential to influence these impacts may differ considerably (see also the box on the HSR Zuid above). Some impacts are difficult to be mitigated at project level, where really environmentally friendly options can be foreclosed. Addressing these impacts at strategic level increases the possibilities to find these better alternatives to prevent or to mitigate such impacts.

The mechanisms

There are several ways how this can occur:

- some societal activities do not need project consent. If their impact is to be considered at all, it has to be at strategic level;
- the cumulative and synergistic impacts of different projects can more effectively be abated (and therefore also better be assessed) at strategic level;
- SEAs may examine large scale impacts more effectively than project EIA, because large scale impacts are easier influenced by strategic alternatives than by project alternatives;
- project EIA alone is not enough to test coherence of sectoral developments with environmental policy objectives; SEA is needed next to EIA.

Some PPPs are not followed by project consent decisions

An useful feature of SEA is, that it can be applied in sectors that have environmental implications, but where no project consent decisions apply. This is supported by the case of the Danish ban on certain pesticides, and the comprehensive spatial plans in the UK and in Sweden. It can be assumed that the number of potential case studies is much larger, because this mechanism can occur if there is only one (strategic) tier of decision-making, whereas in the objective of the present study is to analyse the interactions between *two* tiers.

Cumulative and synergistic impacts

Many of the SEAs that were analysed, were associated with PPPs that involved several projects or activities. All these SEAs examined the cumulative, and where appropriate, synergistic impacts of these projects or activities. Appropriate alternatives were sought to reduce these effects. The following cases illustrate this:

- Garzweiler II mining plan, which studied the hydrogeological and ecological impact of several operational plans;
- Erlangen housing development, which studied the total effect of many housing projects;
- Policy Plan Drinking Water Supply, which studied the combined effect of all water production facilities in the Netherlands on, for example, hydrology and eco-systems at a national level;
- The International Business Park Friesland (IBF), where the cumulative impact of all businesses in the park was considered;
- Ban on pesticides in Denmark, which examined the effect of the ban on total impact of emission of harmful pesticides by many actors who individually needed no permit or EIA;
- SEAs for comprehensive spatial plans were concerned with cumulative and synergistic impacts in particular. Comprehensive spatial planning in Leicestershire, where consistency of different types of land use is assessed. This approach automatically takes account of synergistic impacts of development proposals in a certain area.

Of these, only the Policy Plan Drinking Water Supply and the IBF were followed by project EIAs. The study of these cumulative and synergistic impacts at the project EIA level is less useful. If no SEA is made, and cumulative impacts are considered at project level, a project will be allowed if its individual impact does not cause the cumulative total impact of it with all preceding projects, to exceed allowable limits. This process continues every time a new project is proposed, until the last proposed project causes the limit to be exceeded.

SEAs may examine large scale impacts more effectively than project EIA because large scale impacts are rather more influenced by strategic alternatives than by project alternatives.

Relatively important environmental decisions are often made in PPPs (such as *whether*, *where* and *what type* of project). The undertaking of SEAs enabled the consideration of such alternatives, which are in particular relevant for the large scale impacts, at the 'appropriate' level.

This mechanism can be observed in the Garzweiler II lignite mining, the High Speed Rail Zuid, the International Business Park and in the Wind Energy Plan Zeeland. These are all large projects or groups of closely related projects. Firstly, principle decisions were made, although not always submitted to an SEA, then a site or route was selected, and finally, the site planning was completed. Each of these decision levels was relevant for different impacts. In most cases, as the types of decisions changed from higher tiers to lower tiers, the appropriate alternatives were selected at each assessment level for the specific type of decision. The impacts to be examined were generally selected for their relation to these alternatives.

It should be remembered, that also *small scale* impacts can be considered at strategic levels. They can be used to find the most suitable (least sensitive) project locations, of which there are many cases described in this report. Also the SEA can be used to assess small scale impacts in a generic way, identifying suitable generic approaches for mitigation at project level. Good examples are the Garzweiler II lignite mining and the Danish Ministerial Order about manure storage.

However, these impacts can also be assessed at the project level (if there is one). Assessing them generically at strategic level has the advantage that it makes project EIA easier, by refining its scope, as discussed in section 6.4.

Project EIA alone is not enough to test coherence of sectoral developments with environmental policy objectives. For that purpose SEA is needed next to EIA, but it may require a new decision-making tier.

At project level, it is difficult to assess the significance of a small contribution to a large environmental problem. Instead, environmental sustainability objectives should probably trickle down by demonstrating the coherence of sectoral decisions with these objectives, by undertaking SEAs and EIAs. This is often called the integration of environment in the sectoral decision-making. Applying only EIA is often not enough, because not all impacts can be appropriately addressed at the project level, as it was shown earlier. In this respect, SEA and EIA are supplementary.

This mechanism does not concern an interaction between two succeeding tiers, but in the first place one between environmental policy and each of the tiers of (sectoral) decision-making. The cases in this report were only analysed for interactions between succeeding tiers, however, and these mechanisms if they have taken place, therefore could not be observed.

The mechanism can be explained by a theoretical example from the transport sector. The greenhouse gas emission that is induced by a decision to construct a new road can be significant, but it is still a small contribution to the total emission of greenhouse gas. A fair trade-off between the effects of one particular road depends on other decisions and activities that affect the greenhouse gas emissions, and on the availability of possibly cheaper options to reduce emissions. This concerns all decisions about the transport infrastructure network, but also beyond that: decisions in other sectors (e.g. electricity) and in other countries. Many of these decisions face the same problem.

The reduction goals for greenhouse gas emission should be laid down in national environmental policy, probably supported by a SEA for that policy. Sectoral PPPs and project decisions should be coherent with this policy, and they should be able to give the appropriate weight to greenhouse gas emission. In order to assess this coherence, SEA and EIA would be a useful tool. In this way, SEA and EIA help to integrate environmental objectives into sectoral decision-making, along with the funnelling effect and environmental planning frameworks. Applying SEA for such decisions may require the introduction of a new decision-making tier.

6.6 SEA can also be beneficial for assessment at lower tiers even if its results are not binding

The interactions described above worked, because the information provided in the SEA was used in an associated PPP, which again influenced the lower tier (the solid lines in Figure 2). These are therefore *indirect* interactions between assessment levels, depending on the existence of a PPP that has an influence on further decisions. However, many environmental assessment tiers were also *directly* linked to each other (the dotted line in Figure 2). This is illustrated by the High Speed Rail Zuid, Comprehensive Spatial Planning in Leicestershire, the Policy Plan Drinking Water Supply, the Erlangen Housing Development and the Nordic Triangle. In these cases, assessment tiers were either integrated by co-ordinating their approach ('vertical integration'), or by more spontaneous transfer of methods and experience. These interactions do not depend on the existence of a PPP. They have increased the quality and efficiency of the assessment process as a whole by providing input to the EIA process at project level. However, the funnelling effect, which is often powerful in limiting alternatives and therefore impacts at project level, is not achieved by direct interactions: it depends on the existence of a PPP.

Specific direct benefits of SEAs for the lower tier assessments were:

- an increase of the transparency of the whole planning and assessment process for the public and for stakeholders;
- repeated use of similar methods (datasets, prediction methods, presentations) previously and successfully applied in earlier assessments, increased their acceptance;
- communication between those involved at sequential assessment tiers enhanced the mutual learning process (for example, the same experts were involved at different assessment levels).

Many of these benefits could probably have been reached within one single tier of environmental assessment, because any SEA or EIA can (informally) be split into phases. A successful example of this mechanism was the EIA for seven drinking extraction sites in Utrecht, the Netherlands (OEDI-EIA), the lower tier of the Policy Plan Drinking Water Supply.

6.7 Project EIA is not always applied at the lowest level of decision-making

The difference between SEA and EIA revisited

The difference between project EIA and SEA (as in the EIA Directive and the proposed SEA Directive of the European Union) may be not as clear as generally thought. Both use the same principles; the differences are mainly caused by differences in the decisions to which they are applied. However, there are cases available, where project development consent was given in a prior decision to the last one needed before construction works were allowed to commence. At the last tier no further was required.

Favouring condition: strong functional links between projects

PPPs are sometimes at the same time framework for consent decisions given within the PPP itself, if different proposed developments are strongly functionally interrelated and consent therefore needed to be given to them *jointly*. The plan as a whole would not be feasible if one of its projects would not be admitted.

An example is the Garzweiler II lignite mining plan. The EIA-level was the mining plan. It provided for a detailed environmental framework and monitoring requirements to ensure that the environmental impacts of decisions made in individual operational plans would be insignificant. Garzweiler II is an example where confusion occurred, because a PPP included binding consent decisions about larger units of development which could either be defined as one project with sub-projects, or as a number of projects. In the latter case, it is not a consent decision for the individual projects, and it can therefore legally not be the EIA-level.

Grey zone

If there is uncertainty, as in the Garzweiler case, whether a PPP or a lower tier is the project consent decision, such PPPs can be said to be inside a 'grey zone' between SEA and EIA. Another example is the PKB-level of the HSR-Zuid in The Netherlands.

If a PPP is inside a 'grey zone', it may be possible that the different (sub)project proposals can be sufficiently elaborated and associated with an environmental planning framework, to ensure that unacceptable environmental impacts will not occur in further decision-making at (sub)project level. If this is based on an environmental assessment applying EIA principles, further assessment at the lower level would not be useful. The environmental planning framework will do its work, and mitigate impacts at (sub)project

level. Under these circumstances, an EIA at (sub)project level can be made redundant by an SEA at the level of the PPP.

Therefore, when determining whether a PPP may be the appropriate level for EIA, it is probably more useful to verify the environmental planning framework, rather than trying to define the concept of 'a project'. That framework should contain arrangements (in the PPP and in legislation) for maximum allowable impacts, implementation monitoring and enforcement. This is in fact what is done in the case of Garzweiler II and the HSR Zuid: project consent level is designated as the level where a project is admitted, under sufficient environmental conditions that could be (formally) verified at lower levels decisions.

6.8 SEA seems often to reduce the time and cost needed at the lower assessment level

The scope of lower tier assessments was in most of the available cases refined and reduced, because of the direct and indirect interactions between assessment levels, as described above. This has led, in the view of informants who were involved in these processes, to a reduction of the work load and might therefore be expected to reduce the time and cost of the lower tier assessment.

However, there are exceptions. This mechanism did not occur in comprehensive spatial planning. An SEA for waste management facilities included provisions for scope reduction, but it was not successful because of technological developments occurring in the period between both environmental assessments.

Reduction of time and costs is a general expectation of the involved persons who were interviewed, but quantification is difficult. The cases did not provide material for such a quantification.

6.9 Conditions for SEA to become most effective

The beneficial interactions between assessment levels described above, depend on a number of conditions. They do not occur always. The main conditions are:

- there should be room for learning and communicating;
- not too much time should elapse between two assessment tiers;
- PPPs should be sufficiently 'strong'.

Possibility to learn and to communicate and not too much time elapse between assessments

Successful interactions between assessments tiers depend on the possibility and willingness to co-ordinate the tiers, and to use the lessons learned in the first tier. A major factor is the time that passes between both tiers. If too much time elapses, assumptions made at the time of the first tier, may have become outdated when the second tier starts. For example, in the case of the VAM Bioreactor, national guidance on

waste processing technology was given in an SEA-based PPP. This guidance was outdated at the time the VAM proposed the Bioreactor technology. Therefore, technological assessment had to be part of the scope of the EIA for the VAM waste processing plant. The same may be true for intervening political developments (e.g. the political weight given to certain impacts could change, or a new environmental policy could be adopted between both tiers).

