

EIA-methodology in the Netherlands

Views of the Commission for EIA

June 1994



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PREFACE

Since the introduction of environmental impact assessment (EIA) in the Netherlands in 1987 more than 500 EIA-procedures have started and more than 200 environmental impact statements (EISs) were reviewed. In the EIA-procedure in the Netherlands a special role is reserved for the national Commission for EIA as an independent advisor to the pertinent competent authorities. As the Commission for EIA is involved in each EIA-procedure, this Commission has accumulated much practical experience through the large number of advices on scoping guidelines and EIS-reviews submitted to the competent authorities concerned.

Institutions and individuals who are interested in the practical application of EIA in the Netherlands have frequently approached the Commission with requests for information in English about the EIA and the work of the Commission. As the Commission for EIA acts in a national context all advices as well as her annual reports are drawn up in the Dutch language and therefore they are hardly accessible to interested readers abroad. Hence, the need grew to prepare a number of papers in English on various aspects that characterize the EIA-situation in the Netherlands. This need became even more acute with the announcement of an EIA-summit in June 1994 in Quebec, Canada for which the Netherlands was also invited to participate. At the summit past experiences will be exchanged and desired future developments in EIA discussed. The demand for Dutch EIA information in English has resulted in the preparation and editing of a total of six papers which focus attention on various aspects of EIA and the role of the Commission therein.

Although in the main, these papers were drafted by a few members of the secretariat of the Commission, many secretariat workers contributed to the final preparation and lay-out of the papers.

As these papers were compiled over the past year, they show some overlap. However, they can be read well individually. Together, the papers present a fairly complete picture of EIA as viewed by the Commission.

Lastly, special attention is drawn to one particular paper, i.e. *Scoping alternatives in EIA*. By way of illustration, in an annex to that paper concise descriptions are given of ten representative EIA-procedures about activities ranging from infrastructural developments to gravel extraction and waste disposal at various levels of decision-making. Also, the related scoping advices for specific guidelines for the ten EISs have been translated. These ten scoping documents are not included in this volume. They can be obtained from the Commission by completing the enclosed order form and sending it to the secretariat of the Commission, P.O. Box 2345, 3500 GH Utrecht in the Netherlands, or by fax +31 30 331295.

Utrecht, 2 June 1994


Peter van Duursen
Chairman

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Independent reviewing in Environmental Impact Assessment in the Netherlands

Jules J. Scholten and Rob J. Bonte

SUMMARY

Environmental Impact Assessment (EIA)-systems all over the world have adopted several kinds of safeguards to achieve the objective of providing a balanced weighing of the environmental interest in the decision making process about activities which may cause considerable harm to the environment. Such safeguards are particularly needed in those cases where the competent authority and the proponent share a common interest and may tend to develop a preconceived opinion about the decision-making.

Safeguards may include:

- clarity about the field of application of EIA including exemption from the obligation to carry out EIA;
- scoping the activity with the objective to establish guidelines for each environmental impact statement (EIS);
- the requirement to develop and describe reasonable alternatives to the proposed activity;
- the requirement to describe all environmental impacts which may occur and may have an important bearing on the decision-making;
- public review;
- the requirement to substantiate in the decision's rationale which use has been made of the environmental information provided by the EIA;
- post project analysis;
- the requirement for mitigatory action in case of considerable more adverse impacts than predicted.

In most countries the application of all these elements or of a combination of several of these elements is deemed to be sufficient. A few countries have created in their EIA-systems an additional guarantee in the form of a special role for independent expertise to judge the completeness, the scientific value and the impartiality of the EIS. In this manner, the Netherlands has granted formal status to a Commission for EIA in its national legal framework. The function of this Commission is based upon the principles concerning expertise and concerning independence from the activity and the decision.

In two stages of the EIA-procedure, which is linked to the licensing- or an other existing decision making procedure, the Commission advises to the competent authority. After the publishing of an initiator's starting document, it is obligatory for the competent authority to seek the advice of the Commission on the guidelines for the Environmental Statement (ES). Subsequently the ES is drawn up by the initiator. When it's finished, it's published by the competent authority and the review stage starts. Apart from the public review it is obligatory for the competent authority to seek the advice of the Commission.

The advices of the Commission must be carefully balanced. They must refrain from any possible policy implications which impinge on the viability of the proposed activity. Therefore, the advices concentrate on the correct application of the scientific state of the art to the EIS. The role of the Commission for EIA has become accepted in the Netherlands. In order to maintain its position of trust, the Commission must watch continuously the quality and consistence of the advices. The Commission has noted that in about thirty percent of the EIA-procedures which have been concluded with a decision so far, supplementary information was provided due to the review by the Commission. The Commission is currently reviewing which criteria were applied to call for supplementary environmental information. This took place when such information was deemed indispensable for the competent authority to make a sound decision.

INTRODUCTION

Since its inception more than 20 years ago in the USA, Environmental Impact Assessment (EIA) has become accepted in many countries all over the world where it is carried out to support the decision-making about activities which may have seriously adverse impacts on the environment. Therefore, the aim of EIA is to fully weigh the interest of the environment in the decision-making, however without the insistence that this consideration should automatically lead to decisions which must be friendly to the environment.

From the beginning of the introduction of EIA, ways and means have been looked for to achieve this aim of balancing the environmental interest in the total make-up of issues and concerns. It was noted that the process cannot fulfill its promise if the competent authority and the proponent share a common interest in realizing the proposed activity according to a preconceived arrangement. This risk arises particularly when the competent authority also acts as the initiator for the activity. Thus, safeguards in the EIA-procedure and in the substance of the EIS are necessary to minimize the risk of sweetheart statements which only present a token interest in the environment. These safeguards may include:

- clarity about which decisions for which activities must be made with the application of EIA; this also includes clarity about the field of application of exemption from the obligation to carry out EIA in order to avoid misuse of the exemption clause;
- scoping the activity with the objective to establish project specifications for each environmental impact statement (EIS);
- the requirement to develop and describe reasonable alternative solutions to the proposed activity including alternatives which are friendly to the environment;
- the requirement to describe all environmental impacts which may occur and may have an important bearing on the decision-making;
- public review;

- the requirement to substantiate in the decision's rationale which use has been made of the environmental information provided by the EIA;
- post-project analysis;
- the requirements for mitigatory action in case of considerable more adverse impacts than predicted.

In most countries combinations of the safeguards mentioned above are considered to be sufficiently effective. In some countries however, they were found to still fall short of the objective to fully neutralize a potential tendency towards preparing "sweetheart statements". These countries introduced a special role for independent expertise to judge the completeness, the scientific value and the impartiality of the EIS. In this paper the first legal framework for the Commission for EIA will be discussed, subsequently the working method and its principles are described. Finally some experiences are summarized and quality criteria are given.

INDEPENDENT REVIEWING AS QUALITY CONTROL IN EIA

Legal framework

The Netherlands is one of those few countries where a Commission for EIA was created to see to it that each EIA may achieve its aim of providing sufficient environmental information to enable a sound decision-making. In two stages of the EIA-procedure, which is linked to the licensing- or an other existing decision making procedure, the Commission advises to the competent authority. After the publishing of an initiator's starting document, it is obligatory for the competent authority to seek the advice of the Commission on the guidelines for the Environmental Statement (ES). Subsequently the ES is drawn up by the initiator. When it's finished, it's published by the competent authority and the review stage starts. Apart from the public review it is obligatory for the competent authority to seek the advice of the Commission in this stage.

On both occasions the Commission takes good note of the remarks and comments submitted by the public. These remarks and comments are incorporated in the advices. The advices of the Commission are not binding but they have become highly influential. The advice on the project specifications for the EIS during the scoping phase is usually made in the form of draft-specifications which in most cases are more or less entirely adopted by the competent authority in establishing the specifications. During the preparation of the EIS, commonly there are contacts between the proponent, the competent authority and the secretariat of the Commission.

The secretariat may, in a few particular cases, comment on drafts of the EIS, sometimes involving some experts of the working group. When the EIS has been completed for the formal and public review, the Commission is requested to study the document using the specific guidelines issued for each EIS and

environmental standards as bench marks. The Commission's review does not judge the acceptability of the proposed activity. It only discusses the completeness and substance as well as the correct application of the scientific state of the art to the EIS. Towards the end of the review, the Commission invites the competent authority and the proponent to discuss a draft of the advice. In this draft the Commission's view points out whether the EIS provides sufficient information for the decision or not. If the information is deemed to be insufficient to support a decision, in most cases the competent authority instructs the proponent to supply additional information or to rework the EIS. Although the competent authority may ignore a negative advice of the Commission and go ahead with the decision-making, this is mostly not done because the Commission's advice can be referred at in appeals against the decision.

Working method

The Commission does not convene plenary sessions, but acts through small working groups for each individual EIA. The legal framework stipulates that the Commission (e.g. the chairman on the recommendation of the secretariat) has the privilege to compose its own working groups of experts. Once a working group is formed, its composition is communicated to the competent authority and the proponent are only allowed to question the composition if they have good reason to doubt the impartiality of one or more experts relative to the activity or the decision for which the EIA is executed. If there appears to be a solid case for objection, the Commission usually takes action and replaces the challenged expert.

It has been recognized that the Commission's privilege to compose its own working groups of experts is a prerequisite for her independence.

Each working group is chaired by the chairman or by one of the deputy-chairmen. The chairman of a working group must see to it that the experts focus their attention on the essential environmental issues of the project concerned. A technical secretary is assigned to each working group. This person is responsible for the management aspects as well as the development of drafts of the advices on either project specifications or the EIS's review. The chairman and the technical secretary observe the deadlines and see to it that the advice is submitted within the legal timeframe. The experts are paid for their services professional fees which are calculated on the actual time spent on the consultation. The fees are substantial^{1]} but they do not quite match the professional fees which are usually charged by first class consultant firms for their senior advisors. However, most experts working for the Commission's working groups readily accept the Commission's fees on personal title as it is important to most of them to be associated with the prestigious membership of the Commission. The Commission has its own budget^{2]} and is located in Utrecht, which is in the geographical centre of the country and at 60 km from the seat of the central

- 1 About 360 pounds (1200 guilders) per day for those experts who hand over their fees to their employers and about 150 pounds (500 guilders) per day for those experts who carry out the work in their own time and keep the earnings for themselves.
- 2 For 1993 the total budget amounted to about 4.500.000 guilders or 1.300.000 pounds. The advisory work per advice costs an estimated 25.000 guilders or 22.000 pounds. This is an all-in figure including the experts' fees, the secretariat's expenses and salaries and the chairmen's allowances.

government in The Hague. The site in Utrecht underlines its independent position away from the central government.

Principles

The Commission is founded on two principles: expertise and independence. Expertise is found to be present with all other parties in the decision making process: the competent authority, the proponent and the public. However, it is the combination of expertise with a position of independence which allows the Commission to observe and review all environmental information unbiasedly. In order to achieve these ends, the Commission has been granted formal status in the national legal framework; it has a presidium consisting of a chairman and several deputy-chairmen and a secretariat which includes at the moment about 24 staff members of which 12 technical secretaries. The Commission has about 200 members and about 200 advisors who are experts in all environmental fields ranging from air-, soil- and water pollution to ecology, hydrology, geology, archeology, radiation, noise nuisance and visual landscape impacts. The Commission also includes expertise on the technical and physical planning aspects of the activities which are the subject of EIA. In addition, the Commission can call upon experts with disciplines in the fields of environmental law, social psychology, environmental economics, land reclamation and consolidation, transportation, waste disposal, energy generation and consumption, environmental health etc. In short, the Commission is able to field any expertise required in any EIA. When specific expertise is not readily available amongst the members and the advisors, new advisors can be called upon. If the expertise is not available in the Netherlands, experts from abroad can be invited to participate in the advisory work. Due to language requirements, the search abroad initially focuses on Belgian experts mastering the Dutch language.

Experiences

An examination of all EIA-procedures shows that in 30 % of the projects where the EIA-procedure has already advanced to the actual decisionmaking^{3]}, additional information was supplied. The experiences so far suggest that the role of the Commission occupies an important position in the decision-making's progress not only by strengthening the quality of environmental impact prediction but also through the introduction of new alternatives in the process. The advices of the Commission must be carefully balanced and be aimed at the substance of the EIS. They should refrain from any possible policy implications which may impinge on the viability of the proposed activity. This means that the Commission must watch continuously the consistence and quality of its work.

- 3 At the end of 1993 the total number of EIAs in the Netherlands which have advanced to the decision making stage, amounted to 180. For 116 of these projects the decision has been taken. Since the introduction of EIA 460 projects started with EIA.

Quality criteria

The Commission is currently reviewing which criteria have been observed when calling for the provision of additional environmental information. Such calls are made when the additional information is deemed indispensable and therefore crucial, for the competent authority to make a sound decision. It appears that additional information must be considered indispensable at least if one of the following cases apply:

- In the selection process of viable **alternative solutions** environmental aspects were **not or only insignificantly considered**. This happened for instance in the site selection for contaminated dredged sludge disposal in the province of Zeeland. Selection took place by taking into account mainly financial and physical planning considerations.

- Amongst the alternatives, the legally required **alternative which offers the best protection to the environment**, is **insufficiently elaborated**. This may be a matter of site and/or implementation such as best technical practices or mitigating measures or combinations of these. Examples can be found in EISs on sanitary landfills where the proposed drainage system does not guarantee the long-term prevention of groundwater pollution.

- Sometimes, the **extent and scope of an activity has been miscalculated** with the result that certain environmental impacts have been underestimated or, even worse, overlooked. The plan for a new football stadium in the city of Arnhem miscalculated the parking space requirements for cars and busses.

Consequently, additional parking space had to be found and the corresponding environmental impacts described in terms of space, extra traffic movements, noise nuisance, hindrance to nearby residential areas, etc.

- During the review, it may appear that certain special and **sensitive elements** in the environment of the study area **have been overlooked**. In such cases, an additional impact description is required plus consideration of mitigating measures in the framework of the alternative offering the best protection to the environment. This may involve for instance more detailed hydrological modelling and a modified design and lay-out. A pertinent example can be found in the case of a licence-application for a sand and gravel quarrying activity in the southern part of the country where public participation provided proof that in the project area certain endangered species have their habitat.

- In certain EISs the environmental impacts are described exactly according to the existing standards whereas it is clear that **considerable environmental impacts also occur beyond the standards**. This is in direct conflict with the intention of the EIA rules and regulations which require all substantial impacts to be described regardless the levels of existing standards. A famous case in point can be found in the EIS for an extension of the regional airport near Maastricht in the province of Limburg with regard to air traffic noise. The result was that over a period of three years two

additional EISs had to be prepared and subjected to public review. The first two EISs for the proposed construction of a new runway did not quantify the still considerable impacts which occur beyond the current legal noise standard. Moreover, the EISs did not specify the impacts on sleep disturbance by night-flying. The latter issue led to the development of a new provisional standard on the basis of scientific literature and experimental studies. In this case the decision has still not been made.

- In other cases, the prediction of environmental impacts was done with the application of outdated models, sometimes using **insufficiently detailed baseline information**. Most examples can be found in below standard hydrological modelling. In addition, it often appears that the impacts of changes in the hydrological system as predicted by the hydrological model, are not extended to changes in the ecosystems. Then, the Commission must note that an entire scientific discipline, i.e. ecohydrology, has not been involved in the study.

Conclusion

The Commission intends to continue this review of its advisory practices when to recommend the provision of additional environmental information with the aim of developing a consistent performance which must avoid superfluous calls for supplements which unnecessarily delay the decision-making process.

The Commission is the only institution participating in all EIA-procedures in the Netherlands. Consequently, every move of the Commission is watched and commented upon. Recently, a seminar was held where government officials reproached the Commission to encroach upon policy matters. At the same seminar environmental pressure groups indicated that the Commission restricted itself too much to matters of scientific interest. To the Commission such comments from opposing sides are reassuring signals that for the moment the balancing act between policy matters and factual information is held rather well.

Effectiveness of environmental impact assessment in the Netherlands

Jules J. Scholten and Marja van Eck, with contributions of colleagues.

INTRODUCTION

Since the introduction of environmental impact assessment (EIA) in the Netherlands in 1987 more than 500 EIA-procedures have started and more than 200 EIA-procedures were reviewed. They range from policy decisions about e.g. the national electricity policy plan to project licensing for e.g. highways and waste incinerators. Hence, considerable experience in the application of EIA has been gathered. Since 1987 several attempts have been made to assess the influence of EIA on decision-making. This was not easy as often the impact of EIA on the decision is dominated by political, financial or economic considerations. In this paper a broader view is adopted in that it attempts to identify a range of positive contributions of EIA to the entire process of decision-making. If EIA has a positive influence on the process either directly or indirectly, it is considered effective: EIA effectiveness has many faces. If an activity is carried out in an environmentally more friendly way than originally proposed, this may be regarded as a direct effect of EIA. This is also the case, if the timely recognition of unacceptable adverse environmental impacts leads to cancellation or postponement of an activity. Some features of effectiveness are more indirect. EIA can lead to environmentally more friendly decisions in the future, to improvement of environmental regulations, to new environmental research, to a grown environmental awareness or to faster procedures. All these kinds of effectiveness have occurred in Dutch practice. The various forms of direct and indirect influence are listed in the following table.

direct effect	indirect effect
environmentally more friendly activity, also including - mitigating measures - improvement of environmental situation - compensating measures postponement or cancellation	influence in the long run improvement of regulations incentive to structural research internalization of environmental awareness objectification, streamlining procedures

In this paper many examples are given in the form of very short stories introduced by catch phrases each related to a sequence of true events. The paper concludes with a brief analysis of those conditions that enable the effectiveness of EIA: legal EIA regulations, rational and open decision-making including room for public participation, project EIA sustained by strategic EIA, scoping, independent reviewing and quality EISs.

