

The Practice of Forward-looking Transport Policy Assessment Studies

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Delft University of Technology, 2008

The Practice of Forward-looking Transport Policy Assessment Studies

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Voorwoord

Dit proefschrift gaat over evaluatiestudies van transportbeleid. Het betreft studies die antwoord willen geven op de vraag: wat zijn de effecten van politieke keuzen in transport in de toekomst? Het antwoord kan de politicus gebruiken om een keuze te maken. De vier artikelen over evaluatiestudies waaruit dit proefschrift bestaat, zijn geschreven in de periode 1998 tot 2008. In feite beschrijven de artikelen wat ik tijdens mijn werk zoal heb uitgevoerd in deze tien jaar. Ik heb meer gedaan, maar dit type toekomststudies waren voor mij wel ‘hoogtepunten’. Bij dit type studies wordt namelijk altijd samengewerkt met veel collega’s, zowel van het eigen als van andere instituten. En samenwerking leidt tot heftige debatten, scherpe keuzen, creativiteit en een hoop lol. Ook zeer aantrekkelijk is dat de opdrachtgevers bij dit soort studies er boven op zitten. Dat is soms lastig, maar tegelijkertijd ook inspirerend omdat ze je daarmee dwingen zo zuiver en helder mogelijk te analyseren. In feite heb ik in deze wereld van veel collega’s en opdrachtgevers goed om me heen gekeken en vervolgens opgeschreven wat ze deden. ‘Participerende observatie’ is mijn belangrijkste onderzoeksmethode, zoals dat zo mooi heet. ‘Goed opletten en veel koffiedrinken’ zou je het ook kunnen noemen. Hoe dan ook, ik dank alle collega’s en opdrachtgevers betrokken bij de beschreven studies in dit proefschrift. En wel speciaal mijn coauteurs: Bert van Wee (tevens mijn fantastische promotor), Taco van Hoek, Jan van der Waard en Carl Koopmans.

De laatste delen van dit proefschrift zijn geschreven aan de eettafel in de Troosterlaan in Utrecht. Meestal op woensdagmiddag en in het weekend. En meestal omringd door een stuk of wat vier- en vijfjarigen: Trijntje (mijn dochter), May, Yael, Yorrick en diverse vriendinnen van school. De dames en heren kwamen er al snel achter dat een saaie man achter een laptop toch interessant is, want hij kan kleurplaten uitprinten, en bovendien vergeet hij dat ie al een uur eerder snoepjes heeft uitgedeeld. Ontelbare paarden, tijgers, Bratz, Ariel, Winxclub en weet ik veel heb ik uitgeprint. En, nadat ze enigszins ruw waren ingekleurd, voor ze uitgeknipt. Stoorde dat niet? Nee, het ontspande en het relativeerde, want zeg nu zelf (hoofdstelling van dit proefschrift): het is vele malen belangrijker kinderen lol te laten hebben dan een proefschrift te schrijven.

Ik dank Mirjam Harmelink voor haar kritische commentaar en de ontelbare discussies. Ik geef toe: het klinkt uitermate saai dat twee mensen samenleven, ongeveer hetzelfde vakgebied hebben – zij energie, ik transport – en daar dan nog over discussiëren ook. Maar ik kan u

verzekeren: op vrijdag na etenstijd, met een lekker wijntje, na een week hard werken, is het heerlijk debatteren aan de eettafel over de weinig effectieve of erg dure subsidieprogramma's die nu weer het in leven zijn geroepen.

Dit proefschrift is gebaseerd op werk dat ik met vele anderen heb gedaan toen ik in dienst was van het Rijksinstituut voor Volksgezondheid en Milieu (RIVM) en later van het Milieu en Natuur Planbureau (MNP). Ik dank mijn toenmalige leidinggevenden Theo Aalbers, Marianne Kuijpers-Linde en Klaas van Egmond voor de toestemming en de mogelijkheden die ze me hebben gegeven om de artikelen te schrijven waaruit dit proefschrift bestaat.

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Chapter 1

Introduction

Human beings must make difficult choices. We are no longer in Eden. The world does not flow with milk and honey. We have to choose among cleaner air and faster cars, bigger houses and bigger parks, more work and more play. Economists do not tell us that any of these is bad. They only tell us that we cannot necessarily have them all – all at once. Economics is the study of choice. It does not tell us what to choose. It only helps us to understand the consequences of our choices.

T.G. Buchholz (2007), *New ideas from dead economists: An introduction to modern economic thought*.

1.1 Purpose and outline of the thesis

New railways? Extra roads? Pricing policies to reduce environmental harmful transport emissions? Politicians face tough choices. What are the costs of these proposals? Will the plan result in the expected impacts? What are the risks? Who wins, who loses? This thesis is about the practice of helping public decision making by answering these kinds of questions. Four cases of policy-related *ex ante* evaluations are described. ‘*Ex ante*’ evaluation refers to forward-looking assessment of the likely future effects of new policies or proposals.

The four cases are (see also table 1.1):

1. Chapter 2 describes a pragmatic method used in the Netherlands to evaluate different public investment plans, ranging from plans for new roads and public transport projects to investment plans for improving the Dutch knowledge base;
2. Chapter 3 deals with the role of research in Kyoto-related transport climate policy in the Netherlands;
3. Chapter 4 evaluates the Dutch experience with a standardized cost-benefit analysis (CBA) approach for transport infrastructure investment plans;

4. Chapter 5 analyses the practice of estimating the environmental impacts of transport policy in Dutch election manifestos.

All four cases relate to transport policy¹. And all *ex ante* evaluation methods used were directly linked to a policy-making process.

The assessment methodologies used in these four cases are not unique, and are not invented or improved in this thesis. This thesis is written because I believe it is of interest to analyse the practice of *ex ante* evaluation based on mainstream methodologies. The practice often implies that pragmatic choices must be made in the impact calculation methods, and it implies that sometimes rough assumptions have to be used. Close interaction between researchers and policy-makers is another feature of the practice of *ex ante* evaluation.

Scientific literature pays relatively much attention to transport policy impact modelling and methodologies for valuing policy impacts. Examples of these valuation methodologies are cost-benefit analysis, multi-criteria analysis and combinations of those two. Less is written about the practice of *ex ante* transport evaluation. The purpose of this thesis is to fill that scientific gap by describing and analysing the practice of policy-related, *ex ante* evaluation in transport, based on the author's experiences. The thesis attempts to answer the following questions: What are the strengths and weaknesses of the evaluation methods used? Have the methods resulted in a better understanding of the consequences of a choice? Considering the weak points and bearing in mind the need for speed and pragmatism in practice, what improvements could be proposed?

As stated this thesis is based on own experiences. A first worry here might be that the author is judging his own work, and is not maintaining sufficient independence. I cannot deny this limitation other than by saying that I have tried to be as fair as possible in identifying the strong and weak points of the *ex ante* assessment methods analysed. A second worry might be that this thesis dependence on only four cases of *ex ante* evaluation methods renders it incapable of providing a generalizing conclusion. I think that this worry is unjust because the four cases describe the practice of transport *ex ante* evaluation methods still used frequently in strategic decision-making. So, generalizing conclusions about the strong and weak points of the practice of these four *ex ante* evaluation methods seem of interest to me, because these conclusions are valid for an important part of the current practice. There are more transport *ex ante* evaluation methods based in other scientific areas like spatial planning and environmental studies (see Voogd, 1998 for an overview). An important example is the application of Strategic Environmental Impact Assessment (SEA) in strategic transport decision-making. The current practice of SEA is not analysed in this thesis.

To better understand the discussion in this introductory chapter, it is important to have some insight into the main features of the cases. As shown in table 1.1, in three of the four cases cost-benefit analysis and cost-effectiveness are important assessment criteria. These three cases are: '*Ex ante evaluation of public investment plans* (chapter 2)', '*Transport climate policies* (chapter 3)' and '*The standardized approach for evaluating transport investments* (chapter 4)'. Two of the four cases are also of interest because these evaluations took place in rather special circumstances. The '*Ex ante evaluation of public investment plans*' case (chapter 2) is special because the methodology was developed to assess very diverse investment plans in a rather short time span – a few months at maximum. In the case of

¹ Chapter 2 is somewhat broader, because this paper relates not only to transport investment plans, but to evaluating public investment plans in general.

‘Evaluating transport policies in election manifestos’ (chapter 5), the unique circumstances are caused by the short time between the election date and the finalization of Dutch political parties’ election manifestos. This brief period requires intense interaction between party officials and assessment experts to give concrete form to what are sometimes rather vague policy proposals. So the actual time to calculate the environmental impacts is relatively short, rendering the use of ‘heavy’ calculation models impossible.

Organisation of the thesis

Section 1.2 gives the context of the *ex ante* evaluation cases. Section 1.3 deals with the nature of the intersection between science and policy in the cases. In section 1.4 the three most debated evaluation criteria in the four cases are discussed: the economic legitimacy test, cost-benefit analysis and cost-effectiveness. In chapters 2 to 5 the four cases are treated. Conclusions are given in chapter 6.

Table 1.1: Overview of the cases

	Goal of the analysis	Commissioned by	Methodology of the impact assessment
<i>Ex ante</i> evaluation of public investment plans (chapter 2)	Separating the weak from the solid investment plans	A central government advisory body asked four Dutch national research institutes to evaluate proposed investment plans costing the equivalent of about 22 billion euros (price in 1997). Research-policymaker interaction was mainly between researchers and civil servants from the different ministries who proposed a specific investment plan.	Each individual investment plan was assessed according to the following criteria: a) legitimacy of the investment, b) benefit(s), c) cost-effectiveness, d) uncertainties and risks, e) alternatives.
Transport climate policy: policies to reduce carbon dioxide (CO ₂) emissions (chapter 3)	Assessing the CO ₂ emission reduction of transport policy options	The Netherlands Ministry of Housing, Spatial Planning and the Environment requested the analysis. Research-policymaker interaction was mainly between researchers and civil servants of this ministry.	Assessment of the carbon dioxide (CO ₂) emission effects of a chosen option in 2010 compared to business- as-usual; Other criteria assessed were costs, potential public and political support, potential side-effects.
Standardized approach for evaluating transport infrastructure investments (chapter 4)	Giving insight in the societal costs and benefits of transport infrastructure projects.	Dutch Ministries asked consultants and government agencies to carry out standardized cost-benefit analyses (CBAs) for new infrastructure projects. Important research-policymaker interaction took place between researchers and civil servants of the Ministries of Transport, Public Works and Water Management, Economic Affairs and Finance.	The use of standardized cost-benefit analysis (CBA) for 13 large transport infrastructure projects in the Netherlands was reviewed.
Transport policy in Dutch election manifestos (chapter 5)	Calculating the environmental impact of transport policy proposals in election manifestos	Political parties represented in Parliament were invited to take part in an environmental assessment of their manifestos. Some parties accepted, and some did not. There was interaction between researchers and political party representatives.	Assessment was made of the CO ₂ and nitrogen oxide (NO _x) emission effects of transport policy proposals in 2010 compared to business-as-usual.

1.2 Context of the assessments

The cases in table 1.1 show a ‘classic’ relationship between science and policy-making. The policy maker asks for impact assessment of a policy proposal or proposals. Research delivers this information. It might perhaps be expected that politicians will take the best decision based on the scientific information delivered. Of course the practice is far more complicated, as this section will show.

De Jong and Geerlings (2003, 2004) have pointed out the numerous books and papers of policy analysts and public administration scientists who conclude that the impact of traditional policy analyses is limited. They point at authors like Simon (1947, 1957), Lindblom and Woodhouse (1968), Downs (1957, 1967) who all have analysed people’s limited information –processing capacities and the interest-relatedness of information supply. Simon (1947) analysed that people decide rationally only in a limited number of situations. They make choices according to their interpretation of the situation which is often a simplification. Charles Lindblom’s classic article ‘The science of Muddling Through’ (1959) outlined his view that the U.S. executive bureaucracy uses limited policy analysis, bounded rationality, and limited or no theory at all in formulating policy. More recently Etzioni (1988) argues people are impacted by normative and affective factors in place of rational choice. Van Buuren and Edelenbos (2004) have reviewed some studies that analyse the way in which knowledge is used in policy processes. They conclude, ‘The main result of these studies can be summarised briefly by saying that the use of knowledge in policy processes is often not very impressive and can be characterised in different ways, for example: strategic use, instrumental use, and enlightenment.’ In the Netherlands the decision-making processes of the Betuwe Line (a dedicated freight rail from the port of Rotterdam to Germany) and the HST-south (a high-speed train rail from Amsterdam to Belgium) have been studied extensively (Pestman, 2001; Van Buuren and Edelenbos, 2004; *Algemene Rekenkamer* [Netherlands Court of Audit], 2000; House of Representatives, 2004). The broad picture of these evaluations is summarised in the conclusion of the House of Representatives ad-hoc parliamentary committee (see also chapter 4): ‘decision-making for these major projects...was based on a combination of fear, hope and belief instead of research findings, debate and creativity’ (House of Representatives, 2004). Meanwhile, the amount of reports with all kinds of research finding per project probably piles up to ‘metres’ of research.

What are the reasons for the sometimes poor use of science in decision-making processes? Most important is Van Buuren’s (2006) observation that decision-making is about more than using ‘objective’ research findings showing the consequences of a choice. Public decision-making – in a democracy, at least – is also about finding a broadly politically-supported solution for a problem acknowledged by a majority of the political community. In the often complex processes of finding support for a concrete problem definition and a specific solution, scientific facts² play a role but not *per se* an important one.

I distinguish three main reasons for the less-important role played by classic scientific research in decision-making (not in order of importance):

² I am using scientific information, knowledge and facts, like Sarewitz (2004), in their conventional definitions, e.g. ‘science or scientific knowledge delivers statements (facts) about the world whose truth and falseness can be tested.’

Public choice theory

The first reason for the less important role of classic scientific research in decision-making can be explained by the so-called ‘public choice theory’. In the words of Shaw (2008):

Public choice takes the same principles that economists use to analyse people's actions in the marketplace and applies them to people's actions in collective decision making. Economists who study behaviour in the private marketplace assume that people are motivated mainly by self-interest. Although most people base some of their actions on their concern for others, the dominant motive in people's actions in the marketplace—whether they are employers, employees, or consumers – is a concern for themselves. Public choice economists make the same assumption – that although people acting in the political marketplace have some concern for others, their main motive, whether they are voters, politicians, lobbyists, or bureaucrats, is self-interest. ...the theory ‘replaces...romantic and illusory...notions about the workings of governments [with]...notions that embody more scepticism.’

In other words the theory explains that for reasons of self-interest not always the ‘best’ solution – from a broad societal point of view – will be chosen. Flyvbjerg's (2007) worldwide analysis of problems in megaproject policy and planning illustrates the public choice theory. Flyvbjerg (2007) identifies pervasive misinformation about the costs, benefits, and risks involved as an important problem in megaproject development. Consequences of misinformation, as analysed by Flyvbjerg, are cost overruns, benefit shortfalls, and waste. According to Flyvbjerg the causes of misinformation are best explained by politico economic explanations: planners and promoters deliberately misrepresent costs, benefits, and risks in order to increase the likelihood that their projects, and not the competition's, gain approval and funding.

Individual sociopsychological reasons and groupthink

The second reason is related to the first. But now the non-use or selective use of scientific information in public decision-making is explained by socio-psychological causes and not by self-interest *per se*. The sociopsychological causes can be summarised by the term ‘confirmation bias’. As the term is typically used in psychological literature, it connotes the seeking or interpreting of evidence in ways that are partial to existing beliefs, expectations, or an in-hand hypothesis (Nickerson, 1998). Confirmation bias in decision-making processes is shown in phenomena like minimising the difficulties of a choice (e.g. underestimating technical risks, costs), overestimating the benefits, and marginalising the alternative solutions. The House of Representatives (2004) cited a guise of confirmation bias called ‘*entrapment*’ – a decision-making process whereby individuals escalate their commitment to a previously chosen, though failing, cause of action in order to justify or ‘make good’ on prior investments (based on Brockner and Rubin, 1985). In practice the entrapment theory is visible in many policy processes, where at a very early stage assumptions regarding the nature and extent of a problem and the subsequent solution become ‘articles of faith’ instead of assumptions which need to be carefully examined. Groupthink can enhance these destructive individual sociopsychological processes (‘t Hart et al., 1991). These authors have pointed to phenomena such as the ‘Abilene paradox’ and ‘group polarisation’. The Abilene paradox is the inclination of groups to agree with decisions because individual members think that others will support that decision. Group polarisation is the tendency of people to make more extreme decisions when they are in a group as opposed to decisions taken alone or independently. In the decision-making processes of transport infrastructure and environmental policy (chapters 2 to 5) group decisions play an important role. Of course as ‘t Hart et al. (1991) observe, group

decision-making can be theoretically very advantageous, because group discussions may facilitate more accurate and creative decisions. But as the same authors explain and as is argued above, negative psychosocial group processes also often occur.

Ignorance in science and communication problems

The third reason for the modest role of classic scientific research in decision-making is the nature of the scientific information. Van den Hove (2007) explains, ‘...when reflecting on scientific knowledge for decision-making one needs to recall that ignorance is an unavoidable part of science, as sometimes we do not even know what we do not know. So the science that is involved in policy-science interfaces has to deal with – and live with – uncertainty, indeterminacy, ambiguity and ignorance’. As will be shown in chapters 2 to 5, in most cases only rough indications can be given of policy option impacts. Moreover, as will be shown in chapter 4 and section 1.5, ongoing scientific debates can be identified by the evaluation methodologies used, for example by cost-benefit analysis as a valid or non-valid evaluation method. In short, scientific knowledge has its limits, leading to the recognition that scientific knowledge is not the only type of knowledge relevant to a policy-science interface (Van den Hove, 2007). Next to the fundamental limits of scientific knowledge, also ‘communication’ limits can be identified. First, because of the existence of uncertainties and indeterminacy, it is important that the scientist communicates clearly to the policy-maker or civil-servant about assumptions, choices, uncertainties and about the limits of scientific knowledge. However, doing so clearly is hard because most researchers are not gifted writers. But, even if the communication is clear, in many cases policy-makers get frustrated with the ambiguity of findings that researchers present. They prefer ‘point estimates’, as Brownson et al. (2006) observe. And this, while most cases in this thesis will show that for fundamental reasons – for example, the future is unknown – scientists prefer *ex ante* impact estimates in broad ranges. The title of Brownson et al.’s (2006) paper illustrates a second ‘communication limit’: ‘*Researchers and policymakers travel in parallel universes*’. The cases in chapters 2 to 5 incorporate terms and scientific techniques like economic legitimacy, scenarios, price elasticities, discrete choice transport models, cost-benefit-analysis, cost-effectiveness, et cetera. I am readily familiar with these terms and techniques because I deal with them daily. My influence is based on specialised knowledge. On the other hand, people in the policy-making process have to deal with a history of related policies, demands from stakeholders and the building of support. Having specialised scientific knowledge or keeping it up-to-date is not the most important aspect of their job. A recent study of 292 state policy makers in health care supported the notion that much of the information provided to policy makers is not assimilated (cited in Brownson *et al.*, 2006). Among surveyed policy makers, 27% read the information they receive in detail, 53% skim the information for general content, and 35% ‘never get to’ the material. In Brownson et al. (2006) it is suggested that many policy makers ‘read people, not reports’.

1.3 The nature of the intersection between science and policy in the case studies

Is the sometimes poor use of scientific information a cause for worry? This question deserves a subtle answer, I think.

The cases were written by authors working for independent governmental agencies like the Netherlands Environmental Assessment Agency (in Dutch ‘MNP’) and the Netherlands

Bureau for Economic Policy Analysis (in Dutch ‘CPB’)³. For these agencies – in Dutch ‘planbureaus’ – protocols have been drawn up to guarantee their independence. The protocols contain rules aimed at complete independence related to the contents of the policy analyses carried out. The policy maker can ask for certain analyses, but it cannot advise on or interfere with the contents and the methodologies chosen (KNAW, 2005). The background of the Dutch ‘planbureau’ model is the apparent need of policy makers to have input of objective information in policy making processes. And objectivity implies that the agencies are asked to observe things as they are, without falsifying evidence to match preconceived ideas. This input of objective information is not intended to replace decision-making.

In short, the case studies in this thesis were carried out to obtain scientific information about consequences of choices, based on analyses without preconceived ideas. I, and others, see this information solely as relevant policy input – no more and no less. It is up to the policy-makers to use or ignore this information. So, in this sense I am not worried by the sometimes poor use of scientific information. In a democracy politicians should decide, not scientists. However, I would be worried if the reason of the poor use is due to scientists themselves – if their information is ignored because it is incomprehensible.

Enhance the chance of use

So, to be relevant, the evaluations should at least be clear and address the right policy questions. The cases (chapter 2 to 5) will show that these ‘obvious’ characteristics are more difficult to meet in practice than perhaps thought. For example, in chapter 4 the black box character of most cost-benefit analyses (CBA) for new transport infrastructure in the period 2000 – 2006 is severely criticised. And in chapter 5 the relevancy of the current practice of estimating environmental impacts of Dutch election manifestos is questioned, as long as the trade-offs between the economy and the environment in this ex ante analyses are not shown more clearly. Chapters 2 and 4 stress the policy-making importance of estimating the effects of choices on specific groups. For instance, a disaggregation of impacts between groups of people may, for political equity reasons, be more relevant than calculating effects on the Dutch population as a whole. In practice, these ‘equity questions’ are not always answered. I agree with Kuik and De Boer (2007), who point out the risk of using CBA in complex and difficult policy discussions. If the answers elicited by CBA do not relate to the questions of policy makers and the public, the CBA results become irrelevant regardless of their economic and technical quality.

1.4 The debates

In my experience with the four Dutch ex ante evaluation cases presented, three issues were debated fiercely: economic legitimacy, cost-benefit analysis and cost effectiveness of transport CO₂ policies. In this paragraph the debates on these issues will be summarised: what aspects are disputed especially? In all three debates I will give my view also.

Economic legitimacy

In chapter 2 investment proposals are tested for ‘legitimacy’. In my experience the usefulness of this test is debated fiercely. Policy makers find that it is up to them to decide which policy interference is legitimate. In their view the yard stick for interference is to find a political majority, not a scientific approval or disapproval. Of course, this is true. The misunderstanding is that in the economic legitimacy criterion political justification is not

³ In the case of chapter 5 the CBAs reviewed were carried out by consultants also. According to the standardized procedure in those cases the CPB reviewed the results to check if the methodologies and assumptions chosen were in accordance with the standardized approach.

tested at all. The final aim of this criterion is to test economic effectiveness and efficiency of a policy option. Public investments – or any other form of government interference – are assumed to be legitimate in this criterion if some form of market failure exists (see chapter 2). According to economists, interests can best be served by those parties that are in the best position to do so in terms of costs and prosperity. Many economists believe in principle that the best position is occupied by ‘the market’, i.e. the totality of transactions between private parties. When economists talk about the failure of the market, they mean that the market is no longer by definition the most efficient way of serving interests and government intervention is a possibility (Lijesen et al., 2007). In this approach the thinking is that political choices which do not or hardly relate to market failures will not be effective or efficient (CPB, 2006). The reason is that without market failure government investments or subsidies will result only in unprofitable market activities or these policy instruments will result in surplus profits in market activities which are carried out anyway. Economists acknowledge that even in perfect markets governments can have legitimate reasons for interference. For instance, because for reasons of equity policy makers may want to adjust for an undesired distribution of goods or wealth.

In my view it is advisable always to test policy options on economic legitimacy. The test may enhance the awareness of policy-makers through questions such as: Is government interference in this particular case a sensible thing to do? Which is the goal of the interference: enhancing efficiency or adjusting for equity? And if solely equity reasons are involved, which groups should profit from the desired redistribution?

Cost-benefit analysis

My experience shows that cost-benefit analysis has been by far the most debated evaluation method in the Netherlands over the past 10 years. Chapter 4 addresses this debate with five main points of criticism on CBA, which can be summarised in philosophical and practical objections.

The main philosophical objection is, ‘Many critics of cost-benefit analysis fault it for being rooted in utilitarianism or some closely related form of consequential ethical theory. Consequentialist theories hold that the right course of action is the one that lead to the best consequences, where ‘consequences’ under the utilitarian variant means ‘highest total utility’ (Frank, 2000). Some point out that it would not be sensible to use highest total utility as the only yardstick in decision making. It is not wise to disregard the presence of tragic choices in politics (Nussbaum, 2000), as when cost-benefit analysis leads to a choice of course A (many winners) over course B (hardly any winner), but course A leads to uncompensated losers (a potentially small group whose members may suffer from serious illnesses and even death). In my view it would be worrisome indeed if politicians would decide ‘on the right course’ solely based on CBA results. My view is like Savelberg et al. (2008): use CBA only as a source of policy-relevant information; CBAs should not automatically determine the decision making.