Some of the more successful tiering cases did have a very short time elapse, providing an opportunity for direct interactions:

- comprehensive spatial planning in Leicester (three assessment levels, overlapping in time);
- Erlangen housing development;
- High Speed Rail Zuid;
- OEDI-EIA about drinking water supply.

PPPs should be sufficiently 'strong'

The strongest and most beneficial interactions between an SEA and its lower tier assessment may well be the funnelling effect and environmental planning frameworks. These most clearly save time and money at the lower level. The strong benefits of SEA appear to be in particular dependent on the formal planning and decision-making system, rather than on interaction-related provisions in SEA and EIA legislation (which was in no case formally regulated). An SEA on its own, without linkage to a PPP, has weaker (but still important) benefits.

Opinions expressed by interviewed experts showed that there should be a legal possibility to adopt binding PPPs at a level where environmentally friendly strategic alternatives are still feasible. If there is no decision-making system at a strategic level with any binding effect, it is very difficult to get the 'funnelling effect', or an environmental planning framework. An SEA at that level can still be useful through its direct effects on lower tiers, but it is not likely to reduce scope. To reduce scope, it often seems to be necessary or at least very helpful that an SEA is connected to a formal PPP. For an SEA system to be effective in this way, there has to be a strategic decision-making system suitable for 'hosting' the SEAs. The legal form of PPPs (their contents, responsibilities, competencies) should be defined in a way that strategic alternatives which are better for the environment can be accommodated at a level where they are feasible. There are even cases where PPPs were adopted with the only aim to accommodate SEAs (see the box hereafter).

The importance of the decision-making system can be observed in a number of cases:

- In the case of the HSR Zuid, the SEA system was formally integrated with the planning system. This legislation was designed for the examination of environmental impacts and alternatives at the appropriate level. The PKB, a type of PPP, would not have been made without an SEA.
- In the case of the International Business Park Friesland, a PPP was proposed for one reason: to formally remove strategic impacts and alternatives from the scope of the

lower level environmental assessment. The need for a formal PPP was only recognised when the lower tier EIA was under way, which was to be suspended until the PPP was adopted. A similar mechanism is also seen in France.

- In the case of the Erlangen housing area, it was envisaged that the first site selection PPP would reduce the scope of the lower tier, but it was not formally approved and all potential sites had to be assessed again at the lower tier. Nonetheless, the scope of the second environmental assessment has benefitted from the first SEA: assessment methods were improved and refined.
- Environmental planning frameworks were in some cases formalised in a PPP in order to be effective, e.g. the Danish environmental policy on manure storage facilities and the ban on certain pesticides. Such guidance makes scoping at the lower level easier. It may set limits to the impacts that can be expected when the project is further elaborated. It precludes also alternatives that might exceed these limits, reducing the number of alternatives and impacts to be considered. It is doubtful whether these benefits could have been obtained on a purely voluntary basis.
- In the case of the OEDI-EIA, which is described in the box, the initiator took a risk by making his own strategy (with SEA) without formal adoption of a PPP, and precautions were needed to be successful.

Benefits of tiering without PPP: the case of the OEDI-EIA

There is one example of an SEA that could achieve these 'strong' benefits of tiering *without* making a PPP: the OEDI-EIA for regional drinking water extraction in Utrecht, the Netherlands (one of the lower tiers of the Policy Plan Drinking Water Supply). The OEDI-EIA was directly linked to plan development and internal decision-making by the initiator. The plan was developed and assessed in three phases. The final phase led to a formally submitted proposal and an EIA. The EIA explained and justified the intermediary decisions that had been made at the end of the first and second phase, which were strategically related to phase three.

Decisionmakers may not like this approach. They may feel confronted with a *'fait accompli'* and may feel they are under pressure not to reject internally made strategic choices in the final proposal, because it would cause considerable delay. It would have been better if the decisionmakers had been offered an opportunity to approve the intermediary decisions one at a time. The initiator has reduced this risk by intensive inter-agency and NGO consultation in each phase of the EIA.

PPPs with the exclusive aim to consider strategic environmental impacts

In the case of the Erlangen housing development and the International Business Park Friesland, PPPs were prepared specifically for the examination of environmental issues. These PPPs would not have been proposed if there had been no SEA. These are ad-hoc adjustments of decision-making systems, within the existing administrative setting.

There are also cases where experience with SEA even contributed to a permanent re- definition of the decision-making system, so that the 'right' impacts and alternatives can be considered at the 'right' level. The HSR Zuid is an example. Here, the *whether* question was explicitly linked to the *where* question since spatial impacts are significant and should play a role in the decision-making on *whether* a HSR should be realised. Two SEAs (Nordic Triangle Transport Corridor, Finland and Policy Plan Drinking Water Supply, the Netherlands) has contributed to a similar change in the general decision-making system within the sector.

Relevant environmental assessment issues follow the decision-making tiers

In most of the cases, there was an existing system of tiered decisionmaking, to which SEAs and EIAs were added (see Figure 3). Feasible alternatives at any level depend on the decisionmaking system, and impacts are selected for their 'influenceability' by *these* alternatives. Other impacts are more or less automatically considered in assessments at other tiers of decision-making. The impacts and alternatives in environmental assessments follow the PPPs rather than reversibly. In most of the cases, the tiering order was largely determined by the decisionmaking system. The potential scope of PPPs was regulated by legal requirements and by the scope of the competency of the responsible agencies. An SEA could encourage the assessment of extra alternatives for the PPP with which it is associated. In this way, the impacts and alternatives to be considered at project EIA level are reduced. The importance of this condition for beneficial SEAs can also be seen from 'indirect evidence', described hereafter.

Decisionmaking systems may be adjusted if strategic environmental questions cannot be addressed at the appropriate level

All decisionmaking systems develop, as well as environmental assessment (as a tool) itself develops. There are indications that in more sectors and countries, experience with environmental assessment has encouraged governments to make changes to decision-making systems. A survey indicated that in several EU countries, the planning systems in the transport sector have been, or are being, adapted to enhance the quality of the decision-making process, and to include environmental issues (Kolpron Consultants, 1994).

Environmental issues are not the only important factor in decisionmaking: economic, social, and other factors also play an important role. However, as environmental issues

rise on the political agenda, decisionmaking systems themselves may have to be altered to bring environment issues to the forefront of decision-making. This can be observed in some of the cases in this report. Thus, as the environment (or sustainability in general) becomes more important, decision-making systems are sometimes changed in order to be able to address strategic environmental issues at an appropriately (strategic) level of decision-making. This is partly a benefit of SEA (see following box).

SEAs may work as an incentive to improve the planning system

It is generally acknowledged that a decision should consider impacts of any nature, beneficial as well as adverse. Every impact should not be assessed in more detail than necessary to make a trade-off at that level of decision-making. At strategic level, when “broadbrush” alternatives are compared (which will be elaborated in follow-up decisions), the impacts can also be assessed in a “broadbrush” or qualitative way.

The impacts should nonetheless be assessed with sufficient detail to give the decision-makers confidence that the risk of unacceptable impacts remains small, once the plan is further developed and implemented. It is likely that the level of confidence needed is related to the position of the impact on the political agenda. The political agenda may quickly change, and the position of specific impacts and alternatives in an SEA may change accordingly.

The decision-making system and the agencies which develop and assess proposals, should take into account the priorities of the competent bodies (political issues). A flexible scoping phase is not sufficient if the decision-making system determines which alternatives could be feasible, and which are not (for example, another transport mode may not be feasible when the initiator is a road administration). SEA, as a transparent and flexible process, is acting for practitioners and planners as a way to clarify about political priorities that are sometimes less easily realised by the existing system. In the long run this may help to re-shape planning and decision-making. The transparency needs to apply to strategic decision-making as a whole and not only the assessment of environmental impacts.

6.10 Legal arrangements could possibly take account of sectoral differences and differences in tiering of planning in order to enable SEA to become most beneficial

Earlier in this chapter, some suggestions have been made concerning legal arrangements:

- to define project consent level differently: e.g as the level where a project is definitively admitted, under sufficient environmental conditions that are (formally) verified at that level;
- to consider adjustments of the decision-making system if it can not accommodate PPPs with a funnelling effect, or PPPs with binding environmental frameworks.

However, benefits and interactions are not the same in every policy sector, and any legal arrangements should probably have to account for these differences. There appear to be differences between the following situations:

- tiered decisions (plans, programmes and projects) about individual major projects requiring an EIA. In these situations assessment issues are clearly tiered and strategic decisions offer environmental frameworks for further decision-making and assessment, thus reducing the scope of lower tier assessments;
- sector decisions (policies and plans) affecting a group of activities. The main benefit is that cumulative, synergistic and generic effects can be efficiently assessed (but the number of cases is very limited);
- tiered comprehensive spatial planning at different geographic levels, focusing on the consistency (environmental and otherwise) of a number of developments in an area. In this situation no clear tiering of impacts appears to exist. On the other hand, benefits can probably be reached by co-ordinating the assessment methods and participation.

However, these differences are not well analysed yet, and it is not clear what the implications are for legal systems.

It also seems difficult to make legal arrangements for environmental assessment about the types of impacts that should be considered in particular types of policies, plans, programmes or project decisions. Large-scale and local impacts both appear to be relevant at any level of decision-making. The distinction between *whether*, *where*, *what* type of questions ('strategic issues') and *how* ('project issues') is, in fact, a simplification. *How* type of questions are also often considered in strategic decisions (which, according to the definition used in the present report, is any tier except the last), offering frameworks for further activity development. *Where* questions are often considered at project level (but within a small area). It is difficult to generalise tiering orders across countries, sectors and even across cases.

On the other hand, in individual cases, the scoping process that is undertaken at each assessment tier appears to be flexible enough to determine impacts and alternatives relevant to that decision. The question what a decision is about, and which types of alternatives are feasible for that decision, is in the first place determined by the decision-making system and the proponent, and not by the environmental assessment process, nor by environmental assessment legislation. The SEA and EIA follow in this respect the decision-making process and its contents. The way to consider highly strategic environmental alternatives, is probably to apply SEA to the levels where these alternatives are still considered to be real options.

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APPENDIX

CASE STUDIES

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1 GARZWEILER II OPEN-CAST LIGNITE MINING SITE, GERMANY

(Based on communications with Manfred Steinhage of Euromines, Bonn, and Mr. Brokate (representing the competent authority) and Mr. Lindemann (legal expert) of the Ministerium für Umwelt, Raumordnung und Landeswirtschaft des Landes Nordrhein-Westfalen)

1.1 Situation

In Germany, proposals have been made for open-cast extraction of lignite. Residents of these areas have to be resettled. To obtain a mining permit, the lignite industry has to submit an application at the Lignite Commission (Braunkohlausschuss), which prepares proposals and lignite mining plans. The majority of the Lignite Commission is formed by representatives of the cities and communal bodies concerned as well as the representatives of the region itself. A lignite mining plan for the Garzweiler II site ('Braunkohlenplan für das Abbaugelände Garzweiler II') was approved in 1995. This site is located south of Mönchengladbach. The Garzweiler II site will be an extension of the present lignite open-cast mining site, Garzweiler I ('Anschlußtagebau'). The whole area covers 4.800 hectares and 7.600 inhabitants of this area will have to be moved. The whole area will probably be exploited by 2044 and in 2045 the mining site will be re-planned and will partly be reused as a lake. The lake will be filled up to 2080.

Rheinbraun AG is the mining company that initiated this project. The Lignite Commission is the competent body for the lignite mining plan. It cannot act alone but needs the consent of the other ministries concerned, especially the approval of the Ministry of Environment, Spatial Planning and Agriculture of the Bundesland Nordrhein-Westfalen and of the commission for environment ('Umweltausschuß des Landesparlamentes') within the parliament of the Bundesland..