DIRECT EFFECT OF EIA

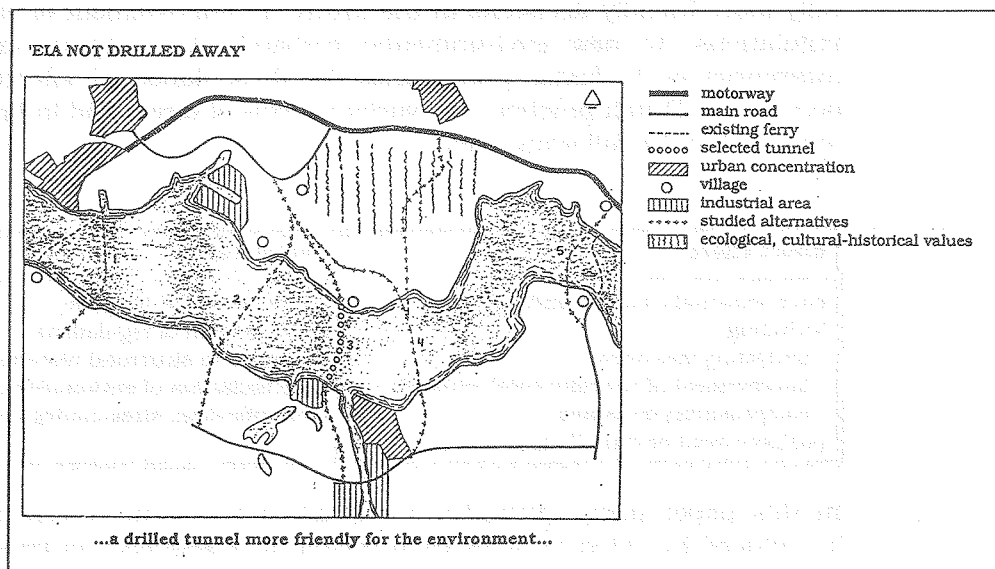
Environmentally more friendly activity

An EIA project, that started before implementation of the EIA regulation, lasted several years, but after all, everyone agrees that EIA led to drastic improvements in the plan.

'Launching a housing area'

A city wants to create a housing area in a nearby lake necessitating land reclamation. Through EIA several problems become clear. First of all, an adjacent polluted area must be cleaned up, as it imposes an unacceptable health threat to future residents. Safety analysis points to sand filling as best means for reclamation instead of impoldering. In order to diminish the required amount of sand, areas are selected, where a sandy Pleistocene substratum lies close beneath the surface. For the design of the area two models are developed: a mobility model with priority for public transportation and slow traffic and an ecological model with priority for ecological zones and water management (self cleaning reed marsh). In the final design elements of both models are combined.

In situations, in which an environmentally favourable solution has other (financial) advantages, the environment is more likely to be regarded in the decision-making. In 'win-win-situations' politicians are less apt to dispose of the environmental interest as 'just one' of the factors that plays a role in the decision-making. Although it is often thought, that environmental and economic interests do not match, this is not always the case.



'EIA not drilled away'

In an EIS for a permanent cross-river connection a bridge and a sunken tunnel on the bottom of the estuary are compared as the implementation alternatives. The EIS describes the environmental impacts of several crossing sites and of the two technical implementation alternatives. The EIA Commission points out that a drilled tunnel might be more

friendly to the environment. The suggestion of the Commission is being discarded as 'technically and financially unrealistic'. When contractors only quote for drilled tunnels, being cheaper, the EIS is adapted. This implies that the decision about the implementation will be readjusted.

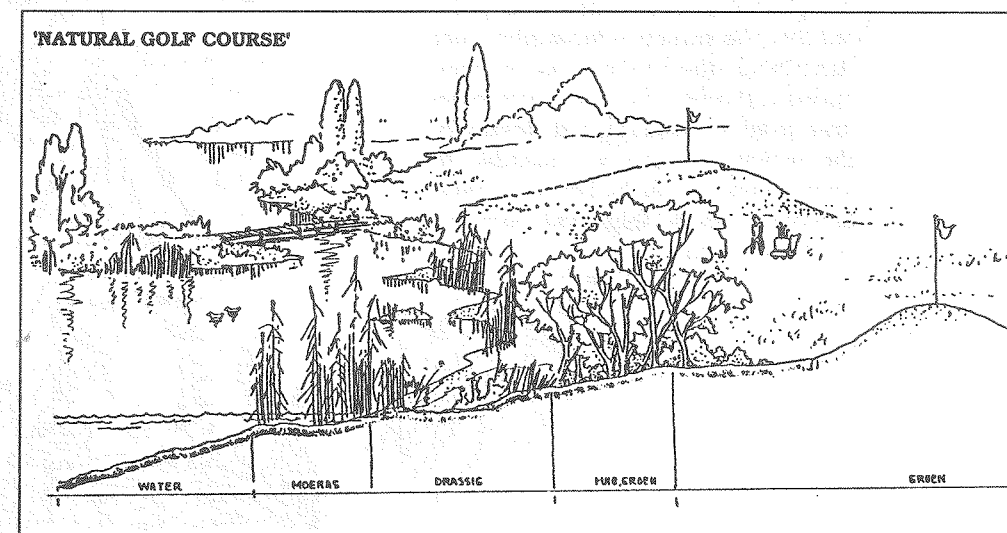
'Sludge gain'

For the storage of a large quantity of polluted dredged sludge a depot must be built. The EIS presents four possible lay-outs. Through public participation and the review of the independent EIA Commission a new possibility comes up. By shifting the depot slightly further away from a nature conservation area and deepening it, the environmental impact is much less. The politicians select this alternative to be carried out. In the end, it even turns out to be less costly than the originally proposed design. Moreover, extra measures are undertaken to compensate the remaining loss of nature values like the construction of a small island bird sanctuary with sand deposits excavated from the site of the depot.

Recreational projects tend to be planned in valuable nature areas, as these are regarded to be attractive. EIA often succeeds in re-locating these projects to less vulnerable areas or in proposing a design, that enhances instead of diminishes the existing values.

'Natural golf course'

In the design for a golf course in a valley the developer decides to restore the original course of the brook and the original groundwater level in the environmentally most friendly alternative. Threatened marsh and brook vegetations get new chances and golf can be played in 'exclusive natural' surroundings. The club-house is constructed on poles in a marsh area.



Win-win-situations will not always occur, but still, the environment can be regarded, when through EIA politicians become more aware of the environmental impact of an activity.

Industrial area-in-development'

The lay-out for an industrial area is planned in good interaction with an EIS being drafted. Assumptions are studied for the types of industry to be permitted. As the environmental consequences become clear, the municipal board chooses against licensing installations with severe environmental nuisance ('A-installations'), while before, this was out of the question. Two parts of the original area turn out to be less suited for industrial settlement and are allocated to other destinations. Much attention is paid to the ecological landscaping. Through EIA a quite different design is achieved, than originally foreseen.

When environmental impacts are unavoidable, through EIA compensation can be required.

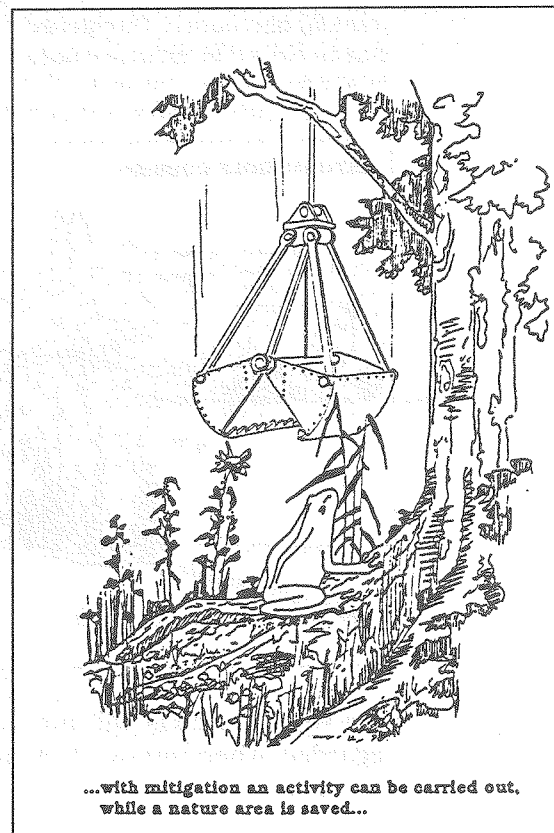
'Take and give water'

A water company wants to expand the capacity for water collection in a particular area. The competent authority accepts the submitted EIS under the restriction that the company will have to show in the license application, how the negative impacts for nature and landscape will be compensated. The company commissions a consultant to develop a proposal.

Neglecting the environmental interest does not always result from a deliberate action. It can also be caused by ignorance about relevant information, that can be remedied by EIA.

'Mining gravel, saving frogs'

EIA is carried out for a gravel borrow pit. The EIS contains amongst others a survey of existing valuable ecological elements. Local residents point out that the survey is incomplete, not describing the habitat of a rare species threatened with extinction (tree frog). In an adapted design of the activity it appears possible to save nature values by constructing a bentonite screen, while still carrying out the activity.



'Wet feet for the environment'

A municipal board proposes EIA for the construction of a housing area and decides to skip EIA for the site selection with the argument that the site selection is simple and clear. The selected site seems to spare two rare wet heather vegetation areas, which is an explicit political objective. The Commission requires a hydrological study to be carried out, as preparing the site for building might influence the level and quality of the ground water in the nature areas, thus threatening them in their existence. The study proves that major parts of the area can not be used for construction, unless several mitigating measures are carried out (two different sewerage systems, infiltration of rain water, houses without cellars). On the other hand a minimum number of houses is needed to support a new public transportation system for the city. Although the decision in this dilemma is not yet taken, EIA can already be regarded as a success, as it brought forward useful information for the decision-making.

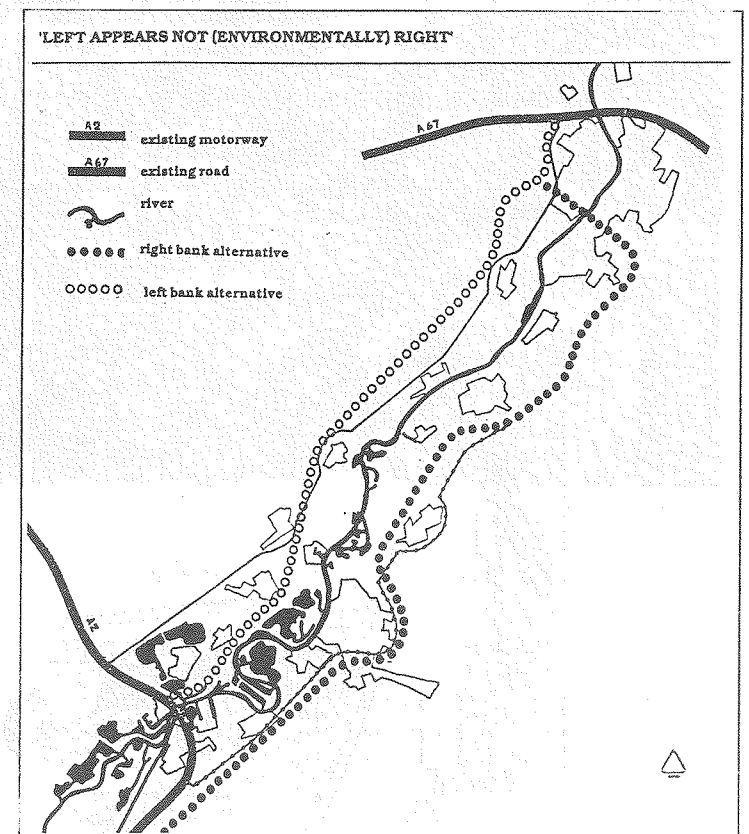
Sometimes, EIA highlights the consequences of earlier decisions opening the way for a reconsideration.

'After all, left appears not (environmentally) right'

For the connection between two motorways there are two possible solutions: a route on the left or on the right bank of the river. In 1985 the Minister For Public Works decides to construct a new motorway on the right bank. The debate seems closed, until, in 1992, EC regulations force the revocation of the decision in order to carry out EIA first. A 'dynamic' EIA procedure is started. The EIS is completed in nine months including several public hearings and a summary for the public. In this way the results of

public participation are incorporated in the EIS on forehand. Thirteen possible alternatives are compared varying from doing nothing, to better public transportation, local minor reconstructions, or motorways on either side of the river. The conclusion is that solutions on the left bank are environmentally more favourable and solutions on the right bank cheaper and more suited to accomodate traffic movements.

Through EIA the choice is clear. The minister decides again in favour of the right bank. Certainly appeals will be made against this decision referring to the EIS.



In some situations, in reviewing EISs it is noted that important matters as legal safety precautions are overlooked.

'Explosion risk for forgotten dwellings'

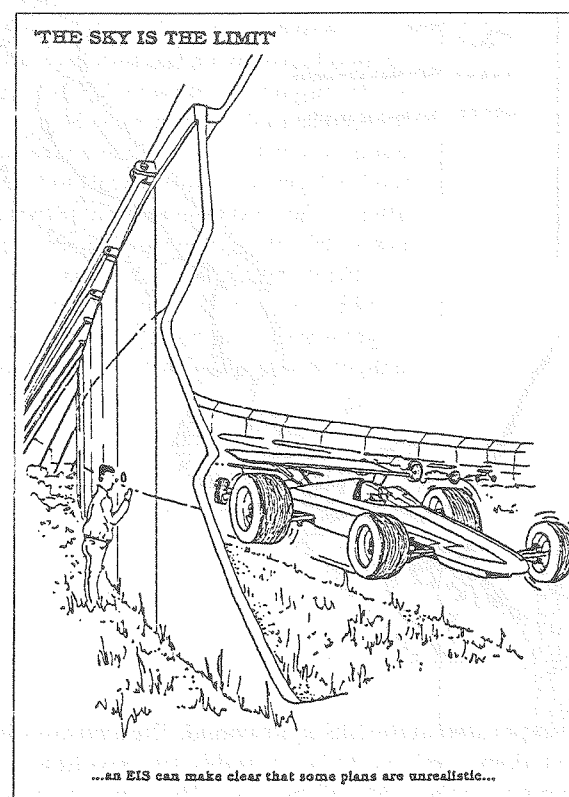
In an EIS for a shredder installation the existence of business dwellings at the industrial area is not noticed. The license application does not account for the legally required protective measures against explosion damage. Due to the review of the Commission this shortcoming is remedied.

'Parking perils'

In reviewing an EIS for a stadium, it appears that the plan does not provide for the required space for parking facilities, causing possible parking nuisance in the neighbouring residential areas. Consequently, the activity is expanded with extra parking facilities, that are laid down in a new land allocation plan.

Postponement or cancellation

EIA not often causes cancellation of a proposed activity. Most cases occur in the recreational sector, where the 'general public interest' is less easy to prove.



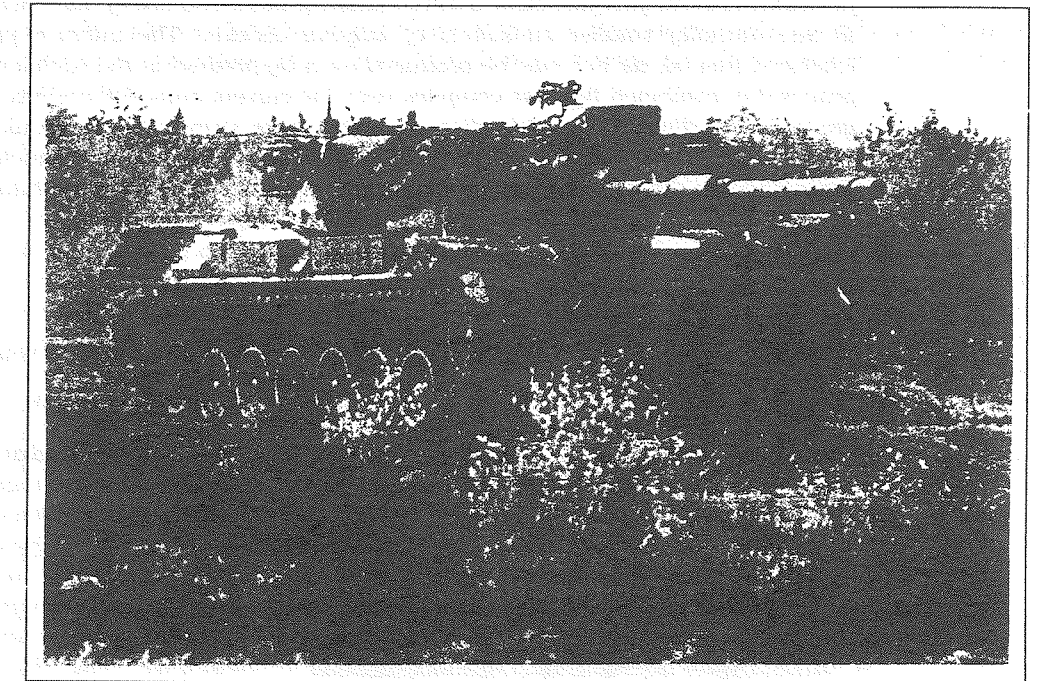
'The sky is the limit'

In an EIS for the expansion of a racing circuit it appears, that the only way to operate the circuit on the actual location in accordance with legal standards for noise hindrance, is to build noise barriers of 17 meters high. The expansion is not carried out.

Also in a few other cases the adverse impact is so distinct that it tips the scale.

'Not free for all'

A military exercising ground is planned in a nature area with forest and heather. One part is a 'free for all area' for tracked vehicle training. A substantial part of the forest must be cleared. The EIS shows that the area contains not only valuable vegetation and a rich wildlife, but also geomorphological and archaeological interesting elements. In the public participation there are many objections against the plan. Subsequently, the initiator decides to withdraw the plan. Surely, the improved military and political east-west relations in Europe facilitated the decision, after all.



Sometimes, the initiator can decide to consider other possibilities:

'Other energy'

In reviewing an EIS for a powder-coal fired power station the Commission indicates that there is not enough attention for alternatives like importation of electricity, maintaining existing power stations or the 'total energy' principle. The debate over the power station becomes a political 'hot issue'. At last the Minister decides to stop the planning of the power station and to consider the alternatives. Although EIA was not the main influence, it surely contributed to the discussion.