The practical objections to CBA relate mostly to the valuation methods of the policy option impacts. CBA valuation is based on the concept of how much people are willing to pay privately for various goods. The main problems with this approach are summarised by Sunstein (2000):

1. A possible lack of information. For example, people may overstate the risks that receive disproportionate media attention;
2. Willingness to pay (WTP) is imperfectly correlated with utility; at best the first is a proxy for the second, and the two should not be confused. This problem is valid

- especially for non-priced goods, for example all kinds of environmental impacts (see chapter 4);
3. Possible distributions unfairness, since willingness to pay depends on ability to pay (see chapter 4);
 4. Potential differences between private willingness to pay and public aspiration. There may be a difference between the choices people make as consumers and the choices that they make as citizens, and it is not clear that the former should be preferred. The context of citizenship may evoke other-regarding or altruistic values that are not reflected in private choices. People may be willing to pay more simply because they know that other people are contributing as well;
 5. Collective action problems of various sorts that might draw the privately expressed amounts into doubt. A particular problem here is that people may not want to spend a great deal to protect – for example – environmental resources, because they seek to protect their financial position. In a regulatory environmental program people will indeed lose money. They might, however, maintain their relative financial position, which may be what people really care about. Current willingness-to-pay numbers do not take this possibility into account.

Finally the discounting of future costs and benefits is a much-debated subject in CBA. A main worry here is that discounting future environmental benefits is unfair. For example, if failure to adopt more stringent air quality standards or transport CO₂ policies today means that respiratory illnesses or damages due to climate change will be more common a generation from now, those illnesses and damages should have roughly the same weight as if they were to occur today (Frank, 2000). The argument against discounting is that having been born later should not mean that one's enjoyment and suffering receive less weight in important policy decisions. I agree with Frank (2000) that 'whatever the ultimate merits of this debate, it does not argue against the use of cost-benefit analysis as a matter of principle. If analysts agree that future experiences should receive roughly the same weight as current ones, the cost and benefits associated with policy change can simply be calculated on that basis. For example, Koopmans (2006) proposes a relatively low risk-free discount rate of 1% for long term environmental impacts with in some cases a risk premium.

Despite the philosophical and practical objections, I have two main reasons why CBA is an important, relevant source of policy information. The first is related to Frank's (2000) remark that 'scarcity is a simple fact of human condition. To have more of one good thing, we must settle for less of another. Claiming that different values are incommensurable simply hinders clear thinking about difficult trade-offs.' So, a new project may endanger rare species or it may result in enhanced risks for some people, but that does not preclude the policy relevance of showing the positive impacts of that new project also. And, of course, the final weighing of these positive and negative impacts is up to the politicians. The second reason follows Sunstein's (2000) line of thinking:

...CBA is most plausibly justified on cognitive grounds – as a way of counteracting predictable problems in individual and social cognition (see section 1.3 of this introductory chapter). Poor judgements, by individuals and societies, can result from certain heuristics, from internal and reputational cascades, from thinking processes in which benefits are 'on screen' but costs are not, from ignoring systemic effects of one-shot interventions, from seeing cases in isolation, and from intense emotional reactions. Cost-benefit analysis serves as a corrective to these cognitive problems.

Cost effectiveness

In chapter 3 it is concluded that methods for estimating costs and cost effectiveness should be improved in policies to reduce transport CO₂ emissions. Especially in environmental and safety policy studies, cost effectiveness is a powerful, widely-used evaluation tool because the method shows per policy choice the amount of money required to reduce a certain amount of emissions or lives saved. Politicians can use the results of cost-effectiveness evaluations to prioritize those policy options for which emission reduction can be ‘bought’ against the least costs. It might seem strange that methodological debates continue on this assessment tool because calculating cost-effectiveness seems straightforward, and the methodology of doing so appears simple. In its simplest form cost-effectiveness is the costs of an option divided by the amount of emission reduction (€/kg). However, as Wang (2004) pointed out in a review of completed cost-effectiveness studies of mobile source emission control measures, ‘there is little consensus among researchers and institutions about ways to address some of the key issues and assumptions involved in many cost-effectiveness calculations’. So, cost-effectiveness studies often yield varied, and sometimes contradictory, results, as Wang remarks.

What are the reasons for the varied and sometimes contradictory results? A short review is given, based on Kampman et al. (2006), Wang (2004), Van den Brink and Annema (2007) and Jansen and Denis (1999):

- In the calculation, it is not always clear to whom the costs of an option accrue: end-users, producers, governments or to all involved (the societal costs).
- Sometimes the calculation seems to be directed at all costs and effects of a policy instrument but the calculations are in fact limited to the consequential – or hoped for – technical measure. This is not always clear to the policymaker, in my experience.
- It is not always clear in the calculation which technical costs are taken into account or left out. Investment costs (e.g. costs of the equipment, labour costs in order to learn to use the equipment and costs of retrofit)? Costs of operation and maintenance, including energy savings or higher energy use? Administrative costs for the government (e.g. costs of monitoring and execution of the policies)? Administrative costs for the users of the equipment?
- It is not always clear in the calculation which intangible (i.e. non financial) benefits and costs are taken into account. For example, costs arise because a policy instrument ‘forces’ people to drive less or in a smaller car with lower comfort compared to the reference case. Or benefits arise because a CO₂ policy instrument has co-benefits on other emissions or on reduced traffic jams. And if these intangibles or non-priced impacts have been taken into account, it might still be unclear on how the monetization has taken place (see the previous discussion on all kinds of problems related to estimating WTPs in cost-benefit analysis). For transport CO₂ policies an interesting parallel can be drawn with Sunstein's (2000) remark on collective action problems. Car owners individually may not want to drive a more fuel-efficient smaller or less impressive car. However, in a policy option making all cars – large, medium and small – more fuel-efficient people might maintain their relative position, which may be what people care about (Verhoef and Van Wee, 2000). As far as I know, currently there are no willingness-to-pay estimates that take account of this possibility;
- It is not always clear how the societal costs are estimated of lost government revenues due to transport CO₂ policies. In the technical approach these costs are ignored completely. In the instrument approach the costs of the way government compensates

for their losses must be estimated⁴. In transport CO₂ policies these costs may be high because the tax incomes (fuel levies, purchase taxes, yearly taxes) in the reference case are high, especially for the cars ‘under attack’ in the new policies: the bigger, less fuel-efficient ones;

- Finally it is not always clear how effects have been assessed. For example, estimates should include the rebound-effect (Greening et al., 2000), which implies that savings in fuel costs result in higher incomes and cheaper driving and hence in an increase in energy consumption (for example, more driving). Furthermore estimates should include the Baumol effect (Baumol and Oates, 1988), which implies that subsidies alter producers’ optimal production levels.

In summary, the cost-effectiveness criterion might look simple but is in fact complex due to the many methodological choices. In my view this criterion for policy options is highly relevant policy information, because it may help policy makers prioritize policy options. However, to be relevant the scientist should be completely clear about assumptions and methodological choices made. By not doing so, the cost effectiveness test for options will result in confusion instead of transparency, as will be shown in chapter 3.

Please bear with the discrepancies in the terminology, spelling and reference style in chapters 2 to 5. These reflect the preferences of the journals in which the papers have been or will be published.

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⁴ Many possibilities exist: raising taxes, economize, increasing government debts, and so on.

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Chapter 2

Evaluation of Dutch public investment plans

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Abstract

This article describes a pragmatic method recently used in the Netherlands to evaluate public investments plans. Using this method, very different kinds of investment plans were evaluated for economic, social and ecological impacts, and direct links were made with a policy-making process. The research institutes involved were asked to develop a general appraisal method, on the basis of which they would rank the investment proposals. All the plans were labelled as either: a) ‘a solid plan’, b) ‘possibly a solid plan but requiring improvements’ (upgradeable) or c) ‘a weak plan’. The research institutes also were asked to estimate the effects of combining investment plans with complementary policy instruments like regulations and/or pricing instruments. Along with the method, options for its improvement will also be discussed.

2.1 Introduction

In 1997 the Dutch public authorities proposed public investment plans to cost the equivalent of about 22×10^9 Euro (EZ, 1997) to cover the period 1999-2010. The goal of the investments was to improve the quality of life in the Netherlands in a very broad sense, i.e. satisfy all kinds of 'economic', 'social' and 'quality of life' goals. The proposed investment plans were clustered into the following policy target areas: a) improving accessibility (60% of the total investment plan funding); b) improving economic development and the quality of life in the large Dutch cities (12%); c) bringing the spatial claims for dwellings, employment, recreation, nature conservation and historical landscapes into balance (13%); d) improving environmental quality (9%); and e) improving the Dutch knowledge base (6%) (table 2.1).

Table 2.1: Proposed investment plans clustered into different policy target areas

Target areas	Proposed investment plans (in 10^9 Euro)
Improving accessibility	13.1
<i>extension of road network</i>	4.0
<i>public transport projects</i>	6.4
<i>freight transport projects</i>	2.7
Improving vitality of large cities	2.6
Improving the balance in spatial claims	3.0
Improving environmental quality	2.0
Improving the Dutch knowledge base	1.4
Total	22.1

A central government advisory committee (the Dutch ICES) asked four Dutch national research institutes (Netherlands Bureau for Economic Policy Analysis [CPB], Social and Cultural Planning Bureau [SCP], National Institute of Public Health and the Environment [RIVM], and the Transport Research Centre of the Ministry of Transport, Public Works and Water Management [AVV] to evaluate these public investment plans (CPB, 1998). The research institutes were asked to develop a general appraisal method, and rank the investment proposals on the basis of this method. They also were asked to combine the proposed investment plans with complementary policy instruments like regulations and/or pricing instruments and to estimate the impacts of these policy measurement packages.

The method developed, in itself, is not new, but it certainly is of interest, and for the following five reasons:

1. Very different kinds of investment plans were evaluated using this method (Table 1),
2. Not only were economic impacts evaluated but also social and ecological impacts,
3. Effects of investments were compared with effects of other policy instruments,
4. Use of the method has been directly linked to a policy-making process, and
5. The study was carried out by independent institutes.

2.2 Methodology

The methodology for evaluating public investment plans, characterised as 'quick scan', was developed to prioritize highly differing public investment plans by defining plans as solid, possibly solid but requiring improvements and weak.

The method consists of three main steps (Figure 2.1). The first step is a prognosis of the future developments, given current policy plans (this prognosis is called the ‘reference situation’). The results of these prognoses can be compared to policy targets. So-called ‘policy bottlenecks’ are identified where the prognosis shows that policy goals will not be met. In the appraisal method developed the prognoses were based on coherent long-term prognosis studies of the Dutch economy, transport intensities, environmental quality and nature conservation (CPB, 1997; RIVM, 1997a and b). The policy bottlenecks identified were used to answer the question: ‘Will the proposed public investment plans contribute to solving them?’ Important policy bottlenecks identified for the year 2010 were a further increase of congestion levels on roads, increased levels of environmental harmful emissions (like CO₂, NO_x, NH₃, noise) that are too high compared to targets, inadequacies in capacity and quality of public transport, further concentration in the cities of a population whose chances of employment are relatively poor, and a furthering of the imbalance between spatial claims (for dwellings/ employment and for nature and historical landscape conservation). Worth noting here is that the chosen macroeconomic scenario, the definition of current policy, and the forecast period in this step may have a lot of influence on the final results of the appraisal. For this reason relatively more time was spent on making the choices in this step and making it clear to all those involved which choices were made and why. It is easy to understand that impacts in a public investment plan could differ significantly, depending on whether a high- or a low-growth macroeconomic scenario is used in the impact calculation or whether the impacts are calculated for 2005, 2010 or 2020. The importance of the ‘current policy’ definition is less obvious, but it can be illustrated. In the ‘quick scan’ method, only road improvement projects for which the government had already appropriated the funds were selected as current policy. This means that after approximately the year 2002 no road improvement schemes were included in the current policy definition, resulting in a rather tight and relatively low quality road network in 2010 and 2020. It is clear that road investment proposals will have higher economic benefits if a tight road network, and, thus, high congestion levels are assumed.

The second step entails evaluating each individual investment plan, with plans being assessed according to the following criteria:

- *Legitimacy of the investment.* Public investments are assumed to be justified if some form of market failure exists. A very important distinction in this respect should be made between private and public goods: i.e. government intervention is legitimate only where public goods are concerned. Government intervention is also legitimate where there are external costs and may be justified on the basis of social goals and equity (e.g. related to income or welfare distribution). An investment that cannot be legitimised is labelled as ‘weak’.
- *Investment benefit(s).* Based on a limited set of major economic, social and environmental indicators, the effects of the investment plan were assessed for the primary goal of the target area (for example: ‘Does the plan result in better accessibility?’) and for intended and unintended other final policy goals (for example: ‘What effect does public transport investment have on social and environmental improvement?’). Table 2.2 illustrates the indicators used to evaluate the investment plans to improve accessibility. When national models were used, the effects were mostly calculated for a cluster of investment plans (for example, the proposed road investment plans were considered as one cluster). This was because this approach is much quicker than a ‘project for project’ one; second, the transport models used are, in general, too coarse to evaluate effects on a project basis. On the grounds of national model results, it was attempted wherever possible to differentiate between the various

proposed road investment schemes. For example, the contribution of a specific road scheme in decreasing national congestion levels was estimated, as was the impact of a specific road scheme on a valuable landscape. In this way, it was partly possible in the final assessment to differentiate between projects in one cluster. Generally, indicators were chosen in this quick-scan approach which would give information on the direct effects, like the ‘travel-time-saving’ indicator used to evaluate accessibility projects (Table 2.2). Indirect effects (like effects on productivity or employment of road investment projects) were not included or only mentioned qualitatively. In estimating the direct effects, it was attempted as much as possible to take into account the selected scenario context. For example, ‘time values’ used to estimate travel-time savings were established for the years 2010 and 2020 on the basis of income growth figures from the chosen scenario. Furthermore, the allocation of effects was not included in the overall appraisal.

- *Cost-effectiveness.* Investment benefits were weighed against material costs (e.g. the amount of money required to build a road) and immaterial costs (e.g. the impact of a new road on a valuable landscape). In the method it was not attempted to monetarize all kinds of non-material costs; sometimes positive or negative side effects were just named. However, where possible, external costs were monetarized, for example, a) costs due to direct damage, b) costs for preventing damage, like noise abatement measures or c) so-called compensation costs (costs required to decrease comparable damage elsewhere). For example, 1 ton of extra CO₂ emission from traffic will ‘cost’ 22 Euro because in the scenario context this is the amount of money assumed to be required to decrease CO₂ emission by one ton with ‘joint implementation’.

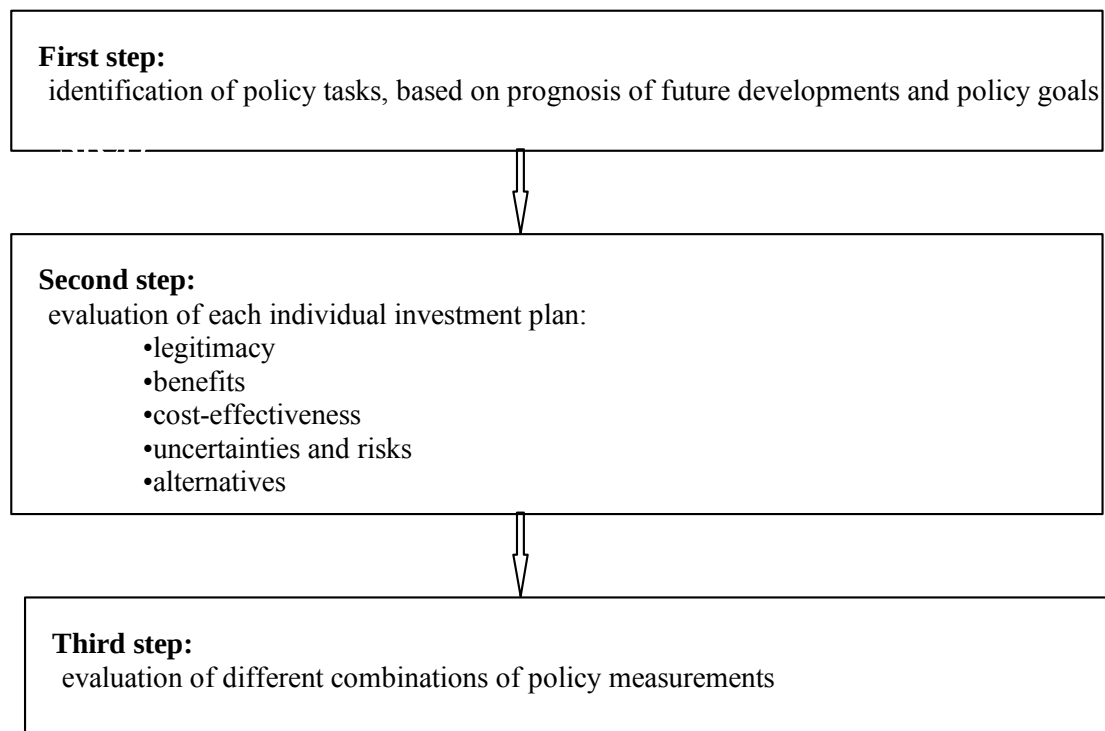


Figure 2.1: Schematic presentation of methodology developed for appraisal of Dutch public investment plans

Table 2.2: Indicators used to evaluate proposed investment plans to improve passenger transport accessibility

Indicators used	Calculation method
Accessibility indicators	
Car use	The effects of the proposed plans on these mobility characteristics were calculated (in comparison to the reference situation, see step 1) with the National Model System (NMS) (Ministry of Transport, Public Works and Water Management, 1992). The NMS consists of a series of state-of-the-art disaggregate choice models.
Van and lorry use	
Hours tied up through congestion	
Average speed of network/travel-time savings	
Environmental indicators	
CO ₂ emission	Calculation is based on the NMS results (transport intensities) and expected emission factors in 2010, given the current policy plans (RIVM, 1997a).
NO _x emission	
Local air quality (NO _x concentration)	Calculation is based on: a) NMS results (transport intensities), b) expected levels of NO _x and noise emission factors in 2010, given the current policy plans (RIVM, 1997a), and spatial analysis using a Geographical Information System.
Noise nuisance	
Landscape and nature indicators	
Openness of landscape	Expert judgement
Cultural and historical values	
Harmful effects on nature	

- *Uncertainties and risks.* Uncertainties and risks of the outcome were related to the uncertainties in defining the policy bottlenecks and the uncertainties of calculating the specific benefits and costs of a proposed investment. In the final results, it looked as if the ‘risk’ criterion had been used unequivocally. However, this can be explained by the sometimes totally different causes of uncertainty in the project appraisal as well as by the very nature of an investment proposal. For example, to improve the quality of the environment public authorities had proposed to finance projects intended to clean up old waste sites for about 390×10^6 Euro. Implementation of this plan was concluded to be risky because the policy bottleneck was uncertain: it was unclear if all the old waste sites to be cleaned up for this amount of money really posed a threat to the environment. In other words, there is a risk that part of the funds claimed would be spent on a minor or ‘non-problem’. So, on the basis of the risk criterion, this plan was finally labelled as ‘a possibly solid plan but requiring improvements, especially for making clear which and how many old waste sites are really environmental threats’. In the proposed plan to finance demonstration projects for the use of electric/hybrid cars (26×10^6 Euro), the risk criterion was applied in a totally different way in the final assessment. In this case, the policy bottleneck, increasing CO₂ emissions due to traffic, was clear. It was also clear that electric/hybrid cars have great potential in decreasing CO₂ emissions. However, the techniques are too expensive and too risky for car producers and car users to sell and apply on a large scale. So, in the proposed plan, the government would have to take some risk (other parties would probably not do so) to

demonstrate to potential users that the new techniques would work. Although it was recognised in this case that the risk that the project itself could fail was real, this plan was also labelled as ‘possibly a solid plan’ (but requiring improvements in view of somewhat unclear project proposal).

- *Alternatives.* Finally, the existence of alternative policy instruments that would be more effective and cheaper than the proposed public investment policy was explored.

With this step all plans were labelled as: a) ‘solid’, b) ‘possibly solid but requiring improvements’ or c) ‘weak’. In general, a ‘solid plan’ label was given to legitimate plans with relatively large benefits compared to costs, and relatively low risks, or risks that would legitimate government intervention/action, and to plans for which cheaper or more effective alternatives were non-existent. A ‘weak plan’ is naturally the opposite of a solid plan: not legitimate, no or few benefits compared to the costs, high uncertainties and/or a more effective and cheaper alternative policy. The label ‘a possibly solid plan but requiring improvements’ can be interpreted as being in the grey area. The plan is legitimate but the uncertainty in the benefits and cost-effectiveness calculations or estimates is too high to label the plan as ‘solid’. These high uncertainties are in most cases the result of an unclear investment plan. For example, the Dutch public authorities proposed an investment plan to clean up contaminated water sediments for about 420×10^6 Euro (1999-2010). It was decided to label this investment plan as ‘possibly solid but requiring improvements’ because it had potentially large environmental benefits. However, the proposals did not mention which sites would be cleaned up and in which way, so a proper cost–benefit estimate could not take place.

In the third step, illustrative combinations of different public investment plans were evaluated as well as investment plans combined with complementary policy measurements like regulations and pricing instruments. This step is taken to serve two goals. Most identified policy bottlenecks will probably not all be solved solely by public investment or subsidies. In this step it can first be examined if the gap between policy goals and forecasts can be reduced with combined proposed public investment and other policy measurements. Second, this step provides the opportunity to answer the question: can the potential of an investment be enhanced by combining it with other investments or policy measurements? The character of the combinations is illustrative because it shows the effectiveness of investments compared to other instruments. Table 2.3 illustrates the importance of this step. On the basis of the appraisal in step two, the Dutch national research institutes concluded that the proposed investment plans of the public authorities to reduce greenhouse gases (for 230×10^6 Euro) were not optimal. The proposed investment plans indicated that a reduction of 3-11 Mton CO₂-equivalents could be reached in 2010 (the range indicating the uncertainty, especially in the N₂O emission reduction by Dutch industry). In step 3, the Dutch national research institutes developed an alternative policy measurement package to reduce emission of greenhouse gases (Table 2.3). They showed that, with this package, based on a combination of investments, subsidies, levies and regulation, a reduction of 17-27 Mton CO₂-equivalents could be reached (also with a government contribution of 230×10^6 Euro in the period of 1999-2010).

Table 2.3: Illustration of a national policy measurement package with the estimated required government financing (1999-2010)

	x 10 ⁶ Euro	CO ₂ reduction effects in 2010 (Mton)
Investments		
Technology development in emission reduction of non-CO ₂ greenhouse gases (like N ₂ O, HFCs)	20 ^{a)}	0-10
Levies	0 ^{b)}	4
Regulation:		
Adjustment of fuel mix in electricity production	0 ^{b)}	4
Regulations to improve energy efficiency	210 ^{c)}	6
Regulation of fossil fuel energy, partially obligatory	0 ^{b)}	3
Total	230	17-27

^{a)} Government subsidy to stimulate technology development

^{b)} No government costs. Costs for consumers and companies amount to approximately 250-400 x 10⁶ Euro per year.

^{c)} Government costs (e.g. subsidies) imply more bureaucracy (to monitor regulations).

2.3 Results

Although this article is mainly intended to elucidate the appraisal method and to discuss options to improve it, the application of this method to the proposed public investment plans of 22 x 10⁹ Euro also will be presented briefly. Plans totalling 4.3 x 10⁹ Euro could be assessed as ‘solid’ (20% of the total), plans totalling 123 x 10⁹ Euro as ‘upgradeable’ (55% of the total) and the remaining plans as ‘weak’ (25% of the total) (Table 2. 4). The main conclusion of the analysis was that the proposed investment plans of 22x 10⁹ Euro would only have a limited effect on meeting the policy targets. There are two main reasons for this:

- The policy measurements evaluated consisted of solely public investments and subsidies, policy instruments having limited effects in achieving emission reductions, improving accessibility (to a lesser extent), solving unemployment problems in large cities and trying to balance all kinds of spatial claims. The illustrative alternative policy measurement packages made (see, for example, Table 2.3 and step 3 of the method) showed pricing instruments and regulation, for example, to be much more effective in meeting policy targets.
- Generally speaking, the proposed plans were often of poor quality, which resulted, amongst other factors, in the relatively large share of labels ‘plans requiring improvement’ and ‘weak plans’.

Table 2.4: Results of the appraisal method on proposed investment plans (steps 1 and 2)

Target areas	Proposed investment plans (in 10 ⁹ Euro)	‘Solid’	‘Requiring improvement’	‘Weak’
Improving accessibility	13.1	25%	58%	17%
Improving vitality of large cities	2.6	18%	82%	0%
Improving balance in Spatial claims	3.0	12%	70%	18%
Improving environmental quality	2.0	0.5%	74%	26%
Improving Dutch knowledge base	1.4	33%	32%	35%
Total	22.1	20%	55%	25%

Three other important conclusions are (1) the very limited influence of public transport investments on car use; (2) the policy-makers often over-estimated level of synergistic effects for combinations of investments, and “(3) the fact that investments for goods transport may have more benefits outside than within the transport sector.

Partly based on the results of this appraisal, the new Dutch government has announced in the Draft Coalition Agreement, 20 July 1998 (in Dutch) the following investments up to 2010: approximately 2 x10⁹ Euro in new roads (in combination with 0.7 x10⁹ Euro in a road pricing system), approximately 2.5 x10⁹ Euro in public transport, about 2 x10⁹ Euro in vital cities, approximately 1.3 x10⁹ Euro in nature conservation development and reconstruction projects in agriculture, and about 1.3 x10⁹ Euro in developing the Dutch knowledge base.

2.4 Discussion and options to improve the methodology

One of the positive aspects is that, with the method developed, a large number of different kinds of public investment plans can be evaluated. This can help decision-makers to see the coherence, gaps or overlaps between different policy fields. However, it should be stressed that the method is rather coarse. This means that even the ‘good plans’ still require a thorough project appraisal before final decision-making, for example, to answer the question if there are still better and cheaper means than the proposed public investment plans to meet policy final goals.