The lignite mining plan is legally very near to a Gebietsentwicklungsplan (a spatial plan). The preparation and decision-making process for these plans is regulated in the spatial planning legislation (Landesplanungsgesetz). Both plans create targets of spatial planning, which are binding to governmental and other public bodies. The lignite mining plan is even more detailed than a Gebietsentwicklungsplan. It contains provisions concerning the mining area, the process of developing the mine, water management, protection of nature and landscape, traffic infrastructure, re-settling of inhabitants of the area and the manner of re-development. The Mining Plan needs an UVP (Umweltverträglichkeitsprüfung, EIA) according to the UVP-procedure. In the present report, this UVP is referred to as an SEA, according to the conventions made in chapter 2, since it is not the last tier of decision-making. Legally, it is an EIA, as the Petition Committee of the European Parliament has confirmed in April 1998.

Apart from the spatial planning framework, there is planning legislation for the mining sector (Bundesberggesetz, BBergG). One or more master operational plans

('Rahmenbetriebspläne') have to be approved. They have to conform with the lignite mining plan. In the case of Gartweiler II, the case which is discussed in this case study, one Rahmenbetriebsplan for the entire area is prepared. If an UVP is available for the lignite mining plan, the lower tier Rahmenbetriebspläne are exempted from UVP obligation.

For parts of the mining area, operational plans (Betriebspläne) are needed. Usually the operational plans must be worked out for phases of two years. For replanning and rehabilitation special operational plans have to be authorised by the competent authorities. All operational plans must (again) conform with the lignite mining plan. These also have to be approved, and deal with mitigation measures, but do not require further EIA.

Decision-making about the Betriebspläne must be based on a verification of the assumptions on which the original plan was based in 1995. This includes the social context. The plan includes binding implementation conditions with an environmental objective. A strong monitoring plan has been developed to monitor the implementation of the plan. If there are essential changes of the assumptions, on which the lignite mining was based, this plan has to be reconsidered.

1.2 Interactions

Because there was only tier of environmental assessment in this case, it is not possible to identify interactions between tiers of SEA and EIA. However, environmental considerations are assessed at higher and lower levels than the mining plan SEA.

Interaction with higher tiers

The proposed lignite mining plan which was submitted for an SEA, is defined by, among others, the boundaries of the area and the volume of lignite to be produced. Alternative energy sources, reduction of energy consumption and alternative areas, and associated environmental and social considerations such as climate change, ecological value of alternative mining areas, are not discussed in the SEA. In the case of Gartweiler II, these issues were thoroughly assessed, discussed, and decisions were taken prior to the SEA, and the results communicated to the public. This did not take the form of the UVP-procedure, however. The original proposals for the Gartweiler II boundaries were changed on environmental grounds (in general new mining areas have to be adjacent to existing mining areas, and in the case of Gartweiler II part of the original proposed mining area was reserved as a buffer zone). The SEA for the lignite mining plan focused on the selected area itself, and mitigation measures such as a resettlement plan.

Cumulative impacts

The SEA considers the cumulative and synergistic impacts of the individual operational plans. Most of the proposed mitigation measures, which were assessed in the SEA, were aimed at reducing the impacts of facilities and choices common to all operational plans, or reducing the impacts of the operational plans in comparable ways (generic assessment). This is explained below.

Common facilities that were assessed

Some of the common facilities that were assessed are the following:

- gravel (Kraftwerkreststoffe) storage and waste water treatment and disposal,
- zoning for re-settling of inhabitants of the area,
- infrastructure (re)location), such as energy cables, water pipes, surface water courses and roads)
- a geohydrological buffer zone and other measures to reduce geohydrological impacts on the surrounding areas (since these long-range impacts are determined by the whole of the mining operations rather than each of the five phases, they were assessed with a common groundwater model and hydro-ecological assessment).
- a plan for the area as a whole after mining has finished (it will become a lake).

Generic measures

Some of the generically assessed mitigation measures, to be applied in each of the phases, are:

- technical measures to reduce dust emission, such as water spraying
- technical measures to reduce noise emission, such as low-emission equipment and spatial approaches (such as the location of noise-producing operations far from settled areas)

Resettlement plan

A full resettlement plan for all phases has not yet been prepared, because the present residents may not be alive anymore in the year 2045, when the 50 years will have passed. Resettlement plans, which will need approval, will therefore be made in phases. The mining plan includes the outlines of these plans.

Efficiency

A joint SEA for several phases would obviously be efficient, because the phases are so comparable and need so many common facilities. Uncertain elements (due to the long time span of the plan, 50 years), are postponed for future decision-making. Some cumulative impacts (groundwater model, resettlement) can only be efficiently assessed for the plan as a whole.

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2 RESIDENTIAL DEVELOPMENT IN ERLANGEN, GERMANY

(based on communications with Thomas Bunge of the Umweltbundesamt and Jürgen Seeberger of the Municipality of Erlangen.)

2.1 Situation

The Municipality of Erlangen, Germany, intended to extend the residential and industrial capacity of the city. Given the context of previous higher tier decisions (higher tier spatial plans), a large scope for alternatives was still open. This decision required an amendment of the Land Use Plan (Flächennutzungsplan).

Three levels of spatial planning are distinguished:

Federation (Bund)	Federal spatial planning (Raumordnung)
State (Bundesland)	State and (sub-)regional spatial planning (Landesplanung)
Community (Gemeinde)	Land use planning (Flächennutzungsplan) and building development planning, the legal statute (Bebauungsplan).

The decision did not require the amendment of higher tier plans. In the case of Erlangen the land use plan was developed for the designation of housing, industrial construction zones, ecological preservation zones and open spaces. It is a preparatory plan for the entire community area, indicating the 'land use as resulting from the intended urban development for the foreseeable future in its main lines'; it implies direct obligations only for the public authorities involved in its preparation.

The Municipality decided to prepare the land use plan and associated SEA in two stages:

- elimination of potential development areas (sites) that are clearly not acceptable (global site selection), also referred to as an 'environmental relevance assessment';
- further assessment of remaining areas (detailed site selection).

Both (voluntary) SEAs applied the formalised UVP-procedure (UVP:

Umweltverträglichkeitsprüfung, environmental impact assessment). Decisions on capacity questions, resource consumption and spatial/ functional relationships in the city as a whole had already been made at higher levels. The spatial plan and the SEAs concentrated on their localisation. The alternative development sites were designated in the scoping phase of the first SEA.

2.2 Interactions between global and detailed site selection for Erlangen development location

Unsuccessful attempt to reduce the number of alternatives in the second tier

The decision to conduct the SEA in two stages structured the work process. A rough assessment of planned zonings in the first SEA stage would reveal which planning zones contained adverse environmental impacts, so that these could be discarded in the second

stage. It would then be possible to minimise the number of sites and reduce time and effort involved in in-depth studies in the second SEA stage. This proved, however, to be not politically viable. The decision-makers decided to retain all possible sites in the second stage, to avoid a land price rise. The first SEA did not, therefore, result in a reduction of the alternatives to be considered in the second SEA.

Co-ordinated indicators

The first tier increased efficiency of the second tier, because the same type of indicators were used in both tiers. In the second tier the assessment method was improved. The scoping document at the start of the first SEA ('study programme') provided a common framework for the SEA in both tiers. It contained an extensive list of environmentally relevant aspects (e.g. biotope protection, soil, water, climate change, noise, landscape). At both tiers, the same aspects and parameters were used, but the impacts were described in more detail in the second tier. (In the first SEA, impacts were scored as positive, neutral or negative. This was perfectly suitable for this level of decision-making.)

Same team

The same departments and experts prepared both SEAs; the second tier therefore could strongly benefit from a learning process in the first tier. The information flows were sped-up. The urban planning and environmental departments met whenever needed.

Method improvements

There were several differences in approach between the first and the second SEA, most of which were results of a learning process. In the first SEA, the different planning and assessment aspects were prepared in an integrative approach, and in the second SEA they were prepared parallel, producing separate documents. The approach in the second SEA was more flexible with regard to the amount of detail but successful elements, such as a verbal/argumentative presentation, were retained. The quality could be improved by using the outcomes of the first SEA as input of a consultation round in the second SEA. The first SEA-report presented balance tables, which showed the environmental impact of each of the potential development sites, and overlays of thematic inventory maps were included.

Public participation

The quality of indicators and methods in the second tier was improved, and they were more acceptable because the results of the first tier were available for public participation. The first SEA report could serve as a basis for consultation (i.e. consultees on landscape and ecology). This helped to improve the assessment methods used in the second SEA. Early public participation in the first SEA, resulted in the involvement of public institutions and a lively exchange of information and coordination between the

environmental planning and city development department and an increased acceptance of the subsequent SEA and public planning decisions.

Learning process

Making the first SEA enhanced the learning process at all sides (environmental department, planning department, politicians and public). In the second SEA, the scope was changed on some points. Sites that gave rise to discussion were given extra attention in the second tier. In the second SEA, frequent use was made of the information and results of the first SEA. Inventory maps developed at the first stage were used, for example, to assess the current situation.

Time savings in public participation

Completing the first SEA stage before early public participation and notification of selected public institutions made for an increase in administrative efficiency. The general public and public institutions could be informally involved within the same stage of the procedure, thereby saving the SEA the work of sending out separate letters requesting opinions regarding the environmental relevance of the planned zonings and the SEA results.

Two SEAs: confusing?

The SEA experts were afraid that public institutions, invited for participation, would get confused by the two-staged SEA approach, and concealed in their communications the fact that the first stage was a (voluntary) SEA. Therefore the word SEA was not mentioned. If it had been, more reactions could probably have been obtained. Even so, some institutions which had not been approached gave their opinions.

Cumulative impacts

The SEAs studied the cumulative impacts of the individual elements in the plan, such as total land use, acoustic impacts, groundwater, and induced traffic. The effects of common needs such as traffic areas, green spaces, special building areas, disposal areas, were also assessed. There was also useful coordination with the ongoing project or building development plan EIAs (e.g. an EIA for a letter sorting centre).

No delays

The SEAs did not cause any delays of the land use planning procedure. The first SEA started sufficiently early, and the process was efficient.

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3 NORDIC TRIANGLE, FINLAND

(based on communications with Anders Jansson of the Finnish National Road Administration.)

3.1 Situation

This SEA concerned a multi-modal traffic infrastructure programme of projects to further develop a multi-modal transport corridor: the Finnish section of the so-called Nordic Triangle. It consists of the Turku-Helsinki-Vainikkala railway and its connections to harbours, the E18 highway, the most important south coast harbours, Helsinki-Vantaa airport and subsidiary functions. The Nordic Triangle SEA was voluntarily initiated in 1995. There was no formal decision based on the SEA, but the SEA report contained recommendations with respect to further decision-making and assessment.

Many decisions about Nordic Triangle projects were still pending at the time. The SEA concentrated on the programme project choices that were still open. All these projects need an EIA but none has yet been completed.

More recently, the Finnish EIA Law requires SEA for all policies, plans and programmes that may have a significant effect on the environment. Ministry-of-the-Environment Guidelines were issued in 1998. Many policy decisions are important, such as the Ministry of Transport and Communications' operational and financing plan and other transport policies and programmes. In general, SEA is required for all policies, plans and programmes that may have a significant impact on the environment. The legislation expects that it will improve the quality and efficiency of project EIA. The original law proposition provides a motivation for this requirement which is both quality and efficiency based:

- for the environmental interests, it offers the improved quality of project EIA, but also of the environment in general
- for project interests/proponents, it offers efficiency, in the form of better focusing and less risk for delays on the project level.