INDIRECT EFFECT OF EIA

Influence in the long run

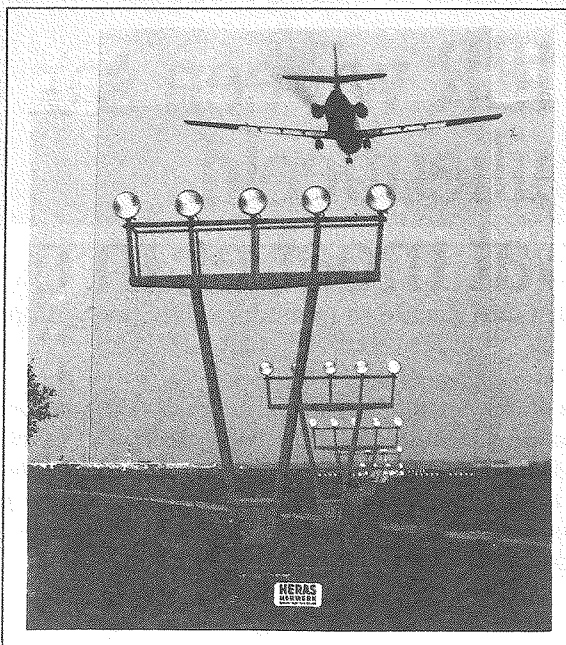
It is not always possible to carry out the best solution for the environment on the short term. Some solutions require more time.

'Temporary fuel'

An EIS for a distillery for mineral oils compares different fuel alternatives for the furnaces: natural gas, fuel oil or a combination of both. The use of natural gas will result in substantially smaller emissions of sulphur dioxide. The initiator prefers to use (cheaper) fuel oil, as this can be produced as a by-product in the distillery. As the EIS proves that combined fuel use complies with the current emission criteria, the license is granted according to the application. Applying more stringent rules would have meant inequality of justice with regard to the other companies in this branch of industry. Strengthening the rules for the total branch may be considered in the future.

Improvement of regulations

The influence of EIA can cover a wider range than the activity itself.



'East, west, standard a jest'

A regional airport wants to expand with the construction of a new east-west runway. In the new situation the airport will be used more frequently, also for night flights. The EIS describes the expected noise hindrance only up to the legal limiting value and not to the target value, while everyone knows that the limiting value is not too stringent and does not deal with the effect of sleep disturbance by night flights. For this reason the EIA Commission finds the EIS deficient. When the initiator does not take the criticism seriously, the Commission itself commissions a study into this matter. As a result the EIS is supplemented as required, describing the hindrance up to the target value starting a process for developing a

standard for hindrance of night flights. Consequently, new national regulations about noise nuisance by air traffic become operational.

'Smell with two yardsticks'

In judging an application for exemption of the obligation to carry out EIA by a compost company the problem arises that the results of different olfactometers (odour indicators) diverge widely. There appears to be no proper test against the set criteria. By 'ringtests' and the establishment of criteria for standardisation of olfactometers the reliability of the measuring results are highly improved. This development is also started in the European Union where the Dutch method is used as a model.

'Better landfilling'

EIA frequently has been carried out for controlled disposal sites. In reviewing the published EISs the EIA Commission often wondered, if a simple bottom lining with foil would suffice. As a result a debate started about the standard requirements for landfilling in the 'Richtlijn gecontroleerd storten' (Guideline controlled landfilling). In a new Decree 'best available techniques' (double bottom lining and drainage) are prescribed for new sites.

EIA also caused improvement of traffic prediction models.

'Independent freight traffic'

In an EIS for a cross-river connection the prediction of freight traffic is based on a fixed percentage of the total traffic. The Commission considers more advanced models desirable, because of the difference in environmental impacts between freight traffic and passenger traffic. The remark is repeated for other projects and becomes more urgent, when a new accessibility policy requires separate data of both types of traffic. The Minister of Public Works replies to one of the reviews of the Commission: 'The objections of the Commission to the traffic prediction models led to the introduction of new models. I assume that in the next EIS your objections will be met.' This is exactly what happened.

Impetus to structural research

In all EISs it is required to describe, which relevant gaps of knowledge remain for the decision-maker. Although, often EIA can be based on already available knowledge, sometimes an alarming lack of information becomes apparent.

'Safety matters'

In EISs for activities, that lead to emission of toxic substances, the impact to human health is often unknown. Particularly in the case of exposure to several emissions (different toxic materials, noise, odour) health risks are hard to define. The problem recurred in several EISs, for instance for airports near residential areas. As a result new research programmes on this subject are started.

'Cumulation limits'

EIA is carried out several times for the establishment of large industries in a new big industrial site. Although each EIS describes the emissions of each individual establishment, no one keeps an overview of the total environmental impact of the site. The Commission expresses its concern over this situation to the competent authority, who commissions a study about the cumulative effect of all emissions.

Internalization of environmental awareness

People that have become acquainted with EIA, have come to appreciate its advantages. One of the major oil companies applies EIA principles to all its policy decisions by doing internal environmental impact studies. Also influential governmental organisations like 'Rijkswaterstaat' (Public Works Office) and 'Landinrichtingsdienst' (Land Reform Office) have learned to use EIA in a constructive way, in spite of earlier resistance ('did we do wrong before?').

'EIA at home'

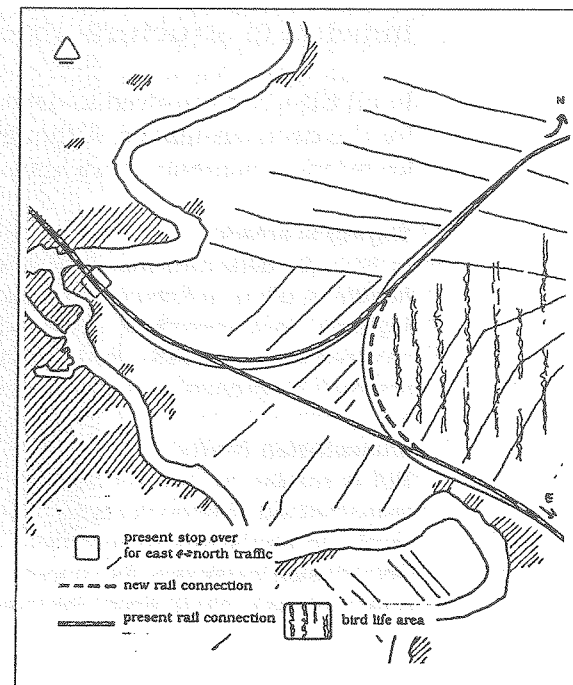
A provincial government frequently contracts consultants for the compilation of EISs. The provincial planning office is opposed to EIA. Consequently, the provincial government decides to commission its own civil servants to draft an EIS, as an experiment. Promptly, a good EIS is written in cooperation between the planning office and the environmental department. The planners are immediately confronted with the environmental impacts of their design decisions. The review of the EIA Commission confirms the quality and objectivity of the content of the EIS. The planning office has become less reluctant towards EIA.

Objectification and streamlining procedures

When the initiator and the competent authority deal with EIA correctly, EIA also can influence other parties in a positive way. While EIA leads to clear, objective information about a proposed activity, the decision-making is less controversial.

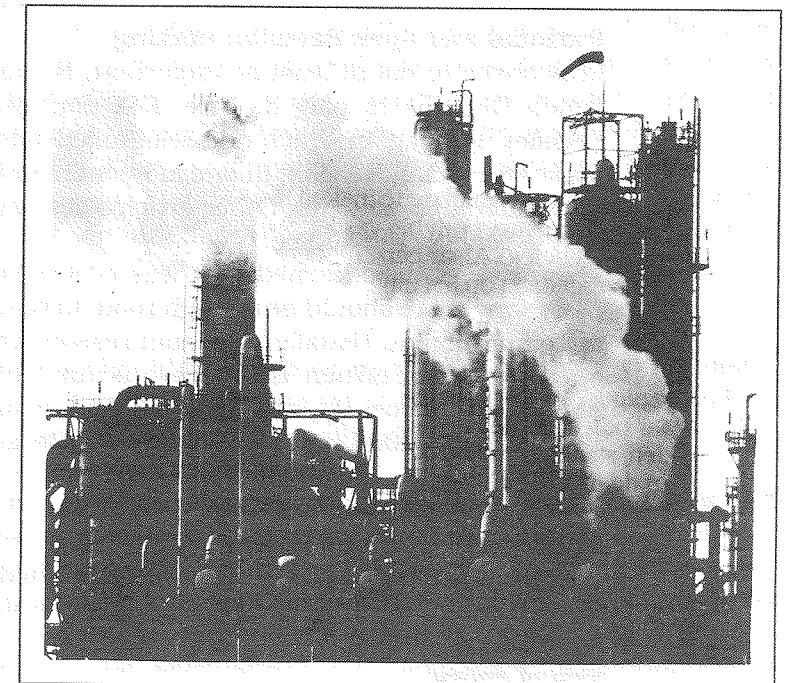
'Controversial rail short cut'

The construction of a short railtrack connecting two main railroads is supposed to greatly improve the train connections between two regions, thereby reducing car movements appreciably. At present, transit train passengers must change trains on the way, thereby losing a lot of time. The connection will dissect a meadow area with an abundant bird life. Opponents of the construction postulate that a change of the train schedules would achieve almost the same time savings. The EIS explains that changing the trains schedules for this connection, will lengthen many other train travel times in a wide area. This argument is only accepted by the opponents, after the EIA Commission confirms the statement in its review of the EIS. After that, the decision-making meets less resistance.



'Fresh air'

A company wants to establish a petro-chemical installation in a non-industrialized area. The local authority is in favour of the initiative because of employment and the use of an underdeveloped industrial park. The local population is worried, especially the society for Chronic Lung Disease, expecting a substantial deterioration in the ambient air quality. The results of the EIA (confirmed by the EIA Commission) show that the impact of the installation is relatively insignificant. The installation is established without any further problems.



This influence of EIA also occurred in EIAs for waste incinerators in relation to dioxin problems. It is illustrative that the first procedure for an incinerator took six years, while the most recent incinerator was built after a one year procedure. Using the stringent criteria in the 'Richtlijn verbranden' (Guideline incineration) an EIS can easily show the restricted impact of such an installation. It must be noted that there is more chance that EIA leads to time saving, when there is experience with these kinds of projects.

CONDITIONS FOR EFFECTIVENESS OF EIA

To advance the chance on an effective EIA some conditions should be fulfilled.

Legal regulations

First of all, EIA must be arranged by law in an unambiguous regulation, leaving no misunderstanding about the interpretation of the obligation to carry out EIA.

Rational and open decision-making

Less obvious, but at least as important, is the governmental constellation, in which EIA has to play its role. EIA performs best in a model of rational decision-making, in which one designated actor (i.e. the competent authority) makes a crucial decision, in one moment of time, based on factual information and rational arguments. Other articles deal with this subject extensively¹, so here a remark will suffice.

Passed experience learned that it is crucial to start an EIA procedure in an open way: there should be enough room to consider alternatives and to absorb new information. Usually, the main reason for an ineffective EIA is lack of an open approach. When the decisions are already made, EIA is used as a defense-in- retrospect and guided to this result. Possible new information is 'argued away' and can at best be used in another future decision-making process.

Project EIA sustained by strategic EIA

Sometimes, the room for decisions is restricted by earlier decisions at national level. In that case, EIA should be applied to these strategic decisions as well.

'Sound policy'

The Fourth National Physical Planning Programme Extra and the ensuing contracts between the local and the national government determine the possible future developments in the urban areas. When the obligation for EIA arises for the decisions in the regional physical plans, there is no room left for the comparison of alternatives. Based on this experience, it is considered to adopt another strategy for future national programmes. A comparable development occurred in the waste sector, where EIA is carried out voluntarily (for the second time) for the National Waste Management Programme.

Scoping in EIA

In EIA in the Netherlands much attention is given to scoping. Good scoping enables an effective EIA process. The publication of a notice of intent and the specific guidelines for the content of the EIS contribute highly to the quality of the resulting EIS.

1 E.F. ten Heuvelhof, "gebruik van m.e.r. kan effectiever; besluitvorming over grote woningbouwlocaties" Stedebouw en Volkshuisvesting, 1993 11.
Dariusz Kobus and Norman Lee, 'The role of environmental assessment in the planning and authorization of extractive industry projects', Environmental Assessment, September 1993.

Room for public participation

Public participation proves to be important in EIA in several ways. EIA provides objective information about an activity to the people involved. Local residents or NGOs often possess information that can be useful for EISs. In some cases this leads to the formulation of new alternatives. Attention for intervenors' remarks diminishes the controversiality of complicated initiatives.

Independent review and central information

In EIA in the Netherlands the EIA Commission plays an important role. It prepares draft guidelines for the content of EISs and reviews all EISs after publication. This means a double check on the presented information and a test of objectivity. As the Commission is independent from the government and does not judge on the desirability of an activity, or the way it should be carried out, the conditions are met for an optimal performance. Although the law does not give any formal power to the Commission, its advice is usually followed. Moreover, the Commission functions as a central EIA information desk with a complete EIA library. This improves the effective performance of EIA.

Quality of the EIS

Sound decision-making should be based on a good EIS, containing at least:

- information on the environmental impact of the proposed activity and its alternatives, including an environmentally friendly alternative
- comparison of all (relevant) alternatives
- comparison of impacts with environmental objectives and standards and (implicit) evaluation of the latter
- survey of gaps of knowledge.

A good presentation of the EIS is important, while it enables a proper use by all participants.

The heart of the EIA is the development and comparison of alternatives in regard to the environmental impacts. Constructing a (realistic) environmentally most friendly alternative is the most interesting and most creative part of EIA, containing possibilities for breaking new ground. As long as the influence of environmental measures does not suffice to counteract the increasing deterioration in quality of the environment, this is no redundant luxury.

EIA METHODOLOGY: SCOPING OF ALTERNATIVES

Marja van Eck, Jules J. Scholten, Stefan A. A. Morel.

INTRODUCTION

The Ministry of the Environment in the Netherlands initiated a survey of best case examples in the field of environmental impact assessment (EIA) methodology, based on the experience of 500 EIA procedures in the last six years.

This survey resulted in the selection of ten cases representing activities that are frequently subject to EIA, like road infrastructure, airports, housing, industry, electricity production, drinking water supply, waste treatment and mining.

As the development and comparison of alternatives play an important role in the Dutch EIA system, the cases were analysed on the approaches applied in selecting alternatives.

(Possible) relevant alternatives and the methods to select these usually are mentioned in scoping documents, that are compiled, before the environmental impact statements (EIS) are written.

For this reason, the ten scoping documents of the Dutch Commission for EIA have been translated into English¹. An extended explanation of the progress of EIA in each of the ten cases and the role of the scoping and reviewing activities of the Commission is added to this article as background material. In the text references to the case examples are made.

The following steps constitute the EIA-process in the Netherlands

- 1 **Publication of a notification of intent**, with an outline of the proposed activity, the location and the environmental interests possibly involved
- 2 **Submitting advice on specific guidelines** for the EIS by the Commission for EIA, in which public remarks on the desired content of the EIS are taken into account
- 3 **Establishing specific guidelines** for the EIS by the authority competent for the decision making
- 4 **Drawing up the EIS** by the proponent
- 5 **After acceptance by the competent authority: publication of the EIS** together with a license application or draft policy plan
- 6 **Reviewing the EIS** by competent authority, the public and the Commission for EIA. The Commission does not judge the acceptability of the proposed activity.
- 7 **Decision making** about the activity. The competent authority motivates how the results of EIA are weighed in the final decision.
- 8 **Implementation of the activity and evaluation** of environmental impacts.

¹ These translated documents can be ordered from the Commission for EIA. An application form is enclosed.

ALTERNATIVES IN EIA

Importance of alternatives

The major role of alternatives is identified in many EIA systems. As EIA is applied to activities with (possible) severe detrimental impact on the environment, it is important to know whether there are reasonable alternatives for the proposed activity with less environmental consequences, that could be carried out instead. This is essential information for a decision-maker. Usually a proponent has only one specific idea in mind. Alternatives are not considered or rejected beforehand. The contribution of EIA is to come up with feasible alternatives and select the most promising for further elaboration and comparison.

Thinking in terms of alternatives can be advantageous to the developer, as it may provide him with a cost-cutting solution to his initiative. Additionally, it can offer him a more secure way in obtaining a favourable decision about his initiative. The interest of the environment is also served best in the development of alternatives, because through it the alternative considering best technical means and causing the least impacts on the environment can be identified and considered next to the preferred alternative with equal weight.

Tiers of alternatives

Dependent on the level of decision-making for which the EIS is prepared the following tiers of alternatives can be distinguished:

- strategic alternatives
- location alternatives
- implementation alternatives

Strategic alternatives are developed in EISs for policy decisions involving major environmental issues at the national or regional level. Such EIAs are always initiated by government agencies.

In the EIS for the National Waste Management Programme the environmental impact of different waste processing solutions (preseparation, landfilling, composting, digesting, incineration) were compared. This is a strategic decision that has several implications at regional level as to where certain new capacity must be realized².

Location alternatives feature in EISs supporting decisions concerning sites for new large scale residential or industrial areas³, power plants, waste disposal facilities, etc. and alignments for transport connections such as roads⁴, railways, runways⁵, waterways, pipelines and high voltage lines. These EISs are mostly initiated by government or semi-government agencies, as private developers seldom own more than one site for implementation of their activity. In such cases only the precise siting of the location might still be open to discussion.

- 2 See Annex 10: Ten Years Programme on Waste Management.
3 See Annex 3: Residential and industrial development Eindhoven-Helmond.
4 See Annex 2: National motorway nr. 73.
5 See Annex 1: Expansion of Amsterdam Airport.

Implementation alternatives are developed in EISs in support of licenses or land allocation plans. Very often such EISs are initiated by private developers and concern waste disposal facilities, recreational facilities, industrial plants etc. They deal with the design of the activity in many ways⁶. In some cases, EISs have to be prepared for one continuous line of tiered decisions requiring the development of different tiers of alternatives⁷.

Types of alternatives

Before the start of the preparation of an EIS, a developer has a clear picture of his plans. The proposed activity, or preferred alternative in the EIS, is selected by the developer, because it offers a direct and financially attractive solution towards achieving his objective based upon the principle of best practicable means. The preferred alternative must be in line with rules and regulations including environmental standards and physical planning requirements. Still, additional measures are possible which can further mitigate the activity and reduce the impact of the activity on the environment. Such mitigating measures also will be developed in reaction to criticism by environmental pressure groups and people affected by the activity. The mitigating measures may range from straightforward end-of-pipe measures which are based upon the principle of best technical means, to more or less different designs and approaches that are still feasible and reasonable to the developer. The results are so-called alternatives which are friendly to the environment.