Inspired by the article of Mackie and Preston (1998) on twenty-one sources of errors and bias in transport project appraisal, some sources of bias in the developed methodology are identified below, along with suggestions on how they might be avoided:

- Ideally, policy objectives should be clear; appraisal criteria should follow directly from them. In practice, as Mackie and Preston (1998) found, conflicts can easily arise and did occur during the development and application of this method. One of the solutions is to spend a relatively large amount of time, as in this quick-scan appraisal, in clarifying which policy targets are to be met before starting the appraisal. Because policy objectives are not always quantitative or completely clear from a more scientific point of view, another approach could be a kind of sensitivity analysis in using different political visions and evaluating projects in the context of these visions. For example, the proposals in this quick

scan could also have been appraised by placing them against a political vision with absolute priority for economic growth or absolute priority for ecology.

- The chosen appraisal method and appraisal criteria provide perhaps only limited answers. For example, in their large appraisal study, SACTRA (1998) concluded that, in certain circumstances, transport investment may have economic effects in addition to effects measured in conventional cost-to-benefit appraisal. These additional impacts could be either positive or negative. As can be seen in Table 2.2 in the appraisal method presented, traditional cost-to-benefit economic indicators for transport projects also were used: indicators mainly aimed at direct cost savings for travellers. Indicators like ‘option values’ (e.g. improved roads possibly increase the potential accessibility of all kinds of activities), values for reliability of the transport system, traffic safety values and values which express the potential social role of public transport in remote areas have not been included. So it is arguable if questions on using the traditional indicators, and final policy goals like social welfare and economic growth, were answered completely. One solution to this problem is given by Weisbrod (1997) in his suggestion to use different combinations of benefit measures and different benefit assessment techniques to estimate expected impacts. The message is that although traditional methods are not necessarily wrong, in combining them with other assessment techniques, the economic impact assessment becomes more complete. Weisbrod (1997) mentions techniques like a) historical production and cost functions of infrastructure investments, b) macro-economic simulation models, c) strategic economic development assessments and d) multi-criteria analysis. In this respect the EUNET project of the European Union (EU) may prove very interesting (Williams *et al.*, 1998, Bristow *et al.*, 1998). The main objective of this project is the development of a comprehensive method for modelling and assessing the socio economic impacts of strategic transport initiatives.
- Also, the method used to assess social and environmental impacts of investment plans is limited. For example, as can be seen in Table 2.2, environmental impacts were mainly assessed using changes in CO₂ emissions, NO_x emissions, air quality (NO_x concentrations) and noise nuisance. Although this approach is probably sufficient for a rough estimate, it is preferable to include more environmental indicators, for example: a) health impact indicators (illness, mortality) based on potential exposure to more chemical substances (PM₁₀, VOCs, CO) than NO_x and of more nuisance factors like light and smell, and b) water and soil contamination factors.
- The conclusion is that with a larger and more complete list of appraisal criteria and indicators, the quality of the appraisal will probably increase. However, in this respect three warnings should be given: 1) although the method is rather rough, the result of the appraisal probably would not have been greatly different with additional appraisal criteria and impact indicators; the chosen set of main and direct indicators is ‘strong’ enough to justify the results; 2) if the list of indicators is extended, the danger of double-counting the same impact with more than one indicator should be avoided; and 3) more indicators could be included in the analysis, but the inclusion of all the indicators in the final outcome could confuse rather than assist the process of policy making.
- Bias can occur because of the treatment of non-quantifiable impacts. Mackie and Preston (1998) emphasise that one of the main criticisms of cost-to-benefit analyses is that impacts that are difficult to evaluate in monetary terms are excluded. Another danger of quantifiable and non-quantifiable impacts in an appraisal is that one set may become dominant. With the appraisal method presented here, there is a danger of an unbalanced treatment of quantifiable and non-quantifiable impacts in evaluating different kinds of public investment plans is real. For the policy fields ‘accessibility’ and ‘environment’, for example, operational assessment techniques (with all their drawbacks, as stated previously)

were available to allow presentation of a more or less quantitative result of an appraisal. On the other hand, a quantitative appraisal approach for the policy area of 'vital cities' and 'knowledge base' was hardly possible. The way to deal with this problem was not to exclude impacts which could not be quantified but to include both quantifiable and non-quantifiable impacts in the assessment.

- Bias can occur because of uncertainties in data about the current situation and forecasts, and in the calculation methods or estimates of the impact assessment. These uncertainties can be dealt with using common scientific techniques like scenario analysis (for example, comparing project benefits using a high and low economic growth scenario) and sensitivity analysis. Besides this, it is important to be very clear about the assumptions, data and models used. In this way scientists, decision-makers and others can gain insight into the uncertainties of the methods and results used, so that the method can be improved continually on the basis of their criticism and remarks.
- As mentioned, the new Dutch government has announced investments of approximately 10×10^9 Euro for 1999-2010. This decision opens perhaps one of the most important doors for improving the appraisal method: ex-post appraisal (mentioned in Mackie and Preston, 1998 and CPB, 1998). Systematic checking of what actually took place relative to that forecasted can be an important discipline to improve impact assessments.

In addition, the method used could be improved in several ways:

- The criteria and calculations of investment effects on these criteria were in some respects rather vague. Therefore stricter definitions and calculation methods should sometimes have been used.
- Some of the models used to calculate the effects should be improved.
- Forward and backward effects of investments (especially infrastructure investments) and employment were not included.
- The instrument packages as developed in the third step were only presented to illustrate how the gap between forecasts and targets can be reduced. However, policy-makers decided to implement the instruments in the packages. Perhaps the political influence of the packages is larger than justified.
- Most effects were only calculated for the Dutch population as a whole. Effects on specific groups were not calculated; for instance, a disaggregation between groups of people may, for reasons of equity, be important for policy-making.
- Effects on the quality of the environment (urban quality; landscape; nature) were difficult to estimate because of a lack of empirical studies in general and especially studies on the perception of the environment.
- Improvements in estimating synergetic effects of combinations of investments (or other policy instruments) can be made, both at the conceptual level as well as at the level of simulation models.

The question is whether or not and to what extent possible improvements should be made: it should be emphasised that the method used has only been developed to separate the not-so-solid from the solid plans, and is not an alternative for a well thought-out cost-to-benefit analysis.

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Chapter 3

Transport and the greenhouse effect - The role of research in Kyoto-related climate policy in the Netherlands

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Abstract

To date, 84 nations have signed the so-called Kyoto Protocol on the control of Greenhouse Gas (GHG) emissions. In the Netherlands the Kyoto agreement has resulted in quantitative national targets for 2008-2012 of -6% GHG emission reduction compared to 1990; this is a reduction of 19% compared to the emission forecasted for 2010. Two years ago the Dutch government launched a policy-making process for meeting the Kyoto target. In both the development and the evaluation of Dutch Kyoto-related policy, research has played a major role. For the transport sector no (a priori) targets were set; however, a list of measures and instruments to reduce transport GHG emissions were discussed in the Kyoto-related policy-making process. Nearly all transport instruments and measures on this list appeared to be car-related. The reason for this focus was an a priori choice of policy-makers. However, cost-effective options for other vehicle categories (road and non-road transport) may be available. The transport options finally chosen for the Policy document will reduce GHG emissions from transport by 3-5% compared to the forecasted 2010 emissions. Researchers estimated that tax differentiation for new cars and in-car instruments such as fuel economy meters and cruise control will be the most effective instruments. The selected transport measures were not really chosen to induce a technology push; rather, the selection was mainly policy-driven to meet short-term targets. Although research played a significant role in the policy-making process, several research improvements can still be made. Important improvements identified are: a) using a better and clearer method for the calculation of the costs of the measures and b) using a broader evaluation method of measures; this will mean including more environmental, economic and social indicators

3.1 Introduction

The enhanced greenhouse effect is caused by increased atmospheric concentrations of gases like carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and fluorine- containing compounds (HFCs, PFCs and SF₆). The enhanced greenhouse effect will result in global climate changes and as a result will probably affect such aspects as world food production and ecosystems. Scientifically speaking, there is currently a fair level of consensus about the relationship between human activities and climate change. In 1995 the United Nations Intergovernmental Panel on Climate Change (IPCC) concluded that: *'...the balance of evidence suggests that there is a discernible human influence on global climate'* (IPCC, 1995). Transport, the subject of this paper, is one the human activities causing greenhouse gas (GHG) emissions.

Possible human-induced climate changes leads to political concerns. In the mid-nineties it became clear to most countries that further political steps would be required to reduce the emissions of greenhouse gases. For this reason, many nations signed the so-called Kyoto Protocol on the control of Greenhouse Gas (GHG) emissions on 10 December 1997. To date, 84 nations have signed the Protocol, which prescribes a 5% reduction in greenhouse gases by most of the developed countries between 2008 and 2012 compared to the emission levels in 1990/1995. Each industrialised zone in the world has its own goal: for the EU it is -8%, for the USA -7% and for Japan -6%.

In 1998 the European Council allocated the EU obligation in the Kyoto Protocol (-8%) among individual member states. A reduction obligation of 6% has been agreed on for the Netherlands (VROM, 1999). About two years ago policy-makers in the Netherlands started discussing how to meet this 6% emission reduction obligation. It soon became obvious that transport would be one of contributing sectors in meeting the Dutch obligation. This paper will discuss the process which has finally led to policy aimed at the reduction of CO₂ emissions in the Dutch transport sector (VROM, 1999). The main questions to be addressed in this paper follow: a) What has been the role of research in this policy-making process? b) What is the result of this process for the transport sector in the Netherlands? and c) What lessons for policy-making processes can be learned for the future?

3.2 Transport and CO₂ emission in the Netherlands

In the industrialised countries (US, EU and Japan) the average CO₂ emissions by all sources increased by 9% in the 1990-1997 period (IEA, 2000). According to the same study, it is expected that without new initiatives greenhouse gas emissions in these countries are likely to increase some 30% above the 1990 levels in the Kyoto time frame of 2008-2012. The trend in the Netherlands shows roughly the same picture (Table 3.1), although the future growth of GHG emissions is expected to be somewhat lower.

Table 3.1: Greenhouse gas emissions in the Netherlands in Mtonne CO₂ equivalents⁵

	1990	1995	2010 BAU ^{a)}
Transport	31	34	40
Other sectors	186	200	219
Total	217	234	259

^{a)} BAU = Business-As-Usual scenario, based on a relatively high economic growth scenario

Source: RIVM (1999), ECN/RIVM (1998)

Total Dutch GHG emissions are expected to grow by roughly 20% in the period 1990-2010. Compared to the Kyoto agreement (6% reduction in this period), this figure shows that a relatively large policy effort will be required to meet the obligation. In the 1990-2010 period transport GHG emissions in the BAU scenario will increase by approximately 30%. As in most other countries (IEA, 2000), this trend also points to the Netherlands as experiencing an increase in fossil fuel use in passenger and freight transport in the near future.

Road transport is by far the most important contributor of CO₂, resulting from emissions (Table 2)⁶. In contrast to the figures in Table 3.1, Table 3.2 shows only the CO₂ emissions from transport. In the transport sector CO₂ contributes more than 90% to total GHG emissions.

Table 3.2: Trend in transport CO₂ emissions in the Netherlands

	1990	1995	2010 BAU
Only CO₂			
Passenger cars	16.0	17.8	17.8
Other road transport	9.4	10.9	16.0
Non-road transport	3.2	3.3	4.0
Total	29	32	38

Source: RIVM (1999), ECN/RIVM (1998)

As shown in Table 3.2, the category ‘other road transport’ (mainly vans and lorries) explains most of the growth in the national transport emissions in BAU. This is due to the expected high volume of growth of vans and lorries (about 70-80% in the period 1995-2010) in combination with an expected low-energy efficiency improvement. In BAU 2010, energy use

⁵ The concept of CO₂ equivalents makes it possible to compare emissions of different greenhouse gases. The comparison is based on differences in the greenhouse warming potential of the gases.

⁶ The international emissions due to bunkered fuels on Dutch territory for mainly ocean-going shipping and aircraft are excluded from the national totals in accordance with the Kyoto Protocol. Emissions due to bunkered fuels come to 47 Mtonnes in 1995 and 70 Mtonnes in 2010 (BAU) (Feimann *et al.*, 2000). The Kyoto Protocol has recommended that the international maritime and aircraft organisations study options to reduce GHG emissions in the international transport sectors.

(MJ/km) of vans and lorries is expected to be about 13% lower than the level of energy use in 1995 (Geurs *et al.*, 1998).

The figures as presented in Tables 3.1 and 3.2 make it clear to Dutch politicians that a large effort will be required to fulfil the Kyoto agreements. Therefore a policy-making process based on the –6% CO₂ emissions target for all sources was launched.

3.3 The policy-making process

The process started off by defining the policy task, i.e. the gap between the expected level of emissions in BAU (2010) and the EU agreement (6% emission reduction for the Netherlands). Defining the policy task was the responsibility of the policy-makers. Policy-makers chose to base BAU on a high growth macro-economic scenario. Compared to the other available Dutch macro-economic scenarios (a low and middle growth scenario; see Geurs *et al.*, 1998), this scenario was assessed as being the most plausible.

In the Kyoto Protocol the decision of taking 1990 or 1995 as base year for these compounds is left to the individual countries. The base years used for the 6% reduction obligation is 1990 for CO₂, CH₄ and N₂O (according to the Kyoto Protocol); 1995 was chosen for the fluorine-containing compounds. On the basis of these choices, the policy task is calculated to be 50 Mtonne GHG emission reduction in the year 2010 (VROM, 1999). The Kyoto Protocol determines that the principal part of the obligation should be met by domestic CO₂ emission reduction. However, Dutch policy has decided that approximately 50% of the reduction effort will be aimed at foreign parties, using policy instruments such as ‘Joint Implementation’, ‘Clean Development Mechanism’ and ‘Emission Trading’. So the resulting domestic policy task amounts to 25 Mtonne emission reduction in 2010. To be clear: this 25 Mtonne emission reduction is valid for the total of all sources, not only transport.

The second step in the process was to describe policy options that could contribute to the reduction obligation. It is important to note that the policy-makers did not choose to set targets for different economic sectors. They asked researchers for an Option document containing measures and instruments for all the Dutch economic sectors in the Netherlands. They wanted to use this list of options to construct sets of ‘feasible’ policy instruments. Policy-makers from the different ministries (e.g. Environment, Economic Affairs and Transport) were grouped together. These groups selected lists of policy options per economic sector (Table 3.3 shows the options selected for the transport sector). They also defined criteria to be used by researchers to assess the effects of the chosen policy instruments and measures. These criteria were: a) potential CO₂ emission reduction in 2010 (in CO₂ equivalents), b) costs for the end-user and the national total and the expenditures for the government in 2010, c) the possibilities for instrumentation of the measures, d) the influence that timing of policy instrument implementation has on emissions and costs, e) the potential public and political support and f) potential side-effects, e.g. reduction in emissions from other substances. Researchers were responsible for the assessment. Results were published in the so-called Option Document (ECN/RIVM, 1998).

On the basis of the Option Document, policy-makers selected a set of measures and instruments to intensify the current GHG emission reduction policy and to meet the obligation of 25 Mtonne GHG emission reduction. This resulted in the so-called ‘Policy document on climate policy’ (VROM, 1999). The guiding principle of selection was said to be cost-effectiveness: instruments or measures which cost more than 70 Euro per tonne CO₂

equivalent were considered too expensive. However, other criteria also played a role in the selection. These criteria involved the potential public support and instrumentation.

The last steps of the policy-making process dealt with evaluation and monitoring. In evaluating the Policy document, researchers could estimate the impact of this document on GHG emission reduction.

As shown in Table 3.3, policy-makers selected 14 transport measures and instruments. Four important observations can be made. The first is that the choice of options seemed to be highly driven by possible feasibility of implementation in the short term (in the period 2000-2005). The options are well known and attempt, for example, to improve car energy efficiency slowly and use existing technology. No options have been selected which could be regarded as inductive to a technology push in transport in the long term. In the Policy Document some attention is given to 'technology-pushes', but the separate section on this subject can be characterised as 'without obligations'. The second observation is that most of the options are aimed at cars. The reason is that policy-makers decided that cars would be the easiest transport category in which to implement short-term CO₂ emission reduction policies. The third observation is that all the options are aimed at CO₂. In the Option document some attention is paid to potential N₂O car emission reduction. Based on the highly uncertain N₂O emission data, the document recommends carrying out new measurements before defining options to reduce these emissions. The last observation has to do with the difference between the notion of 'measure' and 'instrument'. Some options as given in Table 3 were formulated as instruments: it was clear *how* policy-makers want to achieve an impact. For these cases, impact could be estimated in a fairly straightforward fashion. However, most selected options were 'measures'. They described only *what* policy-makers wanted to achieve, but not '*how*' to achieve goals; this remained unclear. In other words, instrumentation for achieving goals was completely lacking or remained unclear. Examples are: 'avoiding short car trips' (but how?), promoting the use of cruise control and an econometer (but how?), enforcement of new speed limits (but what is meant by enforcement?). The lack of clear instrumentation was solved by carrying out 'what-if' analyses. For example, what is the CO₂ emission reduction if 100% of the fleet uses econometers, or what is the CO₂ emission reduction if all car and van users adhere to the agreed speed limits? Although researchers attempted to be very clear about the assumptions used in the Option document, some 'what-if' analysis resulted later on in misunderstandings and misinterpretations in the policy process.

3.4 Results

The Option document (ECN/RIVM, 1998) and all kinds of additional discussion finally resulted in a Policy document (VROM, 1999). Table 3.4 shows what Kyoto-related policy the Dutch government is planning to use for the transport sector. It shows too what kind of instrumentation is planned and what the Policy document expects as the resulting emission reduction in 2010 compared to BAU. According to the policy plan this amounts to 2.2 – 2.9 Mtonne. So, related to the domestic policy task of 25 Mtonne (see section 3.3), transport will, in the opinion of VROM (1999), contribute a share of 9 to 11%. In the research evaluation (ECN/RIVM, 1999) of the Policy document, the estimated reduction in emissions is lower than the estimated level in the Policy document (see Table 3.4). Researchers have estimated that the basic policy set will probably result in a total reduction of 1.3 to 2 Mtonne GHG emission in 2010 compared to BAU.

Table 3.3: Transport measures and instruments in the Option document (ECN/RIVM, 1998)

Measure/Instrument	Aimed at
Increase levies on fuels per 1 January 1999 ^{a)} (petrol, diesel at 22 Euro cents per litre; LPG 16 Euro cents)	Fewer car kilometres and improved energy efficiency compared to BAU
Increase levies on fuels per 1 January 2003 (petrol and diesel 22 Euro cents per litre; LPG 16 Euro cents)	Fewer car kilometres and improved energy efficiency compared to BAU
Energy labelling for cars to inform consumers on the energy use of new cars	Improved energy efficiency of cars compared to BAU
Feebate system on car purchase tax (45 Euro per g/km CO ₂)	Improved energy efficiency of cars compared to BAU
Car owner tax differentiation based on energy use and not, as in BAU, on weight	Improved energy efficiency of cars compared to BAU
Increase the tire pressure	Improved energy efficiency of cars compared to BAU
Improved enforcement of current speed limits on motorways (partly 120 and 100 km/h)	Improved energy efficiency of cars compared to BAU
Improved enforcement of the 100 km/h speed limit on motorways	Improved energy efficiency of cars compared to BAU
Adjusting lorry speed limiters from 89 km/h (BAU) to 80 km/h	Improved energy efficiency of lorries compared to BAU
Promoting the use of econometers, cruise control, board computers in cars	Improved energy efficiency of cars compared to BAU
Training to improve driving behaviour of car drivers	Improved energy efficiency of cars compared to BAU
Road pricing	Solving congestion
Avoiding short car trips (trips with a distance < 5 km)	Fewer car kilometres
Fiscal measures to discourage car use in commuting	Fewer car kilometres

^{a)} During the preparation of the Option document, the feasibility of its introduction in 1999 was already heavily doubted. However, this instrument's purpose was to show the importance of timing.

Researchers divided their document into two levels: a robust level (judged feasible) and a potential level (judged potentially feasible, for example, from a technical point of view, but ignored the fact that in normal circumstances not all users will probably adapt to the fuel-efficient technology). So, compared to the forecasted 2010 emissions for transport (see Table 3.1) the transport options in the Policy document will reduce GHG emissions by 3 - 5% in 2010.

The question of why these eight policy instruments (Table 3.4) have finally been chosen in the Policy Document is difficult to answer because the selection process was not made public. However, especially for transport, it is probable that criteria like short-term feasibility and potential public support have played an important role in the selection. Table 3.4 shows that the transport options as inventoried in the Option Document (Table 3.3) can be regarded as an important source of inspiration.

From Table 3.4 it can be concluded that the differences per policy instrument between the reduction estimates of the Policy Document and the potentials, as estimated in the research evaluation are rather small. The main reason for the differences is instrumentation. For research, less clear instrumentation was reason enough to assume no or low emission reduction effects and policy-makers were, in general, much more optimistic about the effects of unclear policy. The most important difference is related to the *total* impact of the Policy Plan: according to the Policy Document the total reduction effect of all transport measures could be estimated as being 2.2 – 2.9 Mtonne, while in the research evaluation an effect of 1.3 – 2 Mtonne was estimated (Table 4). Despite warnings from research, policy-makers choose simply to add up all the separate effects of the policy instruments to get a total reduction effect compared to BAU. Conversely, research assumed overlap between the chosen policy instruments. Two kinds of overlap were distinguished. Firstly, instruments which affect technology of the same transport category are not independent of each other. In the Policy document most instruments are related to achieving a more fuel-efficient car fleet and use (Table 3.4). Therefore it is not correct to add up the separate reduction effects of these instruments, but the final total reduction has to be calculated by multiplying the remaining fractions of the emission factors (g/km CO₂)⁷. Secondly, most of the selected instruments attempt to influence the behaviour of the same group of consumers (car owners and users). A set of policy instruments (all kinds of instruments taken together) is expected to have a lower impact on behaviour than the impact resulting from ‘adding up’ the behavioural reactions to the separate instruments. In the Research Evaluation report (ECN/RIVM, 1999) this policy instrument overlap is estimated at 0.2 Mtonne in the ‘robust’ estimate and at 0.5 Mtonne in the ‘potential estimate. It should be stressed that these figures are based on expert judgements.

The methodology to estimate reduction potentials (see Table 3.4) comprised model calculations, expert judgement and estimates based on the literature. As far as possible, researchers chose to use state-of-the-art scientific methods. It would take too long to describe the methodologies used in detail. However, some important approaches and assumptions will be elucidated below.

⁷ For example, both measures A and B are estimated to result in a CO₂ emission reduction per car kilometre of 20%. The total reduction brought on by the set of measures, A and B collectively, is not 40%, but 36% (i.e. $1 - [1 - 0.2] * [1 - 0.2] * 100\%$).

Table 3.4: Estimated GHG emission reduction in the Policy document and the Research Evaluation report

Instrument	Plans for instruments according to Policy Document	Reduction effect compared to BAU 2010 according to Policy Document	Reduction effect compared to BAU 2010 according to Research Evaluation <u>ROBUST</u>	Reduction effect compared to BAU 2010 according to Research Evaluation <u>POTEN- TIAL</u>
		(Mtonne CO ₂)	(Mtonne CO ₂)	(Mtonne CO ₂)
EU covenant for more fuel-efficient cars	Covenant with European car manufacturers	0 - 0.4	0	0.4
Feebate system on car purchase tax	Differentiation of 22 Euro per g/km CO ₂	0.6	0.6	0.6
Extra enforcement current speed limits	Five to 10 million Euro per year for extra police	0.3	0.1	0.3
Road pricing	Still in debate	0.2	0.2 ^{a)}	0.2 ^{a)}
Fiscal measures to discourage car use in commuting	Plans presented, not totally clear	0.1 - 0.3	0.1	0.3
Increasing tire pressure	Covenant with the industrial branch and continuing publicity	0.3	0.1	0.3
Promoting the use of econometers, cruise control, board computers in cars	Covenant with industrial branch and continuing publicity	0.5	0.5	0.5
Projects aimed at more fuel efficiency	Unclear	0.2 - 0.3	0	0
TOTAL		2.2 - 2.9	1.3	2

^{a)} At the time of writing, a limited system of road pricing was still not concrete. So, in view of the ongoing political debate, this assumption has to be regarded as being uncertain.

EU covenant

At the end of 1998 the EU and ACEA (European car manufacturers) concluded a covenant. In the covenant it was agreed that from the year 2008 new cars for the EU market would, on average, have a CO₂ emission of 140 g/km (in a test cycle according to EU rules). For the current new cars in the Netherlands this average amounts to approximately 190 g/km (in 'real' circumstances). The estimated GHG emission reduction impact of this covenant was found to be about 0 – 0.4 Mtonne in 2010 compared to BAU. This impact estimate may seem rather pessimistic, but the relatively low reduction effect is mainly due to the assumption that cars in the BAU scenario will autonomously become more fuel-efficient (Feimann *et al.*, 2000). Furthermore: the 140 g/km applies to test circumstances; in reality researchers have assumed a higher CO₂ emission of 150 g/km for new cars in 2008. Finally, it is important to note that the impact of selling more fuel-efficient new cars from the year 2008 will be relatively modest in the year 2010: in 2010 the fleet is not, on average, fully penetrated with these '150 g/km' cars. According to research the average CO₂ emission per kilometre is assumed to drop linearly from 190 to 150 g/km in the 2000-2008 period. Still, it is clear that even if the covenant becomes a total success, the full impact will be in the longer term. For a further discussion on the possible impact of the ACEA Covenant, see Kågeson (2000). The uncertainty range in the estimated reduction results from the lack of clarity about the manufacturers meeting this agreement: the covenant is an agreement without sanctions, not a law.