3.2 Interactions between the Nordic Triangle SEA and further planning

This case study is rather exceptional, because this SEA is not directly associated with a policy, plan or programme, but includes recommendations for further planning and assessment of infrastructure, including desirable and envisaged interactions between tiers. Details of the effects and findings of the SEA with respect to such interactions are summarised below.

Learning effect

One of the strongest effects of this SEA was a learning effect, found in influential recommendations and in the attitudes of the participants in the process. It was instrumental in supporting methodology development. The new experience can be used in future EIAs and SEAs whose quality of these will increase accordingly.

Consultation and participation

The learning effect was enhanced by inter-agency and NGO participation, which was experienced as very fruitful. The discussions clearly increased support for the recommendations in the SEA, that will be implemented in future SEAs and EIAs. The general public was not involved in this SEA.

More SEAs are needed

The SEA report makes recommendations for further SEA and EIA: (i) SEA in early stage ('it was too late now, too many decisions had already been made'), for still upcoming strategic decisions, and (ii) environmental paragraphs in plans and programmes should be related to the environmental objectives agreed upon. The Nordic Triangle SEA confirmed and underlined a development which was already taking place. Especially after 1993, all policy and strategy work contains a clear environmental component. This component often looks for methods and formulations that the makers expect to arise in a future SEA. So even if they do not use SEA, they expect the discussion on, for example, a Transport Ministry task force proposal, to take place in an SEA framework. SEA represents an organised way of assessing impacts that has a general social acceptance. While the assessment methods remain strong inside the administration and NGOs, public discussion of all other than environmental aspects, is strongly shaped by SEA. In the same way, EIA in Finland has influenced project design since the early seventies, even though systematic development started in 1989 and the law was adopted in 1994.

Cumulative impacts

The SEA was a good method to study the cumulative impacts of a transport system as a whole (road, rail, ports). The assessment was broadbrush, including most of the impacts that play a role at project level. Cumulative impacts of alternative sets of projects in the programme for the Nordic Triangle corridor were assessed, such as induced traffic per mode, energy use, emissions, ground water, natural and cultural environment, scenic areas, spatial impacts, and traffic safety. Many of these impacts were the total of the impacts of the projects in the programme (which could have been assessed separately), others were truly caused by the group of projects as a whole (mainly induced impacts on traffic and spatial development).

Alternatives

The SEA compared alternatives for the whole transport system in the Nordic Triangle. In particular, it sought alternatives for road development. Since its elements are functionally related, decisions that affect more than one project cannot be made at the project level. The SEA supported the view of the way in which different transport systems affect each other and land use structure, how transport demand is influenced by economic growth and spatial developments, and what options are open to the government to influence all this (e.g. traffic management to reduce transport demand, and modal alternatives).

Tiering and overall trade-offs

The SEA showed that it is not easy to achieve a fundamental shift in a large-scale investment programme, for example from road to rail. Investment decisions need to be based on reliable scenarios about transport demand by mode. In this corridor SEA, the effects of such alternatives can be studied, but no valid foundation for the choice of alternatives can be found. This would require an overview of the whole system of transportation serving Finland's needs. There are many levels of strategy from national transport policy to this kind of corridor study, and they cannot be compressed into this one level of assessment.

The planning system

Integration of sectoral and environmental objectives at the strategic level is not straightforward, but needs agreement on the competencies of strategic decision initiators and the problems that can and should be solved by the strategic decision. In fact, it needs agreement on the planning system itself and (inter)sectoral divisions of responsibilities. It will be some time before these questions can be answered; before decisions can be made that break with the traditional views of the existing institutions.

SEA improves planning

The SEA revealed what others thought: that the basis of infrastructure proposals is often weak and there is a strong need among proponents to come up with better arguments to justify the proposal. This actually leads to better traffic design, better economics and sometimes even better technology, as the 'engineers' themselves start looking carefully at what they are actually proposing.

SEA in dynamic areas with many developments

SEA is expected to have an effect on the project level especially in complex cases such as urban edge zones and others, where a multitude of projects and an indeterminate land use development interact. In such cases, SEAs will create an agreed framework for subsequent EIA. The different administrations involved will have been able to debate and resolve their views on the role of different developments in that environment, before studying any specific project in detail.

SEA may reduce the alternatives in EIA

In Finland competent authorities are somewhat inclined to expand the scope of EIAs to alternatives that challenge existing policy (review it again in a public process). At strategic level, discussions about the need of extending infrastructure capacity, and the choice of modes, is still at a sufficiently early stage. The typical situation, where a major debate in the road design stage is whether the road is needed at all, can then, in theory, be shifted to the stage where such a discussion could have significant impact, instead of taking place several years too late, in a stage where it would cost time but it is unlikely to lead to a reversal of the strategic decisions.

SEA of nation-wide policies and programmes and their interactions with lower tiers

In Finland, nation-wide programmes such as the national 4 year program, are not so strongly tiered to the project level decisions regarding investment decisions, because time elapses and insights change between the two. However, tiering in the area of (environmental) policy and management in the transport sector is expected to be more pronounced. This means that SEA at a policy level will direct the way in which environmental policy is interpreted at operational transport level. The SEA thus operationalises the environmental policy of the transport administration and companies, making it into a working part of its environmental management system for the aspects or matters dealt with in the SEA. At the operational level, this influence could lead to new technology choices. This effect is enhanced if the SEA is explicitly required to consider environmental policy. An assessment method in this respect is life cycle analysis (LCA). Present day technology development in Finland has a strong LCA-like component.

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4 COMPREHENSIVE SPATIAL PLANNING IN LEICESTERSHIRE COUNTY, THE UNITED KINGDOM

(based on communication with Heather Miller of Hinckley and Bosworth Borough Council, who provided documentation and reviewed the case of Hinckley and Bosworth Local Plan, and Diana Chapman and Kathy Cooper, who provided information about the other tiers and the Leicester Local Plan, and who reviewed earlier drafts of the case study.)

4.1 Situation

The East Midlands region in England has a varied and predominantly rural landscape. The main urban centres are the cities of Nottingham, Leicester, Derby and Lincoln and the town of Northampton.

In the East Midlands, a tiered system of environmental assessment for spatial planning is emerging, potentially at four levels of assessment ('sustainability appraisal' and 'environmental appraisal'). The role of spatial planning is to give political guidance for urban, recreational and industrial development and other types of land use. The key objectives of spatial planning are to accommodate and enhance the economic and population growth of the Region whilst providing for the conservation and enhancement of the Region's natural environment. Though not a statutory requirement, the national government does request that SEAs are carried out for these plans. Planning and assessment takes place at the following levels.

1. Regional Planning Guidance for the East Midlands (RPG) is produced by Central Government (now the Department of Environment, Transport and the Regions, previously the Department of the Environment). The RPG is intended to add a regional dimension to existing policy statements from Central Government. The RPG is currently under review. An SEA will be prepared for the revised policies. The RPG is produced in response to:
 - a) The Regional Strategy. This is produced by the East Midlands Regional Planning Forum. This Forum consists of democratic representatives from Local Planning Authorities within the Region.
 - b) Existing Central Government Planning Policy Guidance Notes (PPGs), circulars and other Government policies and statements.
2. Leicestershire is one of the counties in the East Midlands. At the level of counties, structure plans are produced as required by the Planning and Compensation Act of 1991, setting out strategic policies for the County as a whole. The Leicestershire Structure Plan (1994) is the responsibility of Leicestershire County Council. At that time no SEA was undertaken. It must have regard to the Regional Planning Guidance for the East Midlands. A review and SEA process has recently commenced.
3. Leicester City and Hinckley and Bosworth Borough are local authorities in

Leicestershire. The Planning and Compensation Act of 1991 requires them to produce local plans containing more detailed policies and proposals related to development within their boundaries. Local plans must conform to the structure plan and take the RPG into account where necessary. Leicester City and Hinckley and Bosworth Borough are currently revising their local plans. Environmental appraisals for draft proposals have recently been prepared. The purpose of the local plan is amongst others to:

- a) elaborate policies and proposals of the Structure Plan and relate them to areas within the city;
 - b) provide a basis for development control;
 - c) bring local planning issues before the public for discussion; and
 - d) provide a basis for initiating and co-ordinating the development and other use of land.
4. Initiatives for development proposals at the project level may be taken by private enterprises or public-private partnerships. They need the consent of the local authority, which has to take the local plan into consideration. For some of these projects it may be required to undertake an EIA.

The Local Plan of the Hinckley and Bosworth Borough (described here by way of example; the others are comparable) aims at providing locations for residential and industrial development, to improve the quality of life, to safeguard the environment, to reduce energy use, and to create a national forest. It consists of maps indicating development purposes, and policies with regard to the issue of permits for various activities. Site selection for residential areas, employment (industry, tourism, retailing) and transport development are the most relevant decisions in the Local Plan.

The first objective of the Local Plan, as stipulated in the national Planning Policy guidance Note No 1, is to maintain the principles of sustainable development. The Local Plan includes general strategies and policies at different levels, as well as statements about individual sites. The draft Local Plan contained, among others, the following strategic objectives:

- concentration of urban growth in existing urban areas and transportation corridors;
- dispersal and non-transport choice.

These, and 32 further objectives, were assessed in the SEA, by evaluating their impact on 'environmental stock criteria', and examining them in the light of principles of sustainable development, national policy planning guidance and requirements by higher tiers of spatial plans (Structure Plan). The SEA made recommendations for improvement.

Some examples of statements about individual sites in the Local Plan are:

- Residential development at Woodlands Road will only be permitted if every effort is taken to prevent disturbance of the badgers in this area.
- Residential development at 27 Stoke Road, Hinckley, will only be permitted if the established hedgerows and trees are retained.
- The Council encourages an average density for the Borough as a whole of 27 dwellings/hectare (to reduce the cumulative land use).
- The developer of Earl Shilton industrial area is to ensure that an investigation of possible contamination is undertaken as part of an environmental assessment.
- Nature conservation interests will be a real consideration in determining many planning applications; English Nature will be consulted on sites significant at the County level.
- Light pollution, creating a nuisance to nearby residents, will not be permitted.

For each of these objectives and decisions, the SEA concentrates on identifying (degrees of) inconsistencies between the different strategic objectives, and creating support for the decision by publishing the findings of the assessment. In the case of inconsistencies between planning proposals and environmental strategies, alternatives are actively sought and assessed. The assessment itself is mainly prepared by experts; the SEA process tries to gain support for these assessments through discussions with stakeholder groups and the general public. The SEAs for the higher level spatial plans use a similar approach.

4.2 East Midlands: RPG - Structure Plan - Local Plans - Development Permits

National guidance

SEAs for spatial plans at all levels apply the same general methodology, which can mainly be characterised as consistency analysis. These methods have been proposed in a national guidance context (e.g. the guide 'Policy Appraisal and the Environment', and 'Environmental appraisal of development plans - a good practice guide'). Applying a similar method (including presentation in the SEA report) at all levels increases their transparency, since the same stakeholder groups may be affected by decisions and guidance at all levels. There is also a linkage with national guidance on monitoring of environmental indicators.

Learning process

A significant level of mutual learning is also achieved through cooperation between the different levels of government. Uncertainties indicated at the local level SEAs may be discussed at higher levels. However, since Regional Strategy, Structure Plan and local plans are (or recently were) under revision at the same moment, coordination between the plan and SEA preparations is difficult. A great deal of work is being done by different parts of the County Council and District Councils. In order not to waste effort through duplication of work and at the same time ensure that lack of information does not frustrate the work process, liaison between Regional Forum, the District and the County,

and within the County itself is essential.