In addition to the preferred alternative and alternatives which are friendly to the environment, the developer can be asked to describe the situation in which his activity is not carried out. The developer is required to contemplate whether this situation may yield an acceptable solution towards achieving his objective. If that is feasible, the situation without implementing the proposed activity becomes a reasonable alternative (the so-called zero-alternative or do-nothing/no-go alternative). Usually, the zero-alternative is only used as a basis for the description of the existing state of the environment and as a reference for comparing impacts of the elaborated alternatives.

Alternatives in EIA

Alternatives can be developed on different levels, sometimes combined within one EIS:

- policy-level (technologies for waste processing or drinking water supply)
- site-level (routes for motorways, sites for runways or sites for extracting groundwater)
- implementation-level in which for example mitigating measures are varied (mitigating measures in landfills or waste incineration plants)

Obligatory in Dutch legislation are descriptions of:

- the preferred alternative (PA)
 - the alternative most favourable to the environment (MFA)
 - the existing situation of the environment, based on a 'no go' decision
- Often more alternatives are described, from which PA and MFA are selected

- 6 See Annex 4: Coal-fired power station Amsterdam.
See Annex 5: Expansion of Esso refinery with Hydrocracker, Rotterdam.
See Annex 6: Gravel extraction and (re-)landscaping in Limburg.
See Annex 8: Landfill "Braambergen" at Almere.
See Annex 9: Waste incineration plant Twente.
7 See Annex 7: Deep infiltration of levee groundwater supply SE Utrecht.

SEARCHING AND SELECTING ALTERNATIVES

A general concept: 'the twin funnels'

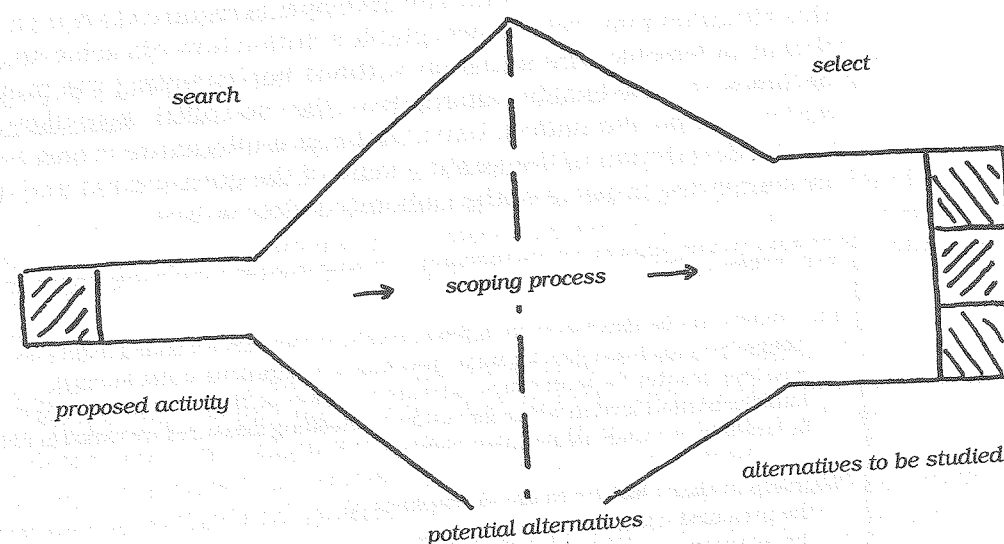
Not just any alternative is interesting in EIA. The following general criteria are commonly used to check alternatives.

Alternatives should:

- be feasible in practice (**sense of reality**);
- meet the objective of the initiator, provided that this is not too narrowly defined (**problem solving capacity**);
- be sufficiently different (**discriminating potential**);
- cover the total range of possible solutions (**width coverage**);
- be composed of 'variants' that can be combined into a consistent entity (**structure**).

The search for alternatives requires an active attitude and a creative mind. First of all the range of potential alternatives must be explored. Then those alternatives must be selected that are interesting for further elaboration. When the search process results in a great number of possible variants the EIS should restrict itself to the most fundamental possibilities. Otherwise the EIS would become an unreadable bulky and complex document. The search and selection process can be illustrated as two funnels placed opposite one another. Although drawn as a linear process, in practice the process can be cyclical, in which the twin funnels are passed through more than once.

illustration: 'the twin funnels'



In the following sections elements of the search and selection process will be explained with the help of representative examples.

Search process of 'bits and pieces'

There are different ways to set the search process in motion. A systematic, often fruitful approach is to divide the proposed activity, for instance a production process, in several parts.

- In a proposal for a waste incineration plant, the following activities can be distinguished:
- transport of incoming waste and outgoing residues,
 - storage facilities
 - the waste processing (pre-processing, incinerating, cooling, electricity generating, flue gas cleansing and waste water treatment)
 - the technical installations (furnace, deslagger, steam boiler, pumps, ventilators and so on)
 - the processing and removal of residues
 - the spatial lay-out of the plant
 - mitigating measures.

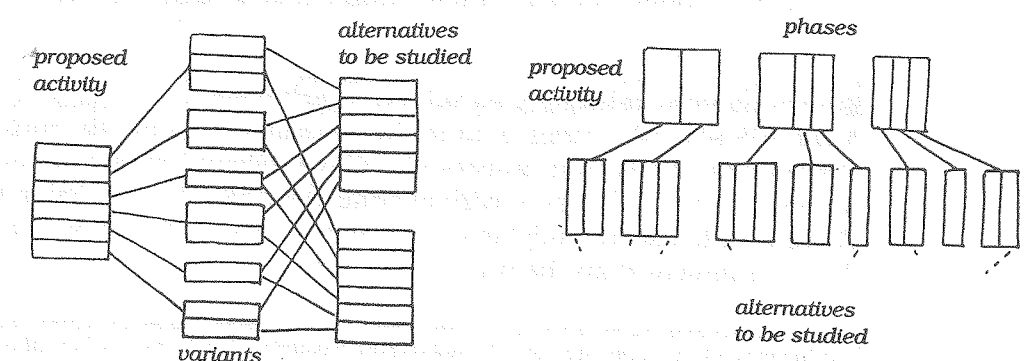
For almost any of these parts different solutions (variants) can be considered with other environmental impacts. Subsequently, environmentally relevant variants can be combined into 'implementation' alternatives to be studied and compared in the EIS⁸.

Sometimes, it can also be useful to consider alternatives in the phases of construction, exploitation and follow-up care and supervision⁹.

For instance, when dealing with landfilling the following aspects can be distinguished:

- construction of the site:
 - top lining, bottom lining
 - off gas treatment, percolation water treatment
- exploitation:
 - type of waste to be accepted
 - manners of transportation
- follow-up care and supervision:
 - final destination of the landfill
 - integration in the surrounding landscape
 - responsibilities
 - endurance of lining facilities

illustration: 'bits and pieces'



8 See Annex 4: Coal-fired power station, Amsterdam.
 See Annex 6: Gravel extraction and (re-)landscaping, Limburg.
 9 See Annex 8: Landfill "Braambergen" at Almere

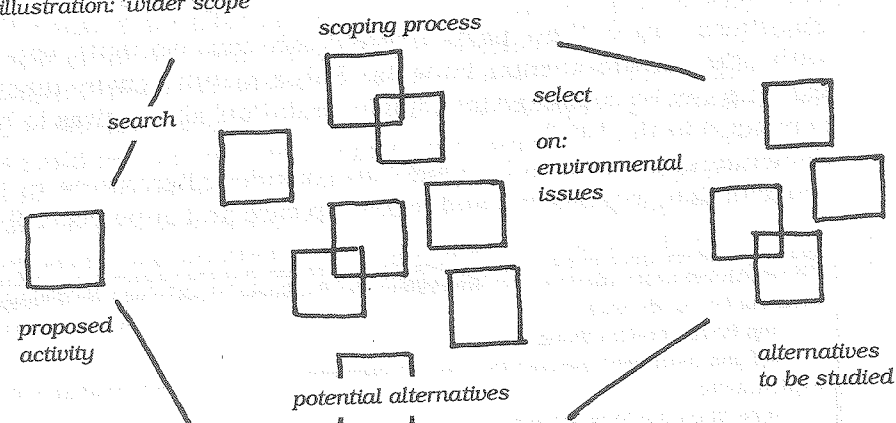
Search of 'wider scope' alternatives

When a proposed activity is narrowly defined, useful solutions can come up by widening the objectives of the activity.

Feasible alternatives for the construction of a coal-fired power plant are for instance coal-gasification, import of electricity or 'total energy concept'. In the selected case of the Coal-fired power station in Amsterdam (see Annex 4) these alternatives were not taken into account, as this was prohibited by earlier governmental decisions in the Electricity Plan. In the example of deep infiltration of levee groundwater (see Annex 7) a study on 'wider scope alternatives' (use of groundwater or surface water, deep infiltration) proved a useful contribution to the EIA.

This method of generating alternatives is illustrated in the following picture.

Illustration: 'wider scope'



Few or no alternatives

Sometimes, even a thorough search process does not result in substantial alternatives.

For example, there can be few or no alternatives, when EIA is carried out for the legalisation or expansion of already existing installations. When no feasible alternatives are in reach, an EIS should not bother with alternatives, but focus on the description of the environmental impacts of the activity¹⁰.

Environmental relevancy as selection criterion

As an EIS should restrict itself to the description of only the most important alternatives, the search process should be followed by a thorough selection process. In this process environmental relevancy is the major touchstone. There is little use in studying an alternative in an EIS with worse impacts on the environment than the proposed activity.

In the case of the expansion of Schiphol airport promising development alternatives were selected on the basis of the following environmental objectives:

- the noise situation around the airport has to improve
- the situation concerning external safety, air quality and odour is not allowed to deteriorate.

10 See Annex 5: Expansion ESSO refinery with Hydrocracker, Rotterdam.

In the phase of constructing and selecting alternatives in the 'bits and pieces' approach much attention should be paid to the consistency of the alternatives resulting from the process. Often, it is useful to aim alternatives at optimizing specific environmental objectives. In an alternative that focuses on noise reduction, air cooling instead of water cooling will undo the effect of silent trucks for internal transportation and should not be combined in that alternative.

In housing projects, where there often are too many site combinations possible, also an approach through environmental issues proves a good solution¹¹: all sites that contribute to mobility control are combined in one model, whereas all sites that contribute to nature conservation constitute another model. Sites that are part of each (or most of the) constructed models appear to be a good choice for the MFA.

Selection in complex projects

In strategic EIAs for policies, plans and programmes the complexity usually is high, due to the fact that in these situations several decisions are taken at the same time. In that case a good solution can be to restrict the EIS to one major decision, as is done in the EIS for the Waste Management Programme, which focused on the selection of waste processing methods.

In the case of Schiphol airport the problem of complexity was greatly reduced through a separate economic study that resulted in the adoption of one growth scenario as an input for the EIS.

Conflicting interests

Often, it is sufficient to constrict the EIS to the comparison of the proposed activity, the environmentally most friendly alternative and the zero alternative. Sometimes, a solution of one environmental problem leads to detrimental impacts in another environmental compartment.

In that case just one environmentally friendly alternative will not be identified, and a solution can be found in developing an alternative favourable to the environment in residential areas and an alternative favourable to the natural environment¹².

The main road connecting two towns must be improved and upgraded. The improved connection can either follow the existing course passing through a number of villages or follow a new course bypassing the villages. The course bypassing the villages is friendly for the inhabitants of the villages because it reduces noise levels and improves road safety in the villages. On the other hand the bypasses might not be friendly for the ecology in the area if they dissect areas with special ecosystems. In this way several alternatives can be developed which either favour the village populations or the natural ecosystems.

11 See Annex 3: Residential and industrial development Eindhoven-Helmond.

12 See Annex 2: National motorway nr. 73 in Limburg.

SUMMARY AND CONCLUSIONS

Alternatives play an important role in many EIA systems.

An EIS should deal with a restricted number of (environmentally) promising alternatives, whereas no relevant alternatives should be overlooked.

Through the scoping process these alternatives should be identified.

Scoping can be seen as a twin funnels process of searching and selecting in which the following steps are usually taken:

- describe beforehand clear objectives for the activity
- divide the activity into sub-activities, operations, measures or decisions
- search for possible variants for each of these subactivities
- select interesting variants in relation to the criteria and expected environmental impacts
- cluster the variants into relevant alternatives.

Examples of the search and selecting process are discussed with the help of 10 representative EIA-cases. Outlines of those cases are added in 10 Annexes.

ANNEXES TO SCOPING OF ALTERNATIVES

1. Expansion of Amsterdam- Airport	33
2. National motorway nr. 73 in Limburg	37
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EXPANSION OF AMSTERDAM - AIRPORT

Introduction

The international airport Amsterdam (Schiphol) is the fourth biggest airport in Europe. The number of passengers who make use of the airport either as point of departure or arrival or for a flight-transfer has grown steadily over the years and substantially over the past few years (e.g. between 1990 - 1993 from 15 to 20 million passengers annually). In order to achieve sustained growth of the airport maintaining its position in the league of leading airports in Europe, a few strategic and executive decisions need to be made. In support of these decisions environmental impact assessment (EIA) must be carried out as the airport is located adjacent to densely populated areas as well as outdoor recreation areas which will be seriously affected by the planned expansion activities.

Before the start of the EIA two objectives were adopted as prerequisites for the formulation of alternatives and the decision-making:

- the airport has to develop into a so-called mainport, thereby stimulating the economic development and employment in the Netherlands which heavily depends on distribution services;
- the environmental qualities in the area around the airport are not allowed to deteriorate and preferably must improve.

These two objectives are basically conflicting. The EIA has to demonstrate whether there are alternative developments which can satisfy both objectives in a harmonious and compatible manner.

The EIA-procedure started with the publication of the notification of intent in September 1991. The specific guidelines were established in February 1992. The EIS was published in January 1994. The decision is expected to be made in 1995.

Advice for specific guidelines

In the advice for specific guidelines the Commission for EIA asked for a specification of the two objectives. The first objective about the mainport principle needed specification in terms of two to three development scenarios and a definition of those characteristics that constitute a mainport. Concerning the second objective, the Commission proposed to select and define a small number of environmental indicators delineating environmental quality. Three possible approaches were presented. In addition, the advice focused attention on the (ongoing) development of a noise standard for night flying and the need for a standard for the external safety around the airport. Concerning external safety, no standard exists, also not abroad in Europe, North America or elsewhere. The advice further drew attention to another controversial matter: the assessment of real and perceived public health risks in relation to airport activities (the incidence of respiratory diseases, cancer, ailments caused by toxic substances, et cetera).

The advice proposed to investigate two series of alternatives: those alternatives which optimize the use of the present set of four tangential runways and those alternatives proposing to expand the take-off and landing facilities with a fifth

runway (see figure 1 showing the preferred alternative). At least one of the alternatives must be able to meet the two objectives.

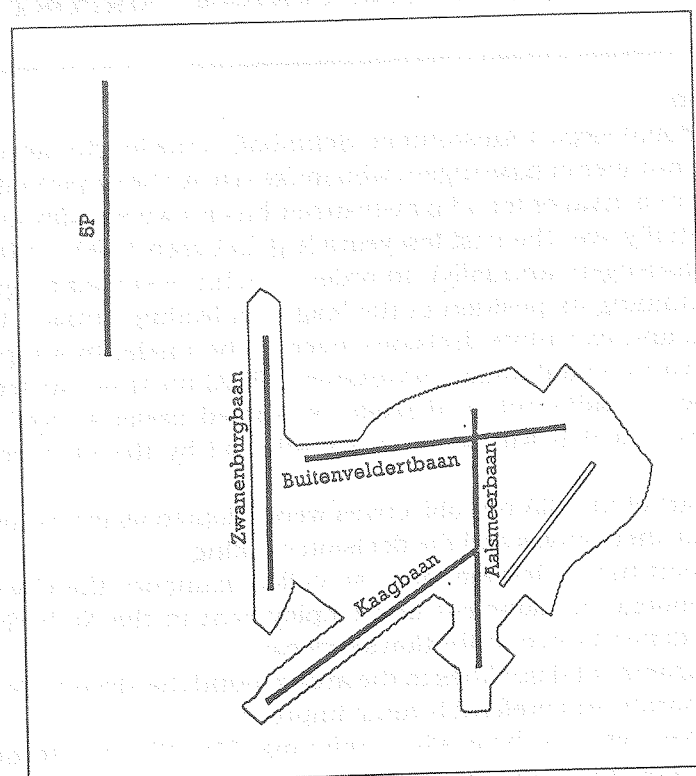


Fig. 1: The preferred alternative including construction of a fifth runway (5P)

Specific guidelines and alternatives

The specific guidelines for the EIS followed the advice of the Commission fairly closely. The guidelines indicated that the mainport principle would be developed in a separate study about the economics of the airport assuming several development scenarios. The scenarios form an input in the preparation of the EIS.

The objective pertaining to environmental quality was elaborated as follows. The improvement of the environmental quality in the area around the airport is characterized by four governing environmental aspects, i.e. noise, external safety, air quality and odour. The objective is formulated in such a way that the noise situation around the airport must improve whereas the situation concerning external safety, air quality and odour will not be allowed to deteriorate. The year 1990 is chosen as baseline. Each of the four indicative criteria is quantified in terms of numbers of dwellings and people within certain noise contours, external safety contours and within areas where air quality standards and certain odour concentration are exceeded.

The guidelines indicated that new standards would be developed for noise from night flights and external safety for specific use in the EIS.

The specific guidelines followed the recommendations of the Commission for EIA in the designation of alternatives.

EIS

The EIS utilized as an input the so-called European Renaissance scenario which occupies the middle ground between a pessimistic scenario (Business as usual) and an optimistic growth scenario (Balanced growth). The European Renaissance scenario predicts that in the year 2015 Amsterdam airport will accommodate 38.6 million passengers and handle 2.1 million tons airfreight with 432.000 plane movements. The development will create 126.000 new jobs. The mainport principle is based on the assumption that in the near future international flights will be serving only a limited number of main airports (mainports). Intercontinental airpassengers will first have to take regional flights to the nearest mainport for transfers onto intercontinental flights.

The EIS reports that only two of the four indicative criteria: noise and external safety, differ substantially between the various alternatives. Air quality and odour appear to be non-discriminating criteria. In the EIS more alternatives are developed and elaborated than required by the specific guidelines. The preferred alternative (see figure 1) that was indicated as such at the start of the EIA still comes out on top as it satisfies the mainport objective and most of the indicative criteria that characterize the environmental quality objective. However, there are other alternatives which perform better relative to the environmental criteria although they are more costly than the preferred alternative. There appears to be no alternative that can meet all environmental criteria.