Extra enforcement of current speed limits

The estimation of the impact of the measures on speed limits was based on a detailed study of Peeters *et al.* (1996). Three effects were included: a) a direct effect, since speed reduction will result directly in a lower CO₂ emission per kilometre, b) the rebound effect: increase on car use due to a decrease in fuel costs and c) an indirect effect, since speed reduction will result in longer travel times and therefore fewer car kilometres. A travel time elasticity (of car use) of –1.27 was used (Peeters *et al.*, 1996, based on Van der Waard, 1990). After finishing the research evaluation, reviewers assessed this travel time elasticity as probably being too high. So the emission reduction estimates for the measures on car speed limits have to be considered as upper-bound. For example, Goodwin (1996) calculated a long-term travel time elasticity of –1. A travel time elasticity of 0 was assumed for lorries. This assumption could be regarded as probably lower-bound. The uncertainty range of the research in estimated reduction is due to not being clear about the extent to which setting in extra police agents will result in better enforcement of the current speed limits and to the uncertainties in the travel time elasticities.

Feebate

A feebate is a system where car buyers get a rebate when they buy a car that is more fuel-efficient than the average fuel-efficient car in a certain car class. Additionally, they have to pay a fee when they buy a car which is less fuel-efficient than the average car in that particular car class. The effect of the proposed Dutch feebate measure was based on an American model study by Davis *et al.* (1995). The American results were scaled down to suit Europe, where the fleet is already more fuel-efficient. Another reason was the non-existent expectation that car manufacturers will react by supplying much more fuel-efficient cars on the Dutch market if a measure like this is taken only in the Netherlands, with its relatively small car market. Supply reactions in the American study constitute an important explanation of the effects occurring.

Promoting the use of econometers, cruise control and board computers

The estimation of effects when promoting the use of econometers, cruise control and board computers was based on demonstration projects (Wilbers, 1994; NOVEM, 1998).

Rebound effect

In general, researchers have taken a rebound effect into consideration for all policies (see Table 3.4) resulting in higher car-fuel efficiency. The rebound effect is defined as: the increase in car kilometres due to the lower fuel costs (as a result of improved fuel efficiency). Rebound effects due to lower fixed costs were not considered. A non-symmetrical rebound effect of -0.2 (fuel cost elasticity of car use) based on Dargay and Gately (1997) was assumed.

3.5 Discussion

In this section we will discuss the Kyoto-related transport policies and research as described so far. This section has been partly inspired by Van Wee and Annema (1999), who reviewed three European engineering-economic transport studies.

With regard to the Kyoto-related transport policies in the Netherlands, we have taken note of two important weak points. The first weak point is the limited selection of instruments in the first research stage, focusing mainly on car-related measures and instruments. The instruments evaluated in the first phase of the research were selected by policy-makers. Instruments which because of equity or lack of support by society or policy were considered to be difficult to implement were pre-excluded. This exclusion was based on a 'gut' feeling rather than careful analysis. Such an approach, which, for example excludes all kinds of options in goods transport, may easily lead to possibly attractive options being ignored. To us, it would seem advisable to survey a relatively large list of GHG emission reduction options in the first research stage, both for other road categories than cars and for non-road categories. Close cooperation between policy-makers and researchers should result in the optimal list. This should not be too short, as we think has been the case in the Dutch Kyoto policy-making process, or too long, as will probably be the case if the choice of options is left to the decision of researchers only. The second weak point in the contents of the Kyoto-related transport policies in the Netherlands is the limited time horizon of ten years. The focus on 2010 can be easily explained by the time horizon of the Kyoto Protocol. However, this focus implies that longer-term instruments and measures have not been considered but may be very relevant. This is especially important because the greenhouse effect may be found more important in the much longer term, making other 'long-term instruments and measures' relevant. These longer term instruments and measures may require policy actions in the short term. These actions were this time not considered in the Kyoto-related policy process (see also AER, 1998; VROM-raad, 1998).

On the research methodology used in the Kyoto-related transport policies in the Netherlands we notice one very important weak point: the poor definition of costs and cost-effectiveness. In the Option Document national and end-user costs, and costs of the policy options to the government, were poorly determined. After much discussion between the different researchers, it was decided to limit costs to 'out-of-pocket' money. This is a very limited approach since it has resulted in incomplete 'cost' estimations. For example, the cost-effectiveness of the levy increases (see Table 3.3) was presented as being negative: the levy increase results in savings since less fuel has to be bought compared to BAU; at the same time, the levy increase reduces CO₂ emission in comparison to the BAU level. However, costs

like ‘loss of mobility’ (compared to BAU, fewer car kilometres are driven), and ‘loss of comfort’ (people are perhaps stimulated to buy smaller and lighter – less comfortable – cars, compared to BAU) are not included. This limited use of the cost notion could, from a societal point of view, have easily resulted in non-optimal policy instruments. With respect to costs our impression is that total costs hardly counted in the final round of the Kyoto-related policy process for transport. The option of levy increase illustrates our impression: i.e. the lower costs resulting from a levy increase, as suggested by the research, did not lead to selection of this option in the Policy Document.

Related to the discussion about the poor use of the cost aspects, it is, in our opinion, advisable for researchers evaluating the impact of policy options to present as much relevant information as possible. The information could include (1) impact on economic indicators: the costs (and then not only in terms of ‘out-of-pocket’ money), as well as other economic impacts, such as the impact on employment, GDP, consumer and producer surpluses, and impacts on accessibility (as far as this has an economic impact); (2) impact on environmental indicators: the effects on other emissions, other environmental aspects, e.g. noise, concentrations of pollutants, negative impacts on nature and landscapes, and less traditional environmental indicators such as nuisance of parked and driving vehicles, and (3) impacts on other societal indicators, such as safety impacts, equity impact, accessibility as far as the non-economic aspects are concerned and public support. By presenting this information for all options, policy-makers obtain insight into impacts of policy options from a broad perspective, which could improve the quality of the selection process when choosing between options.

For the Netherlands as a whole (not only transport), the Research Evaluation report (ECN/RIVM, 1999) concluded that the Policy document will result in a robust emission reduction of 15 Mtonne GHG emissions, and in a potential reduction of 26 Mtonne in 2010 compared to BAU. The largest share in reduction is expected to come from the energy production companies, industry and households, which together contribute 60%. The expected share of transport in reduction is rather modest: due to Dutch Kyoto policy, transport will contribute with a share of 5 to 8%, which is lower than the transport share in total Dutch GHG emissions of approximately 15%.

From the gap between the goal and the robust emission reduction estimate of 15 Mtonne for all sources, we can see, when making use of a metaphor from the world of transport to end this section, that Dutch policy-makers will have to ‘set out all their sails’ if they are to meet the policy task of realising a 25 Mtonne reduction in emissions.

3.6 Conclusions and evaluation

Research has played a major role in both the development and the evaluation of Dutch Kyoto-related policy. Researchers have estimated that related to the domestic policy task of 25 Mtonne GHG emission reduction in 2010, transport will contribute 5-8%; this is lower than their share in the total Dutch GHG emissions due to Dutch Kyoto policy. The most effective instruments are tax differentiation for new cars and in-car instruments such as economy meters and cruise control.

The 2008-2012 Kyoto target period meant that this period would be focused on. However, many possible relevant measures for transport may not or may hardly have effects by then. Such measures were not included in the process but may be relevant in meeting possible future (international) targets for GHG emissions. Nearly all instruments that were discussed in

the Kyoto-related research and policy-making process are correlated. The reason for this focus is an *a priori* choice of policy-makers. However, cost-effective options for other vehicle categories (road transport and non-road transport) may be available.

The Dutch Kyoto-related policy-making process was highly merited on the close interaction between research and policy-makers. Also, the chosen evaluation criteria and the method used in the process appeared logical and was fairly easy to put into practice. However, looking at the Dutch Kyoto-related policy making process, there are also some lessons to learn. Firstly, researchers and policy-makers in these processes should be aware of the importance of drawing up a relatively large list of options in the early stages of the policy-making process, including those which may have their full impacts in the long term. Secondly, researchers should try to avoid confusion about the impact of options, which are sometimes defined as measures and sometimes as policy instruments. The lesson is that in these kinds of policy-making processes, one cannot be clear enough about the assumptions used to assess the impact of options. The third lesson is that researchers should improve their methods for estimating costs and cost-effectiveness of measures and instruments, especially the inclusion of indirect costs should receive attention. Finally, the evaluation showed that in evaluating the impact of policy options it is advisable for researchers to present as much relevant information as possible, including (1) impact on environmental indicators, (2) impact on economic indicators (more than only costs) and (3) impacts on other social indicators.

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Chapter 4

Evaluating transport infrastructure investments: the Dutch experience with a standardised approach

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Abstract

The Dutch government introduced a requirement in 2000 to evaluate proposed major infrastructure plans using a standardised cost–benefit analysis (CBA) following published guidelines. Since then, 13 new major infrastructure projects have been evaluated. This paper reviews the Dutch CBA practice since 2000. The overall conclusion is that the use of standardized cost–benefit analyses has improved the quality of ex ante evaluations of large infrastructure projects in the Netherlands. However, the relatively young CBA practice has not yet fulfilled its potential. About half of the CBAs analysed can be considered as being suitable for helping decision making. The other half has weaknesses with respect to methods and assumptions. Looking at the standardized CBA's influence on policy-making, the most important conclusion is that unfavourable CBA results have contributed to the postponement of decisions and to the downsizing of projects.

4.1 Introduction

In many countries research plays an important role in the decision-making processes of infrastructure investments, since findings help decision makers to assess and evaluate the impacts of new infrastructure. During the past decade the trend in research supporting the decision-making process has been towards an impact evaluation based on a broad definition of welfare. Not only are economic impacts included in *ex ante* project evaluations of new infrastructure, but also increasingly these prove to be ecological and, sometimes, even social. In many countries cost-benefit analysis (CBA) is used for evaluating all possible impacts of infrastructure investments. This currently includes the Netherlands, where, historically, a mixture of CBA and multi-criteria analysis has been used (Bristow and Nellthorp, 2000).

Here, the present paper will aim to answer the following questions around this relatively 'young' standardised CBA practice in the Netherlands. Why have Dutch authorities chosen CBA as the main evaluation method for new infrastructure projects? Is this choice well thought out, taking the, sometimes fierce, scientific criticism into consideration? Has CBA practice in the Netherlands exploited its potential? Has the practice led to transparent and theoretically well-founded *ex ante* impact evaluations, and has the CBA practice really supported decision making on new infrastructure projects? To be clear, it is not our main intention in this article to evaluate Dutch CBAs in depth but, rather, to evaluate the Dutch CBA practice since 2000 to see if it has improved the quality of decision making on new infrastructure projects. Interesting in reviewing the Dutch CBA practice is that this practice is based on the systematic application of a CBA guide (at least that it is the intention of policy makers and researchers involved in the practice). It is shown here how the results of this systematic application of a CBA guide are challenged by earlier vented criticism on the use of CBA as a tool in the decision-making process. To our knowledge this has never been done.

The review methodology is based mainly on a study of all the relevant literature: the CBA reports of the thirteen large investment proposals, the written reviews (if carried out) and additional written policy documents, for example, the Dutch CBA Guide. This information is supplemented with practical experience. The authors have been involved in carrying out CBAs, in participating in advisory committees for CBAs or for specific CBA issues, in CBA workshops, in debates with CBA users, etc. The advantage of this involvement is that the knowledge on Dutch CBA practice from 2000 – 2006 is at first-hand and detailed. However, one disadvantage of involvement in CBA practice is that most impressions gathered in practical experience are not traceable. Discussions between the authors and others involved in the practice have no formal status. And minutes of meetings can often not be used formally because they were not approved by all the participants. So although we have used informal knowledge in this article, we have tried to base our main conclusions and statements solely on written information. Another disadvantage of involving the authors in the Dutch CBA practice may be the risk of being somewhat more positive about the quality of a CBA in which one of the authors was involved compared to a CBA from others, while 'the facts' may hardly support this view. Happily, the three authors were not collectively involved in the same CBA, so we could avoid this problem by assessing each other's work (and not our own).

The second section describes why the Dutch government decided in 1998 to develop a guideline for CBA (Eijgenraam *et al.*, 2000). Since its publication, the CBA Guide (the 'OEEI Leidraad' in Dutch) has been used to evaluate thirteen large infrastructure projects. To answer the questions around this 'young' Dutch CBA practice these CBAs were analysed using benchmarks. The benchmarks for good CBA practice are based on CBA aims, as described in

the CBA Guide (see the second section), and on the advantages and disadvantages of CBA, which have been under debate in the scientific literature for many years now (see the third section). The fourth section presents the results of analysis using quality and impact benchmarks on decision making. Recently published supplements to the CBA Guide are analysed in the fifth section. Discussion and conclusions are handled in the sixth section.

4.2 Choosing CBA as a standard approach

The Dutch Ministries of Transport, Public Works and Water Management and of Economic Affairs decided in 1998 to make an inventory of the knowledge of economic effects of infrastructural projects. The departments commissioned a research programme on the economic effects of infrastructure (the 'OEEI-programma' in Dutch). The ministries were moved to start this research programme after observing that the economic effects of major Dutch investments plans were, before 1998, often estimated using diverse methods (Eijgenraam *et al.*, 2000). Noting that the situation surrounding the economic assessment of large infrastructural projects in the Netherlands was very loosely structured, they concluded that 'not only was the assessment characterised by diverse research methodologies, but many intense, and not always very lucid, discussions about the appropriateness and applicability of these methodologies arise'. Years later, an ad hoc parliamentary committee for projects on infrastructure (House of Representatives, 2004) confirmed the poor quality of Dutch decision making on infrastructure projects before 1998. The committee analysed in depth the decision-making process of two major infrastructure projects carried out from 1990 – 1998: a high speed rail project from Amsterdam to Belgium and a dedicated freight rail project from the port of Rotterdam to Germany (the Betuwe Line). The committee concluded that 'decision-making for these major projects in that period was based on a combination of fear, hope and belief instead of research findings, debate and creativity'.

A very important step in the OEEI programme was to decide to strive for agreement on research methods, in which the programme succeeded. The 'OEEI community' – almost all of the important economic institutes and consultancies in the Netherlands – reached consensus on a number of crucial points, for example, the importance of implementing CBA. The most important report in the OEEI-programme (Eijgenraam *et al.* (2000) contained a set of guidelines for applying CBA to infrastructure proposals. In 2000 the Dutch government decided that this CBA Guide should be applied to all major transport infrastructure plans.

Eijgenraam *et al.* (2000) concluded that CBA should be the preferred approach for project evaluation. They also considered the main alternative method – multi-criteria analysis (MCA) – which can also make effects comparable. MCA relies on 'political' weights. This has the advantage of comparing virtually all types of effects possible. However, Eijgenraam *et al.* (2000) concluded that MCA has the disadvantage that the basis for the weights assigned to the effects is often unclear and that there is a real danger of double counting because clear criteria to include effects in a MCA are non-existent. Or, as put by Grant-Muller *et al.* (2001, p. 241): 'in particular, there may be a sense that the MCA is making the decision rather than supporting it'. To fit the aim of the OEEI project as developer of less controversial methods, CBA was chosen within the OEEI-programme as the preferred evaluation method. We will comment on this choice in the Discussion and Conclusion section.

The new Dutch approach as presented in Eijgenraam *et al.* (2000) is, in many respects, similar to the methods proposed in Great Britain by the Standing Committee for Trunk Road Appraisal (SACTRA, 1999). Both studies are concerned with the application and

improvement of CBA itself, and with the way CBA results should be communicated to policy makers. The recommendations of the two studies are similar, e.g. both stress the importance of wider economic impacts and distribution effects. The Dutch study is more applied, using many examples to illustrate dos and don'ts.

Two CBA aspects, namely, dealing with risks and the wider economic impacts (also called indirect or strategic effects) receive relatively much attention in the Dutch CBA Guide. Since most people are risk-averse, the CBA Guide points out that additional risks of a project will (*ceteris paribus*) represent negative effects on welfare. Investments involve short-term costs and long-term benefits. The Dutch CBA Guide stresses the theoretical advantages of risk valuation but does not advise on a practical method to do this valuation.

The CBA Guide states that most of the wider economic effects of infrastructure are due to a redistribution of the original transport effect through other markets. According to the guide, additional benefits can only be realised if markets do not function optimally, and if the project influences the size of these imperfections or, alternatively, if the project results in international displacement of production or consumption. The existence (or non-existence) of wider economic impacts always plays a relatively important role in Dutch debates on impacts of infrastructure. This may be linked to the size and geographical position of the Netherlands. In accordance with its relatively small size, the Dutch economy is relatively open. Moreover, the position of the Netherlands at the mouth of large, navigable rivers (Rhine, Meuse and Scheldt) has led to specialisation in transit and distribution of goods. This international orientation attracts considerable attention to the distribution of economic activities across national borders.

4.3 Ongoing debate on CBA as a sound appraisal method for new infrastructure

The choice for CBA in the Netherlands fits in perfectly with evaluation methods used for infrastructure investments in other countries. CBA or CBA techniques form the core of the economic appraisal of transport projects in most high-income countries (Grant-Muller *et al.*, 2001, Hayashi and Morisugi, 2000). However, applying the optimal appraisal method for new infrastructure is a hotly debated issue. In the words of Sen (2000, p. 931): '*CBA has fearless champions as well as resolute detractors*'. In the remainder of this section we will survey some of the main issues in this ongoing scientific debate.

The disputes on CBA can be summarised into five main points of criticism (based on Kelman, 1981; Heinzerling and Ackerman, 2002; Sen, 2000; Kopp *et al.*, 1997; Posner, 2000). First, some scientists argue that, fundamentally, CBA represents a flawed appraisal method, based as it is on utilitarianism, which the authors consider as an unsatisfactory moral system. One of the basic principles of CBA is that all impacts of a project on individuals are valued on the basis of the impact issue: i.e. does it satisfy or dissatisfy individual preferences? This concept of 'utilitarianism' as the base for decision making has been widely attacked (and we suppose that this is the root of the antithesis); '*satisfaction of people's "manifest" preferences is not an adequate index of well-being because there are conceivable circumstances in which these preferences might be satisfied, even though the individuals' true interests were far from being served*' (Scanlon, 1991, p. 42). This seems to suggest that people cannot be relied on to seek their own interests and that someone else must deem certain goods and conditions important for a good life; for example, someone will have to protect nature/endangered species when building a new – economically highly attractive – port in a wildlife area.

The second criticism of CBA is that the market analogy valuation methods for non-priced goods, required in most CBAs for infrastructure projects, are inherently flawed. In mainstream cost-benefit analysis, non-priced impacts are valued using 'willingness to pay' (WTP). According to the criticism, not all non-priced impacts can be valued via a price tag. As the critics say, it is especially the common methods of valuing environmental impacts in CBAs that cannot possibly result in a true picture of the real values people attach to goods such as nature, landscapes or a clean environment (see, for example, Heinzerling and Ackerman, 2002, Niemeijer and Spash, 2001). Contingent Valuation Methods (CVM) are commonly used as valuation techniques for environmental goods. Niemeijer and Spash (2001) give empirical evidence of the divergence between theoretical assumptions and the way humans value the environment in practice. For example, they argue that in assessing a WTP to value an impact of a road in a scenic area with a Stated Preference method, respondents may believe they are being asked to give a charitable contribution to a nature conservation organisation, while the economic analyst uses the responses as a welfare-theoretical measure of changes in the quantity and quality of an environmental good, in this case a scenic area.

A third criticism of CBA is that it ignores equity issues. In the words of Heinzerling and Ackerman (2002), *'cost-benefit analysis ignores the question of who suffers as a result of environmental problems and, therefore, threatens to reinforce existing patterns of economic and social'*. They also state that CBA treats questions about equity as, at best, side issues, contradicting the widely shared view that equity should count in public policy.

A fourth point in the debate is that some people worry that CBAs will easily result in incomplete or incorrect information to the decision makers. Mackie and Preston (1998) emphasise that impacts difficult to value in monetary terms tend to be excluded by CBAs. Next best to exclusion seems to be inclusion of these impacts, either qualitatively or as physical units. However, Mackie and Preston (1998) stress the real danger of an unbalanced treatment of priced versus non-priced impacts in CBA using this approach. The risk here is that the non-priced impacts will be represented less dominantly in the main conclusions and tables compared to the priced impacts. Critics point out that double-counting impacts is also a risk of CBA, resulting in the incorrect information going to the decision makers. The danger of double-counting impacts is real, especially in claiming wider economic impacts of an investment (SACTRA, 1999, Banister and Berechman, 2000, Eijgenraam *et al.*, 2000, ECMT, 2001). Double-counting will occur if wider economic effects are claimed in addition to direct economic impacts, while in reality most of the wider impacts are redistributions of the original direct effect (see also the second section).

Finally, CBA is criticised violently because, in the words of Heinzerling and Ackerman (2002), *'it fails to produce the greater objectivity and transparency promised by its proponents'*. The authors find that the highly complex, resource-intensive and expert-driven nature of the CBA appraisal method makes it extremely difficult for the public to understand and participate in the process. This last observation is probably also valid for most of the population – advisors, civil servants, politicians – directly involved in the decision-making process. CBA requires different base-case scenarios (possible developments in the project region without taking the investment project there), applying transport models, and discounting and using (shadow) pricing methods for impacts on non-priced goods. For people not familiar with these techniques and models – probably most of the decision makers – a CBA can easily become a black box. De Jong (1999) compared several countries with respect to policy decisions and related research on infrastructure evaluation. His comparison shows that for only 2 of the 7 countries compared, did a standardised appraisal method seem

‘relatively effective’. One explanation given by him for this fairly poor result is the seeming complexity of the evaluation methods. Because of this complexity, politicians may find it hard to interpret the results or they may doubt the results because of their incomprehensibility. Another explanation De Jong gives for the relatively ineffective standardised appraisal methods is that they are developed or applied without support from relevant policy actors. This is an invitation to actual or potential enemies to rapidly invent alternative methodologies. De Jong (1999) observes the danger in many countries that elaborate and carefully balanced appraisals will be used selectively as political toys or that the evaluation results will lead silent lives in the bosom of the national ministries.

What has been made clear in this section is that CBA as an evaluation method is not undisputed. Philosophical, methodological and practical objections to CBA are easily raised. In the next section, several of these objections are used to define benchmarks, which one can apply to the current Dutch CBA practices.

4.4 CBA applications

Benchmarks for good CBA practices

Standardized methods do not guarantee clear, unequivocal and balanced CBAs (see the third section). In turn, ‘good’ CBAs do not automatically have a strong impact on decision making. This section will try, in the authors’ analysis, to see if Dutch CBA practices so far have resulted in ‘good’ CBAs and ‘better’ decision making.

Table 4.1 summarizes the benchmarks applied by the present authors in evaluating the quality of Dutch CBA practice so far. The international critique on utilitarianism and the view that non-priced impacts cannot be valued with a proper price tag (see the third section) are not translated into benchmarks, because these fundamental judgements imply that a CBA should not be carried out at all, while this paper has chosen to analyse Dutch standardised CBA practice. The other three main points of criticism (ignoring equity issues, incomplete information and the lack of transparency) are translated in benchmarks (see Table 4.3). Equity issues (such as to whom do the costs and benefits accrue?) and the risks of incomplete information are treated together in the benchmark ‘completeness’. In addition to the benchmarks based on the international critique two benchmarks are added: a benchmark to evaluate the treatment of uncertainty and risks in a CBA and a general benchmark on the quality of the CBA carried out. Two types of benchmarks are distinguished herein:

- That based on the points debated in the previous section and concerned with the quality and transparency of the CBA itself, e.g. is the CBA theoretically correct? Are all impacts (direct and indirect) included properly? Are risks and uncertainties dealt with properly?
- That aimed at assessing the process: has CBA practice in the Netherlands so far had an impact on decision making?

Table 4.1: Benchmarks to evaluate the quality of CBA practices

Criterion	Clarification	Benchmark for evaluation
<i>Quality</i>		
Transparency	The meaning, possibilities and limitations of CBA should be clear to decision makers. The impacts should also be presented in their own units (travel time savings in hours, extra CO ₂ emission in tonnes and loss of biodiversity (amounts)). This will open the ‘black box’.	The CBA should be comprehensible for non-welfare economists. All impacts of a project should be clear to non-economists.
Completeness	Are all impacts of the new infrastructure (direct and indirect impacts, distributional consequences) mentioned in the CBA?	The summary and final table of the CBA should mention all impacts of the new infrastructure, including those that cannot be quantified and monetized.
Risk & uncertainty	As most people are risk-averse, risks and uncertainties will (all things being equal) represent negative effects on welfare.	Uncertainties should be reflected in different scenarios and sensitivity analysis. Ideally, the (negative) value of risks should be included in the financial results.
Quality	The CBA should be performed according to scientific standards.	The final results of a CBA should be reviewed by peers.
<i>Process</i>		
Policy impact	Has the CBA influenced decision making?	Are there indications that CBA has influenced decision making (rejection or approval of a project proposal, or possibly new project designs)?