Common assessment factors

In addition to organisational coordination, the benefit of different tier SEAs is enhanced by adopting the same assessment factors (indicators) where appropriate at each level. These factors are fully applied first at the local level. A similar set is then applied at county level. A comparable set will also be applied at regional level (a methodology for this environmental appraisal, based on the same factors, has recently been finalised). The environmental impacts of the Regional Strategy, Structure Plan and local plans are therefore simple to compare, thus increasing transparency. In the case of the Structure Plan, the following factors, including more general sustainability factors are applied: quality of life and local environment (open space, health (including pollution), safety & security, housing, accessibility, equity and equality of opportunity, local economy, vitality of centres, built environment, cultural heritage), natural resources (landscape character and open countryside, minerals, waste, water, land & soil, global sustainability (biodiversity, movement, transport mode, energy use, regional air quality).

Cumulative impacts

The local plan SEAs investigated alternative development strategies: general policies of site selection and issue of permits. By assessing the correspondence with environmental policies, an appraisal could be made of the cumulative impacts of the decisions about individual developments in the plan area which is to be guided by these policies. A great many individual proposals could then either be accepted, rejected, or accepted with caution.

Easier decision-making about planning applications

Local plan SEA contained alternative options and policies which can improve the quality of decision-making. The interactive planning approach of the SEA contributed to a better implementation of sustainability goals and resulted in more support. The affected residents can influence the decision-making process at the project level, because they are allowed to comment on detailed planning applications. The SEA is likely to give more (political) legitimacy to the local plan, and therefore delays are less likely when controversial detailed planning applications are brought forward. If proposals were accepted in the local plan with caution, environmental constraints were sometimes set for further decision-making. Thus, the SEA and the Local Plan give explicit guidance for further decision-making. A minority of planning applications may be subject to an EIA. In these cases scoping will probably be easier.

EIA screening guidance

In the UK, projects which require an EIA screening examination, are 'schedule 2

projects'. One of the local plans includes the following statement: 'the Council will seek an environmental assessment for Schedule 2 projects on, or in the vicinity of sites of recognised nature conservation value. Informal EAs will also be sought for non schedule 2 projects in similar circumstances.' (summarised statement)

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5 HIGH SPEED RAIL ZUID, THE NETHERLANDS

(Based on an interview with Thinka Bor (EIA specialist in the High Speed Rail Zuid (HSL) project.)

5.1 Situation

The High Speed Rail Zuid in The Netherlands, from Rotterdam to the Belgian border, forms part of the Trans European Network of High Speed Rail (HSR) connections.

The following important events were relevant for the HSR Zuid:

- early '80s: first preparatory studies;
- 1989: publication of an international feasibility study and an SEA for an HSR network between Paris-Brussels-Cologne-Amsterdam-London (PKBAL), and start of negotiations between the countries involved;
- 1991: publication of the HSR Note and SEA for the HSR Zuid. These were intended to form the basis for the 'spatial planning key decision' (PKB), about whether or not the HSR Zuid should be realised, and its indicative routing. It did not, however, provide enough information for a decision to be made
- 1994: publication of the improved 'new' HSR Note and SEA
- 1995: bilateral Dutch - Belgian routing study;
- 1997: the PKB-decision was made by the Parliament
- 1998: EIA for the 'draft route decision' (OTB);
- 1998: 'route decision' by the Minister of Transport and Water Management.

The interactions between these tiers were complex, and depended on the statutory position of each of the decisions. Moreover, PPPs that were not directly related to the HSR-Zuid also affected the process. The most decisions were the following.

In a way, decision-making about High Speed Rail in The Netherlands began with the approval of a plan for the development of the national airport (the so-called PKB Schiphol, which was based on an SEA). This plan declared that in the future a tax on jet fuel should be introduced, increasing the feasibility of High Speed Rail. The airport plan was partly based on the assumption that also an HSR would be realised, and the airport plan made the HSR more feasible.

Government policy on allowable impacts, also operating at the highest level, is aimed at reducing the environmental impacts of railways. Noise standards have been introduced together with compensation for local impacts on biodiversity. Many of these policies had been subject to some form of environmental assessment and participation.

The first actual decision about the HSR Zuid was the so-called Spatial Planning Key Decision (Planologische Kernbeslissing, PKB). The PKB-procedure is laid down in physical planning legislation. It provides for the following phases:

- publication of Volume 1 (preliminary PKB);
- consultation and public participation;
- publication of Volume 2 (reactions on preliminary PKB);
- publication of Volume 3 (cabinet decision, in this case the New HSR Note which is mentioned above);
- approval by Parliament;
- publication of Volume 4 (final PKB).

In the PKB, it was decided:

- *whether* rail capacity between The Netherlands and Belgium was necessary;
- *what mode* was most appropriate (e.g. making use of conventional rail, high speed rail, or a completely different mode);
- *where* the HSR would be aligned.

The EIA legislation required that an SEA be conducted for the PKB-decision. The EIA-procedure was formally linked to the PKB-procedure; the public participation phases of both procedures were merged together. Anticipating an EIA at the subsequent Route Decision-tier, the PKB decision did not specify a very precise alignment, leaving considerable uncertainty about the potential environmental impacts.

The next tier of decision-making was the Route Decision (Tracébesluit), which followed the procedure which was defined in the Routing Act. The Route Decision determined the detailed alignment, the mitigation measures and the construction methods of the HSR, taking account of the decisions made at the PKB-level. A voluntary EIA was undertaken at this level, following the procedure defined in the EIA Decree. The preparations for the Route Decision started in 1996 and were finished in 1998.

5.2 Interactions

Tiering of issues

In the course of the PKB procedure, it became clear that it would be difficult to make a very detailed decision about the alignment of the HSR. This was, among other things, caused by the controversy about the HSR. After publication of the SEA report, it was decided by the initiator and the EIA Commission (which has an important formal role in the EIA procedure), to limit the PKB-decision to an indicative route, postponing many elements of decision-making to the Route Decision tier, whilst undertaking a voluntary EIA at that level. The final PKB decision formulated the obligation to undertake a project EIA at the Route Decision-level.

Formally, however, both the PKB tier and the Route Decision tier were submitted to the same environmental assessment procedure (according to the EIA Decree). Both tiers worked under the same scoping decision, but the issues that would be 'postponed' to the second tier were determined later.

The scoping decision for the SEA at the PKB level dated from 1987 when it made no reference to the Route Decision tier. The scope included the following main items:

- large-scale environmental impacts caused by effects on the existing rail transport, the modal split and car and air transport and by analysing the social-economic spatial relationships;
- local impacts of seven alternative alignments for the HSR connection.

The scope of the EIA at Route Decision-level was determined by conditions in the PKB-decision, and by the report of formal review by the EIA Commission of the SEA report. The scope was limited to application of approaches developed at the PKB-level (e.g. landscape plan), detailed assessment of local impacts (e.g. noise nuisance) and relevant impacts at the project level (e.g. sustainable construction methods; e.g. limiting the use of sandfill and energy).

The PKB and the SEA dealt with the *whether* question. It compared two scenarios (part, or no part, of the European HSR Networks), and it analysed transport alternatives varying from 'do nothing' via 'high speed trains on conventional railways' to 'the realisation of an HSR (via different alignments) in the Netherlands'. The environmental impacts were assessed for each of the various alignments. This included the horizontal alignment (with a bandwidth), and where necessary an assessment of the impact of the whole route, as well as the vertical alignment.

To assess many of the large-scale impacts, the SEA has made use of the information provided some time earlier in the international SEA for the PKBAL. This included a generic comparison of the impacts of the HSR with the conventional modes of long distance transport, i.e. road traffic, conventional rail and aviation. The international SEA made overall estimates, amongst which the emissions of carbon dioxide and energy consumption, noise nuisance and traffic safety.

Interaction with national policy

The alignment at both the PKB and the Route Decision-level was gradually developed, trying to reduce environmental impacts as much as feasible. This frequently caused dilemmas, for example when a route could pass through an area with many residents, or through a sensitive ecosystem. The development of each of the seven alternative alignments therefore required many evaluation steps. This could, however, partly be based on national, provincial and local environmental policy. For example, sensitive and protected objects and areas were identified in policy (e.g. peaceful areas). Noise nuisance legislation was useful for evaluation, also in cases where no standards would be exceeded. Most of this policy and legislation, in particular at the national level, had been subject to a generic *ex ante* evaluation and consultation before it was approved (but not in a formal procedure).

The PKB-decision (indicative alignment) was definitely influenced by the SEA. Not the horizontal alignment but more significantly the vertical alignment was influenced by

information presented in the SEA: on certain locations where significant conflicts of land use occurred, for example, the HSR would be built below ground level to prevent visual nuisance and noise.

Much of the baseline data and the methods that were developed at PKB-level, could be used again at the Route Decision-level. During SEA preparation at the PKB-level, several methodologies and concepts were developed which referred to the Route Decision-tier in terms of further elaboration and detailing. For example an approach for fitting the HSR into the landscape was developed at the PKB-level. The approach was intended to be applied in the development of the Route Decision. As a consequence time and costs could be saved at that level.

Public participation

At both the SEA-level and the EIA-level, public participation was intensive. It was not difficult to explain to the public why decision-making issues were tiered in this way. In the Route Decision and at public meetings, frequent reference was made to the PKB-decision and the SEA. The SEA was generally considered as sufficiently comprehensive and the trade-off made when the PKB-decision was made (one of seven indicative alignments was chosen) was accepted. This gave the PKB-decision political legitimacy. Public participation at the level of the Route Decision could therefore concentrate on detailed issues at local level. The SEA was essential for the political legitimisation of PKB-decision: strategic discussions at the project level could be generally prevented by referring to the SEA. This was particularly important since realisation of the HSL alignment was controversial.

Same team

It was in particular beneficial for the linkage between the PKB-SEA and the Route Decision-EIA, that both assessments were carried out by the same team of experts. Environmental experts worked together with transport experts and engineers in a 'project office' that was set-up especially for the planning and assessment of the HSR Zuid. The group of environmental experts which had been involved in this work for about 8 years was still roughly the same..

Decision-making system

Finally, it should be noted that the development of legal procedures (PKB and Route Decision) had been preceded by a series of problematic infrastructure EIAs. The system was therefore designed to consider environmental issues at the correct level of decision-making thereby ensuring quality improvement and reduction in time and costs of decision-making. It was acknowledged that environmental impacts should be taken into account at ever level of decision-making. The system aims at achieving this by (normally) requiring only one, elaborate, environmental assessment at the most crucial, binding level of decision-making. This does not have to be the last tier of decision-making.

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6 COMPREHENSIVE MUNICIPAL PLANNING, SWEDEN

(This case description is an abstract prepared by DHV of the report 'Environmental assessment in Swedish physical planning. Examples from a new generation municipal plans', which was prepared as a contribution to this study by Aili Käärrik and Kristina Svensson of Boverket, the Swedish National Board of Housing, Building and Planning (EA Centre), Box 534, S-371 23 Karlskrona, Sweden, tel: +46 455 53000, fax: +46 455 53121.)

6.1 Situation

Municipal comprehensive planning (*översiktsplanering*), covering the whole area of a municipality, is mandatory in Sweden (Planning and Building Act, PBA). Plans are to be revised every four to five years. A specific form of a municipal-wide comprehensive plan is the 'in-depth comprehensive plan' (*fördjupning av översiktsplan*) which mostly covers only a limited area of the municipality, or a highlighted specific issue. The municipal comprehensive plan is followed by detailed development plans. According to the Natural Resources Management Act (NRMA), amended in 1996, some of the municipal comprehensive plans, the 'in-depth comprehensive plans' and the detailed plans may require an SEA. Although these are referred to as EIA in Swedish legislation, the present study uses the term SEA to distinguish these environmental assessments from project EIA.