Standards have been developed for noise from night flights and for individual risk around airports. There is no standard for group risk. The study into a potential relationship between health and airports does not yield significant correlations with the exception of sleep disturbance and related health problems from night flying.

The EIS presents most of the required information set out in the specific guidelines in a clear manner with lots of tables, diagrams and maps. However, due to its complexity the amount of information is overwhelming and the non-specialist can easily lose track in determining the significance of the information.

Review

The review of the EIS is still ongoing as the decisions will only be made in 1995. However, the following preliminary conclusions can be drawn:

- The EIS presents good quality information on a large range of alternatives and environmental impacts. The approach in the EIS with adoption of the two main objectives has worked well as it enables reviewers to compare alternatives on the basis of quantitative criteria. Nevertheless, there is a real risk that the results related to the various environmental criteria are interpreted in such a way that they suit the decision-makers best. Some of the critical remarks about the EIS are directed at such potentially subjective interpretations.
- It appears that different assumptions have been adopted as inputs for the calculation of noise and external risk contours. The difference in approach is not explained. Uniform application of inputs is needed and hence additional calculations must be made for external risk. There is an indication that if this is done another environmental indicator will yield a deterioration instead of an improvement over 1990.

- At the request of some local governments and environmental pressure groups still another alternative is investigated and will be reported on. If this alternative scores well on the mainport objective and better on the environmental quality objective, it will be added to the EIS.
- During the review Parliament debated the new noise standard for night flying and lowered the standard from LAeq 27 dB(A) to LAeq 26 dB(A). This implies the calculation of new contours for noise from night flying. Consequently, the cost of isolating houses and buildings will rise accordingly.
- The pressure for developing a standard for group risk is rising. This is related particularly with an accident that happened in October 1992 whereby 50 residents in an Amsterdam suburb were killed when a Boeing 747 crashed into an apartment building.
- There are two methods for assessing the number of persons who experience serious disturbance from airplane noise. There is a large difference between the numbers obtained from the two methods. Only the lowest number is used as indicator for environmental quality. The difference is not explained neither is the rationale given to formally adopt the method yielding the lowest figure as environmental indicator.
- In the calculation of noise contours for night flying an assumption is made for the level of noise absorption by constructing materials diminishing noise levels reaching bedrooms. However, the assumption is substantially larger than the value for noise absorption which was observed in an EIS for a regional airport that was carried out a few years ago. The assumption for a larger degree of noise absorption yields much smaller noise contours for night flights. The difference in assumption is not explained. Moreover, in the calculation of noise levels in bedrooms it is assumed that bedroom windows are closed during the night. Most people in the Netherlands however, like to sleep with windows slightly opened. The assumption of opened bedroom windows was also made in the EIS for the regional airport.

NATIONAL MOTORWAY NR. 73 IN LIMBURG

Introduction

The provincial branch of the Ministry of Transport, Public Works and Water Management in the province of Limburg intends to construct a motorway connection between the towns of Venlo and Saint-Joost, either on the western or on the eastern side of the river Maas. This connection will be called the southern part of National Motorway 73.

This project has a long history. The Minister of Transport, Public Works and Water Management did already choose the routing in 1985 – after long research – and without EIA being applied. This routing decision (on the eastern side of the river Maas) was cancelled in 1992; it was decided then, that through the direct mandate of the European Commission (EC) Directive on EIA the routing decision had to be submitted to an EIA.

The existing road infrastructure in the area cannot cope with the growing (motor) traffic. At both sides of the river Maas there are several villages and small towns. These villages and towns are connected by regional roads (1x2 lanes and a speedlimit of 80 km/h), that lead right through their centres. These roads are frequently used by lorries, often plying between Germany and Belgium.

The natural and scenic values in the area (landscape ecological values in the valley of the Maas) are affected adversely, because various new activities cause fragmentation.

These developments have led to major problems in the area affecting environmental quality, accessibility and economic potentials. The initiative aims at solving these problems.

Advice for specific guidelines

To solve these bottlenecks many solutions are conceivable. The advice for specific guidelines therefore selected a wide approach. The competent authority has adopted this approach in the specific guidelines. This approach accentuates a gradual method of developing alternatives, as discussed below. The gradual method defines alternatives ranging from no new action to a new national expressway. By checking the environmental and transport impacts of the alternatives against the initiative's objectives a view on the possible solutions will be possible. In this way the Minister can select the routing. The guidelines mention the following degrees of 'solutions':

- the no-go alternative (= zero alternative): no extra measures will be taken (apart from the ones that have already been decided upon);
- the zero-plus alternatives. There are three possible subalternatives:
 - the bypasses alternative: road bypasses will be constructed around the villages and towns;
 - public transport alternative: a strong impulse is given to stimulate public transport;
 - combination alternative: the elements of both previous alternatives are combined.

- motorway alternative: construction of a new motorway on either side of both river banks, or the upgrading of one or both of the existing roads to a motorway. This is because measures at one side of the river will inevitably have consequences for the other bank;
- expressway alternatives: construction of an expressway on one river bank (including the measures to be taken on the other bank);
- the alternative most favourable to the environment: in this context the Commission suggested elaborating two of these alternatives: one with regard to the interest of the population centres and one favouring natural and ecological values.

EIS

The EIS followed the guidelines closely. Eventually 13 alternatives were elaborated. The EIS proved unmistakably that new traffic infrastructure on the west bank was best for the environment, and that alternatives on the east bank were best from a point of view of economy and traffic.

Both elaborated alternatives favourable to the environment appeared to be real options. These alternatives concerned upgrading of an existing road or construction of a motorway on the west bank.

Review advice

The Commission expressed in its review advice its appreciation for the EIS, as it describes very well the method of developing the many alternatives. A very positive remark was made about the popular summary made especially for the public.

The description of impacts from fragmentation received negative comments. Fragmentation is a major impact with this kind of projects, especially for this area. The Commission stated that a more quantitative approach would have been appropriate. Therefore, the Commission stressed the necessity of elaborating mitigating and compensating measures relative to the fragmentation impacts in the evaluation programme (post-project analysis).

Decision

The minister decided to speed up the decision-making process for completion before the national elections. The choice was clear between 'economy' and 'ecology': new infrastructure on the west bank is better for the environment, whereas the regional economy will benefit more from the development on infrastructure on the east bank. The various advisory bodies and pressure groups put forward remarkably different views and recommendations. The minister decided in favour of a motorway on the east bank. Certainly, this decision will be challenged in court by environmental pressure groups.

Annex 3

RESIDENTIAL AND INDUSTRIAL DEVELOPMENT EINDHOVEN - HELMOND

Introduction

The EIA concerns the planning of 12,500 houses and 500 ha industrial area in the region around the adjacent cities of Eindhoven and Helmond. The area under consideration covers the territory of eleven municipalities. The project started with the publication of the notification of intent on 9 June 1993. The notification contained a proposed model for future development of the region, based on the mutual consent of all the municipalities involved. Unfortunately, this model was not constructed with the aid of EIA.

The regional government, the province of Noord-Brabant, carried out EIA to found the decision for a regional development plan, and is the proponent and the competent authority in the EIA procedure. The province added two extra models (the 'corridor' and the 'concentration' model) to the notification of intent, to be studied in the EIS.

Advice on specific guidelines

The advice on guidelines was drawn up taking into account the earlier experience with comparable EIAs (see under 'Special features'). The province accepted the advice and established the guidelines without alterations in October 1993.

Alternatives

The guidelines suggested to consider alternative models that were organized around environmental objectives in order to come to the identification of the environmentally most friendly alternative to be compared with the municipal and provincial models.

EIS

The EIS was completed in June 1994.

Special features

Since the introduction of EIA in the Netherlands, several EIAs were started for decisions on regional urban development projects. As several municipalities are involved, EIA is usually carried out at regional level, the provincial government acting as proponent and competent authority. In the role of proponent the province consults the municipalities regularly.

Plans for urban development used to be based on well-known basic principles of town and country planning like concentration, dispersion, ring, ribbon, honeycomb etcetera. With the introduction of EIA for these projects, the need was felt for a more environmentally based approach to be used alongside, or instead of the usual models, especially for the creation of environmentally friendly solutions.

The first step in such an approach consists of a survey of all locations suitable for future development, covering the total range of possible solutions. Ideally,

the total range is three times larger than the area that is needed for the planned houses, facilities and industries. This creates sufficient room for different solutions. Secondly, sub-areas with similar characteristics are distinguished. Scores are attached to the sub-areas, to measure the suitability for urban development. A computer programme for multicriteria analysis can be a helpful tool in this operation. The suitability criteria are organized around environmental objectives like:

- mobility control
- economic space consumption
- preservation of ecological and scenic values
- living quality for existing and future residents.

Sub-areas with high scores on each of the objectives are combined in different environmental models, like mobility control model etc. Each of the models indicates a possible future development, if priority is given to that particular environmental objective. Further analysis and discussion will lead to the construction of one or two environmentally friendly models, combining areas with high scores on several aspects. These models should be further elaborated and optimized by adding extra mitigating measures to counteract remaining expected environmental impacts.

As it turned out, the models that result from this approach often differ fundamentally from the earlier proposed models, based on town and country planning principles or mutual municipal consent.

COAL-FIRED POWER STATION IN AMSTERDAM - WEST

Introduction

Electricity supply in the Netherlands is organized centrally for reasons of optimization and guarantee of supply. The electricity producers have to operate within the framework of the Ten Year Electricity Plan. This plan which is updated every two years, is elaborated by the Dutch Electricity Generating Board and confirmed by the minister of Economic Affairs. The plan contains decisions on the capacity and siting of new power plants. The Electricity Plan is not subject to EIA but the National Structure Scheme for Electricity Supply must be established with the application of EIA. The Structure Scheme decides on the kind of fuel applied in power stations. Additionally it provides criteria for the definite site selection in the Ten Year Electricity Plans.

In the Ten Year Electricity Plan 1987-1996 the decision was made to extend the power station (Hemweg) in Amsterdam-west with a new coal-fired unit of 600 MWe. The EIA for the licensing of the new unit started in June 1987 with the publication of the notification of intent. The EIS was published in May 1988 and the licenses were granted in June 1989.

Advice for specific guidelines and alternatives

The strict policy framework established in the Structure Scheme and in the Ten Year Electricity Plan precludes the elaboration of site and fuel consumption alternatives restricting the EIA at the licensing level of decision-making to the elaboration of implementation alternatives. Hence, the advice for specific guidelines and subsequently, the guidelines only dealt with the design of the plant and mitigation measures reducing emissions.

These concern:

- fuel composition
- supply, transport and storage of coal
- design of the power plant
- the installation for flue gas desulfurization
- reduction of NOx-emissions
- treatment of bottom ash and slag
- treatment of waste water
- facilities to prevent calamities
- the availability and use of cooling water

EIS

In the EIS all main subjects of the specific guidelines were covered.

Review advice

In the review advice the Commission for EIA concludes that the mitigating measures as part of the preferred alternative are not on the level of best technical means although this intention had been stated already in the notification of intent at the start of the EIA-procedure. Consequently, the Commission proposes to carry out extra mitigation measures complying with available best technical means.

Decision

The competent authority followed through on the review advice of the Commission and attempted to enforce the proposed extra environmental mitigation measures. These extra measures however will lower emissions from levels which comply already with current emission standards. Further reduction of emissions is only possible if the proponent agrees to such measures voluntarily. This is confirmed in court in an appeal against the initial decision. In a letter dated February 1989 the proponent agrees to seriously attempt to further reduce sulfur dioxide and nitrogen oxides emissions with one third below the standards.

Special features

This case confirms that EIA at the licensing level must be restricted to implementation alternatives dealing with design and mitigation measures only. It also shows that the proponent can obtain the required licenses if he can demonstrate in the EIS to be able to contain emissions within current standards. In addition this EIA shows however, that the application of EIA can exert pressure on a further lowering of permissible emissions from power plants.

Annex 5

EXPANSION ESSO REFINERY WITH HYDROCRACKER, ROTTERDAM

Introduction

The ESSO refinery intends to build a so called 'Hydrocracker' for the conversion of high-sulfurous gas oil fractions into lighter low-sulfurous products like diesel oil and kerosine. It concerned the expansion of the existing refinery near Rotterdam. The EIA started in 1991.

Advice on specific guidelines

The advice can be characterised by two major aspects.

Firstly the new installation had to be implemented in an existing refinery. The main question was how to match the new and the already existing installations regarding technology, capacity, and mitigating measures, in order to reach a minimum increase and if possible even a reduction of negative environmental impacts.

Secondly the activity had to be regarded as part of a product chain, existing of a *raw material stage* (amounts and qualities of crude oil to be processed), a *processing stage* (the hydrocracking process) and a *product stage* (quantities and qualities of products). Though the EIS should focus on quantifying environmental impacts in the processing stage, attention should also be paid to the raw material and product stages at least on a qualitative level. In this way the 'environmental benefits' in all stages of the activity could be elucidated, not only on the site of the refinery but also on a wider scale related to the use of the products. The province acting as competent authority for licensing accepted the advice of the Commission and established the guidelines in 1992.

Alternatives

In this situation only few alternatives were reasonable. Therefore, it was recommended to restrict the EIS to the description of environmental impacts of the proposed and the existing installations, where necessary with supplemental mitigating measures. Not the comparison of alternatives for the proposed installation but the investigation of environmental advantages and disadvantages of the refinery with and without the new installation should be the main purpose of the EIA.

The alternatives to be elaborated were:

- configuration of the present refinery
- configuration of the refinery including the new installation
- configuration of the refinery including the new installation and supplemental mitigating measures (if possible)

EIS

All relevant guidelines were covered in the EIS. The EIS showed the environmental impacts of the new installation to be negligible in comparison to the impacts of the total refinery. Moreover, due to the significant reduction of the sulfur content of products of the new installation, the diffuse sulfur pollution was expected to decrease with ca. 40,000 tonnes yearly.

Review advice

The review by the EIA-Commission resulted in a positive review advice. There were hardly any critical remarks by the public. It was felt that the insight in the total product chain given in the EIS contributed to the support of the public for this new installation. The EIS showed reductions in diffuse acidifying emissions, an important topic for both the national environmental policy and for NGOs.

Decision

The licenses were granted in June 1993.

Annex 6

GRAVEL EXTRACTION AND (RE)LANDSCAPING IN THE AREA STEVENSWEERT - OHÉ and LAAK, LIMBURG

Introduction

STEVOL B.V. proposed to extract gravel in their concession-area, and published a notification of intent in December 1989. The EIS was completed in December 1990, and the decision was taken in September 1993.

Advice for specific guidelines

The major questions in the advice concerned:

- hydrological effects, the impact on the environment in Belgium, the impact of the extraction of lignite in nearby Germany on the initiative of STEVOL;
- noise hindrance; mitigating measures are important because of the substantial effects on the neighbourhood;
- (re)landscaping of the area; at the start of the project the (re)landscaping plan must be available with a view to the direct relationship between the gravel extraction and the landscaping.

Alternatives

The public questioned the need for the proposed gravel extraction and maintained that the no-go (zero) alternative was feasible. The Commission recommended the authorities to take a clear stand on the objective of the proponent and hence on the validity of the public's opinion.

The proposed activity exists of a number of subactivities such as:

- removal of the overburden
- extraction of sand and gravel
- sorting, sieving, crushing and washing of sand and gravel
- temporary storage and removal (by ship) of the products
- implementation of infrastructural support facilities
- re-landscaping of the entire area.

The Commission recommended to develop variants on these issues, as a starting point for the composition of consistent alternatives covering the above mentioned issues completely.

EIS

At first the EIS did not cover all relevant guidelines. The proposed activity, hydrological aspects, noise hindrance, the possible event of collapse of a narrow strip of land between the excavation area and a nearby canal and cultural-historical aspects were all not correctly described. Also, the potential impact of the extraction through the hydrological system on an adjacent nature area with a groundwater-dependent ecosystem was not recognized in the EIS. Well-prepared comments by the public drew attention to these aspects. The proponent withdrew and adjusted the EIS.

All relevant guidelines were covered in the second EIS. A conclusion of that EIS was that the noise levels were too high in comparison to what is allowed for mining activities.

Review advice

In the review advice the Commission recommended to pay attention to mitigating measures to protect the adjacent nature area and its special ecosystem e.g. through increasing the impermeability of the subaquatic slopes of the mined-out areas. The Commission also concluded that the risk assessment for a possible collapse of the strip of land between the excavation and the canal had been carried out correctly.

Decision

The licenses were granted in September 1993. Appeals against these licences have been made.

Special features

This project illustrates the essential role of public participation in EIA.

The standard for noise levels for mining activities has been adjusted as a result of this EIA.

Annex 7

DEEP INFILTRATION OF LEVEE GROUNDWATER SOUTHEAST UTRECHT

Introduction

So far only little experience has been gathered with EIAs on groundwater extraction. All EIA's in this field which have been published cope with essentially different activities. This case was chosen as an example because it combines different aspects: recovery of levee groundwater, infiltration, and limited treatment. Furthermore, the decision making about this project will be on three different levels. The first concerns the policy level in which the choice for the aspects mentioned above will be substantiated. The second and third levels deal with the site selection and the project design.

The choice for deep infiltration of levee groundwater results from environmental problems. Originally, in the Netherlands groundwater extraction for drinking water supply was applied as a common method. Nowadays extraction is limited due to the problem of excessive lowering of the groundwater table as a result of increasing extraction for domestic, industrial and agricultural uses. The alternative of direct extraction of surface water is often too costly because of the necessary treatment. By extracting infiltrated surface water on a certain distance from the river the soil acts as a natural treatment facility. In the Southeast Utrecht case, the proponent opted for the extra stage of deep infiltration of the extracted levee groundwater.

Advice for specific guidelines and alternatives

Alternatives should be developed on three levels:

1. The policy level, where systems of surface water catchment and drinking water preparation are discussed.
2. The site selection level, where the most suitable locations for the selected systems are determined.
3. The implementation level, where the design and management of the catchment and deep infiltration areas as well as the facilities for distribution are discussed.

On each level a variant most favourable to the environment should be described. Entire alternatives are coherent combinations of variants at the three levels, consequently following through the three tiers of decision-making.