For the benchmark ‘completeness’ some additional remarks next to Table 4.1 have to be made. In the author’s view, it is important to always address wider economic impacts, even if they are negligible, so as to avoid ongoing hazy debates about the importance of the ‘strategic’ effects of new infrastructure. In addition, it is important in a CBA to communicate concisely about the distributional impacts of a new project, separate from the efficiency data. After all, distributional impacts of new infrastructure often play an important role in political decision making. Like SACTRA (1999) and Banister and Berechman (2000) comment it is advisable to report on the wider economic impacts of infrastructural projects separately before including them in a CBA. However, it must be acknowledged that assessment of the wider economic impacts and related distributional effects is a process, which may require additional expertise and involve additional costs, as the project benefits tend to ‘spread’ through sectors

of the economy (and, ultimately, to consumers) in a rather diffuse way. Detailed analysis of such effects requires the use of complicated macroeconomic models.

Therefore, in the benchmark ‘completeness’ the paper takes into account the nature of the project considered: for projects where ‘strategic’ effects are claimed politically to be very important, a complete view on the distributional impacts is considered to be more important than smaller investment plans with less scope on the distributional aspects. Furthermore, it should be noted that it is fairly easy to identify the initial beneficiaries of projects (e.g. consumers, business or government) whereas it is harder to measure the final incidence of the benefits. This aspect in this benchmark is again treated by taking into account the nature of the project considered: for projects where positive effects on certain groups – a specific income group, for example – are claimed politically to be very important, a more detailed view on final beneficiaries is considered to be more important than infrastructure investment plans, with less detailed political views on the question on to whom the benefits should accrue.

Analysing CBA practices so far

Several infrastructural projects were subjected to CBA after publication of the CBA Guide. Between January 2000 and September 2004, 16 CBAs for 13 new national infrastructure projects were published. For three of the projects two CBAs were made. In all of these cases, the second CBA was a more elaborate or up-to-date version of the first one. The authors studied only the second versions for the analysis. Although the CBA method was also applied to other policies and local infrastructural projects, we will focus here on only national infrastructural applications. Table 4.2 shows the projects for which CBAs were carried out. Of course, much more could be said about the substantive aspects of the CBAs, but this is beyond the scope of this article.

From the projects shown in Table 4.2 it can be concluded that new rail and port infrastructure formed the focus of Dutch policy in infrastructural planning in the 2000 – 2004 period. The table shows investment costs of the projects to vary from €0.3 to €12 billion. The costs of a specific project can also differ considerably, depending on the project alternatives studied. For example, in the CBA for a high-speed rail link from Amsterdam to Groningen (around 200 km, reaching from the west to the north of the Netherlands), cheaper project alternatives relate to improvement of the existing intercity rail link, while the most expensive alternatives name a magnetic levitation (MAGLEV) link as a possibility. According to the table most projects generate more costs than benefits to society, at least according to the CBAs carried out. The Amsterdam Schiphol Airport extension and deepening the Scheldt’s waterway to Antwerp seemed to be efficient actions; (the ‘Amsterdam port entrance’ or parts of it, ‘Rotterdam port extension’ and ‘extra road-building schemes’ in the ‘Haarlem–Schiphol–Amsterdam–Almere’ area were found positive on certain conditions.

One can also see that the benefit–cost ratios for several projects are not precisely determined (Table 4.2). For some of these projects, the relatively wide ranges used in cost–benefit ratios can be explained on the grounds that the different project alternatives studied appear to have wide divergences in costs and benefits and/or because the cost–benefit ratio appears to be very sensitive to the future scenario used. Examples are the Rotterdam port and the Amsterdam airport extension projects.

Table 4.2: Overview of projects, investment costs and benefit/cost ratio

Project	Investment (x billion euro; approximate)	Benefit/cost ratio (approximate)	CBA reference(s)
High-speed rail Amsterdam – Germany	2	0.2	Dijkman et al. (2000); AVV et al. (2001)
High-speed rail Amsterdam – Groningen	1.3 – 6.7	0.6 – 0.7	NEI (2000); NEI et al. (2001a)
High-speed rail link between large Dutch cities	5 – 9	0.4 – 0.8	NEI (2001c)
Rail link Lelystad – Kampen	0.7 – 0.8	0.9 – 1	NEI (2001b)
Freight rail Antwerp–Germany	0.3 – 0.6	0 (for the Netherlands)	NEA and UFSIA (2001)
Freight rail Rotterdam–Antwerp	0.5	0.5 – 1	NEI (2001a)
Rotterdam port extension	2	0.7 – 1.9	CPB et al. (2001a); CPB et al. (2001b)
Amsterdam port entrance	0.6 – 0.7	0.5 – 3.2	NEI et al. (2001b)
Freight transfer centre, Valburg	0.3 – 0.4	0.6	TNO Inro (2001)
Amsterdam Schiphol Airport extension	1	1.2 – 12	Koning et al. (2002)
Urban development and infrastructure projects Amsterdam-zuid (near Amsterdam Schiphol Airport)	1 – 2.4	0.5 – 0.6	Besseling et al. (2003)
Extra road or public transport investments in the Haarlem – Schiphol – Amsterdam – Almere area	8 – 12	0.5 – 1.1	Ecorys-NEI (2004)
Deepening the Scheldt's waterway up to Antwerp	0.3 – 0.4	4 – 9 (for Europe)	Saitua Nistal (2004)

Transparency benchmark

Table 4.3 shows the results of the transparency benchmark evaluation. The scores solely were based on the CBAs published. There was no attempt to gather additional information by interviewing the authors of the CBAs. In the present authors' view, written CBAs should be self-explanatory, and their summaries in particular should be easily readable for non-economists. The focus on the summaries in the transparency benchmark can be explained by the experience that most users of CBA only read the summary. The table shows the transparency of 10 CBAs to be unsatisfactory. These CBAs do not seem to be written from the idea of them being essential to make the main results of the CBA clear to non-welfare economists (besides, most decision makers are not even economists). Economic jargon is used abundantly. An important weakness is that categories of costs and benefits of the project are not explained. One cannot expect that important users of a CBA can beforehand understand what is meant by monetised figures of poorly explained impacts like 'transport advantages', 'industrial site benefits', 'exploitation surplus', 'external effects', 'residual value', etc.

Completeness benchmark

Table 4.4 shows most Dutch CBAs to be fairly complete, at least with regard to the 'grand' topics: i.e. researchers' focus on direct and indirect economic impacts, external effects and on impacts by region and by groups. Important direct effects in Dutch CBA practice are, not surprisingly, travel time gains and improvements in transport quality (e.g. the increase in frequency of regular connections after the project).

Most CBAs are fairly complete with regard to external effects. Twelve out of 13 CBAs valuated changes in CO₂ and NO_x emissions using shadow prices of around 20€ per ton avoided or extra CO₂ and 10€ per kg avoided or extra NO_x. Most CBAs also pay attention to impacts of the project on landscape, nature and spatial quality: qualitatively in all cases. This qualitative approach may result, in some cases, in a presentation in the final conclusions biased towards monetized impacts. Especially in the more 'technical' CBAs, stressing monetized impacts in the final cost-benefit table and conclusions, there is a risk of overlooking the negative impacts of infrastructure on landscapes and/or nature, despite the fact that the negative impacts on landscape and nature are mentioned qualitatively somewhere in the CBA.

All CBAs pay attention to indirect effects, and quantitative estimates of the indirect effects are made in 10 out of 13 CBAs (Table 4.4). Possible improvements of the labour market are considered to be important indirect effects in Dutch CBA practice. In the CBAs that quantify labour market impacts, the basic assumption is that infrastructure projects can improve the regional match between demand and supply of labour. Four CBAs include 'international indirect effects'. These impacts relate to estimates of economic activity in the Netherlands, which, without the new Dutch infrastructure, would develop in other countries.

The indirect effects compared to the direct effects differ significantly among the Dutch CBAs (Table 4.5): from zero up to 600%, as shown below. The high share of 600% is estimated in the CBA 'Amsterdam port entrance'. In this CBA so called 'economic activity benefits' (extra productivity) are quantified. This relates to the valuation of economic activity of port services and companies in the port area, which without the improvement of the port entrance – an improved or larger lock – would relocate to other countries, at least, according to the CBA.

Table 4.3: Evaluation of transparency benchmark

	Transparency: (+) good, (-) unsatisfactory
High-speed rail Amsterdam – Germany	(+) Clear, except for a (negative) benefit claimed: ‘macro economic (continued) impact’. Travel time gains are given in minutes compared to the base case in summary. Other effects are not given in their own units.
High-speed rail Amsterdam – Groningen	(-) Benefits claimed, e.g. ‘labour market benefits’ and ‘international benefits’ are not explained in the summary, nor is ‘residual value’. Travel time gains are given in ‘minutes’ compared to ‘base case’. Other effects are not given in their own units. However, it is especially the methods and assumptions used for the wider economic effects that are incomprehensible for non-economists.
High-speed rail link between large Dutch cities	(-) Fairly technical summary. The different costs and benefits are unexplained in the summary. Economic jargon is used. ‘Residual value’ is not explained in the summary, and ‘travel time gains’ are given in ‘minutes’ compared to ‘base case’ in summary. Other effects are not given in their own units.
Rail link Lelystad – Kampen	(-) Clear in basic assumptions. Economic jargon in summary is limited, except for a wider impact claimed ‘generation on labour market’. The explanation of this term in the report is also unclear. ‘Travel time gains’ are given in ‘minutes’ compared to ‘base case’ in summary. Other effects are not given in their own units.
Freight rail Antwerp – Germany	(-) No clear explanation of important impacts like ‘transport benefits’, ‘fragmentation of urban areas’, ‘ecology’, ‘agriculture’ in summary. ‘Impacts’ are not given in their own units. But are explained further in report. Cost–benefit analysis of eight different project alternatives are given in the summary. However, a clear explanation (or figure) of the differences between the alternatives is not given, which makes the summary difficult to interpret.
Freight rail Rotterdam – Antwerp	(-) Economic jargon is limited. The use of five different scenarios, including different assumptions on potential modal shift, makes the summary fairly technical. Summary contains very few figures.
Rotterdam port extension	(-) Very elaborate and technical. Not clear about the main benefit: i.e. avoiding port quality losses due to decreased market share of Rotterdam in the ‘base case’.
Amsterdam port entrance	(-) Fairly technical description in summary. A positive point is the attempt to explain all benefits and costs,

Transparency: (+) good, (-) unsatisfactory	
	while the presentation of the main results in time required recovering the costs and in Internal Rate of Return is a negative point. This makes the results hard to interpret for non-economists. Different economic scenarios are used in combination with three project alternatives and IRRs for three time periods (2020, 2035 and 2060). The resulting large amount of data makes it difficult to gain a clear view of the main outcome of this study.
Freight transfer centre, Valburg	(-) Elaborate but technical summary. The different costs and benefits are unexplained in the summary. Unclear is the handling of generative and distributive effects.
Amsterdam Schiphol Airport extension	(-) Fairly technical summary. Economic jargon like ‘claiming scarcity profits’ is used.
Urban development and infrastructure projects Amsterdam-zuid (near Amsterdam Schiphol Airport)	(+) Clear. Hardly any jargon. Recommendations are given to improve the project (for example: skipping some investments in rail projects).
Extra road or public transport investments in the Haarlem – Schiphol – Amsterdam – Almere area	(-) Fairly technical summary. The different costs and benefits are unexplained along with indirect benefits like ‘productivity impacts’. Economic jargon is used.
Deepening the Scheldt’s waterway to Antwerp	(+) Clear. Hardly any jargon.

Table 4.4: Evaluation for Completeness Benchmark

Project/ CBA	High-speed rail Amsterdam–Germany	High-speed rail Amsterdam–Groningen	High-speed rail link between large cities	Rail link Lelystad – Kampen	Freight rail Antwerp – Germany	Rotterdam port extension	Freight rail Rotterdam – Antwerp	Amsterdam port entrance	Freight transfer centre, Val-burg	Amsterdam Airport extension	Infra-structure project Amsterdam-zuid	Extra road or public trans-port Haarlem – Schiphol	Deepening Scheldt water way to Antwerp
Direct effects													
Business case	X	X	X	X					X	X		X	
Travel time gains/ Reliability-Quality improvements	X	X	X	X		X	X	X		X		X	X
Lower (or higher) transport costs					X	X	X	X	X		X	X	
Postponement of other transport investments				X			X						
Land value											X		
External effects													
Carbon dioxide and nitrous oxide emissions	X	X	X	X	X	X	X	X	X	X		X	X
Decrease in traffic jams		X	X	X						X			X
Nature/Landscape/ Spatial quality	X	X	X	X	X	X					X		X
Safety			X		X	X	X	X	X	X	X	X	X
External safety					X	X				X		X	
Fragmentation of urban area				X	X	X							
Noise			X	X		X	X		X	X	X		

Project/ CBA	High-speed rail Amsterdam–Germany	High-speed rail Amsterdam–Groningen	High-speed rail link between large cities	Rail link Lelystad – Kampen	Freight rail Antwerp – Germany	Rotterdam port extension	Freight rail Rotterdam – Antwerp	Amsterdam port entrance	Freight transfer centre, Val-burg	Amsterdam Airport extension	Infra-structure project Amsterdam-zuid	Extra road or public trans-port Haarlem – Schiphol	Deepening Scheldt water way to Antwerp
Indirect effects (wider economic effects) (see for details: table 4.5 below)	X	X	X	X	X	X	X	X			X	X	
Residual value		X	X	X	X	X	X			X			
Impacts by region (mostly employment effects)	X	X	X	X		X		X	X		X		X
Impacts by group (e.g. travellers, operators)	X	X	X	X		X		X	X	X	X		X
National versus international benefits and costs					X	X							X

Table 4.5 shows that ad hoc methods play an important role in estimating indirect effects. A much used ad hoc method relates to valuation of changes in labour mismatch due to new infrastructure. The basic assumption is that because of travel time and/or travel quality gains resulting from new infrastructure regions with relatively high unemployment or a high number of vacancies can gain or lose jobs respectively (or vice versa). Labour mismatch is valued on the basis of rather rough estimates about regional job gains or losses, added value of unskilled or low-skilled labourers and the extent of displacement (e.g. new jobs are given to someone already working and not to someone unemployed). In most cases it is assumed additionally in the base case that for the higher skilled work force no mismatch in regional labour market will occur in the future. In some CBA reviews (see below), the assumptions and methods for estimating the indirect effects in Dutch CBA practice were criticized sharply.

Risk and uncertainty benchmark

Table 4.6 shows the methods and assumptions in uncertainty and risk valuation. Dutch CBA practice is strong in the use of three or more macroeconomic scenarios with high, middle and low economic growth (Table 4.6). The use of scenarios tests the robustness of the project under different economic conditions. However, less attention is paid to the uncertainties within the scenarios, for example, those due to the transport models used or to developments in the scenario that could not be modelled.

Scenarios indicate to what extent the return of a project depends on specific and general external factors. Scenarios give a qualitative picture of the risks of a project, but do not provide a quantitative measure for risks (Eijgenraam et al., 2000). Our evaluation shows that the valuation of project risks or risks of project alternatives varies in Dutch CBA practice. For example, in two CBAs a limited time period (15 to 25 years) was used to determine the costs and benefits, combined with a rather low discount rate of 4% for all impacts. Benefits in these CBAs arising after 30 years are balanced against the costs of uncertainty, which increase in time. While in another case, eight CBAs (Table 4.6) took a ‘residual value’ into account, combined with a relatively low discount rate of 4% for all categories of costs and benefits (a residual value represents the benefits of a project arising after the chosen time period, often 30 years). Contrary to CBAs with a limited time period, the risks of a project here could be underestimated. Interestingly, in three CBAs in the 2003/2004 period – ‘urban development and infrastructure projects Amsterdam-Zuid’, ‘extra road or public transport investments in the Haarlem-Schiphol-Amsterdam-Almere area’ and ‘Deepening the Scheldt’s waterway to Antwerp – risks are valued more explicitly using risk premiums and sensitivity analysis (see Table 4.6). This shows the impact of a debate on improving and extending the Dutch CBA Guide (Eijgenraam et al., 2000), which started around 2002. One of the points of improvement in this process was explicit risk valuation (see fifth section for more on the subject of recent supplements to the CBA Guide).

Table 4.5: Overview of indirect effect in Dutch CBA practice presented as percentage of direct effect estimates

	Methodology used and indirect effects distinguished	Indirect effects compared to direct effects
High-speed rail Amsterdam – Germany	Macro-economic input-output model. Main types of indirect effects: expenditures, taxation and relocation (international effect)	20- 30%
High-speed rail Amsterdam – Groningen	Ad hoc methods. Main types of indirect effects: labour mismatch, relocation (international effect)	30 – 50% (and PM ^b items)
High-speed rail link between large Dutch cities	Ad hoc methods. Main types of indirect effect: labour mismatch, relocation (international effect) is PM item	-6% to 5% (and a PM ^b item)
Rail link Lelystad – Kampen	Ad hoc methods. Main type of indirect effects: labour mismatch	Around 30%
Freight rail Antwerp–Germany	Ad hoc methods. Main type of indirect effects: labour mismatch	Zero
Freight rail Rotterdam–Antwerp	Interviews with transport companies and electronic workshops with experts. Indirect effects considered small	PM ^b)
Rotterdam port extension	Ad hoc methods. Main type of indirect effects: labour mismatch, scale economies	Around 1%
Amsterdam port entrance	Transport model and ad hoc methods. Main type of indirect effects: productivity, monopolies	200 - 600%
Freight transfer centre, Valburg	Ad hoc methods. Main type of indirect effects according to the CBA: none. However, perhaps question if the main effect claimed (exploitation profits of the land owners) should not be considered as an indirect effect (relocation of economic activity) ^{a)} . The CBA not clear in this respect	Considered to be small, according to the CBA
Amsterdam Schiphol Airport extension	Ad hoc methods. Main type of indirect effects: none	Indirect effects ‘PM ^b ’, considered relatively small
Urban development and	Ad hoc methods. Only	Very small

	Methodology used and indirect effects distinguished	Indirect effects compared to direct effects
infrastructure projects	employment redistribution	(less than 2%)
Amsterdam-zuid (near Amsterdam Schiphol Airport)		
Extra road or public transport investments in the Haarlem – Schiphol – Amsterdam – Almere area	Input-output model. Main type of indirect effects: labour mismatch, scale economies, relocation	8 – 31%
Deepening the Scheldt's waterway to Antwerp	Only qualitative remarks	Indirect effects 'PM' ^b , considered relatively small

^{a)} And even more, it could be questioned if, on national scale, this 'indirect effect' is only another distribution of economic activity on Dutch territory; ^{b)} PM (*pro memorie*), as a reminder.

Table 4.6: Benchmark uncertainty and risk valuation in Dutch CBA practice

Uncertainty and risk valuation	
High-speed rail Amsterdam – Germany	Three economic scenarios. Limited time period: 2007 – 2032 (in sensitivity analyses a longer period is considered). Discount rate 4% (in a sensitivity analysis 8% is used). A sensitivity analysis is applied to the impact of postponement of German investments in the German section of a high-speed rail linking Amsterdam with Cologne.
High-speed rail Amsterdam – Groningen	The results in the summary are presented using one economic/demographic scenario. Sensitivity analysis is carried out using two additional scenarios. Limited time period: 2010-2040. Discount rate 4% (in a sensitivity analysis 8% is used). Residual value is 35% of the remaining value of the initial infrastructure investment in 2040; 50% higher investment costs is assumed in sensitivity analysis.
High-speed rail link between large Dutch cities	Three economic scenarios. Limited time period: 2010 – 2040. Discount rate 4% (in a sensitivity analysis 8% is used). Residual value is 35% of the remaining value of the initial infrastructure investment in 2040; 50% higher investment costs are assumed in sensitivity analysis. Some additional sensitivity analyses are carried out using other spatial developments other than the base case in the Randstad (western part of the Netherlands where the large Dutch cities are located) and simultaneous investment in High-speed Rail investments to the northern part of the Netherlands (see row above).
Rail link Lelystad – Kampen	The base case is one demand scenario for rail freight in the future. Two other demand scenarios are used in sensitivity analysis. Limited time period: 2005 – 2035. Discount rate 4% (in a sensitivity analysis 8% is used). Residual value is 35% of the remaining value of the initial infrastructure investment in 2035. In sensitivity analysis + 50% higher investment costs compared to base case are assumed.
Freight rail Antwerp–Germany	The base case is one demand scenario for rail freight in the future between and Antwerp and Germany. Two other demand scenarios are used in sensitivity analysis. Limited time period: 2005 – 2040. Discount rate 4%. Residual value is 35% of the remaining value of the initial infrastructure investment in 2040. In sensitivity analysis, +/- 25% investment costs are assumed in comparison to base case

	Uncertainty and risk valuation
Freight rail Rotterdam–Antwerp	Five scenarios. Three scenarios with different economic developments. Two ‘policy scenarios’ with different assumptions on modal shift to rail. Limited time period: 2006 – 2040. Discount rate 4%. Residual value is 40% of the remaining value of the initial infrastructure investment in 2040. Alternative lines and the impact of postponing the investment are studied in sensitivity analysis.
Amsterdam port entrance	Three main scenarios (and two sub-scenarios but these are unclear). Different time periods: a) 2000 – 2020 with a residual value, b) 2000 – 2035 with a residual value, c) 2000- 2060 without residual value. Discount rate 4%. Residual value estimates are unclear.
Freight transfer centre, Valburg	Three economic scenarios. Limited time period: 2004 – 2020. Discount rate 4%. No residual value taking into account because, as the report states, the discount rate chosen is relatively low.
Amsterdam Schiphol Airport extension	Three economic scenarios. Limited time period: 2002 – 2040. The balance of advantages and disadvantages in 2030 is extended over the period 2030-2040 (as a kind of residual value). Discount rate 4%. Sensitivity analysis with another permit system for landing and takeoff compared to the base case. Impact of tightened safety standards in the future compared to the base case is analysed as well.
Urban development and infrastructure projects Amsterdam-zuid (near Amsterdam Schiphol Airport)	One scenario. Net Present Value calculated using discount rate of 4% for all costs and benefits, except for transport and land benefits (discount rate 7%). Infinite time period. Sensitivity analysis carried out using different input parameters (lower and higher investment costs, property rents and selling prices).
Extra road or public transport investments in the Haarlem – Almere area	The results are presented using one economic and demographic scenario. Sensitivity analysis is carried out using two additional scenarios. Limited time period: 2010-2050. Discount rate 4% except for transport benefits (discount rate of 7% is used). Some additional sensitivity analysis is carried out using other spatial developments in the area studied compared to the base case.
Deepening the Scheldt’s waterway to Antwerp	Three economic scenarios. Results presented using limited and infinite time period of the project. Limited time period (2005 – 2030) combined with ‘lower’ discount rates (3 to 4%). Infinite time period combined with ‘low’ (4%) discount rate for costs and higher discount rate for benefits (7%).

Benchmark quality

Finally, the paper comes to the question of the quality of the CBAs. Eight out of 13 CBAs were reviewed, most of them by the CPB, a legally independent agency in the Netherlands for economic policy analysis. Two of these reviews were devastating: for the cases ‘Amsterdam port entrance’ and ‘extra road or public transport investments in the Haarlem-Schiphol-Amsterdam-Almere area’. The reviews concluded that neither CBA forms a sound basis for decision making. In fact, for the ‘Amsterdam port entrance’ the high indirect effects were considered implausible. The reviewers remarked, for example, that the assumption that less sea transport in Amsterdam would result in relocation of companies to other countries is implausible. This is because the sea transported cargoes considered could easily (without much extra costs) be handled in the port of Rotterdam. In the other case the transport model used was sharply criticised: the model calculated, for example, that building more roads in the area would result in more traffic jams compared to the ‘base case’, without giving a sound explanation.

For three CBAs the reviews were critical: ‘high-speed rail large cities’, ‘freight rail Antwerp-Germany’, ‘freight rail Rotterdam-Antwerp’. In the freight rail cases, the scenarios used for future growth of rail transport were reviewed as being much too optimistic. For the three CBAs: ‘Deepening the Scheldt’s waterway to Antwerp’, ‘Rotterdam port extension’ and ‘high-speed rail Amsterdam-Groningen’, the peer review was positive. The case ‘high-speed rail Amsterdam-Groningen’ is a special positive case, because the reviewers criticised both the direct effect estimates (probably underestimated) and the indirect effects estimates (probably overestimated). However, in the end the reviewers concluded that the calculated differences between costs and benefits were so large (much higher costs than benefits) that the main conclusion of the CBA would have to be considered as robust. The project alternatives considered do not improve Dutch welfare.

Five CBAs were not peer reviewed. Based on our own analyses, the paper considers three of these five CBAs not peer reviewed as suitable for policy makers: ‘urban development and infrastructure projects Amsterdam-Zuid’, ‘High-speed rail Amsterdam-Germany’ and ‘Amsterdam airport extension’. These CBAs, based on theoretically well-founded methods and assumptions, are relatively clear. A point of criticism relates to the ‘Amsterdam airport extension’ CBA: assumptions on the extent of technical progress towards much more silent planes than currently in use seem very optimistic, but a more pessimistic assumption does not seem to affect the main conclusion of this CBA. In the other two cases, ‘Rail link Lelystad-Kampen’ and ‘Freight transfer Valburg’, the quality is relatively poor. In case of the ‘Rail link Lelystad-Kampen’, the indirect effect estimate method is, to say the least, hard to understand. However, careful analysis revealed that the method seems to be based on very rough assumptions about a better match between demand and supply of labour in the region thanks to the new rail link. Since the indirect effects are relatively large (see Table 4.5), a more careful analysis would seem appropriate. The CBA ‘Freight transfer Valburg’ is highly unclear (see tables 4.2 and 4.5).