The project-level EIA tool has been judged ineffective to deal with larger-scale or higher-tier activities other than projects. The integration of impact assessments in physical planning has been of major concern (Boverket, 1993) and has been made explicit in the Swedish Planning and Building Act through the amendments in 1994 (SEA in detailed development plans) and 1996 (SEA in comprehensive plans). The PBA now requires impacts on the environment (as well as social and economical aspects), to be part of municipal comprehensive planning. These aspects also include human health and safety, cultural heritage, and the management of natural resources. At the same time (1996), provisions for public participation in the planning process were cemented.

The PBA aims primarily at the impacts of strategic decisions about land use, such as major settlements or large scale traffic solutions, but the 'impression' of the plan as a whole as an important goal, is also mentioned in the preparations for the Act amendments. This comprehensive plan 'impact analysis' may be described as an attempt to integrate different types of impact assessments, in order to give a broad base for decision making (Lerman, 1997). On the other hand, there have also been warning signs that this wide-scope impact analysis may only lead to washed-out, far too generalised and thus not especially useful conclusions (Emmelin, 1997).

At the detailed plan level, the PBA requires SEAs to be carried out when the plan has significant environmental effects. These regulations in the PBA concerning

comprehensive respectively detailed planning are the most obvious examples of potential environmental assessment tiering in the Swedish municipal planning system.¹

The detailed plan should be based on the intentions in the comprehensive plan; the impact assessment in the detailed plan would then become a follow-up and specification of the comprehensive plan assessment. In some cases the detailed plan is used for only single projects, and the plan is then very similar to a project proposal, and its SEA thus comparable to a project-EIA. In other cases, the detailed plan may be a specification of land use and only the general impacts may be described, since the final use of the area is still open (Lerman, 1997). Although the detailed plan-SEA may be similar to a 'traditional' project-EIA, it has been pointed out that there is a big difference between the two, and they should not be confused: the detailed plan-SEA should describe the impacts of the regulations in the detailed development plan and not the impacts of a proposed project (Palm, 1997).

Knowledge is increasing, especially on matters concerning environmental aspects, and Boverket is currently analysing recent developments in the municipalities, where the current focus is on the municipalities' efforts to tackle the challenges of new planning and impact assessment requirements (Käärik, 1996; Jonsson and Palm, 1997).

Although municipal planning procedures are expected to be integrative and to function as 'host-procedures' to environmental assessments, existing planning procedures have been deemed inadequate for accommodating environmental impacts (Asplund & Hilding-Rydevik, 1996). Project-EIA methods have also often been declared ineffective to deal with larger scale or higher-tier activities other than projects. However, despite the shortcomings of existing planning procedures, the main premise is to carry out SEA within the municipal planning framework (Käärik, 1997).

In the 'new generation' of municipal plans, i. e. plans developed after the PBA amendments in 1996, innovative municipalities now present a variety of comprehensive plans. These new plans tend to focus on 'sustainable community development' as the ultimate goal; they present a range of alternatives for possible future developments; they may paint scenarios in order to encourage local, public discussions on future community development; and they may also try new approaches to both analyse impacts and present their consequences - encompassing environmental, social and economic aspects (Käärik, 1998). There is also increasing demand for the development of methods for social and economic impact assessment specifically adapted to a physical planning context (Svensson, 1998).

The SEA requirements are supported by a current Swedish project on Environmental Goals and Indicators in Physical Planning (Rönning, 1996; Swedish Environmental Protection Agency & National Board of Housing, Building and Planning, 1997). This project is carried out in close co-operation between Boverket and the National

¹ Other examples may be found for instance in sectoral planning for roads.

Environmental Protection Agency. A major revision of the national environmental goals is also in progress. Over the last few years, the regional (county) and local (municipal) authorities have adapted the national goals to regional /local conditions, and have defined, through bottom-up approaches, these local and regional goals. The three-year project (1997-2000) called 'SAMS' is partially funded by the EU LIFE-fund, and includes municipal and regional case studies on the application of environmental indicators in physical planning and SEA. Geographic Information Systems, GIS, are tested as support systems.

Early in 1998, cases in the following municipalities were available for review.

Lund municipality

The first example is ÖPL-97, a comprehensive plan of 1997 for the municipality of Lund in the south of Sweden. The strategic goals for the municipality are:

- Lund is to continue to develop and renew but not more than the municipality's long-term capacity allows
- Valuable environments and nature areas are to be preserved.
- The unique character of Lund as a small 'big city' is not to be jeopardised.
- The medieval town centre may not be exposed to more pressure than it can stand.
- Environmental thinking must be integrated in all planning activities.
- The municipality of Lund is to be an 'ecocycle society', with good management of common (public) natural resources (Stadsarkitektkontoret i Lund, 1997, p 2).

The plan includes two impact assessment documents describing the impacts at regional level and at municipal/local level. These impact assessment documents outline the ecological, economical and social impacts of the comprehensive plan. An SEA is thus a part of the wider impact assessment carried out. The regional level assessment describes the following environmental impacts, as well as the economic, social and traffic impacts of the plan (Inregia, 1997): environmental goals, large-scale environmental problems, management of natural resources, regional green areas.

The Municipal-level plan and its IA/SEA have somewhat different focus and contents (VBB, 1997) (Natural resources, Impacts on the landscape. Housing environment and circulation of materials, Green areas Traffic, Energy, Risks and vulnerability, Social impacts, Economical impacts, Environmental impacts). In the planning process, two other assessment documents have been prepared to be used as background material for the comprehensive plan. The first document, called 'A study of the expansion of Lund in a long-term perspective' (Stadsarkitektkontoret i Lund, 1996a), describes the impacts of different expansion alternatives. The other document is called 'Expansion of the municipality of Lund with minimised land-use conflicts' (Stadsarkitektkontoret i Lund, 1996b) and it discusses one specific alternative that in the long run will lead to the lowest number of land-use conflicts and negative impacts. When the comprehensive plan is to be adopted by the Municipal Council (later in 1998), these assessments, if they are part of the plan documents, will be formally adopted as well. However, the weight given to the

assessment in the decision making process will vary case by case, and by the intentions of the decision makers and politicians.

Helsingborg municipality

The new comprehensive plan, adopted in 1997, for the municipality of Helsingborg in the Southwest of Sweden outlines a strategy and a vision for socially, environmentally and economically sustainable development of the municipality.

The plan's focus is to develop a society where public transport dominates (over individual transportation), people live close by the transport (i.e. local train and bus) stations, and the green areas are important (Helsingborgs stadsbyggnadskontor, 1997a).

The strategic goals of the plan and the development of the municipality include:

- attractive housing environments and preservation and strengthening of the cultural heritage values,
- priority treatment for pedestrians and cyclists in both new and old environments,
- proximity to green areas for all residents,
- protection and development of existing urban- and housing environments with the municipality living up to its commitments as an 'eco-community' including sustainable development,
- adjustment to natural eco-cycles,
- protection of biodiversity,
- natural and cultural environments,
- increasing the accessibility in the municipality, within the region of Öresund and to other regions,
- the comprehensive plan to be well supported by the public.

The dialogue, the discussions and the process are as important as the final result (Helsingborgs stadsbyggnadskontor, 1997a).

The plan contains a separate document that describes the social, environmental and economical impacts of the comprehensive plan (Helsingborgs stadsbyggnadskontor, 1997b). The assessment document aims at providing an overview of the impacts. Being one of the first wide-scope impacts assessments in Sweden, it also serves as a test of methods and approaches. In the SEA the following environmental impacts of the plan are described: water, biodiversity, national interests, landscape, circulation of materials circulation (town and country), transportation, cultural heritage, other (Helsingborgs stadsbyggnadskontor, 1997b). Other issues are:

- Is natural circulation supported?
- Is the use of energy reduced/more effective?
- Is the use of materials reduced/more effective?
- Is there a change to renewable sources of energy?
- Is there respect for nature and its capacity?
- Is the biodiversity protected/is damage on biodiversity avoided?

- Are long-term health aspects improved or unaffected ?
- Is the 'precautionary principle' used?
- Is this alternative the most sustainable in the long run?
- Are important groundwater/surface water conditions unaffected?
- Is the environmental impact improved or unaffected?
- Is there a need for a preliminary environmental assessment?

The municipality has also adopted local guidelines for the work with SEA in comprehensive planning and in detailed planning.

Luleå

One of the municipalities where an environmental assessment enhancement programme has been prepared is Luleå in northern Sweden. In Luleå, a working team for SEA has developed check-lists for SEAs (for programmes, comprehensive plans, and detailed plans). These check-lists have recently been revised and adapted to current demands and decision-making tendencies (Sundström, 1997 and 1998). The check-list for comprehensive plan/programme level SEA in Luleå (Sundström, 1997):

- Is the use of energy reduced/more effective?
- Is there a change to renewable sources of energy?
- Is the use of materials reduced/more effective?
- Is there a change to renewable materials resources?
- Is the use of persistent compounds reduced?
- Are eco-cycles closed in a higher degree?
- Are the functions and the capacities of nature and eco-systems preserved?
- Is biodiversity preserved?
- Is the health of people preserved in the long-term?
- Is cultural heritage preserved?
- Is the community developing towards sustainability?
- Is the precautionary principle used?
- Is there a need for further environmental assessment work?

The following check-list was used for the detailed plans SEA and project EIA in Luleå (Sundström, 1997): ground- and substance circulation, water, air and climate, energy flows, flora and fauna, town- and landscape visual impact, technical infrastructure, health and safety, living, work/employment, services, traffic and communications, agriculture, forestry, fishery, cultural heritage protection, recreation, nature conservation, total energy use, use of renewable sources of energy, total materials use, use of renewable material, use of persistent substances, degree of closed ecocycles, the functions and capacities of nature, biodiversity, the community's total sustainability. The final question to be answered is: Is there any need for further environmental assessment work?

Gislaved

Another municipality with a programme for environmental assessment is Gislaved, in south Sweden. A planning tool for carrying out environmental assessments has been prepared. There are also municipal guidelines for the work with SEA and EIA.

A standard form which can be used for assessing the impacts of a plan includes the following aspects: Nature, Cultural heritage, Relics of antiquity, Social aspects, Economy/ industry, Health and safety, Aesthetics, The public welfare, Concluding impacts (Impacts recommended to assess in physical plans, in the working material of Gislaved(Abrahamsson, 1996)

Reftele in Gislaved

Another planning example is the In-depth Comprehensive Plan for Reftele, June 1996. Reftele is a small community in Gislaved municipality. The plan is a more detailed form of a comprehensive plan, and covers a smaller part of the municipality. The plan will focus especially future exploitation and traffic issues.

The impacts of the in-depth comprehensive plan for Reftele are described separately in an individual document. The purpose of the Reftele plan-SEA is to anticipate the impacts caused by changes in land use. In this plan-SEA, the municipality has made explicit statements on the development alternatives that may be realised and those which will not.

6.2 Interactions between tiers of assessment

In the available cases, the following interactions between tiers of assessment were identified.

Some comprehensive plan SEAs provide guidance for detailed development plan SEAs

The PBA states that the detailed development plan will be based on a Programme which indicates the starting point and objectives of the plan. In this programme, the municipality has to decide if the detailed plan needs an SEA. The programme can include the higher level of the comprehensive plan and its SEA.