In the advice, the Commission does not ask for prediction of impacts at the policy level, but recommends to use existing government policy targets as touchstones for the alternatives. For the site selection and project design stages of decision-making the Commission refers to a list of possible impacts which was included in the notice of intent (starting document).

EIS

The EIS for this project is currently being elaborated. In a comparable project elsewhere which has been decided upon already the competent authority made a decision after the policy and site selection stages. This set the framework for

the decisions to be made at the implementation level clear but it cut off a possible return to higher level alternatives in later stages of the decision-making. In the Southeast Utrecht case the possibility of such feed-back loops remains open until the final stage of the EIA and decision-making process.

Decision

The EIA is expected to play an important role in both the site selection and the project design decisions.

Special features

This case shows how EIA can contribute to tiered decision-making processes at different levels.

Annex 8

LANDFILL 'BRAAMBERGEN' AT ALMERE

Introduction

In 1982 a para-statal organisation was granted a licence to establish and exploit a site near Almere in Flevoland for disposal of household and industrial waste. The waste disposal site consists of a series of waste-heaps. No special provisions were required for sealing off the underlying soil layers. A top sealing with non-polluted material should, however, be placed within a month after reaching the intended fill level. As formulation of a request for a new licence was delayed and as the licence was due to expire, the licensing of a temporary facility was decided. This facility did require, amongst other preventive measures, a bottom sealing of the disposal site. A request for a regular licence to extend the disposal site to a capacity of about 2 million cubic metres has been submitted. In relation to this request an EIA procedure has been started in October 1993 with the publication of the notification of intent.

In 1993 new legislation with regard to waste disposal facilities came into effect. High level environmental standards were imposed to protect soils and ground-water under and around landfills.

Environmental standards and requirements relate to:

- suitability of the location of the landfill (soil stability, presence of impermeable soil layers, presence of drinking water extraction areas)
- technical design (bottom sealing, percolation water treatment)
- after-care (inspection, institutional and financial responsibility after the completion of the landfilling).

Although the regulations with regard to the physical design of the disposal site are rather strict (only with application of the best technical means the requirements can be met) there is some margin left for creativity in the design. This creativity is expressed the multitude of ways in which alternatives for design items can be formulated. With regard to alternative formulation, the advice for guidelines gives clear indications.

Advice for guidelines

The licence is requested for the waste disposal site as a whole. This implicates that the EIA procedure will have to cover the landfilling activities of the past as well as future landfilling. For the existing part of the disposal site, this opens up the possibility to mitigate existing, and to prevent future pollution that has or might have occurred as a consequence of insufficient protective means formerly provided.

Alternatives

In its advice the Commission for EIA recommends to describe alternative methods for this rationalisation of the existing parts of the disposal site. These alternatives vary from complete reconstruction according to presently applicable standards to the installation of additional protective means.

For the disposal compartments to be developed in new parts of the disposal site, the Commission considers the initiative in time perspective. It distinguishes the following phases:

- design and construction
- exploitation
- finishing
- supervision after closure

Each of these phases present specific activities with specific environmental hazards that might need description in the EIS.

In the advice, the Commission asks for identification of variants for every activity which might have adverse environmental effects. Preferably variants are asked to be identified that might prevent occurrence of environmental hazards. These variants may relate to design (lay out, engineering, monitoring facilities), construction (materials), alternative means of transport etcetera. Mitigating measures are asked to be developed for environmental effects that cannot be prevented. Having identified environmental relevant variants, the essential step concerns the combination of variants into consistent implementation alternatives.

The competent authority accepted the advice of the Commission and established the specific guidelines for the project without alterations.

EIS

The EIS has not yet been completed.

Special features

Although environmental regulations and standards in the Netherlands impose strict requirements on the design, lay out and completion of the disposal site the EIA can still contribute to the consideration of the environmental interest in matters of important details.

Annex 9

WASTE INCINERATION PLANT TWENTE

Introduction

In a joint venture the regional government of Twente and the regional electricity company¹⁾ of Overijssel proposed to build a waste incineration plant, and published a notification of intent in April 1993. The EIS was completed in September 1993, and the decision was taken in March 1994.

Advice on specific guidelines

The major questions in the advice concerned:

- Which current or future problems necessitate the building of the incinerator, whereas overcapacity of waste incinerators in this part of the country is expected?
- How will the plant comply with the legal requirements, for instance the CO₂ emission standards?

Several alternatives and variants were mentioned for further exploration in the EIS (see 'alternatives').

Air pollution was identified as the main environmental problem to be expected. Soil, water, noise and safety matters would have to be regarded as well.

Alternatives

The guidelines focused on alternatives and variants for the design of the plant that contained elements like pre-separation, biological processing as an alternative process, energy management, flue gas cleansing devices, waste water treatment, processing of residues and manners of transportation.

EIS

All relevant guidelines were covered in the environmental impact statement (EIS).

Review advice

In the review advice the Commission stressed the importance of a good contract between the proponents and the waste suppliers (guarantees for a minimum supply, return of non-reusable residues) and the need for continuing efforts to promote prevention and reuse of waste.

As the waste incinerator is to be built in a former salt mining area, the Commission paid much attention to possible (environmental) risks due to soil instability. If subsidence would occur gradually, the incinerator could be closed. In case of a sudden collapse, a short period of high emissions was not expected to lead to severe (environmental) damage.

The Commission recommended implementation of a monitoring system.

The review advice was positive, and no remarks or objections were made by other participants (public, advisors) in the procedure.

¹ In the Netherlands, as a rule the residual heat of an incinerator is used for generating electricity and sold to an electricity company.

Decision

The licenses were granted in March 1994. The construction started in May 1994.

Special features

This project illustrates how a decision-making procedure about a seemingly controversial project can be completed quickly through contribution of EIA.

Annex 10

TEN YEARS PROGRAMME ON WASTE MANAGEMENT (1992 - 2002)

Introduction

The task of the Waste Consultation Agency (WCA) is to prepare guidance on a national level of the policy regarding eight waste flows. For this purpose the WCA compiles a progressive Ten Years Programme on waste management, which is revised every three years based on the most recent developments. The EIA for the first Ten Years Programme (1992-2002) was made on a voluntary basis.

Advice for specific guidelines and alternatives

In the advice for guidelines of the Commission for EIA a methodological approach was given in order to select a restricted number of policy alternatives to be considered. The Commission indicated the following relevant decisions to be made for which alternatives should be described:

- the method to determine the amounts of waste, taking into consideration the possibilities of prevention and reuse per waste flow and the feasibility thereof;
- the choice of processing techniques, taking pre-separation techniques into consideration;
- the required processing capacity per category or fraction of waste;
- the set of criteria to be implemented when selecting locations;
- the structure of the waste disposal organisation.

The WCA however decided to focus the EIA on the choice of processing techniques for waste disposal such as incineration, landfilling and composting, taking into consideration different scenarios for waste supply.

EIS

Two different scenarios were developed for estimating the quantities of waste supply. The first scenario was based on realisation of current policy concerning prevention and reuse. The second scenario was based on disappointing results in implementing current policy.

The following alternatives for processing techniques (in combination with the different scenarios for waste supply) were described:

- pre-separation, minimised landfilling (current policy);
- no pre-separation, minimised landfilling;
- minimised incineration;
- minimised landfilling, maximised pre-separation;
- minimised incineration, maximised pre-separation.

To describe environmental impacts 12 indicators were selected. These indicators were chosen because of their main impact on the environment. By comparing the alternatives on the basis of a selected number of indicators a clear comparison of alternatives was possible.

The following indicators were selected:

- Hg and Cd
- PAHs (Polycyclic Aromatic Hydrocarbons)
- Dioxine
- Organic matter (deoxidizing)
- SO₂ and NO_x
- odour
- CO₂ and CH₄
- net energy production
- residuals to be dumped in landfills
- chemical waste to be dumped in landfills
- reuse of residuals
- space occupation.

Based on the comparison of environmental impacts the alternative most friendly to the environment (EMFA) was considered to be a combination of maximised preseparation, composting and minimised landfilling.

Review

In the review advice the Commission stated that the EIA gave a clear insight in the possible environmental impacts of the described alternatives. The use of a selected number of indicators for comparing the impacts was received with enthusiasm.

The following remarks were made in the review:

- In both scenarios for waste supply a decrease in the year 2000 was envisaged. This was considered too optimistic by the Commission.
- The emphasis of the EIA was put on processing techniques and programming processing capacity. Too little attention was paid to the following aspects:
 - * implementation of the device of regional self-support as a base for planning;
 - * the structure of the waste disposal organisation;
 - * the methods for selecting locations.
- The environmental impacts were not related to the total environmental burden of each indicator in the Netherlands; therefore for instance no insight was given in the relative minimal impact of reduction of CO₂-emission due to incineration on the total CO₂-burden in the Netherlands.

Decision

The WCA gave preference to the alternative in which preseparation was combined with landfilling restricted to a minimum (current policy), realised by prohibition of landfilling of waste that can be incinerated. The EMFA was thought to be not (yet) realistic due to the absence of the necessary preseparation and composting capacity on short term. The EMFA was thought of as a desirable option for the near future.

Special features

Recently the EIA-procedure for the tri-annual revision of the Ten Year Programme has started. Though the scoping stage has not finished yet, both the initiator and the Commission for EIA agree on the application of a new approach in the EIS, based on the lifecycle analysis (LCA) of products. The scoping document for this EIS will also be available in english in the near future.

Comparing alternatives in Environmental Impact Assessment

Marja van Eck, with contributions of colleagues

INTRODUCTION

Environmental impact assessment (EIA) is meant to enable a balanced decision on a proposal by providing information on the environmental consequences of the proposal. In the Netherlands EIA regulations require that a proponent should describe alternatives for his proposed activity in an environmental impact statement (EIS). Thus the core of an EIS will be a matrix comparing the environmental impacts of the proposed activity and of the alternatives.

When reviewing EISs the Dutch independent Commission for EIA often finds the comparison of alternatives inadequate.

This article gives some examples of how some Dutch EISs compare alternatives and shows how this important part of EIA might be improved.

Objectives of comparing alternatives

The Explanatory Note accompanying the Dutch legislation on EIA discerns several objectives for the comparison of alternatives:

"(...) First, to give the competent authority a clear view of the impact of the proposed activity compared to the impact of considered alternatives. Secondly, to compare the impacts of the proposed activity and its alternatives in relation to standards and objectives of the environmental policy. The impacts should be comparable, to make a sound decision. The information should be factual and without value judgement. If value judgements are unavoidable, they should be explained and justified. (...)"

A comparison of alternatives should answer several questions:

a. How will the proposal change the environment?

This concerns identifying the environmental consequences of the proposal by comparison with the existing state of the environment.

b. How serious are these changes for the environment?

This means relating the impact to environmental standards and objectives.

c. How can serious impacts be prevented?

This includes comparing the different possible solutions for the proposal, constructing the alternative most favourable for the environmental (EMFA) and giving the arguments for the chosen alternative.

Although it is possible to construct a comprehensive matrix that will show the answers to all these questions at once it can be useful to deal with each question in a separate matrix. Moreover, in practice, the importance of the individual questions varies per decision-making process.

Example 1. 'Highlight relevant questions'.

An EIS about the possible developments in an urban region compares the environmental impacts of the various models for future growth and examines which alternative is most friendly to the environment. The objectives of the environmental policy are relatively general (automobility control, nature conservation) and sometimes inconsistent. In such case it is important to establish the best solution (c) as for the existing state of the environment (a).

If a new industry wants to settle in a large developing industrial area, comparison of the future environmental situation with the existing situation is less useful than a sound inventory of criteria for emissions of noise, pollution and odour related to the ALARA (as low as reasonably achievable) principle (b, c).

Consequently, there is no standard solution for a good comparison of alternatives. Yet, some observations can be helpful for drafting and reviewing EISs.

Suggestions for comparison of alternatives

■ Consider only relevant alternatives

The Dutch EIA legislation requires that an EIS should contain at least a description of the proposed activity and of the alternative most friendly to the environment. In practice, many more alternatives can be interesting, for instance on location, design, construction, size, phasing and mitigation.

However, alternatives should be feasible and substantially different from each another. The comparison of alternatives and particularly the matrix presenting the final comparison of alternatives should not contain unfeasible or 'fake' alternatives.

Example 2. 'Avoid unrealistic alternatives.'

An EIS concerning a composting facility contains elaborate descriptions of the advantages of a new technique for control of odour emissions. The technique is included in the EMFA and thus regarded in the comparison of alternatives. On page 251 the EIS notes that the described technique is not yet operational, and will not be in the near future.

Sometimes, alternatives are made up and used to place the preferred alternative in a favourable perspective.

Example 3. 'Avoid alternatives that will not be considered'.

In an EIS for a recreation project several environmentally unfriendly alternatives are presented to emphasize how favourable the proposed activity is. Yet, none of the alternatives seems to have any value, not even to the initiator.

EISs for airports and road construction often use the expectation that future cars and aircraft will produce less noise and will create less air pollution. Although this hypothesis might be very true it can lead to derision in the comparison of alternatives, if this assumption is applied to the alternatives and not to the autonomous development of the existing situation.

The following criteria can be used to check the selection of alternatives. Alternatives should:

- be feasible in practice (**sense of reality**);
- meet the objectives of the initiator, provided that these are not defined too narrowly (**problem solving capacity**);
- be sufficiently different (**discriminating potential**);
- cover the total range of possible solutions (**width coverage**);
- be composed of partial solutions ('variants') that can be combined into a consistent entity (**structure**).

Sometimes the proponent will notice during the writing of an EIS that certain alternatives are irrelevant in that their environmental impacts are worse, while there are no advantages compared to other alternatives. The user of an EIS should not be bothered with such alternatives.

■ Consider only relevant environmental aspects using concrete criteria based on policy objectives and standards

In the scoping phase of EIA much attention is paid to define the most relevant environmental aspects. Only during the drafting of the EIS it will become clear whether the first impressions were correct.

Example 4. 'Remove nondiscriminating environmental aspects from the final tabular presentation, unless friction with environmental standards is shown.'

In an EIS for a water extraction project the alternatives all showed the same impact on the groundwater level. Deletion of this information from the matrix and just the mention of it in one line would have made the comparison of the alternatives less complicated.

If all alternatives lead up to a drastic lowering of the groundwater level, this should be mentioned in the matrix presenting the alternatives in relation to the objective to counteract dehydration.

In the Netherlands several explicit environmental standards have been legally set (noise, water quality, emission of toxic material, etc.). To help the comparison of the environmental impacts with the standards the matrix should contain the standards and the impacts should be described along the same variables and parameters.

Example 5. 'Enable a check with environmental standards'.

In an EIS for a digestion installation the deposition limit of ammonia is expressed in mol. acid/ha/year and the emission of the installation in ton/year, clearly not revealing the meaning of the emission with respect to the standard.

By checking the environmental impacts of the proposed activity and the alternatives with environmental standards the implications for decision-making must become apparent.

Example 6. '... and clarify the consequences for the decision-maker.'

The EIS for the expansion of a racing circuit shows that the only way to operate on the present location and to comply with legal standards for noise hindrance is to build noise barriers of 17 metres high.

■ Describe the impacts as quantitatively as possible

Factual differences between alternatives may be better understood if the impacts are described and compared in a quantitative form: emissions to the air in mg/m³, loss of vegetation in surface area, loss of biodiversity in the number of species, noise in dB(A), groundwater level changes in cm.

By showing the impacts in this way the information about the size of the effects remains intact. Even the use of percentages can sometimes be misleading.

Example 7. 'Be careful with percentages'.

In an area with an extremely high background concentration of SO₂, a 'fractional' increase of 0.5% can mean a substantial emission increase.

Matrix presentations

Almost every EIS contains an overview of the comparison of alternatives in a matrix. It can summarize the most important information of the EIS.

■ Make the matrix comparing the alternatives a well-organized and verifiable summary of the results of the EIS

The most frequently used presentation of a comparison of alternatives is a matrix, in which +, o and - show how each alternative affects the different environmental aspects. This can be a useful way to provide a quick overview of the differences between the alternatives. Sometimes however at a closer look it is totally obscure, why one alternative gets a '+' and the other one an 'o'. The EIS reader can only find an explanation and background arguments by collecting information from 'all over the EIS'. Even if the correct information can be found, it appears that definition of plus and minus signs is a relatively subjective operation.

Consequently each final matrix presenting a comparison of alternatives should be based on an extensive overview of background information in a matrix form, containing all relevant data. If necessary, a page reference should guide the readers to more ample information.

If the described environmental impacts can be read out against the environmental standards (included in the matrix) all the required information is available at once.

In practice, such a matrix is often too extensive and cannot be used to get a quick overview. Then further elaboration and simplification are necessary.

■ Only process information if needed for easy reference. Balance the advantages against the loss of information and the risk of introducing value judgements.

The following methods for simplified presentation are common in EISs.

Plus-minus-matrixes

- The impacts of each alternative are evaluated against a reference (usually the existing situation, see example 7); or:
 - For each alternative it is shown, how it contributes to the environmental objectives; or:
 - The impacts of each alternative are compared with the preferred alternative. ++ and -- give extra possibilities for differentiation.
- Obviously the composition of a plus-minus matrix implies making many questionable decisions. By presenting the background information in matrix form the decisions can be checked and the discussion is eased.

Example 7. Why does the proposed activity improve the soil condition?'

	existing situation	proposed activity	process alternative	envir. most friendly
air	o	-	-	o
soil	o	+	+	+
surface water	o	-	o	o
waste	o	+	+	+
noise	o	-	-	-
safety	o	(-)	(-)	(-)
nature	o	o	o	o
energy	o	-	o	+
costs	o	-	-	-

- deterioration compared to the existing situation, + improvement, o no difference
(-) insignificant deterioration

Comparison matrixes

In comparison matrixes the environmental aspects of each alternative have a comparative score. The scores are expressed in numbers or amount of symbols. This method is useful if a plus-minus approach runs short of differentiation, or when it simplifies the comparison with the environmental standard. The following example shows that also in this case a background matrix must provide the necessary explanation.