Therefore, the quality score for Dutch CBA practice so far is, in summary, mediocre: six out of 13 CBAs were evaluated as being suitable for helping decision makers. The other seven require improvements. Potentially, the practice of peer reviewing could lead to achieving these more desirable CBAs. In the case of the high-speed rail link between Amsterdam and Groningen, critical reviews led indeed to a second CBA round. In another case, the Amsterdam port entrance, a devastating review led to a two-year deadlock, followed by a new, improved, CBA, which concluded that the main project alternative – building a new

relatively large sea lock – will result in more costs than benefits (Rosenberg and Koopmans, 2004). However, in many other cases critical reviews did lead to changes in the CBAs. An important example is the CBA on extra road or public transport investments in the Haarlem – Schiphol – Amsterdam – Almere area, for which the peer review was devastating (Verrips *et al.*, 2004), but that did not prevent the Ministry of Transport, Public Works and Water Management from including the CBA results in a policy document exploring future transport investments in the area considered (Ministry of Transport, Public Works and Water Management, 2005). At the end of 2005 the Ministry commissioned new CBAs on extra road investments in the area considered.

Impact on decision-making benchmark

Table 4.7, illustrating our assessment of the process, shows that decision making for seven projects is pending. In the freight rail cases and in the freight transfer project, one sees that unfavourable CBA results are not followed by a no-go decision, but by postponement of decisions, reformulation of the project and new research. This is an iterative process, which could end in an implementation decision for a much thinned-out version of the original proposal. However, this is for most of these cases not certain as yet. For other projects, our impression is that the CBA practice has actually led to down-sizing the original – sometimes very ambitious – plans, such as improved utilisation of existing tracks, building only one link or building in phases (Table 4.7). So, the influence on policy of Dutch CBA practice seems more a tool for changing plans than for simply accepting or rejecting original plans.

On the other hand, we see too that decisions are not always in accordance with CBA results (Table 4.7). For the rail link, Lelystad – Kampen, the policy argument was that some benefits were not valued but in the final table included in the column ‘to be decided’. For the domestic high-speed rail link between Amsterdam and Groningen, the dominant picture was that the benefits would not weigh up to the costs. Nevertheless, the government decided in 2004 to make the investment, mainly because of earlier political deals with the regions involved. However, based on criticism of the Dutch parliament in 2005, the government has decided to commission new studies (including CBAs) (see Table 4.7 (see the sixth section for discussion). In the Amsterdam urban development case, the negative CBA result has not resulted in a ‘no go’ decision. In such situations, CBA researchers may ask why decision making precedes research. However, they should be aware that in a democracy, politicians have the freedom to act until they are voted out. CBA should not be seen as a technocratic replacement for a political system.

Table 4.7: Impact on decision making benchmarks

Project	Policy impact
High-speed rail Amsterdam – Germany	Improved utilisation of the existing tracks instead of building new tracks
High-speed rail Amsterdam – Groningen	Positive decision in 2004 despite negative CBA results ¹ .
High-speed rail link in large cities	Negative decision
Rail link Lelystad – Kampen	Positive decision despite negative CBA results; construction postponed due to budget constraints
Freight rail Antwerp – Germany	Decision pending
Freight rail Rotterdam – Antwerp	Decision pending
Rotterdam port extension	Positive decision. Led CBA to considering the extension of the port in phases (depending on the arrival of new customers for the port grounds)
Amsterdam port entrance	Decision pending. New CBA
Freight transfer centre, Valburg	Decision pending
Amsterdam Schiphol Airport extension	Decision pending
Urban development and infrastructure project Amsterdam (near Amsterdam Airport)	Positive decision. The national authorities and the city government of Amsterdam have announced to explore a development scheme which includes underground infrastructure building.
Extra road or public transport investments in the Haarlem – Schiphol, –Amsterdam – Almere area	Decision pending. New CBAs (only for the road projects)
Deepening the Scheldt's waterway to Antwerp	Positive decision

¹ However, in January 2005 the Dutch parliament criticised the project on the basis of a report of a Dutch parliamentary committee about the history of decision making in Dutch infrastructure investments (House of Representatives, 2004). Consequently the government has decided to reconsider their initial positive decision and has commissioned new studies (including CBA) (see section 6 of this paper for discussion).

4.5 Supplements to the CBA Guide

In 2002 the Ministry of Transport, Public Works and Water Management commissioned Buck Consultants International to evaluate the Dutch CBA practice to date. The evaluation report and the subsequent discussions with users, scientists, consultants and politicians have resulted in supplements to the Guide (Ministry of Transport, Public Works and Water Management and Ministry of Economic Affairs, 2004). Table 4.8 shows the improvements proposed in the supplements.

With reference to the results of the analysis in this article, it is in our view highly probable that the proposals in the supplements, if carried out, will improve Dutch CBA practice. For example, as shown in Table 4.8, one of the supplements proposes more transparency; the supplements also include practical guidelines on how to meet this requirement. According to our analysis, this aspect of the supplements addresses a major weakness in current Dutch CBA practice, as identified in the previous section.

Three national CBAs were carried out during scientific debates on the supplements: an urban development and infrastructure project for Amsterdam (near Amsterdam Airport), extra road or public transport investments in the Haarlem – Schiphol – Amsterdam – Almere area and deepening the Scheldt's waterway to Antwerp. In two of these more recent CBAs, the risk valuation recommendations in the supplements (debated in several workshops during the 2003 – 2005 period) clearly had an impact.

On the basis of only three CBAs it is too early to say if the supplements will have an impact on the other improvements proposed. The supplements do not advise creation of a permanent independent review commission. Related to the previous section, this could turn out to be a missed opportunity, considering the sometimes poor use of review results in current Dutch CBA practice.

According to the Ministry of Transport, Public Works and Water Management, the supplements have the same status as the original CBA Guide.

4.6 Discussion and conclusion

In the first section several questions were asked related to the Dutch CBA practice. The first – ‘... *why have Dutch authorities chosen CBA as the central evaluation method for new infrastructure projects?*’ – is relatively simple to answer. Reasons are the poor experience with project appraisal, where there is no standardized approach and the desire to fit in with the abundant international and scientific CBA experiences. One might wonder why CBA is preferred as the central evaluation method instead of MCA. This is perhaps MCA requires ‘political weights’, which could result in controversial conclusions. Indeed, the authors regard this as a real danger of MCA, but, as shown in this article, Dutch CBA results too are often controversial. Nevertheless, these CBA controversies are not political but scientific, which in the present authors' view is preferable, because CBA scientists can debate the methods used independently of the political debate, while in MCA these debates – scientific methods and political weights – could become mixed up, resulting in more confusion than presented in the current CBA debate.

Table 4.8: Improvements for a better Dutch CBA practice, as proposed in the supplements to the CBA Guide (Ministry of Transport, Public Works and Water Management and Ministry of Economic Affairs, 2004)

Subject in supplement addressed	Supplement explained	Supplement related to the results of analysis presented here
Position of CBA in the decision-making process	The supplement deals with the improved relationship of CBA to current legislation and with peer review procedures.	Better use of review results will improve Dutch CBA practice.
Transparency	The supplement recommends short and clear summaries– not only presenting impacts in monetised figures but also in physical units, and clearer insights into project impacts related to policy goals.	Very important, as transparency appears to be a major problem
Direct effects	The supplement recommends more specification on the beneficiary of direct benefits and costs; the supplement presents methods to estimate future time values.	More specification could make CBAs more transparent.
Indirect effects	The supplement recommends improved definitions and research methods to estimate indirect effects.	Important, because direct and indirect impacts often get confused
Nature impacts	The supplement includes guidelines on how to deal with these impacts in a CBA	Important, because a uniform method was missing
Distributional impacts	The supplements recommend a clearer treatment of distributional impacts. The way these impacts should be reported is also recommended.	Important, as a uniform approach to dealing with distributional impacts in CBAs was missing
Risk valuation	The supplements give new guidelines for risk valuation.	Important, because a uniform method was missing

The second question – *is this choice well thought out, taking the, sometimes fierce, scientific critique into consideration?* – requires a more subtle answer. First, the decision to start with a broad economic research programme is considered as being positive, just as the production of a CBA Guide. The choice was well thought out and is based on debates with a broad range of Dutch economic institutes and review. However, perhaps too much attention is paid to the contents of a CBA in this stage at the cost of the focus on communicating the results transparently to decision makers, who are often not familiar at all with welfare theory. Furthermore, in our view, the Guide addresses all relevant topics but is not always clear in the practical implications.

The main questions here are as follows: *Has the CBA practice in the Netherlands so far fulfilled its potential? Or, in other words: a) has the practice led to transparent and theoretically well-founded ex ante impact evaluations, and b) has the CBA practice really supported decision making on new infrastructure projects?* Looking at the cases in the previous section, one can conclude that applying the CBA in the Netherlands has not fulfilled its potential as yet. Only six out of the 13 CBAs analysed can be considered suitable for contributing to decision making. The other seven CBAs have weaknesses or even major weaknesses with respect to methods and assumptions. Furthermore, the transparency benchmark shows that transparency as yet is generally poor in most cases of the Dutch CBA practice to date.

On the positive side, one can distinguish three methodological improvements as a result of the recent CBA practice. First, an improvement in the evaluation practice is that all impacts of a project are estimated using the same scenarios. Second, the current CBA practice shows that policy makers can base their decisions on fairly complete information on the effects of a project. However, it should be noted that information may be complete. If some of the information shows poor quality, use of these CBAs does not lead to better decision making. Third, the CBAs seem to function as a good discussion platform for those involved in economic research and in designing and planning the infrastructure project itself. In the authors' view, this platform function improves the quality of the information for decision making and helps to gain broad support for final decisions.

One can also conclude that in some cases the Dutch standardised CBA practice to date has actually supported and improved the quality of decision making. In some instances policy makers have used CBAs as tools to improve the original infrastructure proposals. However, one should be careful in applying such a conclusion, since it is not known what would have happened if decision-making in these cases had been supported in the pre-CBA fashion. The progress in the current policy process around the 'high-speed rail link from Amsterdam to Groningen' is a sign that CBA practice has improved the quality of decision making (Table 4.7). The criticism of the Dutch Parliament in 2004 forced the government to reconsider its initial positive decision to build this new rail link (see the fifth section) and did indeed decide to reconsider this project in 2005 by embarking on a new process of decision making. New CBAs were created and included detailed analyses of the potential wider economic and distributional impacts of the new infrastructure. Research findings did (again) show negative CBA results for infrastructure alternatives. On the basis of preliminary findings it can also be concluded that the new infrastructure 'solutions' hardly contribute to solving the economic and social problems of the northern Netherlands, such as a relatively high unemployment. The decision of the Dutch government is clear: i.e. the new rail link will not be built because 'the benefits and the necessity of this new rail link have not been proven' (Press release of the Dutch government, April 2006). This 'high speed rail link' case is comparable in scope to two

pre-standardised CBA infrastructure projects: a high speed rail project for the Amsterdam – Brussels trajectory and a dedicated freight rail project (the Betuwe Line) running from the port of Rotterdam to the German border (see the second section). All three projects involve billions of investment costs, and all three cases were considered to be strategically of very high importance to the Dutch economy. The second section shows the two pre-CBA guide projects to be significant reasons for introducing standardized CBA practice. Furthermore, the authors think one can conclude that this practice has made the current decision-making process for the ‘high-speed rail Amsterdam – Groningen’ more into a combination of research findings, debate and creativity than a combination of ‘fear, hope and belief’.

Besides the positive conclusions about CBA practice, the fourth section makes it clear that the current Dutch CBA practice will require improvements. As in the international critique mentioned (the third section), the poor transparency of most CBAs is a special cause of concern. Interviewed users of CBAs find the systematic research into costs and benefits of projects to be an improvement with respect to the ‘old’ Dutch appraisal practice, but most people interviewed attack the lack of transparency of most CBA reports, calling them ‘black boxes’ (Buck Consultant International, 2002). On the basis of the De Jong (1999) research, one can see a danger that the highly complex appraisals will be used selectively or not at all in the continuation of the current CBA practice. One more remark has to be made here, i.e. the assessment of ‘lack of transparency’ is based solely on the final reports. However, in some cases researchers and policy makers may have tried to unlock the CBA results to the public using brochures and presentations.

The international critique on CBA (the third section 3) also puts considerable focus on the difficulty of valuing non-priced environmental goods. Not much of this ongoing scientific discussion can be found in Dutch practice. The ecological effects have been partly expressed in monetary terms in the CBAs, especially for emissions and noise. However, in most cases this is not accompanied by any information to the reader on drawbacks of valuation methods or data, which, for example, would justify some kind of sensitivity analysis. One can see the somewhat arbitrary and pragmatic nature as an important limitation of the current practice of including ecological effects in Dutch CBAs. There is no standardised approach and hardly any tradition in the valuation of environmental ‘goods’ in the Netherlands.

Although the authors find the Dutch CBA practice fairly complete in the ‘grand’ topics, the more detailed information on risks, all, or at least some, of the ecological effects and distributional impacts of infrastructure projects is fairly weak. The OEEI recommendation to value risks has not been followed in practice, probably because there has been a lack of a practical way to do this. Some analysts have ignored risk, even though this is called a ‘pitfall’ in the CBA Guide. As a consequence, the benefits of these projects have been overestimated. Other researchers used limited periods for the benefits, which has the advantage of there being fewer data requirements, but the length of the time period chosen is fairly arbitrary. In this respect, the CBA Guide has not led to consensus or to standardized methods. The information on ecological and distributional effects of infrastructure also requires improvement. As these effects are not expressed in monetary terms, they tend to receive less attention from policy makers than the financial balance. This is exacerbated if researchers stress the financial balance in their conclusions, leaving out other effects. As non-financial effects are mostly costs, not benefits, this distorts the overall picture of the project.

As in the international context, the wider economic (indirect or strategic) effects of infrastructure are still much debated in Dutch CBA practice. The Dutch cases described above

(Table 4.5) seem to indicate that these effects are small when compared to the direct effects. However, some researchers have shown relatively large indirect effects for certain projects, although the methods used to obtain these results have been sharply criticised by others. The best example is the MAGLEV alternative in the ‘high-speed train, Amsterdam–Groningen’ project. In this case the difference in indirect effects calculated by various researchers amounted to almost 3 to 4 billion euro, 40 to 50% of the total investment costs (NYFER, 2001). Since the discussion on the importance of the wider economic impacts of a project will probably continue for years, it was with good reason then, that the first discussion on the use of the CBA Guide in the Netherlands was mainly concerned with the approach to wider economic impacts of infrastructure (CPB *et al.*, 2003).

The recent supplements to the Dutch CBA Guide demonstrate that the Ministry of Transport, Public Works and Water Management – by far the most important commissioning body for new infrastructure in the Netherlands – still supports CBA as an important tool in the decision-making process. In the present authors’ view the supplements address important weak points in Dutch CBA practice. At the moment of writing (April 2006), however, only the improved risk valuation methods, as proposed in the supplements, could be identified clearly as already being in use. The Ministry has indicated on its website that the debate on CBA methodology and use will go on, and that it is highly probable in the future that new supplements will be added to the CBA Guide.

The overall conclusion is that the Dutch use of standardized cost–benefit analyses since 2000 has improved the quality of ex ante evaluations of large infrastructure projects but this standardised CBA practice has not yet fulfilled its potential. Lack of quality in methods and assumptions, unclear treatment of the wider economic impacts, and poor transparency are important issues that will have to be improved in Dutch CBA practice. The recent supplements to the CBA Guide deal with almost all of the issues raised over the 13 Dutch CBAs reviewed in this article, including recommendations for improved transparency, and for more attention to the impacts on nature and landscape, as well as to distributional effects and risks. Time will tell whether the supplements live up to the expectations.

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Chapter 5

Transport policy in Dutch election manifestos. Estimating the environmental impacts

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Abstract

It has become a tradition in the Netherlands to assess the environmental impacts of the election manifestos of political parties. This paper shows that the assessment methodology chosen for transport policy proposals can result in uncertain estimates, for example the reduction in the amount of CO₂ emission of party proposals by 2010 compared to a reference scenario. However, one important result of the election manifesto transport analysis – which election manifesto has the most environmental impact and which the least – is robust and does not mislead the public. The pros and cons of assessing election manifestos has been debated fiercely in the Netherlands. Based on this debate and our own observations we conclude that an important merit of the assessment is that it can help the political parties make their promises more realistic and consistent.

5.1 Introduction

In the Netherlands it has become a tradition to analyze the economic consequences of Dutch election manifestos. In 1986 the electoral manifestos of the three major Dutch parties were scrutinized by the Netherlands Bureau for Economic Policy Analysis (CPB in Dutch) for the first time. Since then, in every election period for the Dutch parliament, the CPB has repeated the economic analysis of the manifestos (1989, 1994, 1998, 2002 and 2006). We refer to two English written papers giving insight into the way the economic impact assessment is carried out by the CPB (Haffner and Van Bergeijk, 1994 and CPB, 2002). Since 1994 the Netherlands Environmental Assessment Bureau (MNP, formerly RIVM) has joined the tradition of analyzing election manifestos by estimating their environmental impacts (RIVM, 1994a; RIVM, 1994b; RIVM, 1998; RIVM, 2002). To the authors' knowledge this practice of assessing the impacts of election manifestos is unique in the world.

This paper focuses on the environmental assessment of election manifestos and in particular the assessment of the transport policies proposed. Two main questions will be answered. What methodology is used to estimate the impacts? Does it make sense to estimate environmental impacts of election manifestos?

This paper will show that the assessment methodology chosen itself is not unique. What is interesting in this paper, in our view, are the 'unique' circumstances surrounding the assessment exercise. The time between the election date and the Dutch parties finalizing their election manifestos is short. In this short period much interaction is required between party officials and assessment experts to give concrete form to sometimes rather vague policy proposals. So the actual time to calculate the environmental impacts is relatively short, making the use of 'heavy' calculation models impossible. This paper will ask the question: is that worrying? Also, the close interaction between party officials and the assessment experts may be unique and highly interesting, but the question arises: is it not cause for concern that 'technocratic' assessment experts partly influence the final shaping of policy proposals? The estimated impacts are uncertain, as in all assessment methodologies. Unique in this exercise is that the important merit of the assessment methodology has to be that the party outcomes are distinguishable, rather than that the methodology is capable of showing accurately that a policy plan will meet a certain environmental goal in, say, the year 2020. The question is: is the methodology chosen capable of showing the differences between the parties accurately? Finally, the methodology may be strong enough to show differences, it may be designed in such a way that the technocratic influence is not about a cause for concern, but then still the question arises: 'does the assessment exercise make sense at all'? Does it help Dutch voters, Dutch democracy, and/or the Dutch political parties? These questions will also be addressed in this paper.

The information and analysis in this paper are based on a literature review, informal interviews and participation of the authors in the transport environmental assessment exercises. The informal interviews took place with political party representatives and assessment experts during the assessment exercises. This information is used as background material. However, as the interview results have not been formally published or checked by the interviewed persons, only public sources are used when people are cited by name in this paper.

5.2 The aim of analyzing election manifestos and some general rules

Aim of the assessment

The Netherlands is a parliamentary democracy. Roughly every four years Dutch voters choose a new national parliament; the so-called Second Chamber of the Parliament. Every Dutch citizen aged eighteen or over has the right to vote in the elections for the Second Chamber. In principle it is very straightforward to take part as a political party in a national Dutch election, although some small barriers are put up to prevent people from putting themselves forward as candidates just for the fun of it. The result is that a relatively large amount of political parties take part in Dutch elections, making it relatively difficult for Dutch voters to see the political differences. Therefore, in the Netherlands the political parties have a tradition of writing rather detailed election manifestos. The aim of the environmental assessment of these manifestos is formulated, albeit it not very specifically, by the Environmental Assessment Bureau (MNP, formerly RIVM). In the introduction to the assessment reports it is merely stated that the agency has calculated the environmental impacts of proposals in the election manifestos at the request of the parties. So the exercise seems to be aimed particularly as a service for the political parties.

Rules and methodology

The assessment methodology is shown in figure 5.1. The environmental assessment is by invitation. Only parties represented in parliament receive the invitation. A very important rule of the environmental assessment is that the parties must also have their election manifestos assessed economically by the Dutch economic assessment bureau (CPB). The reason for this is that MNP want to keep a close relation between the economic and environmental impact assessments. By doing so both assessment exercises use the same starting-points for impact calculation. For example: both assessments use the same baseline scenario, or reference scenario, and both assessments base their impact calculations on the same government budgets proposed by the political parties. Even though the environmental assessment agency (MNP) has made the choice that environmental impacts will only be calculated if the CPB calculates economic impacts, the CPB will calculate the economic impacts without environmental impacts being calculated, as happened in 2006.

An important step in the assessment methodology is the choice for the reference scenario. In general a ‘cautious’ economic scenario is chosen (see section discussion). In this scenario the current transport and infrastructure policies (‘standing policies’) are taken into account. So, the political parties are judged based on the impacts of new transport and infrastructure policy proposals compared to the reference or ‘business-as-usual’ case. Then an iterative step commences. The election manifestos are analyzed roughly and in deliberation with representatives – by phone, interviews, emails - made concrete. This process ends with a list of concrete transport policy measures, which are finally formally approved by the parties. In this iterative step the MNP ensures a level playing field for all the parties. If MNP experts, in deliberation with one party, come up with a new idea for making a somewhat vague policy thought more concrete, they are obliged to inform the other parties about this new idea as well.

Finally the impact of the concrete policy proposals is estimated (see estimation methodology). Both national and international policy proposals are analyzed (step 6a and 6b in figure 5.1), although the results are reported in such a way that only the impacts of the national proposals can be found in the summarizing tables and texts. The impacts of the international measures are reported in text boxes. The reason for this is that it is highly uncertain whether

international policy proposals will be carried out, even if a party gains absolute control in the Dutch parliament. Even then this party will be dependent on often long and difficult international negotiations to realize their political ambitions.



Figure 5.1: Rough outline of the assessment methodology

5.3 The proposals and the impact calculation methodology

Proposals

Transport policy proposals of the different parties were assessed in 1994, 1998 and 2002. In the election of 2006 no formal environmental impact calculation took place (MNP, 2006). The reason for this was that the MNP considered the 2002 assessment exercise not representative, because only 'left-wing' parties accepted the invitation. MNP agreed with the CPB that in subsequent elections the MNP would only assess the environmental impacts of election programmes if a more representative part of Dutch political parties would accept the invitation. This did not happen.

Some general trends can be observed in the proposals of the different Dutch political parties. The first is that in every election the amount of investments in new road and public transport is an important point of political debate. The more ‘leftish’ and green parties tend to cut the ‘standing’ budgets for road investments and are willing to spend more on public transport. The party ‘GL’ (progressive environmentalists) is the most radical in this respect with proposals in 2002 to cut road budgets by roughly 50% and almost doubling rail investments compared to ‘business-as-usual’. The other parties deviate modestly from the ‘standing’ policy line: 10 to 20% at most.

The second trend is the continuing attention for new transport pricing policies. An interesting pricing proposal in this respect is ‘road charging’. Currently, most Dutch political parties see road charging as a means to reduce congestion levels, but – especially by the more green parties – also as a means to improve environmental quality by reducing car use and stimulating consumers to buy more fuel-efficient and cleaner cars. In 1994 only two parties proposed some modest road charging schemes. In 2002 all the parties involved in the assessment proposed elaborate road pricing policies. Although their proposals differed somewhat in the final charging levels, the most important aspects were similar. For example all parties proposed abolishing parts of the Dutch fixed car taxes – a yearly fixed tax and a purchase tax - and introducing road pricing for cars. Also, all charging levels proposed in 2002 differentiated between car weight, kind of fuel and environmental performance (the EU Euro classes, see Directive 70/220/EEC). Finally, all the parties involved in the 2002 assessment proposed charging schemes for vans, trucks and lorries. Ironically, the two parties refusing to be involved in the 2002 assessment – the more right-wing parties ‘CDA’ and ‘VVD’ – were opposed to any kind of road charging and they ended up the forming the Dutch Government. However the story goes on. In the 2006 election all the main Dutch parties proposed road charging, including the CDA and VVD. The history of road charging in the Dutch election manifestos shows the slowly increasing political support for road charging in the Netherlands.

The third trend is the continuing political attention for new international policies to stimulate the use of cleaner and more fuel-efficient vehicles. In this respect a kerosene levy proposal seems almost a ritual. Dutch politics supports this idea almost by consensus, but in every assessment it is clear that the international support required to realize this ambition is poor - perhaps very poor.

Impact calculation methodology

The impact calculation methodology can be described as ‘spreadsheet modeling’. The modeling consists of two steps. First, the environmental impacts of the individual measures are estimated. An important source for the impact estimations was the results of other Dutch policy assessment studies, which were published before or around the time of the election manifestos assessment. In these studies the transport and environmental impacts of infrastructure investment proposals and new environmental policies were assessed compared to business-as-usual. Examples of these studies are CPB et al. (1998) (see Annema et al., 1999 for an English written analysis of this study), CPB (2001) and CPB et al. (2002) (see Dijkman and Verrips (2002) for an English paper of this study). Another important source for impact estimations of the individual measures are Dutch and foreign studies on transport price, cost and travel time elasticities (for example Dargay and Gately, 1997; Glaister and Graham, 2002; Goodwin, 1992; Goodwin, 1996; Nijkamp and Pepping, 1998; Oum et al., 1992; Oum et al., 1996; Van Wee et al., 1996). Also elasticities are used, derived from the so-called National Model System – a Dutch discrete transport choice model (Gunn, 1994).