The comprehensive plan SEA can facilitate lower tier SEAs and EIAs by throwing light on those issues and impacts the municipality considers important or significant. The SEA can also identify which impacts need more analysis. Moreover, the information in the SEA can be useful in conducting the SEA.

The comprehensive plan and its SEA often contain guidelines on whether, and where further impacts assessments need to be carried out in detailed planning or in subsequent development projects. The comprehensive plan for Lund includes, for example, the specification of municipal in-depth Comprehensive Plans containing SEAs for the stone-quarries and gravel-pits in the municipality (Stadsarkitektkontoret in Lund, 1997, p. 71).

The comprehensive plan-SEA for Helsingborg contains guidelines, earlier adopted by the municipality, for SEA and EIA. In this framework for SEA at comprehensive planning level and at detailed planning level, the municipality states that if the comprehensive plan provides a detailed description of a project and its impacts no other Programme is needed for the detailed plan. On the other hand, if the comprehensive plan does not provide detailed descriptions of the impacts an environmental assessment at detailed planning level will definitely be necessary. (Helsingborgs stadsbyggnadskontor, 1997b, p. 3).

The plan-SEA for Helsingborg outlines the environmental impacts of the plan. A matrix (described above) contains several questions on environmental issues. The purpose of these questions is to find out if the plan or an alternative will contribute to improved environmental conditions. One of the questions concerns the need to carry out preliminary environmental studies, specifically to be used in municipal (political) decision-making. In most of the alternatives there did indeed appear to be a need for further assessment work (Helsingborgs stadsbyggnadskontor, 1997b). It is, however, uncertain if additional and more detailed assessments will be carried is since the SEA results are not legally binding.

SEA guidance on alternatives at the lower tiers

The comprehensive plan can also serve as guidance on which alternatives should be examined in subsequent detailed planning SEA and project EIAs:

- The comprehensive plan for Lund contains information on alternatives to be considered in subsequent planning, for example, in a case concerning the re-location of a golf-course. The comprehensive plan requires that in subsequent planning it should be assessed, which of the two alternatives is the most preferable in a long-term perspective (Stadsarkitektkontoret i Lund, 1997, p. 67).

- The plan-SEA for Helsingborg contains information (as mentioned above) on alternatives to be analysed in subsequent planning. The municipal guidelines for SEA require a programme including an environmental assessment to be prepared in those cases when the detailed development plan counteracts the comprehensive plan (Helsingborgs stadsbyggnadskontor, 1997b, p 3).
- The environmental check-lists in Luleå contain information (as mentioned above) about alternatives that have to be analysed in subsequent planning.
- Another example of SEA indicating which alternatives are the most preferable is the in-depth comprehensive plan for Reftele in Gislaved municipality. This plan-SEA describes the impacts of several different expansion area alternatives. The assessment also provides suggestions for final decision-making. In several cases, it is suggested that particular alternatives should not be realised due to unfavourable geo-technical conditions, nearness to industrial areas, conflicts with national interests, and more (Gislaved municipality, 1996, pp 18-27).

The SEA can provide guidance on mitigating measures at lower tiers

The comprehensive plan may contain mitigating measures or alternatives:

- The plan-SEA for Lund contains mitigating alternatives. The regional-level SEA elaborates a particular alternative that implies Lund can choose a more cautious approach in its expansion. Since this alternative is meant to trigger discussions and is not a 'real alternative', no detailed description has been given. In the assessment it is stated that the impacts of such an approach would probably be to increase segregation in the region, and increase expansion strain outside the region (Inregia, 1997, pp 6-7).
- The local-level SEA (municipal comprehensive plan) for Lund outlines mitigating measures for different expansion alternatives. For instance, one specific alternative involving an expansion in the north part of the municipality implies that new buildings would be exposed to rough climatic conditions, which would in turn influence the housing environment, energy, and the need for heating. Mitigating measures for these impacts would be, for example, the use vegetation as a wind-shelter. Another example of mitigating measures in this plan is the designation of restricted areas along roads and railways aimed at minimising the risk of accidents with dangerous goods transports (VBB, 1997).

The SEA may reduce the alternatives considered at lower level

The comprehensive plan and its SEA are not binding and any alternative is still open for consideration at detailed planning level. The comprehensive plan is nevertheless the instrument containing the municipality's plans for the future. In the comprehensive plan and its SEA the municipality outlines the alternatives which fit in with the municipal

goals and intentions. At this planning level there should be a discussion about the desirability of an alternative / project / establishment in the municipality and if so, where. Alternatives or measures in detailed plans and in development projects which do not fit in with these intentions and the goals will probably not be realised. Moreover, if a detailed plan counteracts the comprehensive plan, this has to be mentioned in the detailed plan and has to be thoroughly motivated. Questions generally answered in comprehensive plans are:

- **wether:** Is this specific alternative/project of interest or value to the municipality? Should the municipality aim at execution of this alternative/project? Can the municipality deliver the requirements for this alternative/project? Can the demand (for the alternative/project?) be provided by other means?
- **where:** Are there one or several suitable places/locations? Which location/area is the most suitable?
- **how:** how should the alternative/project include the location in its design to achieve quality improvement and minimise the impact or damage on the environment and other interests? (Palm, 1997)

Therefore, although the comprehensive plan cannot (legally) limit the alternatives to be considered in detailed plans (and their SEAs), it can indicate what alternatives will satisfy the municipal goals and intentions and are therefore likely to be approved. Therefore it may indirectly limit the alternatives to be considered in detailed plans. In some cases, these limitations are based on environmental considerations, possibly inspired by the SEA: there are examples of comprehensive plans containing restrictions (although not binding) on subsequent planning. In the comprehensive plan for Lund, the municipality declares that it will not allow any big shopping-centres in the municipality due to increased traffic and the possible adverse impact on the character of the very old city centre. Other examples from the Lund comprehensive plan state the municipality will protect land- or water areas from activities that may potentially harm the natural environment. Furthermore, the municipality states that it will restrict land uses other than agriculture within high-quality agricultural land areas (Lunds stadsbyggnadskontor, 1997).

In general, however, tiering of issues in decision-making are limited because the municipalities which have drafted these 'new generation comprehensive plans' have not yet had time to prepare subsequent detailed plans which would be explicitly linked to the aims of the comprehensive plan. In some cases, the detailed plans 'seem to live their own life', as one municipal representative expressed it.

SEAs serve as guidance on impacts at lower tiers

Since the scope, i.e. impact assessment contents, is not regulated, the person (consultant or the municipal staff) preparing the SEA determines which aspects or impacts should be included in each specific case. Explanations are seldom given as to why certain aspects or issues have, or have not been included in the impact assessments. There is some

indirect information however, showing that SEAs may affect the type of impacts considered at lower tiers: the comprehensive plan-SEA for Lund states that an expansion in the northern part of Lund will not lead to negative impacts on the landscape. This could indicate that the impacts on the landscape would probably not be analysed further. However, the same expansion alternative would probably cause the development to be exposed to air pollution and high noise disturbances because of the proximity to major traffic routes (VBB Samhällsbyggnad, 1997, p 66). This could lead to further analysis of this specific issue in the detailed plan-SEA.

The SEA can therefore indicate that the impacts of a project may not be significant in certain aspects, which could then mean that the aspects in question will not be analysed in more detail in subsequent detailed plan-SEA. One reason why this does not appear to occur more frequently is that assessment questions and issues in municipal-wide comprehensive planning with rather unspecified goals such as 'sustainable development of the community', can be very different from those at the detailed plan level.

The spatial plan SEAs are mainly concerned with the total impact of many small activities

The purpose of the SEA in comprehensive planning is to describe the total impacts of the comprehensive plan and thus also the cumulative and synergetic impacts. The comprehensive plan often contains several different building areas, protection areas and so forth. In this way, an overview is provided, and the total impacts of several minor projects can be assessed.

This kind of overview is not possible at detailed planning and SEA-level (and project EIA level) as these plans or projects mostly involve limited spatial areas. If the cumulative impacts are analysed in the SEA, it can serve as guidance to the work with detailed plan-SEAs. Impacts that would not have been detected in the detailed plan-SEA may show that a project or a plan (together with other plans and projects) may or may not meet the intentions or strategic goals in the municipality.

The regional plan-SEA for Lund contains a concluding description of the impacts. In this description the municipality states, for example, that the exploitation areas would together require about 800 hectares of high-quality agricultural land. The consequences of this are not mentioned (Inregia 1997, p 59).

In the same assessment it is also stated that an increase in population, accounted for in the plan, will involve increased eutrofication and acidification problems. Together with the effluent and leakage of nitrogen from agriculture and traffic these effects will increase the need for specific measures against acidification and eutrofication (Inregia 1997, p 58).

The local plan-SEA for Lund also discusses the summarised impacts of the different exploitation areas, for example, impacts on the green areas ('the green structure') of certain alternatives. Some of the alternatives advocate a stronger requirement to plant

vegetation and create more green areas than other alternative exploitation do (VBB Samhällsbyggnad, 1997, p 9).

Transfer of knowledge and information

It is acknowledged in Sweden that the lower tier SEAs should benefit from the experiences at the higher level. For instance in Luleå the municipal council has recently supported an extensive 'Environmental assessment improvement package' encompassing both staff training and revised EIA and SEA materials (checklists, matrices), i.e. tools for the practitioners (Sundström, 1997 and 1998).

When an SEA has been prepared at the comprehensive-plan level, municipal staff should be practised in assessment work and methods and this should in time lead to increased efficiency and impact assessment quality improvements. It is, however, a prerequisite that the tiers of environmental assessment have been prepared by the same individuals. The Swedish case studies which were analysed did not, however, verify this; on the contrary the assessments are often prepared by different staff members or consultants at both levels.

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7 WIND ENERGY PLAN ZEELAND, THE NETHERLANDS

(Based on an interview with Ms. T. Westerhof of the Province of Zeeland.)

7.1 Situation

The first tier of this case study is the Structure Scheme Electricity Supply (SEV). Electricity supply in The Netherlands is the responsibility of regional Electricity Supply Companies, organised into the Association of Electricity Supply Companies (Dutch abbreviation: SEP). The SEP prepares an electricity supply plan every two years. This plan had to comply with environmental and spatial conditions, set by the national government in the Structure Scheme Electricity Supply (SEV). According to the Electricity Act 1989, the SEV must include decisions with respect to:

- the possible locations of power plants of 500 MWe or more;
- the suitability of these locations for utilisation of certain fuel types;
- the maximum capacity of a plant per fuel type ;
- permissible routes of power lines of more than 220 kV.

The SEV also included policies concerning:

- new electricity supply capacity with a horizon of ten years;
- environmental standards and targets for electricity supply until 2010;
- decentralised capacity and the trade-off between decentral and central combined generation of power and heat;
- capacity and site selection policy for wind energy.

The decision-making process of the SEV followed a procedure defined in physical planning legislation, the 'spatial planning key decision' (PKB). It required an SEA according to the EIA procedure. The preparation of the SEV formally started in May 1991 with the publication of the notification of intent for the EIA procedure, and a notification to Parliament. The procedure ended in 1994 with the approval by Parliament.

The main decisions in the SEV with respect to wind energy were:

- production target of 1000 MW of wind energy in the year 2000 and 2000 MW of wind energy in the year 2010. The Province of Zeeland, for example, was given a target of 250 MW.
- Regional, structure and local spatial plans must take into account the decisions made in the SEV. Because of the (potentially) small scale of the wind energy parks, the SEV did not actually select their sites. Site selection and design of the parks were considered more appropriate at the lower tiers of decision-making (provinces and municipalities).