Example 8. 'The nature alternative is good for nature, but what now...?'

	existing situation	preferred alternative	nature alternative	living quality alternative	energy alternative
soil and water	■■■	■■	■■■■■	■■■	■■■■
infrastructure noise, air	■■	■■■■■	■■■	■	■■■
nature	■■■■■	■■■	■■■■■	■	■■■■
landscape cultural heritage	■■■■■	■	■■■■	■■	■■■
living quality	not relevant	■■■	■	■■■■■	■■■

■■■■■ highest preference
■■■■ some preference
■■■ neutral
■■ less preference
■ least preference

In each case it is important that the signification of the symbols is properly defined.

Example 9. 'Define the used symbols properly.'
In an EIS for a shredder installation the symbol '+' meant: 'no negative impact', 'mitigation' and 'diminished risk' simultaneously. Such a 'legend' really does not improve the clarity of the matrix. Sometimes, it can be useful to define the symbols in the matrix:

impacts	alternative A	alternative B	remarks
safety	-	o	o = according to Delta regulation
traffic	-	o	- = traffic growth
landscape	o	-	o = same as existing situation
buildings to be demolished	10	8	amount

Example 10: 'A quantity is more informative.'
In an EIS for a housing project the alternatives differ in space occupancy. In the final matrix comparing the alternatives '++' indicates highest preference, '+' some preference, 'o' neutral, '-' less preference and '--' least preference. It appears odd and misleading that the zero alternative (no new construction) scores the same as the alternative with the smallest space occupancy, but this is the result of scoring 8 alternatives in five categories. This example also illustrates why sometimes factual data are more informative than processed data.

Comparison of space occupancy

	zero alt.	1	2	3	living quality	mobility	nature	EMFA
scores	++	--	-	o	o	+	o	++
in ha	-	691	601	592	564	505	571	476

Weight sets

The disadvantage of the former mentioned methods for comparison of alternatives is, that they do not account for weight differences in environmental impacts, while anyone is definitely inclined to sum up the contents of the cells. In this respect the matrixes provide spurious clarity and make manipulation of conclusions possible.

Example 11. 'Let the matrix reflect the real problems.'
In a factory for processing manure the emissions of ammonia and odour are the major problems. In the matrix that shows the results of the EIS odour and ammonia problems are presented together in one (narrow) column. Several other less important aspects, as noise, safety, water and soil, are extensively presented, distorting the complete picture of the comparison of alternatives.

By assigning weights to each environmental impact this problem can be solved (more or less). Then sensitivity analysis should clarify to what extent the (relatively subjective) weight assignment influences the results.

Presentation

To get a quick overview of the results of an EIS, a comparison of alternatives can be presented as a graph, a map, a diagram or other kind of picture. Colours or shades of gray can enhance the presentation.

Example 12. Matrix using colours.

objectives	indicator	route 1	route 2	route 3
limitation of car kilometres	amount of car kilometres	293.700	297.700	293.700
limit expansion of infrastructure	kilometres new motorway	7	10	7
nature conservation	dissection of ecological zones	yes	no	partly mitigation possible

The advantage of using colours is that they can be combined in a matrix with factual information. Shades of green can show the positive effects and shades of red the negative. It gives an indication in which environmental compartments problems can be expected and which alternatives are most promising.

Complete information or a quick overview

By carefully choosing the method and appearance of the presentation of alternatives, this part of the EIS can prove its value as a well-organized summary of the major results of the EIS, containing the information the decision-maker should determine his position on. It is preferable, if possible, to present a matrix with factual quantitative information about the major environmental impacts, including environmental standards.

Example 13. 'Quick but factual overview'.

	lead concentration in air ($\mu\text{g}/\text{m}^3$)	NO_x emission $\mu\text{g}/\text{m}^3$	noise level at periphery area dB(A)	tons/year hazardous waste produced
alternative 1	0.8	35	55	2674
alternative 2	0.7	20	50	2350
background level existing situation	1.0	80	43	-
predicted backgr. level 2005	1.2	110	45	-
environmental standard	1.5	100	55	-

Sometimes, selection and further elaboration are needed to create a clear picture. Then, the choices, made during this process, should be explicit and verifiable.

Summary of recommendations

- Pay much attention to the presentation of the comparison of alternatives. It is the core information of the EIS.
- Account for the triple function of the comparison:
 - Which is the difference in regard to the existing situation?
 - How good or bad is that in relation to the objectives?
 - What is the most favourable alternative?
- Select only relevant alternatives and environmental impacts for the final presentation. Remove 'empty' rows and columns that unnecessarily complicate the presentation and can be dealt with more easily in another way.
- Also present the background information in a tabular form and illustrate how the final matrix is derived from the more extensive one.
- Avoid data processing, if leading to unnecessary loss of information. Make sure that the processing decisions can be verified.
- Check use of weights by a sensitivity analysis.
- Use visual presentation techniques to enhance the presented factual information.

Reviewing Environmental Impact Statements

Jules J. Scholten and Marja van Eck

SUMMARY

This paper describes the conditions that govern the review of environmental impact statements (EISs). It recommends the adoption of a certain approach in reviewing. This approach contains considerations and points of view that are common in the Netherlands' system of environmental impact assessment.

Reviews of environmental impact statements are carried out by the competent authority (or on behalf of the competent authority) in support of decision-making. The amount of time and money available determines the speed and intensity of the review, ranging from quick overviews by one person to thorough reviews by teams of experts.

In setting up reviews, attention should be given to the availability of scoping guidelines for the activity concerned, the availability of general review criteria such as legal EIS-requirements, national and regional environmental target values, standards etc as well as reviews of EISs on comparable activities.

The reviews should progress through three steps. In the first step an overview is produced encompassing all deficiencies noted in the EIS. The second step concentrates on the recognition of those deficiencies which appear to be serious shortcomings in information hampering sound decision-making. In the third step the review must recommend to the competent authority how and when serious shortcomings should be remedied for the benefit of the decision and the implementation. The product of each review should be a report focussing on crucial shortcomings only with a clear recommendation as to how these serious shortcomings must be remedied: either directly in the form of a supplement to the EIS, or as explanations and conditions attached to the decision or through monitoring the implementation and operation of the activity with possible corrective action afterwards. If no serious shortcomings are found, the review report should state clearly the adequacy of the EIS for the decision.

If the review is an independent review this should be the end result which refrains from judging the desirability or viability of the proposed activity. However, in many cases the review must be carried out to prepare the decision and a standpoint on the implementation of the proposed activity must be developed. In these cases, it is clear that the review must be carried through with the advice to either permit the activity or not or conditionally on the basis of environmental considerations.

INTRODUCTION

This paper describes the conditions that govern the review of environmental impact statements (EISs). It recommends the adoption of a certain approach in reviewing. This approach contains considerations and points of view that are common in the Netherlands' system of environmental impact assessment. Following completion of an environmental impact statement (EIS) by a developer (proponent) in support of a license request for an activity, the EIS is presented to the competent government authority. Before making the decision the competent authority studies the EIS in order to determine whether the license can be granted or not or whether the license may be granted conditionally. For this purpose the **EIS must be reviewed**. The **review** is carried out by the competent authority or by an agency on behalf of the competent authority.

The review team

Suppose you are asked by the competent authority to perform the review of an EIS and you have not done it before, how do you deal with it?

When you find yourself in such a position, the first questions that must be addressed are:

- How much time is available for the review?
- Are any funds available to carry out the review?

The answers to these questions determine the **speed and intensity of the review**. The choice ranges between a quick overview by one person (probably yourself) to an in-depth review by a team of experts assembled by you to do the job. If sufficient time and money are available to appoint a small team of experts, their expert inputs must be assessed on the basis of the most important environmental issues and aspects that govern the activity. For example, the ideal composition of a team reviewing the EIS about a sanitary landfill would include a landfill engineer, a geohydrologist and an ecologist. The team of experts can only operate well if it receives the support of a technical secretary (probably you) who organises a site visit to the project, the meetings, the background information, the time table for the expert's inputs and the sequence of drafts leading to the final product: the review report. Whether you are on your own carrying out the review or with the help of a team of experts, the deadline for the review report must be observed carefully, so that it can be met on time.

The review approach

Once the number of persons carrying out the review is determined, the proper **approach** has to be found. This can be done by answering another set of questions:

1. Are any terms of reference available for the review in the form of scoping guidelines?
2. Are any reviews of EISs available about comparable activities in similar settings?
3. Which general review criteria should be observed?
4. Which steps must be observed in the review and what should be the final product of the review to provide a clear message to the competent authority?

The answers have to take into account the following considerations.

1. If scoping guidelines are available for the EIS concerned, it is clear that they should be used as **terms of reference in the review**. In case no scoping guidelines were prepared prior to the preparation of the EIS, the first task of the review is to still **scope the main aspects of the project** which should be addressed in the EIS. The following aspects are relevant:
 - objective of the proposed activity
 - policy context giving information about past decisions which may preclude or predetermine certain aspects of the implementation and information about environmental target values, standards or criteria which should be met
 - existing environmental quality and key problems confronting the implementation of the activity
 - description of the activity enabling the prediction of impacts
 - expected environmental impacts (see Annex 1)
 - possible mitigating measures and potential alternatives reducing or neutralizing the adversity of impacts
 - uncertainties about the activity, the existing environmental quality and the impact prediction and their significance for the decision
 - monitoring environmental quality and actual impacts
2. Any **existing reviews of EISs about comparable activities** and settings are helpful as they can provide useful reference material as to which information is considered significant for the activity and for the decision. If comparable cases are available, it is also useful to learn about any problems these activities may have experienced in their implementation and operation. These experiences may reveal important clues to the precise nature of impacts occurring during implementation and operation.
3. Apart from the specific guidelines for the particular EIS as mentioned above, the following **general review criteria** must be observed:
 - legal EIS-requirements (if any)
 - national and regional environmental target values, standards or criteria about emission levels and environmental qualities (e.g. sulphur dioxide and nitrogen oxide levels governing air quality, drinking water standards, etc.) directly related to the activity
 - state of the art of technological and environmental sciences involved in the EIS

- significance of impacts in view of the decision
- clarity of statements and the presence of a concise executive summary.

It is clear that the intensity of observation of these criteria depends very much on the time and expertise available in the review. If you have to carry out the review on your own, the competent authority cannot expect you to be reasonably well informed about the state of the art of the various technological and environmental sciences which support the EIS.

In the review, special attention must be given to the quality of the executive summary of the EIS. In the summary the significance of the impacts in view of the decision must be explained concisely in a non-technical manner. It is an established fact that decision-makers and most readers of the EIS usually only study the summary. Hence, if the summary does not reflect the substance of the issues in the EIS, the EIS has missed an important part of its message to the decision-makers and to the public.

4. The actual execution of every EIS-review should progress through three steps.

In the **first step**, all deficiencies in the EIS are listed on the basis of the specific scoping guidelines and general review criteria and checked against any experiences with reviews of comparable EISs on similar activities.

When the overview of deficiencies is ready, in the **second step the review must determine which shortcomings are so crucial that they matter directly to the decision**. In other words, **the review must clearly separate the crucial shortcomings from the less important deficiencies**. It is obvious that the review report must mainly deal with the crucial shortcomings observed in the EIS. If no serious omissions are found, the review report must state this clearly. In Annex 2 a list is presented including a number of serious shortcomings which during reviews in the Netherlands were found crucially important in EISs. Remarks about less important deficiencies which have no crucial significance to the decision should be moved to an appendix to the review report at most. Such remarks only have a learning effect for future EISs. For the sake of clarity and brevity however, the review team may decide to leave out altogether remarks about less important deficiencies from the review report.

In the **third step**, the review team must **recommend to the competent authority how and when serious shortcomings should be remedied** for the benefit of the decision and its implementation.

Three options are available:

- The shortcomings are so serious that they require immediate remedy in the form of a supplement to the EIS. In this particular option, the review report must give clear instruction as to how the additional information can be collected and added to the information in the EIS. In selecting this option, the review team must realize that the decision-making will be delayed with some time until the supplement to the EIS is ready.

- The shortcomings can be rectified fairly easily by means of a set of explanations and conditions attached to the decision. Selecting this option has the unmistakable advantage that the decision-making can proceed as planned without considerable delay in gathering additional environmental data.
- The shortcomings cannot be remedied immediately either by providing additional information to the EIA or in the form of explanations and conditions attached to the decision because they require too much time and effort to collect. In this case the review may recommend monitoring the shortcomings and uncertainties during the implementation and operation of the activity with possible corrective measures if impacts turn out to be worse than expected.

In some cases, it may happen that the review team includes so much expertise that it feels it is able to rectify serious shortcomings in the EIS immediately in its own review report. Although this option may appear attractive as it does not delay the decision and it may offer information which directly can contribute to the solution of the problem, it has the obvious drawback that in doing so the review team is carrying out the correction for the developer and running the risk to be identified with the position of the developer.

The nature and result of the review

If the review concerns an **independent review** that requires reporting to the competent authority in the form of a review advice, **the completion of the third step signals the end of the review**.

The result of an independent review is a judgement on the quality and adequacy of the environmental information in the EIS including clear recommendations on how any serious shortcomings in information should be remedied. If no serious shortcomings are noted, the adequacy of the EIS for the decision should be stated distinctly. In conclusion, **an independent review should refrain from judging the desirability or viability of the implementation of the activity**.

However, **often the review will be required to present** - in addition to the statement on adequacy of the EIS - **an advice on the question whether to proceed with the activity or not**. Then an additional step must be added to the three steps mentioned above. That extra step involves the formulation of a motivated standpoint on giving either the green or the red light to the activity or alternatively, the yellow light indicating a conditional decision.

If this extra step is required, it must be emphasized that the review follows the approach in taking the steps as outlined above to remain as objectively as possible before addressing the final question whether to proceed with the proposed activity or not. If this is not done the review runs the risk to be inclined too early towards a decision in favour of a certain solution.

The review approach and the required result can be illustrated by means of the following example.

The review of an EIS concerning a new railroad connection has noted that all alternatives of the EIS still will cause considerable noise nuisance along those sections of the railroad passing through population centres. The review team may conclude that the description of additional mitigating measures concerning

noise abatement ought to be added to the EIS before a decision can be made. This would be the conclusion if the review would be an independent review. If however the review must be completed with a statement on whether to proceed with the activity or not, the review team must explain to the decision-maker that it is best to supplement the EIS with the mitigating measures before making a decision and - if this is not done - what will be the consequences for the people affected along the new railroad connection including the possibility of appeals against the decision which can delay the implementation.

Checklist concerning types of environmental impacts

- dispersion of pollution to air, water and soil
- acidification through the process of acid deposition or the use of certain fertilizers
- change in nutrient status of soil and water either through the process of acid deposition, or through disposal of waste water and solid waste, mining and agricultural activities etc.
- climate change through clearing vegetation, reforestation, producing greenhouse gases, changing land-water relations (land reclamations, reservoirs), thermal pollution, etc.
- change in groundwater tables either by land reclamation, insufficient or excessive land drainage, extraction of water for domestic or industrial uses or for construction purposes
- erosion, sedimentation through changes in the dynamics of geomorphology, changes in vegetation cover and built-up areas; excavation and landfilling
- ecological changes both in terms of affecting individual terrestrial and aquatic species and habitats
- disturbance (noise, odour, light)
- public health and safety either by affecting environmental qualities or through accidents and natural disasters (fires, explosions, floods, earthquakes, landslides, volcanic eruptions)
- change in land use, loss of space
- change in landscape
- loss of cultural heritage, archeological elements

Annex 2

List of serious shortcomings noted during reviews of EISs in the Netherlands

- *Objective of the activity is described too narrowly.*
Example: The EIS describes the transport problem concerning the movement of persons and goods between two places only in terms of road transport neglecting the potentials for rail or other means of transport.
- *The description of the activity does not cover the entire activity.*
Example: The EIS describes the proposed construction of an industrial plant but omits information about construction of a pipeline and other facilities to transport and handle raw materials and finished products to and from the plant.
- *Selection of alternatives does not take into account environmental aspects.*
Example: The EIS on a car racing circuit in a coastal dune landscape only considers alternatives meeting motorsport requirements, visitors 'needs' and public safety regulations while overlooking environmental considerations such as noise abatement, the protection of geomorphology and ecology of the coastal landscape.
- *Key problems affected by the activity are not described.*
Example: The EIS describes the proposed construction of a coal-fired power plant using surface water as cooling medium. The EIS does not describe that the surface water body is already used by other industrial activities for cooling purposes to the limit of its cooling capacity.
- *Sensitive elements in the existing environment are overlooked.*
Example: The EIS on a pipeline project does not describe that the proposed alignment of the pipeline will dissect certain areas of ecological value.
- *Environmental target values and standards are not properly described and observed.*
Example: The EIS for an extension of an airport describes the impacts up to the standard of 25 percent of people seriously affected by aircraft noise whereas the target value aims at 10 percent of people seriously affected.
- *No alternative is described complying with legal environmental regulations and standards.*
Example: The EIS for a sanitary landfill indicates that the soil types in the area are very diverse ranging from sand and clay to peat. The alternatives do not take into account the large differences in compaction and subsidence of these soil types with subsequent failures of underlinings and drainage systems underlying the landfill.
- *Possible promising mitigating measures are not considered.*
Example: The EIS for a sanitary landfill does not describe a system collecting the methane gas produced in the landfill. Methane is a greenhouse gas contributing to global warming.

- *The alternative offering the best protection to the environment is not described or insufficiently described.*

Example: The EIS on a bridge or tunnel connection across an estuary does not take seriously the alternative whereby the connection is carried out as a drilled tunnel. A drilled tunnel underneath the bottom of the estuary has considerable less impact on the environment than a bridge connection or a tunnel composed of segments on the bottom of the estuary.

- *Serious impacts on the environment are not or not correctly described.*

Example: In the case of the EIS for a sanitary landfill in an area with very variable soil conditions the EIS does not describe the impact on the environment following failure of the underlying sealing and drainage systems.

- *Insufficient or outdated prediction models are used.*

Example: The EIS on an urban development scheme made use of a mobility prediction model using national averages whereas local input data is available enabling a more precise prediction.

- *Environmental impacts are not compared with standards or target values.*

Example: See the case of the EIS on the airport extension where the target value of 10 percent of people seriously affected is not described.

- *In comparing the alternatives incorrect conclusions are drawn.*

Example: In the EIS on a regional management plan for the disposal of municipal sewage sludge various alternative methods for disposal are compared. One alternative concerns composting the sludge into a low grade compost product. The comparison of the alternatives in the EIS presents the composting method as an attractive form of disposal as it greatly reduces volume. However, the comparison does not take into account the limited potential of applying the low grade compost as a soil conditioner or improver due to high heavy metal contents in the sludge.