Sometimes crude estimation methods were used, consisting of a mix of empirical research results, common sense and the use of general transport behaviour theories, like constant time travel and money budgets for transport on an aggregated level (see for example Schafer (1998) and Schafer and Victor (2000)).

The second step in the 'spreadsheet modelling' is integrating the impacts of the individual proposals per party. This step is complicated. The impact assessment of individual measures results in a list of estimations of, for example, the CO₂ emission avoided compared to 'business-as-usual'. And the complication is that these individual estimates cannot be added up simply to give a total estimation of the CO₂ impact of all the political proposals. One reason is that it would simply be mathematically wrong to add up the CO₂ results of different measures. For example, suppose a party proposes two measures: A and B. Measure A results in less car use compared to business-as-usual and measure B results in more fuel-efficient cars. It is clear that if taking both measures together the potential impact of measure B – more fuel-efficient kilometres – applies to less kilometres compared to business-as-usual, due to measure A. This 'problem' can be solved rather easily by using the method of multiplying remaining fractions.

The other reason why it is wrong to simply add up the results of individual measures to give a total estimate is far more difficult to solve. The crux is that sometimes the same section of the population will react to the individual measures proposed, and the same person cannot be forced twice to substitute his or her less fuel-efficient car for a more fuel-efficient one. Some political parties – and this applies especially to the Dutch green party GL – propose many measures to decrease car use and to make car use more fuel efficient. As mentioned above impact assessments of most of these measures are based on other impact studies or on elasticities. These impacts studies and elasticities are based on modelled or empirical relations between an impact and a cause. For example, higher fuel price (cause) results in more fuel-efficient car use, less investment in roads (cause) results in travel time increases resulting in less car use, more fuel-efficient cars (cause) results in lower fuel costs resulting in more car kilometres, et cetera. These relations have been found under the condition of 'ceteris paribus': 'all other circumstances being equal'. And this is where the root of the problem lies: if a political party proposes many policies for the same user, the 'circumstances' for an individual measure are not equal anymore. For example, a proposed fuel levy increase is combined with all kinds of changes in the fixed car taxes and with less road investments. No empirical data exist, which could be used to estimate the behavioural impacts of these combined changes in the determinants of car and fuel use. As a result of limited time, an advanced modelling exercise was not an option. The solution chosen is using crude assumptions. For example, suppose a party proposes a fuel levy increase (C) in combination with a further differentiation of the Dutch car purchase tax (D). Measure D means that people have to pay more tax if they want to buy a relatively fuel-inefficient car and less tax if they want to buy a fuel-efficient car. The impacts of C and D separately are estimated using elasticities. The estimation of the impact of combined policies C and D is the addition of the individual impacts multiplied by 0.75. In this way the analyst can take into account the fact that both measures are incentives for the same group of car users: the most price sensitive part. In other words: the measures C and D partly cancel each other out, because 'the same' car user changes his or her behaviour due to C as well as to D. These 'extinguishing factors' are based on expert judgement and are highly uncertain.

5.4 Results and uncertainty

Results

The results of the Dutch impact assessment (RIVM, 1994a; RIVM, 1994b; RIVM, 1998; RIVM, 2002) are here only briefly presented (Figure 5.2). In figure 5.2 the impacts of the 1994 election manifestos were shown for 2010 compared to the reference. The reference is CO₂ and NO_x transport emissions for 2010 and the 2010 level of transport levies in the Netherlands in ‘business-as-usual’. The election manifesto of GroenLinks (GL, the ‘green’ party) has the biggest environmental impact at the cost of the highest increase of the transport levies. The reason is the GL political choice for relatively high price incentives on, in their view, environmentally ‘bad’ behaviour: car use, use of relatively fuel-inefficient cars, air travel, et cetera. The difference from the reference is far more modest for the other party proposals. The same pattern as in figure 5.2 could be shown for the 1998, 2002 and 2006 election manifesto impact assessments. The ‘2006’ manifestos have not been assessed in detail, as mentioned, but this remark for 2006 is based on a rough qualitative judgement of the 2006 party ambitions on transport and the environment.

The environmental impact assessments were related to more environmental indicators than CO₂ and NO_x. Noise impacts were treated qualitatively and air quality impacts were also shown for PM₁₀, next to NO_x. In the Discussion we will deal with the question of the completeness (or incompleteness) of the indicator choice.

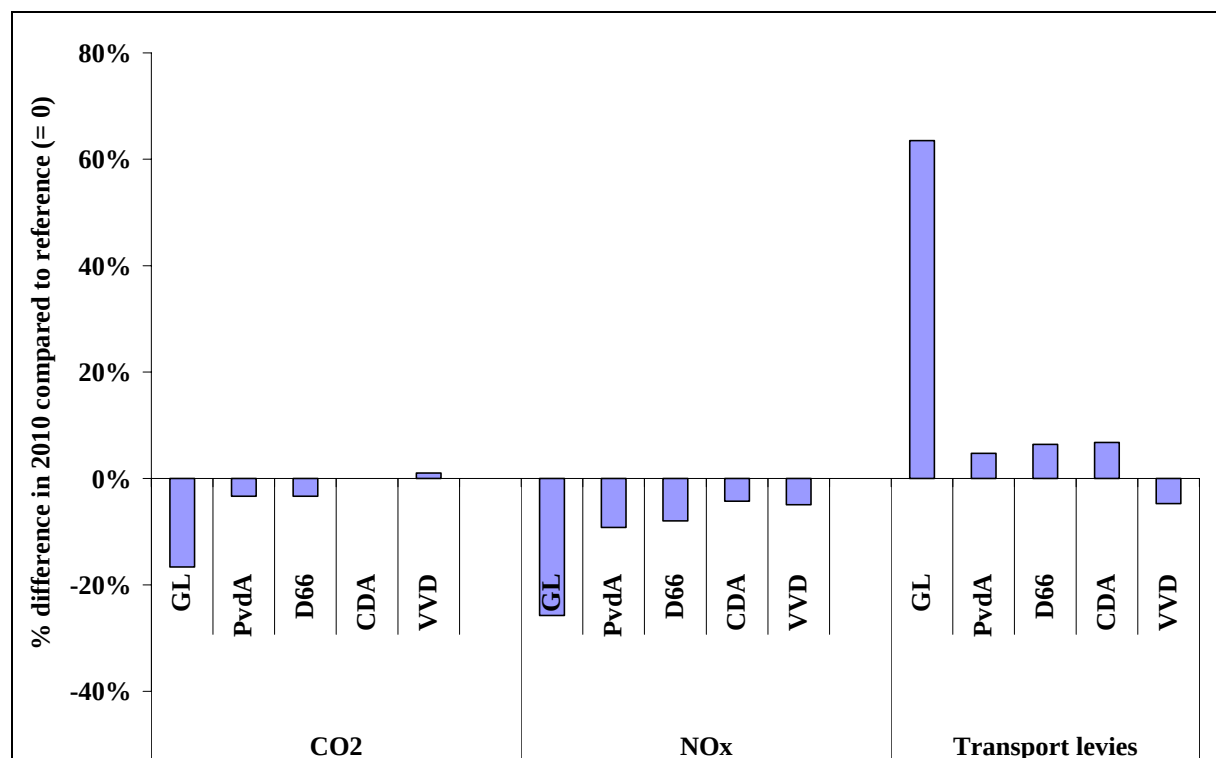


Figure 5.2: Results of 1994 election manifestoes. The 2010 impacts are shown for CO₂, NO_x and transport levies compared to the reference (=0)

Uncertainty

How certain is the impact assessment? The pattern – the relative positions of party results - as shown in the figure, appears to be robust. However, at the same time, it is important to note that the impact estimation of an individual election manifesto is highly uncertain.

The first reason for this uncertainty is the choice of the reference scenario. The future is, by definition, uncertain. Van der Lecq (2003) has analyzed the quality of the economic assessment practice of election manifestoes and remarks: *‘it should be noted that large mistakes in the baseline scenario would affect all parties equally, but depending on the particular aspect of the scenario involved, some parties may be worse off than others’*. We would not speak of ‘large mistakes’ (but of uncertainties). However, the essence of her remark is correct in our view. All the party proposals are judged using the same assumptions on future transport growth and its related environmental impact. Also all parties’ proposals are confronted with the same assumptions on the environmental impact of policy proposals in business-as-usual. However, in the analysis a ‘cautious economic’ reference scenario has been chosen, (see section 2). A cautious reference scenario is especially ‘good’ for parties with low environmental policy ambitions. And that makes GL (the progressive environmentalists) come out particularly worse off. In a less cautious economic scenario, transport growth and the related environmental pressure would become relatively high in 2010, making the many and relatively strict GL environmental policy plans more effective compared to the more modest environmental proposals of the other parties. To be clear: the pattern of figure 5.2 would not change in a higher economic growth scenario, but the differences between the parties would become more extreme. Scientifically, this intrinsic problem of future uncertainty could be dealt with using more reference scenarios. But it is questionable whether this scientifically correct approach is worthwhile taking the indicative character of the exercise into account (see Discussion).

The second reason for uncertainty is related to the impact calculation model specification. Based on Graafland (2003) we distinguish four main sources of uncertainty. In ‘italics’ the possible source of uncertainty is given, followed by the view of the authors in the normal font:

- *The selection of transport economic theories and mechanisms which are considered to be relevant for analyzing policy instruments.* We consider the studies and transport theories used in the impact assessment as ‘mainstream’ science, based on sound theories and empirical research;
- *The empirical specification of the theories and mechanisms chosen.* The empirical specification for the election manifestos assessment is not very precise, for example for the price elasticities used. These elasticity estimations are uncertain by themselves because of the uncertainty in the input data and the modelling required estimating the specific elasticity value. Additional uncertainty arises because, for example, the United Kingdom based elasticities or other study elasticities are ‘transferred’ to this Dutch impact assessment study. In the light of the discussion in Hanly and Dargay (1999), estimated elasticities from different studies are not directly comparable. For example, Hanly and Dargay state that different mode choice elasticities may not be comparable due to the inclusion of different alternative modes or of specific geographical characteristics or properties of the data used in a particular study. Following this line of argument, it can be concluded that generalizing the value of an estimated elasticity to different circumstances is highly uncertain;
- *The integration of the results of different ‘models’.* The integration of the impact assessments of individual election proposals is highly uncertain (see section 3). In fact,

for election manifestos which pile up different price instruments on the same transport user, the final combined impact of these instruments is based on ‘what-if’ expert judgments and not on empirical evidence;

- *Uncertainty following from the fact that rather ‘vague’ electoral proposals have wrongly been given concrete form or have not been given concrete form at all.* Some uncertainty arises in the step of making ‘vague’ proposals concrete. However, we consider this point as less important because, in our view, the assessment methodology chosen warrants sufficient involvement of political party experts to prevent ‘wrong’ clarification by the assessment experts.

Graafland (2003) has analyzed the uncertainty in the economic assessment of election manifestos. He concludes: *‘because of this uncertainty a presentation of point estimates of the overall effects of the electoral programs on important goals of economic policy might therefore mislead rather than inform the public’*. Based on our own uncertainty analysis, we agree that the final point estimates of the environmental effects of transport proposals are highly uncertain. However, we think that an important result of the outcome of the environmental transport analysis – showing differences between parties – is robust and does not mislead the public. GL has the highest impact, albeit also the highest error in the assessed impact. The other parties have far less impact; a robust statement even considering the relatively large error in the GL outcome. The difference in results between the other parties with positive environmental results is so small that considering the error in the results, it would probably be better from a scientific point of view not to show any difference (as in figure 5.2). Finally, we think the assessment methodology chosen is robust in giving the ‘right’ direction, as in figure 5.2, where the VVD policy proposals lead to a somewhat increased environmental pressure from transport compared to the reference. Again, the precise increase calculated incorporates an error, but the direction is robust. The reason is that the VVD has not proposed new transport environmental policies compared to the reference. But, compared to the reference, in 1994 this party proposed building more roads, resulting in road travel time gains. These gains will result in a somewhat higher road transport demand compared to the reference, and consequently in somewhat higher emission levels.

5.5 Does the environmental assessment of election manifestos make sense?

The costs and benefits of the economic assessment of the election manifestos by CPB have been debated fiercely in the Netherlands (see Graafland and Ros, 2003). Based on this debate, we will now analyze the pros and cons of the transport policy assessment exercise.

A fundamental critique is that the assessment promotes a reading of manifestoes that does not do justice to their function as *‘reasonable political conceptions’* (Van Erp, 2003). He remarks: *‘In keeping with Schumpeter, manifestos have a merely strategic function to canvass followers for a party or a candidate, and they play a clearly subordinate role with respect to their content’*. In this view the assessment exercise is not significant for a good democracy. For a good democracy, these critics argue, rather vague election manifestos, containing a mixture of visions, ideas and concrete proposals are no cause for concern, because they play a subordinate role in the bargaining process for a new government. After the election it becomes clear which two or three political parties have a majority in Dutch parliament. These parties will put together a new government with new policy plans, loosely based on the ‘promises’ in the election manifestos. The voter’s choice in the subsequent new election will be based on their view of the policies realized (or not realized); the contents of the political manifesto play a less important role.

Another fundamental critique is related to the ‘technocratic character’ of the exercise. Huitema (2005) is very clear in his analysis of the environmental assessment: ‘*the conclusion is that the RIVM-politics interaction in this particular case can best be described as technocracy*’. RIVM (now MNP) stands for the Dutch governmental agency carrying out the environmental impact assessment. He specifies three criteria for his judgement. The first is that the environmental assessment agency uses mainly its own expertise in the calculating exercise: competing scientific approaches are not addressed openly. Secondly, the assessment experts do, in his view, to some extent decide what realistic policy is and what is not. In the third place he claims that the assessment may result in a certain level of uniformity amongst the parties involved. This uniformity may turn the voter into a ‘lazy’ voter and may make the media lazy as well. In short: in his view there is a real danger that technical experts, perhaps narrow-minded in the assessment methods chosen, determine the political debate on environmental policies. Or, as Huitema (2005) remarks, ‘*independent critical social debate is not stimulated in this fashion*’.

In addition Keuzenkamp (2003) mentions that some critics doubt whether a government agency should be allowed to judge election manifestos. In their view it is an upside-down world when civil servants examine political parties. Some political party representatives have also aired their doubts about the assessment exercise. The exercise results in their view in technocratic policy making (Mr. Klein Molenkamp of the VVD, cited in Huitema (2005); Mr. Visser of the VVD, cited in Van der Lecq (2003) and Huitema, (2005); Mr. Jeekel of D66, cited in Van der Lecq, 2003). The view of Ad Melkert, former leader of the Dutch Labour Party (cited in Keuzenkamp (2003) is very clear in this respect. Although political parties join the analysis voluntarily, his view is that their cooperation may be the result of a prisoner’s dilemma. Mr. Melkert mentioned that he would like to make a deal with colleagues to stop the political programme analysis. He is dissatisfied with the false pretenses and with the tendency towards technocratic policy making; where specialists go far beyond the actual programme in order to put some ‘flesh on the bones’ of the programmes. He asks: ‘*Who controls this process*’?

Next to these more fundamental objections, there are also more pragmatic objections to the exercise. Den Butter (2003) argues that it is impossible to calculate the effects of policy proposals in a completely objective way. In his view this problem could be solved carrying out sensitivity analysis for important calculation specifications, in deliberation with party representatives. At the same time Den Butter (2003) realizes that this would be very time consuming and would also involve the danger that political parties go shopping for good results. Other objections to the exercise are the highly technical calculations making the results very difficult to judge for laymen and relative outsiders. In relation to the technical and complex calculation process, some political party representatives argue that the larger parties are more in favour than the small ones (Van Liedekerke, 2003). Only the larger parties would have the resources and knowledge to support the assessment exercise successfully. Especially as the calculation procedure (section 4) takes place during the relatively busy election time. Small parties have limited amounts of experts, who, during election time, are more needed for ‘normal’ election tasks.

The exercise has important merits also. Keuzenkamp (2003) and Don (2003) mention that the assessment is a useful disciplinary device that encourages political parties to make their promises realistic and consistent. They also conclude that the exercise is a service to the public, showing voters how and to what degree political parties are able to realize their preferences. Or, in the words of Den Butter (2003), ‘*the assessment shows that parties cannot*

promise the moon at no costs'. The exercise prevents parties boasting about better environmental outcomes than another by being more optimistic (or pessimistic) about the effectiveness of the proposed policies (based on Don, 2003). This is because in the exercise the same base line scenario applies to all parties⁸. And environmental impacts compared to the base line are estimated using the same methodology. Among the political parties involved in the exercise *'there is consensus that the rationalistic attitude in politics is the only decent way to do politics. It is because they believe in this style of politics that each of the parties volunteered to participate. The main beneficiaries of the exercise are the political parties themselves. The calculation effort disciplines parties and precluded that wishful thinking turns into party politics'* (Van Liedekerke, 2003).

It is interesting that in the debate the disciplinary impact of the exercise on party politics seems to be considered to be more important than the 'service to the voter' function. However, the limited 'service to the public function' may, on second thoughts, be no surprise. The results of the assessment are communicated to the public by the newspapers in short summaries and it will be no surprise to Dutch voters to read in these summaries that the political choices of GL (progressive environmentalists) has the highest environmental impact compared to other party choices. Furthermore, Dutch voters are not particularly interested in the calculated environmental impacts of policy proposals in the election manifestos. They know that these impacts will not mean much in real-life politics in regimes of highly proportional representation, as in the Netherlands. Vandervelde (2003) is even more pessimistic, remarking that in those political regimes it is even doubtful whether the electoral result has much influence on the governmental coalitions. For example, in the Dutch 2006 election the two largest parties losing votes (the Christian Democrats, CDA, and the Dutch Labour Party, PvdA) ended up making a coalition government, together with the much smaller, but winning, Orthodox Christians (CU). However, despite this pessimistic view, Vandervelde (2003) sees an important benefit of the Dutch habit of assessing election manifestoes: *'the assessment of election manifestoes is a statement against the society of appearances and its personalized lifestyle politics, a statement against the degradation of politics to a media show. It represents an intellectual input in the political process'*.

5.6 Discussion and conclusions

Section 5 shows that the assessment exercise has some merits but the merits should not be overrated. In the fierce debate on pros and cons, the disciplinary impact of the assessment in particular is seen as useful. Also an important merit of the exercise in our view is helping the political parties to make their promises realistic and consistent. The current assessment methodology (section 5.3) is fit for this purpose, despite the high uncertainties (section 5.4). The reasons are that the current method forces parties to give more concrete form to their proposals in so far that a rough indication of the desired environmental impact can be given. Furthermore, the current assessment method is 'good enough' to distinguish between the impacts of parties with high, medium or low environmental ambitions compared to business-as-usual. We think that aiming at developing a 'more precise' environmental impact assessment methodology would be of no use. It would require giving vague proposals far more concrete form as is done currently. This could result in more technocratic policy-making than appears to occur with the current assessment method. Also, better modelling and increased empirical underpinning could result in more precise environmental impact

⁸ Of course the exercise will not completely prevents 'boasting', because for political reasons parties will always use the results of the calculation selectively.

calculations. Section 5, however, shows that Dutch democracy will not improve with a more precise environmental impact assessment of election manifestos.

If the disciplinary impact of the assessment is seen as useful, the question is: 'Why is it important that parties make their election promises realistic and consistent?' One could argue that most Dutch voters are hardly interested in realistic promises because they know that even realistic promises will not come true. Nevertheless, we think there are two reasons why it is important to make election promises realistic by carrying out assessments of election manifestos. The first is that the assessment process results in direct contact between political party experts and assessment experts. In our view this leads to an important intellectual input in the political process (see section 5.5). Party experts learn directly from the assessment agency about the latest state of the art in environmental impact estimates. For example, in giving concrete form to a vague plan of 'kilometre charging' parties get access directly to up-to-date scientific assessments of various charging schemes. They may learn also that piling up pricing instruments on the same consumer group – for example car users – is less effective than perhaps initially thought. And they may see that international agreements make it sometimes difficult to realize domestic political ambitions easily.

The second reason why it is important to make election promises realistic by carrying out assessments of election manifestos is the possibility of showing trade-offs. It is to be expected that parties with high economic ambitions will show less favourable environmental results and vice versa. In our view an important function of the election manifesto assessment should be to show these trade-offs. In paraphrasing Den Butter (2003), by doing so the exercise will show to parties and voters that it is impossible to promise *'the moon at no costs'*. But showing trade-offs clearly is a problem in the Dutch assessment culture. The economic and environment assessment results are published separately, despite the good cooperation between the assessment agencies (section 5.2). This makes it difficult for Dutch parties and voters to see the tradeoffs between the political choices clearly. Figure 5.2 in this paper (section 5.4) shows some trade-off by giving insight into the increase of transport levies due to political choices. This analysis is limited and the analysis does not show the economic consequences of the high levies clearly. In CPB (2002, page 16) some qualitative remarks on the trade-offs of political choices can be found: *'GL has an ambitious environmental program with high levies on polluting activities. This not only leads to relatively high inflation, in some sectors it also erodes competitiveness to such an extent that domestic production activity in those sectors will fall sharply. Both the actual and potential GDP growth will therefore come out significantly lower than in the baseline scenario without new policies'*. But the reader has to study the assessment reports closely to see these trade-offs. In our view the economic and environmental assessment exercises of election manifestos could become more informative if one integrated assessment is published. In this integrated assessment the consequences of political choices should be shown for only some main indicators. Otherwise the analysis would become too detailed, which would not be in accordance with the rather rough – highly uncertain – impact calculation method and would probably lose the attention of most of the potential users. So, in our view, the current main indicators used (CO₂ and air quality) are sufficient for the environmental assessment of the transport proposals. One could argue that this small set of indicators would give a rather incomplete view on the environmental impacts of the transport policies proposed. But a complete detailed environmental assessment of election manifestos is, in our view, not of much use for a 'good' democracy. We consider that it would be of more use to roughly calculate the impacts of the party proposals on some main economic and environmental indicators – less is more, in this case – and to publish the trade-offs between economy and environment in one integrated report.

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Chapter 6

Conclusions and epilogue

6.1. Conclusions

In the introductory chapter three main research questions were posed: What are the strengths and weaknesses of the evaluation methods used? Have they resulted in a better understanding of the consequences of a choice? Considering the weak points and bearing in mind the need for speed and pragmatism in practice, what improvements could be proposed? In this concluding chapter these questions will be answered, as the main conclusions of this thesis are formulated. The more detailed conclusions regarding *ex ante* evaluation methodology evaluated are not repeated here – see chapters 2 to 5. The benchmarks applied in this chapter in evaluating the quality of the ex ante evaluation cases are mainly based on table 4.1: transparency, completeness, the treatment of risks and uncertainty and quality/robustness.

What are the strengths of the evaluation methods used?

Completeness and robustness are considered to being strong points in the evaluation methods used. But there are some important exceptions.

Completeness

Strong in three of the four cases is the attempt to being fairly complete in the assessment criteria (Table 6.1). The conclusion on completeness does not relate to the case ‘estimating the environmental impacts of Dutch election manifestos’ (chapter 5). In this case the economic and environment assessments of the election manifestos are published separately, which makes it hard for the voter to see the ‘complete’ picture, i.e. the possible trade-offs of political proposals between the ‘economy’ and the ‘environment’.

Table 6.1: Overview of criteria used in the four ex ante evaluation cases

	<i>Criteria</i>
Evaluation of Dutch public investment plans (chapter 2)	economic legitimacy; benefits and costs cost-effectiveness; uncertainty and risks; alternatives
Assessment of transport CO₂ policies (chapter 3)	potential CO ₂ emission reduction in 2010; costs for the end-user; the national total costs; expenditures for the government; possibilities for instrumentation of the measures; influence of timing; potential public and political support; potential side-effects
Evaluating transport infrastructure investments (chapter 4)	direct costs and benefits; external effects (in twelve of the thirteen CBA's); indirect effects (in ten of the thirteen CBA's); distributional impacts (in nine of the thirteen CBA's); national versus international benefits and costs (in three of the thirteen CBA's)
Estimating the environmental impacts of Dutch election manifestos (chapter 5)	potential CO ₂ and NO _x emission reduction; noise impacts (qualitatively) and PM ₁₀ air quality impacts

Robustness

Another strength of the cases is that the results may be rough, but they seem robust. However, there are some important exceptions, as will be elucidated. Robustness means here that the consequences of a policy option assessed do not put the decision-maker on the wrong track. In the *ex ante* evaluation of public investment plans (chapter 2) the aim is to separate the not-so-solid from the solid plans. The method is judged to be 'good enough' to categorize public investment proposals in this rough way – although all kinds of methodological improvements are suggested in chapter 2. The strength of this case is that relatively much attention is paid to uncertainty, for example by testing policy bottlenecks in different future scenarios. This makes the analysis results more robust because the inherent uncertainty of the future is taken into account, at least to some extent. In the case of assessing impacts of transport CO₂ emission reduction (chapter 3) options the emission impacts are presented in ranges because of uncertainties in the specific impact calculation of an option. This approach is more robust than giving a point estimate. Nevertheless, in this case it would have been better to test the robustness of the emission reductions calculated by using different future scenarios, for example in a sensitivity analysis. In addition, in this case the cost and cost effectiveness estimates of the CO₂ options cannot be denoted as being robust, due to methodological problems and vagueness (see chapter 1 and further). The case of calculating the environmental impacts of election manifestos of Dutch political parties shows that the assessment methodology chosen (chapter 5) results in uncertain point estimates, for example the amount of CO₂ emission reduction of party proposals in 2010 compared to a reference scenario. However, an important result of the environmental transport analysis – which election manifesto has the most impact and which has the least – is considered to be robust. The analysis on the application of a standardised CBA practice (chapter 4) requires a subtle answer on the question '*are the results robust?*' In the CBA practice six out of the thirteen CBAs analysed were considered suitable for contributing to decision-making. Especially

strong in these cases is the use of three or more macroeconomic scenarios with high, middle and low economic growth. The use of scenarios tests the robustness of the project under different future economic conditions. The other seven CBAs have weaknesses or even major weaknesses with respect to methods and assumptions. So, it is clear: the robustness of the CBA practice requires improvement.