The second tier is the Regional Plan (streekplan) of the province of Zeeland, which provides for a wind power capacity that legally required an SEA (according to the EIA

procedure). This SEA was still ongoing in early 1998. The SEA would contribute to the site selection of wind energy.

The third tier is the development of future individual wind energy projects.. Wind turbines first need an amendment of the Municipal Local Plan. After that, they also need an environmental permit.

7.2 Interactions between Structure Plan Electricity Supply, Regional Plan and wind energy projects

Cumulated impacts, streamlining

The SEV-SEA generically compared wind energy to other energy sources, looking at cumulative impacts at national level (e.g. noise, safety, emissions to the atmosphere). Different alternative scenarios for power supply, including wind energy, were compared. In the SEV, this resulted in a target for wind energy capacity development in the Netherlands, and the recommendation to consider only spatial impacts (site selection impacts) at lower tiers. The SEV stated: 'Projects requiring EIA could be focused on aspects relevant to the site selection. In this way, the SEA contributes to speeding-up of the permit application procedure for site selection and construction of wind turbines.'

This recommendation was followed-up in the regional plan SEA for Zeeland. This might, however, also have been caused by other, political, factors in the period between the SEA for PKB-SEV (submitted in 1992) and the SEA for Regional Plan (submitted in 1996) (e.g. political agreements).

Generic effects

The SEV-SEA also compared two alternatives for site selection for wind energy parks: a small number of large wind energy parks versus a large number of small parks (or individual wind turbines). Following on a generic assessment of spatial impacts (taking account of cumulative and synergistic impacts of the individual turbines in one park), the SEV recommended a de-concentration policy.

Site selection

Site selection itself was postponed to lower tiers, such as the Zeeland Regional Plan, which followed-up the guidance given in the SEV. The SEA for the Regional Plan was focused on the site selection of only small and middle-sized scale wind energy parks (15-20 MW).

The Zeeland Regional Plan-SEA, which had not been completed at the time of writing, studied the impacts of individual wind parks. The Province of Zeeland recognised that environmental issues also have to be considered at project-level. At the time of writing,

the Provincial authorities aimed at including environmental guidance in the Regional Plan for the development plans of individual wind energy parks. The SEA was to play a role in the formulation of these criteria. This guidance was expected to increase the quality and the efficiency of project decision-making, thus removing the need for project EIAs.

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8 POLICY PLAN DRINKING WATER SUPPLY (BDIV), THE NETHERLANDS

(Based on interviews with Mr. W. Cramer, Director of the Drinking Water Department of the Ministry of Housing, Physical Planning and the Environment, and Mr. H.J. Roelofs, project manager at WMN of the OEDI project.)

8.1 Situation

In the Netherlands, the Minister of Housing, Physical Planning and the Environment is responsible for a sufficient, safe and sustainable water supply. A national water supply policy was formulated in the (third) 'Policy plan drinking water and industrial water supply' (Beleidsplan Drink- en Industriewatervoorziening, BDIV). This is the highest tier of decision-making in this case.

Originally, the Ministry wanted the BDIV to be responsible for the decision-making about individual water production sites. The decisions were required to follow a legal procedure defined in spatial planning legislation, the 'spatial planning key decision' (PKB). An SEA was required for this type of decision. The BDIV was started formally in 1990 with the publication of the notification of intent for the SEA procedure, and a notification to Parliament. The procedure ended in 1996 with the Parliamentary approval.

During the PKB-procedure, the proposals were changed several times. The BDIV became more abstract than originally intended and it did not include as many binding statements for lower tiers. The finally approved BDIV included a proposal to amend the Water Supply Act; to reorganise the system of tiered decision-making.

The final BDIV included the following main policies:

- sustained priority for production of sufficient drinking water of good quality;
- continued strict requirements for drinking water production;
- enforcement of quality assurance and environmental management systems and procedures during production and distribution;
- curbing the increase of water demand in order to reduce the environmental impact of water supply with a mix of instruments;
- avoidance of natural areas in site selection to minimise impact of land use and soil dehydration;
- revision of the formal planning system for water supply (tiered system and methods for trade-off).

Provincial authorities are required to make a number of plans related to water management. In this case study, the Province of Utrecht is taken as an example. Its target, formulated, in its Water Management Plan, was to reduce soil dehydration by 20% in 2000. This target, and a number of related provincial plans, formed a framework for issuing and revising permits for water production facilities. The Water Management

Plan required no SEA, but it had environmental protection as one of its main objectives, and was set up in a public procedure. Little information is available, however, about the issues that were considered at that level.

This framework, included in the provincial plans of the province of Utrecht, had important consequences for the Water Supply Company Midden Nederland (WMN). By the year 2000 it was required to shift the intake of 15 million cubic meters of water from groundwater to surface water. The OEDI project, 'Bankfiltration, extraction and depth infiltration extraction project was set up by WMN to study this. The OEDI-project led to a number of proposals for water production facilities which required a permit and an EIA.

In order to improve the organisational efficiency and to improve the quality of the final decision, WMN conducted the EIA in three phases, asking the following questions:

1. *how*: assessment and decision with regard to water extraction methods
2. *where*: assessment and decision with regard to site selection for
 - a) extraction of bankfiltration,
 - b) infiltration and extraction of surface water and
 - c) reduction of present ground water extraction
3. *how*: assessment and decision with regard to the design of the selected sites (including mitigation measures, such as environmental management systems)

The intermediate decisions, after stages 1 and 2, were made internally by the WMN. Only the result and the overall justification were (in the form of permit applications and in the EIA), submitted to the provincial authority for approval. External parties were consulted in all three EIA stages. Several provincial departments, the Ministry of Public Works, the Association for Agriculture and Horticulture (GLTO) and several environmental protection bodies acted as a 'sounding board' for the intermediate EIAs and subsequent internal decisions. The OEDI-EIA started formally in August 1993. The final report was submitted in October 1996.

The WMN prepared the OEDI-EIAs for a number of water production sites in a larger area at the same time. There was no PPP associated with the EIA at that level, but it was associated to environmental permits decisions for seven production sites. Therefore, this EIA is in fact an SEA.

A similar EIA was prepared by the water supply company DZH in the Province of Zuid-Holland, on depth-infiltration in an ecologically sensitive dune habitat at the same tiering level as the OEDI-EIA of the WMN in Utrecht.

8.2 Interactions

Cumulative impacts

The SEA for the Policy Plan Drinking and Industrial Water Supply (BDIV) assessed the cumulative impacts of water production in the whole of the Netherlands. The scope of the SEA at this level included the following issues:

- scenarios for reduction of drinking water consumption;
- generic comparison of technical drinking water production systems, using 'building blocks', alternative chains of functionally linked activities (typical cases);
- these building blocks were used to develop scenarios for the development of new water supply facilities and their environmental consequences;
- this led to a comparison of building-blocks, based on criteria such as soil dehydration, public health, nature conservation, technical feasibility, flexibility and legal and organisational feasibility;
- assessment of environmental management systems of water production operations
- ecological management of natural areas (managed by drinking water companies as infiltration zones);
- revision of the tiered planning system in this sector.

The environmental assessment focused on the impacts on the water system and biodiversity, but many other large scale and local impacts were considered (e.g. energy use, waste production). At the second level, the OEDI-EIA, all the issues identified at the national level were again taken into consideration, but this time of course not in a generic way. The OEDI-EIA was used to make choices about concrete facilities.

Changing decision-making system

The interactions between the SEA and the OEDI-EIA have to be explained by the history of the case: many of the decisions that were originally intended to be made at the BDIV-level, were, in the end decentralised. The SEA became more detailed than intended. The national SEA generated a useful database of methods, knowledge and experience that could be applied in the OEDI-EIA (including, for example, a national GIS system with biodiversity in wetlands). This was unintended SEA spin-off. It offered no explicit framework or guidance for the lower tiers of decision-making. Various reactions and (political) consultation on the SEA persuaded the Ministry of Housing, Physical Planning and the Environment to compose a supplement to the SEA. The supplement announced the further development of standardised trade-off methods that could be applied by water supply companies. The method should contain the following tools:

- a set of (sub)criteria;
- a trade-off method (multicriteria analysis);

- drawing up an inventory for measuring methods for ecology and landscape criteria, and
- a measuring method for the calculation of impacts on the non-biological environment.

The SEA at the national level, as well as the OEDI-EIA, concentrated on cumulative and synergistic impacts of a large number of water production projects. The hydrogeological impacts of groundwater extraction may have impact on faraway wetlands. Each wetland is influenced by the cumulation and synergy of the effects of many wells. At both levels, a hydrogeological model of the area of influence (the Netherlands, and the province of Utrecht) was developed, and this was linked to an ecological model that could estimate the impacts on vegetation and biodiversity. Only in this way, could scenarios for trading-off technological systems be environmentally compared. At the national level, the assessment was more broadbrush, and at the provincial level, it was more detailed. One of the results of the national SEA was general acceptance that the provincial (or regional) level is the 'right' level for the environmental assessment of water production projects, since this is the natural scale of hydrogeological relationships. The competency of the provincial authorities should therefore be strengthened at the expense of national authorities. The BDIV included a proposal to amend the Water Supply Act, to reorganise the system of tiered decision-making. This proposal linked decision-making in the water supply sector with the environmental decision-making systems (regulations for environmental policy, SEA and EIA, and environmental permits). This was mainly the result of a general privatisation and decentralisation movement, but it was also believed to be better for the environment, as the SEA could support.

Internal tiering of the OEDI-EIA

The OEDI-EIA itself was internally tiered in three phases of decisions and assessment. In each of the phases, the WMN explicitly made use of the methods that had been developed in the national SEA. The main reason for this was that these methods were known and accepted (as a result of extensive consultations and participation at the national level). The internal tiers considered different issues:

- in the first phase all available technical systems were environmentally compared, using the 'building blocks' which had been developed at the national level. Bank filtration and depth infiltration were selected. (The technological systems that had been compared at the national level, had not become outdated, but a new system had been developed in the period between both tiers. Bank filtration was new, but it could easily be added to the existing set (the building blocks). At the same level, future water demand was assessed, taking account of options to reduce water demand;
- in order to clarify the potential new production sites selections, and existing ground water wells where extraction should be reduced (to maximise the benefit for wetlands in the area of influence), the EIA made use of evaluation criteria that had been formulated in the national SEA;
- detailed design of the facilities at the selected sites also partly made use of criteria which had been developed at the national level (e.g. environmental management

systems).

Reduced time and cost

The national SEA was therefore useful in many respects at the regional level. A number of methods had already been developed at the national level which increased credibility of the results. It also increased the efficiency of EIA preparation. This can be demonstrated by comparing this EIA with a similar EIA which was undertaken by the water supply company DZH in Zuid-Holland. In that case, the EIA procedure had started before the BDIV was available. It could therefore not make use of the methods that were developed in the SEA. In order to avoid the risk that the EIA would not be accepted, DZH spent much more time and effort on the procedure which finally took twice as long as the OEDI-EIA (article in Kenmerken, 2-96). According to the contact person, this difference is mainly explained by the benefits of the national SEA. The lessons learned at the national level improved not only the OEDI-EIA, but probably all other later EIAs in this sector.

The development of the SEA also gave a significant impulse to scientific discussions and research efforts. This process had a great learning effect in the area of hydro-geology and biology of wetlands.

The OEDI-EIA combined the EIAs of a number of facilities that needed individual project consent. In an article about the OEDI-EIA (article in Kenmerken, 2-96), suggestions were made to adjust the EIA Decree by removing the obligation to carry out an EIA for the design of the facilities, since these are sufficiently 'covered' by the environmental permit regime.

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