Environmental Impact Assessment for policy plans and programmes in the Netherlands

Marja van Eck

INTRODUCTION

Legislation on environmental impact assessment (EIA) was introduced in the Netherlands after a 10-year period of experimentation.

According to the Act, that was adopted in 1987, EIA has to be carried out for decision making about activities and plans with possible severe detrimental consequences for the environment. These activities and policy plans are specified in a positive list with threshold values published in a General Administrative Order related to the Act.

The EIA-procedure starts by publishing an initial document (*memorandum of intent*) on the proposed activity or proposed policy by the proponent. The competent authority¹ gives the national Commission for EIA (an independent scientific advisory body) the opportunity to recommend on specifications for the content of the environmental impact statement (EIS), that has to be drawn up. The Commission takes the results of public participation into account. This is regarded as the *scoping phase* in the procedure.

The competent authority decides upon the ultimate specifications for the EIS.

The EIS is compiled by the proponent or by a consultant hired by the proponent. A draft plan or license containing relevant decisions on the proposed policy or activity is drawn up at the same time.

Next, the EIS and the draft plan or license application are published simultaneously. The Commission for EIA writes a *review report*, incorporating the results of public participation. The Commission reviews whether the EIS is scientifically correct and whether it is in accordance with the established specifications and the legal requirements. The acceptability of the proposed activity as such is not judged by the Commission. The competent authority decides, taking into account the results of the EIA. The governmental decision must also contain a programme for *post-project analysis* to be carried out after realization of the proposed activity or implementation of the plan.

In the Netherlands, wide experience with EIA has been acquired for (almost 400) projects and some experience with 'strategic' EIA for policy plans and programmes.

At national level strategic EIA was carried out for:

- the National Structure Plan for Rural Areas
- National Guidelines for storage of dredged sludge
- the National Policy Plan for industrial and drinking water supply
- the National Structure Plan on Electricity Supply
- the National Waste Management Programme.

Regional strategic EIAs covered similar subjects and town and country planning.

This article concentrates on EIA for policy plans and programmes.

It explains how EIA is carried out, which problems were encountered, how they were solved and which conclusions were drawn.

1 In EIA for policy plans and programs the proponent and the competent authority are often the same governmental body.

THE NATIONAL WASTE MANAGEMENT PROGRAMME

The National Programme on Waste Management 1992-2002 (Waste Programme) states how much capacity for incineration and land filling is needed, determines where and when this capacity has to be realized, gives criteria for the selection of sites and specifies a range of supplementary measures, which should guarantee that waste is effectively disposed of in the coming years. The Waste Programme will serve as a reference framework for all levels of administration involved in the elaboration of the policy plan.

The Waste Management Council, a cooperation between local, regional and national authorities, decided to carry out EIA for this programme on a voluntary basis.

Through EIA a nation-wide picture of the contribution of waste disposal to the entire burden on the environment was acquired. The EIS shows and compares the environmental impact of the various options for waste disposal, especially the decision to incinerate instead of landfilling.

In the EIS two alternative scenarios were distinguished in order to make valid statements on the increase of the waste volume:

- ① a scenario based on meeting the objectives of the National Environmental Policy Plan on recycling and prevention of waste: the 'policy scenario'.
- ② a scenario based on a more pessimistic view on these topics: the 'head wind scenario'.

The EIS examined the environmental impact of various disposal approaches (containing different amounts of pre-separation, dumping, composting, digesting and incineration), using twelve statistical indicators. These indicators are typical for the implications for the environment and cover relevant environmental topics as: dispersal, acidification, disturbance, climate change, energy use, removal and economy of space.

An example of a comparison of alternatives is given in table 1.

Using the indicators it is possible to compare the different alternatives, although it is important to bear in mind that the result of the comparison will partly depend on the importance attributed to the various indicators.

The EIS pointed out that pre-separation and digestion were the most favourable ways of waste processing with regard to the environment, but the most difficult to realize on the short term lacking sufficient processing capacity and even lacking technological experience with large scale processing plants for digestion.

The EIS suggested that this was the best direction for the long term approach, but for the coming years it proposed to mainly incinerate all combustible waste and dump the remaining waste, as was brought forward as the proposed activity at the start of the EIA. Meanwhile, much attention must be paid to the development of pre-separation and digestion technologies.

Within the framework of the National Waste Programme, the regional authorities plan their own disposal capacity and select sites for the processing, incineration and dumping of waste in a five year term Waste Management Plan. EIA is compulsory for these plans. Although these plans contain proposals on a regional instead of a national level, they can be regarded as strategic plans and EIA is carried out in a way comparable to the National Programme. For a majority of the Dutch regions EIA was carried out for Waste Management Plans.

Table 1. Overview of environmental effects of the policy alternative
(Source: EIA, Draft Ten-Year Programme on Waste Management 1992-2002
AOO, Deventer, January 1992)

Stat. Indicator	Policy		Ref. Var	Alt I	Alt II	Alt III	Unit
	1990	2000					
		pre-separation minimal dump	minimal dump	minimal incineration	maximal pre-separation, minimal dump	maximal pre-separation minimal incinerat.	
Dispersion							
-Hf+Cd	5457	5445	5696	3257	4632	2463	kg
-PAH	62	3,7	3,8	3,1	3,4	2,7	kg
-Dioxin	147	4,1	4,3	2,2	3,3	1,5	g
-COD	792	202	211	359	228	303	ton
Acidification							
-acid equiv.	222	107	111	68	99	53	Meq.H ⁺
Disturbance							
-odor emission	17	55	43	45	9	9	10 ¹² ge
Climatic change							
-CO ₂ eq.	4349	-1496	-1525	-175	-1526	-494	kton
Energy							
-energy output	6,2	20,9	21,5	11,4	20,1	-9,6	PJ
Removal							
-res. to be dumped	220	398	402	548	359	896	kton
-chemical waste	118	164	164	76	165	49	kton
-res. to be recovered	637	1802	1891	1316	1502	1043	kton
Space occupied							
-space occupied	79	29	28	46	32	50	ha

NATIONAL STRUCTURE PLAN ON ELECTRICITY SUPPLY

The National Structure Plan on Electricity Supply is drawn up by the national government and contains selections of sites for power plants, windmill parks and transportation facilities and decisions on the fuels to be used for the coming 20 years. EIA is compulsory for this Structure Plan.

In the EIA procedure the Minister of Economic Affairs and the Minister of Housing, Physical Planning and Environment acted both as proponent as well as competent authority. During the procedure a role division developed. The Minister of Economic Affairs acted rather as the proponent, whereas the Minister of Housing, Physical Planning and Environment took up the role of competent authority, according to the subject of their interests (electricity supply or environmental protection).

In the EIS the proposed sites and transportation facilities in the draft Structure Plan were checked on the basis of the objectives of the Nature Policy Plan, containing a map of the main ecological structure, and on the basis of expected effects on cooling water capacity, water quality, noise hindrance and safety.

The impacts of fuel use were predicted for the scenario's '50% natural gas, 50% coal' and '33% natural gas, 33% coal, 33% oil-gassification'. Variations were taken into account due to various forecasts on the development of technology. The emissions were calculated as the sum of all individual plants, on which data were available.

The EIS was bulky, the calculations numerous and time consuming, but all participants considered the effort worthwhile.

As a result of the EIS it was suggested that the use of coal had to be diminished and restricted to the modern technology of coal-gassification. Moreover, the EIS limited the possibilities of sites for power plants.

A simplified example of the comparison of alternatives is given in table 2.

Table 2. Comparison of alternatives for fuel use
(Source: EIS, Structure Plan Electricity Supply
Ministries of Economic Affairs and of Housing, Physical Planning and Environment,
Arnhem, May 1992)

Alternative	emissions kt/a		acidification	emission Mt/a	residu Mt/a	slag	plaster
	SO2	NOx	mol/ha	CO2	fly ash		
Low energy demand							
50\50 powdercoal	22.5	31.8	45	50.3	0-2.5	1.5	1.1
50\50 coal gassif.	13.1	33.0	30	49.9	-	5.0	-
33\33\33	15.3	33.1	35	49.0	-	3.0	-
High energy demand							
50\50 powdercoal	29.1	37.8	55	65.2	0-5.0	1.5	2.5
50\50 coal gassif.	14.1	39.8	35	64.5	-	7.5	-
33\33\33	16.0	39.7	35	61.4	-	4.5	-

50\50: 50% natural gas, 50% coal

33\33\33: 33% natural gas, 33% coal gassification, 33% oil gassification

TOWN AND COUNTRY PLANNING

The national policy on town and country planning is stated in a National Physical Planning Programme. In 1986 the Fourth National Physical Planning Programme was published. However, in 1990 the new Minister of Housing, Planning and Environment decided to draft a new programme, the Fourth Programme Extra, intended amongst others to have a better integration of the national environmental policy into the town planning policy. Main environmental issues were mobility and quality of life.

No EIA was envisaged for the Fourth Programme Extra. The Minister argued that the Programme established only 'directions of development', and would not decide on specific locations for housing, industry or recreation.

Eventually, the Fourth Programme Extra proved rather decisive in the selection of sites for future urban development, so the next National Programme for town and country planning will not get away without EIA that easily anymore.

At regional level several EIAs were carried out for regional physical plans, especially, when the site selection for major housing, industrial and recreational areas was at stake.

Selection and comparison of possible sites is often performed by the use of multicriteria analysis (MCA). Criteria groups that are considered, regard pollution of soil and water, nature and landscape protection, mobility guidance, quality of life and economy of resources.

Sites that prove to be the most favourable or least damaging to the environment, are selected to be part of 'the alternative most favourable to the environment'.

Figure 1 illustrates the original plans, that three adjoining municipalities in the northwest of the Netherlands had for future development, and the different models, that resulted from the EIS. Another outcome of the EIS was that 25 kilometres of new motorway were not necessary.

EIA and the use of MCA is by now widely regarded as a fruitful aid in (complex) site selection decisions.

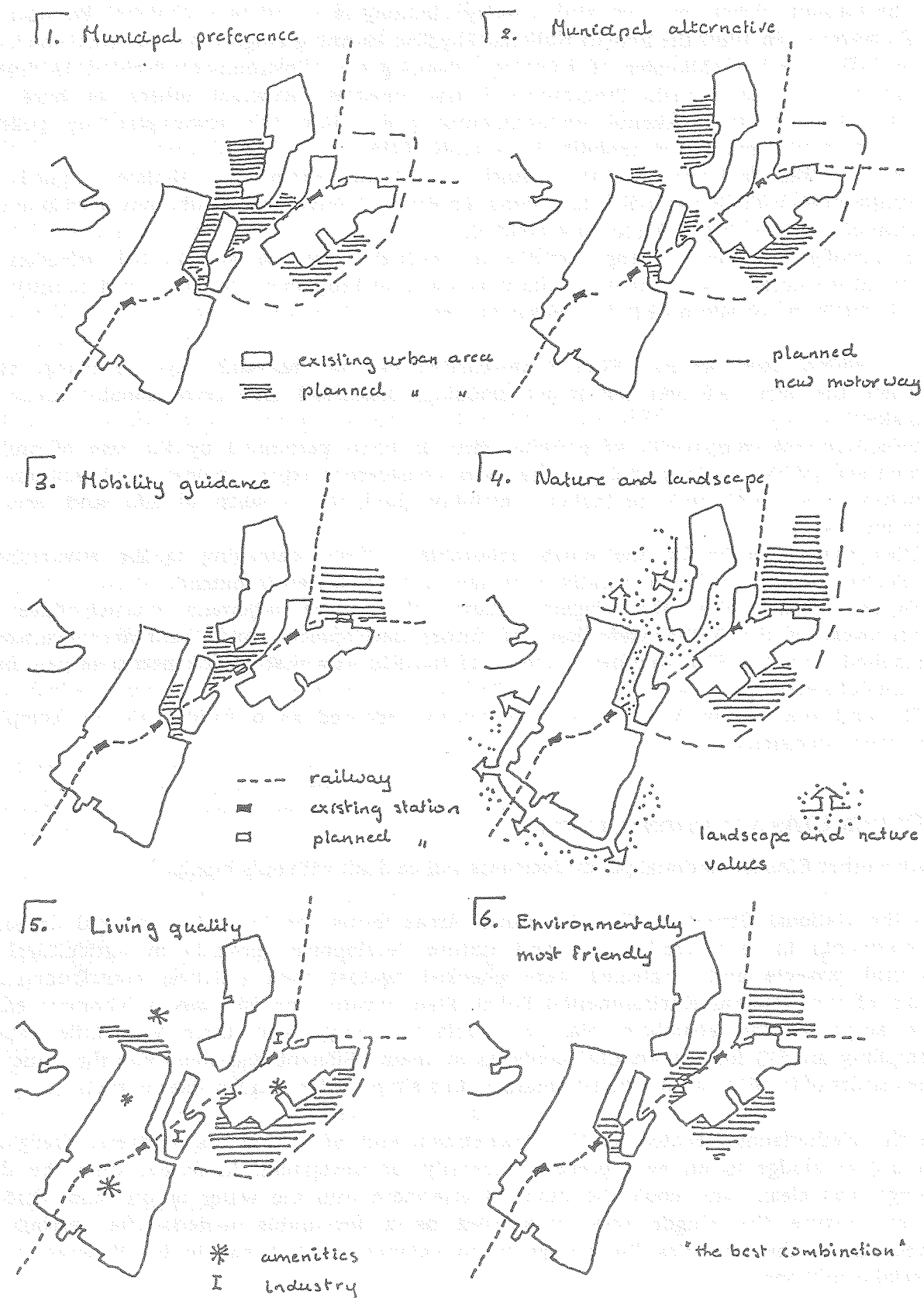
OTHER EIAs AT NATIONAL LEVEL

Some other EIAs for national policy decisions will be dealt with only briefly.

In the National Structure Plan for Rural Areas forms the basis for national decisions on investments in land reallocation and nature development projects in agricultural areas. Several projects and strategies were checked against their (relative) contribution to the aims of the National Environmental Policy Plan. Writing the EIS was a laborious effort, as the scope of the structure plan was relatively large and there was little experience compiling an EIS for a plan that contains so many different decisions. For the same reason the results of the EIA can not be summarized in a simple table or a few lines of text.

In the Netherlands, located at the downstream end of several major rivers, dredging and storing of sludge is an ever present necessity for navigation. In former days the dredged sludge was clean, and could be dumped elsewhere into the water or on land. Due to its loamy texture the sludge was considered as a favourable material for raising polder levels. Since the seventies the sludge is so polluted, that it has to be disposed of under special conditions.

Figure 1. Site selection models for urban development in the region Heerhugowaard, Alkmaar, Langedijk (HAL region), North Holland province
(Source: EIS, Site selection for housing areas, HAL region Grontmij, Zeist, Final Draft, March 1992)



In the EIS on National Guidelines for storage of dredged sludge several solutions for the sludge disposal problem were compared, and recommendations were given for storing conditions to be used as criteria for proposed projects. Storage on land was compared to storage under water in regard to environmental impacts and environmental risks. Also, proper isolation techniques were described. Although storage on land appears easier to carry out, control and monitor, storage under water was more advantageous for sludge that is polluted, for instance, with heavy metals, which are highly immobile under anaerobic conditions.

The EIS for the National Policy Plan for industrial and drinking water is not yet completed.

RECOMMENDATIONS

Although the most important decisions with regard to the environment are often made in policies, plans and programmes of national governmental bodies, in most countries environmental impact assessment is only carried out for projects. In the Netherlands it appeared, however, that the EIA process used for projects can also be applied to strategic issues. This is probably due to the fact that scoping is an important feature of the Dutch EIA process.

Yet, EIA for policies, plans and programmes faces its own difficulties, that can only be dealt with in learning by doing. For this reason it is important that all experiences are gathered centrally. In the Netherlands the Commission on EIA performs this function and found out after some EIAs for plans and programmes that:

- * Most policies, plans and programmes are fairly interrelated. Much attention has to be paid to the definition of problems and aims and to the descriptions of the decisions that are involved. Moreover, it should be clear, which projects with possible detrimental effect will result from the decisions in the strategic plan and to which extent these will be subjected to EIA afterwards. If not, the information in the strategic EIS should be more specific.
- * Not all decisions are suitable for the development of alternatives. The EIS should concentrate on those that are, and indicate the range of possibilities, of which the extremes are further explored. The environmentally most friendly solution results from the description of environmental consequences of the explored alternatives.
- * Environmental consequences can be approached by comparing the relative contribution from each of the alternatives to the established goals. If the goals are quantified and the contribution of the alternatives quantifiable a very useful comparison of alternatives can be made. Although in the Dutch EIA process costs are not required to be taken into account in an EIS, an approximation of costs of environmental deterioration, might prove useful as a counterbalance to economic arguments.
- * Comparing alternatives and choosing the best alternative will always contain elements of uncertainty and subjectivity. Therefore the choices must be made public and the method and results should be verifiable.
- * Compiling an EIS for policies, plans and programmes should not be too time-consuming, as they can be rendered out of date by new policy developments. That means accepting gaps of knowledge and keeping the EIS simple and focused on the pertinent problems.
- * Most important is, that proper time is spent on creative thinking about scenarios and alternatives (most favourable to the environment). Especially in creating, discussing and comparing alternatives the most important added value of EIA can be found.

SUMMARY AND CONCLUSIONS

In the Netherlands wide experience with environmental impact assessment for projects has been built up and there is also some experience with EIA for policy plans and programmes.

In carrying out EIA for these policy plans and programmes, several problems were encountered and had to be solved. The experience gathered in working with EIA for all kinds of different projects has been of use.

The EIA approach for projects appeared to work for plans and programmes with only a few alterations. This is mainly due to the existence of a scoping phase in the EIA procedure. In this phase the specifications for the content of an environmental impact statement (EIS) are established, 'made to measure' to the project or plan at stake.

When EIA was carried out for policy plans and programmes, some kind of added value was usually acknowledged. Multicriteria analysis proved a useful tool, when dealing with complex (site) selection problems.

Another important conclusion from the Dutch practical experience is, that 'the best learning is by experience'. The first EIAs for policy plans and programmes eventually may not prove the best in methodological approach and efficiency, but they have prepared the way for new EIAs to come and for a growing understanding of the possible use of EIA for policies, plans and programmes.

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