Have the ex ante evaluation cases resulted in a better understanding of the consequences of a choice?

It may be concluded that the cases are strong in completeness and robustness – with important exceptions – but the question remains: *Have the ex ante evaluations resulted in a better understanding of the consequences of a choice?* Partly, I conclude.

The CBA practice (chapter 4) shows that the standardized approach seems to function as a good discussion platform for those involved in economic research and in designing and planning the infrastructure project itself. In my view, this platform function has improved the quality of the information for decision making (although not for all CBA cases, as remarked before). This is shown by the fact that unfavourable CBA results sometimes lead to the postponement of decisions or reorganisation, including downsizing, of projects (chapter 4). One of the positive aspects of the methodology for evaluating public investment plans (chapter 2) is that a large number of different kinds of public investment plans can be evaluated using the developed method. This can help decision-makers to see the coherence, gaps or overlaps between different policy fields. The methodology had some influence in decision-making, because proposals for new investments of the new Dutch government (1998) were partly based on the results of this appraisal. Furthermore, the usefulness of this evaluation methodology for decision-making may be shown by the fact that on different occasions after 1998 the same Dutch advisory body has asked for the public investment analysis described in chapter 2 (for example, CPB et al., 2002 and Verrips, 2005). In essence the methodology remained the same. The chosen evaluation criteria and the method used in the Dutch Kyoto process (chapter 3) appeared logical and was fairly easy to put into practice. This kind of impact assessment for transport CO₂ emission reduction options is useful for decision-making apparently because it has been carried out several times since the ‘1999’ case (Van den Brink et al., 2004; Daniels and Farla, 2006). However, it is questionable whether the approach has resulted in better understanding of all consequences for an policy option, because in my view the cost and cost effectiveness estimates in these new analyses are still unclear. Finally, I have doubts whether assessing the environmental impacts of election manifestos of Dutch political parties has helped decision-making. In my experience this evaluation seems to be used by parties – with favourable outcomes, of course – especially to show their better environmental performance compared to others, not as a means to reflect on their proposals as sound policies, based on insight of all consequences. Some people argue that the calculation process is helpful for politicians in the bargaining process for a new government. In their view the quantitative impact assessment of election manifestoes provides politicians with a better insight on the effects and costs of various policy options. This is possible, but as I have found no evidence for this statement I see this statement merely as a possibility which need further research.

What are the weak (or debatable) points?

It is concluded that poor transparency and poor methodological choices are major weak points in the *ex ante* evaluation methods examined.

Transparency

In two of the four cases the poor transparency is worrisome. Especially, the poor transparency of most CBAs (chapter 4) is an important cause for concern. Interviewed users of CBAs find the systematic research into costs and benefits of projects to be an improvement with respect to the 'old' Dutch appraisal practice, but most people interviewed attacked the lack of transparency in most CBA reports, calling them 'black boxes'. The poor definition of costs and cost-effectiveness is a major worry in the Kyoto-related transport policies case (chapter 3). This is partly a methodological question, but in my view 'vagueness' plays a role, too. If the researcher is vague or not transparent on the methodological choices made, the chance enhances that the policy maker is put on the wrong track, and, consequently the implementation of non-optimal policy instruments may take place. The other cases in this thesis (evaluating public investment plans and calculating the environmental impacts of transport policies in election manifestos) may be clearer but in these cases also complex criteria and techniques like CBA, transport modelling, elasticities, et cetera, are used. So, for the policy-maker the transparency of these cases may not be sufficient either.

Poor methodology

As previously mentioned, the methodology calculating costs and cost-effectiveness in transport CO₂-related policies (chapter 3) was poor. In this case it was concluded that national and end-user costs, and costs of the policy options to the government, were poorly determined. After much discussion between the different researchers, it was decided to limit costs to 'out-of-pocket' money. This is a very limited approach since it has resulted in incomplete 'cost' estimations, see introductory chapter. Another worrisome aspect is the conclusion in chapter 4 that seven of the thirteen CBAs evaluated have minor or even major weaknesses with respect to methods and assumptions. The following main methodological weaknesses have been identified in these seven CBAs:

- Non-uniform and sometimes incorrect treatment of uncertainty and long-term risks related to transport infrastructure in CBA's;
- Weak inclusion of some of the ecological effects and distributional impacts of infrastructure projects; and
- Treatment of the wider economic (indirect or strategic) effects of infrastructure, which is a hotly-debated issue still awaiting scientific consensus.

Considering the weak points and bearing in mind the need for speed and pragmatism in practice, what improvements could be proposed?

The analysis of the four cases leads to three proposals for improvement: improved transparency, better treatment of uncertainty and long-term risks and methodological improvements.

Improving transparency

The four cases in this thesis show the importance of being clear about choices, assumptions and uncertainties. Without clarity, *ex ante* evaluations will become unused 'black boxes', or they may lead to wrong policy decisions. I think it is illusionary to believe that improving the transparency of *ex ante* evaluations will always enhance their use in decision-making. Policy makers will base their choices on other reasons (see introductory chapter, section 1.3). Perhaps poor transparency is used sometimes as a mere pretext for not using an analysis with the 'wrong conclusions' – from a political point of view. Whatever the use or non-use of evaluations, in my view scientists must never brush aside the question of clarity. Being utterly clear should be part of scientific professionalism.

There is no existing recipe for improving transparency – as the cases in this thesis show. However, some general lessons can be learned from the cases:

- Present short and clear summaries.
- Give clearer insights into project impacts related to policy goals.
- In the case of CBA or cost-effectiveness: do not only present impacts in monetised figures but also in physical units.
- Be clear about the methodologies chosen and assumptions made in cost and cost-effectiveness studies.
- Weigh the advantage of a larger and more complete list of appraisal criteria against the disadvantage of confusing – rather than assisting – the policy-making process. For example, in an integrated assessment of the consequences of political choices in election manifestos (chapter 5) it is recommended to show the trade-offs between economy and environment for only some main indicators. This will make the analysis somewhat coarse, but the results presented will be more transparent.

Better treatment of uncertainty and long-term risks

The cases show a different approach of dealing with future uncertainty. The Dutch government has stated the importance of testing policies and investment plans in different possible futures. Doing so evaluates the robustness of the impacts of a plan (Van Beek, 2007). Only one future scenario is used in the cases of the transport CO₂-related policies (chapter 3) and calculating the environmental impacts of election manifestos (chapter 5). Because there are reasons to do so (see the chapters 3 and 5), it would have been better to perform some sensitivity analyses with more possible futures – to take a retrospective view. This would give policy makers more insight into the high uncertainty of *ex ante* estimates, instead of a false feeling of certainty. One could argue that using more scenarios clashes with the quest for greater transparency. However, in my view it is highly relevant policy information to show politicians that impacts of a choice may be large or small depending on future developments. It is up to them to take these risks into account in their decision. The case of transport infrastructure CBA (chapter 4) shows also the importance of uniform, clear standards for quantifying these risks in CBA, as is recognised in the 2004 supplements to the CBA.

Methodological improvements

All cases show the possibility for improving *ex ante* impact assessments of individual transport policy instruments or packages of these instruments. And of course it is useful to improve transport modelling, to get more empirical information on price and travel time elasticities and to get more insight in behavioural responses due to specific transport policy proposals. However, these improvements are not the essence of this thesis. The four cases analysed show that these impact assessments are often ‘good enough’. Of course, the impact assessments of transport policy instruments are uncertain, but the uncertainty in the final impact assessment of a policy option will often be caused more by the inherently uncertain future – see above – than by the uncertainty in the calculation methods applied. Furthermore, the cases show that incorrect or unclear application of ‘state-of-the-art’ methods, like in the transport infrastructure CBAs case and the transport CO₂ policy case, are sometimes a more important reason for highly uncertain – or even incorrect – results than application of a somewhat uncertain but ‘state-of-the-art’ assessment methodology.

This does not mean that no improvements are at all foreseeable. The cases analysed point in two main directions: first, to the improvement of methods for estimating costs and cost effectiveness of transport CO₂ policies, especially the inclusion of intangibles (see introductory chapter); second, to the improvement of valuation methods for non-priced

impacts of transport plans. Some improvements have been carried out lately (see Ruijgrok *et al.*, 2004 for valuation of impacts on scenic areas and biodiversity, water and soil), but this field requires constant updates. In both cases I would recommend addressing the collective action problems that might draw privately-expressed willingness-to-pay numbers into doubt (see the introductory chapter). Current willingness-to-pay numbers for keeping a big, impressive car or for ‘saving’ the environment do not take account of the possibility that people especially want to maintain their relative position. Some survey-experimental studies find that individuals are concerned with both relative income and relative consumption of particular goods such as cars (Alpizar *et al.*, 2005; Carlsson *et al.*, 2006; Solnick and Hemenway, 1998). It seems important to test whether people would in fact be willing to spend more for smaller cars, or for environmental amenities, if the result would be significant decreases in absolute income but the same relative income.

Main conclusion summarised

- The strong points in the *ex ante* evaluation methods reviewed are completeness and robustness. However, in some cases important exceptions to these strong points are identified.
- Poor transparency and poor methodological choices are the major weak points in the cases.
- The practice of *ex ante* evaluation shows the importance of being clear about choices, assumptions and uncertainties. If not, *ex ante* evaluations will become non-used ‘black boxes’ or they may lead to wrong policy decisions.
- The cases show the possibility of improving *ex ante* impact assessments of individual transport policy instruments or packages of these instruments. However, these improvements are not the essence of this thesis. The four cases analysed show that these impact assessments are often ‘good enough’ to give robust policy insights. Uncertainty in final impact assessment of a policy option is caused more often by the inherently uncertain future or by wrong or unclear application of ‘state-of-the-art’ methods.
- This does not mean that no methodological improvements at all are foreseeable. The cases analysed point at two main directions: first, the improvement of methods to estimate costs and cost effectiveness of transport CO₂ policies, especially the inclusion of intangibles; second, improvement of valuation methods for non-priced impacts of transport plans.

6.2. Epilogue

Two papers in this thesis were written 8-10 years ago. In this epilogue a short reflection is given on the contents of those papers. The papers describe methods and applications that are still state-of-the art. The discussions in the two papers about the quality and usefulness of *ex ante* evaluation methods are still valid in my view. However, I distinguish four exceptions.

In the paper on *ex ante* evaluation of public investment plans (chapter 2) the possibility of wider economic impacts of transport investments – also called indirect effects or forward and backward effects – is discussed. It is argued to include these impacts in the assessment methodology. In retrospect I would not advise this anymore. The aim of the methodology in chapter 2 is rather coarse: to separate the not-so-solid from the solid plans. The method is not meant to be an alternative for a well thought-out cost-benefit analysis. For such a ‘coarse’ evaluation methodology the inclusion of indirect economic impacts seems to be too much detail now. The only exception would be if indirect economic impacts of transport

investments (e.g. to boost regional employment) are the explicit political aims of an transport investment proposal. In that case it is useful to pay explicit attention to these indirect impacts.

In the discussion section of the paper on *ex ante* evaluation of public investment plans (chapter 2) more attention could have been paid to the possibility of policy-makers influencing the outcomes. Civil-servants and politicians who are familiar with models and impact calculation methods can design and present their proposals in such a way that the impact assessment results suit them best. This is not a problem for these proposals: a good plan is a good plan. However, it may be a problem for good policy plans designed with less expertise which will score relatively unfavourable in this method. In my view this means that (1) it is very important that scientists clearly explain their methods and assumptions to all people involved, (2) there is an intensive consultation process between the scientists and the policy makers with the aim to really see through a proposal, especially if it is a proposal is somewhat unclear.

In the paper on transport climate policy the political choice for one Business-as-Usual scenario (BAU) based on a high-growth, macro-economic scenario is not discussed at all. In retrospect I would have discussed this choice. In my view researchers should always use at least two scenarios in *ex ante* evaluation. These two scenarios should describe the full range of plausible futures; so, not two middle scenarios should be used, but a plausible ‘low’ economic and demographic growth scenario, and a plausible ‘high’ one. By not doing so researchers communicate a false feeling of future certainty to the decision makers.

The papers hardly pay any attention to the possibility that policy-makers try to manipulate the results of forward-looking transport policy assessment studies. This is an omission because in my experience policy makers indeed try to manipulate results. Most common applied method is trying to persuade scientists to use only one scenario: a scenario that is not very plausible but will result in high benefits. For example, in transport investment assessment projects using an unrealistic high growth transport scenario will result in relative large infrastructure capacity shortfalls in the future, making the investment project proposed highly desirable. In my view manipulation is less of a problem in the standardized CBA approach (chapter 4) for two reasons. The first one is that there is a standard: a guide is available - approved by the scientific and political communities – that describes methodological do’s and don’t’s. So, if a scientist is persuaded to use one scenario or include an implausible scenario in the analysis, he or she can refuse by pointing at the standardized approach agreed upon. The second reason is that in the standardized approach second opinions are compulsory. These second opinions can be viewed at as reality checks. In the non-standardized spreadsheet-modeling approaches (chapters 2, 3 and 5) manipulation could take place easier. In my view the best way to prevent manipulation in these cases is to be very transparent on the assumptions and methods used, and include an independent review in the assessment process ‘Independent’ in this case means that the reviewer should have no relationship with the policy-makers commissioning the research, and with the consultants or research institutes carrying out the assessment.

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Samenvatting

(De praktijk van ex ante beleidsstudies in transport)

Politieke keuzen

Nieuwe wegen aanleggen? Investeren in openbaar vervoer? Extra belasting voor onzuinige personenauto's? Politici moeten lastige keuzen maken. Zijn de effecten van de plannen zoals verwacht of gehoopt? Zijn er neveneffecten? Wat zijn de kosten van de plannen? Wie winnen? Wie verliezen? Dit proefschrift gaat over onderzoek om dergelijke beleidsvragen van tevoren te beantwoorden. Vier zogenaamde ex ante evaluatiestudies op het beleidsterrein 'verkeer en vervoer' zijn in dit proefschrift geanalyseerd. In ex ante evaluaties wil de analist de toekomstige effecten van beleidskeuzen schatten. In dit proefschrift is de praktijk van dergelijke beleidsevaluaties onderzocht: wat kunnen we van de praktijk leren? In de wetenschappelijke literatuur is relatief veel aandacht voor het verbeteren van transportmodellen en het verbeteren van methoden om effecten van beleidsopties te schatten. Er is daarentegen minder aandacht voor de praktijk van ex ante evaluaties. Dit proefschrift wil dit wetenschappelijke gat vullen. De toegepaste methoden in de vier evaluatiestudies zijn algemeen gangbaar en zijn niet door de auteur van dit proefschrift bedacht of verbeterd. Vier hoofdonderzoeksvragen staan in dit proefschrift centraal. Wat zijn de sterke punten in de vier casussen? Hebben ze geresulteerd in een beter inzicht in de mogelijke effecten van beleidkeuzen? Wat is zwak? En, tot slot, welke verbeterpunten zijn voorstelbaar - rekening houdend met de noodzaak tot snelheid en pragmatisme in de beleidpraktijk?

Evaluatie (ruimtelijke) investeringsvoorstellen

De eerste casus is een methode om allerlei typen overheidsinvesteringsplannen te evalueren. Het is een 'quick scan'-methode ontwikkeld door het Centraal Planbureau in samenwerking met andere Nederlandse planbureaus en instituten. Het doel van de methode is om investeringsvoorstellen in te delen in 'goede', 'opwaardeerbare' en 'zwakke' voorstellen. Het proefschrift beschrijft de eerste keer dat deze methode werd toegepast in 1997. Later is de methode vaker toegepast. Bij de toentertijd ingediende overheidsvoorstellen in 1997 ging het om voorstellen met een totale gevraagde investering van 22 miljard Euro. Ruim 13 miljard Euro hiervan was bedoeld voor plannen voor verbeteren van de bereikbaarheid. Belangrijk in de methode is de toets van de plannen op legitimiteit, baten, kosten of kosteneffectiviteit, onzekerheden en risico's en, tot slot, op alternatieven.

CO₂-emissiereductie verkeer

De tweede casus beschrijft een methode om effecten in te schatten van beleidsvoorstellen om de uitstoot van broeikasgassen door verkeer terug te dringen. Het belangrijkste door verkeer uitgestoten broeikasgas is kooldioxide (CO₂). De kern van de methode is om per beleidsvoorstel de CO₂-effecten en kosten in te schatten ten opzichte van een referentiescenario. Ook worden de beleidsvoorstellen getoetst op neveneffecten, haalbaarheid/draagvlak en op de invloed van de 'timing' van het instrument op de effecten. Het proefschrift beschrijft de toepassing van de methode eind jaren negentig ten tijde van het willen halen van het binnenlandse zogenaamde 'Kyoto'-doel. De beleidsvoorstellen behelsden toen onder andere aanpassingen in de aanschafbelasting van nieuwe personenauto's, snelheidsmaatregelen en fiscale maatregelen om autogebruik in het woon-werkverkeer te ontmoedigen.

Kosten-batenanalyse transportinfrastructuur

De derde casus beschrijft een analyse van ex ante kosten-batenanalyses (KBA's) van dertien grote transportinfrastructuur uitgevoerd in de periode 2000 - 2006. De KBA's werden uitgevoerd volgens de zogenoemde leidraad 'onderzoek economische effecten infrastructuur'. De dertien projectvoorstellen in de periode 2000 - 2006 waren vooral gericht op rail en haveninfrastructuur. Het ging onder andere om voorstellen voor hogesnelheidslijnen Oost, Amsterdam-Groningen en Rondje Randstad én om voorstellen voor een Tweede Maasvlakte, uitdieping van de Schelde en een goederenspoorlijn Rotterdam-Antwerpen.

Verkiezingsprogramma's

De vierde casus gaat in op de methode om transportbeleidsvoorstellen in Nederlandse verkiezingsprogramma's door te rekenen op hun milieueffecten. De kern van de methode bestaat uit het concreet krijgen van de soms vage voorstellen in de verkiezingsprogramma's. En het vervolgens doorrekenen van de effecten van die concrete voorstellen op de uitstoot van CO₂ en stikstofoxiden (NO_x, een luchtverontreinigende stof) ten opzichte van een referentiescenario. In 1994, 1998 en 2002 werd de methode toegepast; in 2006 vond een meer kwalitatieve analyse plaats. De beleidsvoorstellen van de politieke partijen richtten zich in al die jaren sterk op meer of minder infrastructuurinvesteringen, openbaar vervoer en prijsbeleid waaronder een kilometerheffing.

Sterk

Sterk in de vier casussen zijn compleetheid en robuustheid – maar met belangrijke uitzonderingen -, zo laat de analyse in dit proefschrift zien. In drie van de vier evaluatiemethoden doen onderzoekers een poging een vrij compleet beeld te geven van de toekomstige consequenties van beleidsvoorstellen: hoofdeffecten, neveneffecten, baten, kosten, kosteneffectiviteit et cetera. Het gaat om de casussen 'evaluatie van ruimtelijke investeringsvoorstellen', 'CO₂ emissiereductie verkeer' en 'kosten-batenanalyses transportinfrastructuur'. De evaluatie van verkiezingsprogramma's geeft geen compleet beeld. De cultuur in Nederland om de economische en milieueffecten van verkiezingsprogramma's apart te publiceren maakt het niet inzichtelijk voor de kiezer om in te zien dat keuzen van een partij op het ene aspect kan leiden tot 'winst', maar op het andere aspect kan leiden tot 'verlies'. De casussen zijn ook vrij robuust, dat wil zeggen dat de uitkomsten de beslissingnemer niet op het verkeerde been zet. De uitkomsten zijn weliswaar onzeker, maar de richting van de schatting (toename of afname) en de geschatte omvang van de effecten (klein, middelmatig of groot) is robuust. Er zijn twee belangrijke uitzonderingen op robuustheid: de kostenschatting in de evaluatie van beleidsvoornemens van CO₂-emissiereductie verkeer geeft verwarrende uitkomsten. En de resultaten van zeven van de

dertien KBA's van transportinfrastructuurprojecten zijn niet robuust door zwakke methodische keuzen en veronderstellingen.

Zwak

Het gebrek aan transparantie ('aannemelijk, duidelijk, begrijpelijk') en verkeerde methodische keuzen zijn belangrijke zwakheden in de vier casussen, zo concludeert dit proefschrift. Vooral in de casus 'kosten-batenanalyses transportinfrastructuur' is het gebrek aan transparantie zorgelijk. Zwakke methodologische keuzen zijn gemaakt in de kostenschatting van de evaluatie van beleidsvoorstellen om CO₂ te reduceren. Er is gekozen om de kosten van beleid te beperken tot 'out-of-pocket'-kosten, wat een zeer beperkte definitie van kosten is. In zeven van de geëvalueerde KBA's van nieuwe transportinfrastructuurprojecten zijn methodologische zwakheden geconstateerd. Het gaat hierbij om de behandeling van onzekerheden en risico's, het onvoldoende meenemen van effecten op milieu en natuur en de behandeling van de indirecte effecten.

Transparantie en onzekerheden

Dit proefschrift laat het belang zien om in ex ante evaluaties uitermate duidelijk te zijn over gemaakte methodologische keuzen, veronderstellingen en over de onzekerheden en risico's. Zonder deze transparantie lopen dit soort studies grote kans ongebruikte 'black boxes' te worden, dan wel te leiden tot verkeerde beleidsbeslissingen. De casussen laten zien dat de behandeling van onzekerheden niet-uniform en soms zwak is. Het is belangrijk de robuustheid van effecten van beleidsvoorstellen te testen door de effectschatting uit te voeren in verschillende mogelijke toekomsten. Dit geeft de beleidsmaker inzicht in de soms grote onzekerheden van ex ante effectschattingen. De beleidsmaker zal deze onzekerheid moeten meewegen in de beslissing, en niet vertrouwen op de schijnbare zekerheid van een effectenstudie gebaseerd op één mogelijk toekomst.

Methoden

Ook allerlei methodologische verbeteringen zijn aan te bevelen. Het gaat hierbij om bijvoorbeeld verbeteren van transportmodellen, meer empirisch onderzoek naar prijs- en reistijdelasticiteiten of preciezer inzicht in de gedragsreactie van bepaalde transportbeleidsvoorstellen. Dergelijke verbeteringen zijn zinvol want het kan de ex ante effectschatting van een instrument beter maken. Maar deze verbeteringen zijn niet de essentie van dit proefschrift. De vier casussen laten zien dat de individuele effectschattingen van maatregelen en projecten – hoewel onzeker - veelal goed genoeg zijn. De onzekerheid in de uiteindelijke resultaten komt volgens dit proefschrift meer voort uit de 'inherent onzekere toekomst' - zie eerder – en het verkeerd toepassen van 'state-of-the-art' maar op zich juiste methoden.

Relatieve positie

Dit betekent niet dat er helemaal geen methodische verbeteringen voorstelbaar zijn. Dit proefschrift wijst op twee richtingen. De verbetering van kosten- en kosteneffectiviteits-schattingen van instrumenten om CO₂ te reduceren in transport, én het verbeteren van methoden om milieu- en natuureffecten te waarderen in KBA. Voor beide geldt dat nader onderzoek nodig is naar de 'bereidheid-tot-betalen'-schattingen. De huidige schattingen van 'bereidheid-tot-betalen' voor een kleinere minder imposante auto of het behoud van een natuurgebied houden niet rekening met het feit dat mensen misschien vooral hun relatieve positie willen behouden. Beleidsvoorstellen zijn mogelijk waarbij mensen er weliswaar in absolute inkomen of positie op achteruitgaan, maar ze hun relatieve inkomen of positie kunnen blijven behouden. Met relatieve positie wordt bedoeld dat sommige mensen misschien

door een beleidsmaatregel een kleinere auto moeten kopen, maar hun burens – die al een kleinere auto had – ‘gelukkig’ ook, waardoor die mensen dus hun relatieve positie houden. Misschien zijn mensen in dat geval bereid veel meer te betalen dan ze zeggen in de gebruikelijke ‘bereidheid-tot-betalen’-studies, waarbij ze uitsluitend met de individuele gevolgen van een beleidsvoorstel worden geconfronteerd.

Delft, July 2008, Jan Anne Annema

Summary

(The practice of forward looking transport policy assessment studies)

Political choices

New railways? Extra roads? Pricing policies to reduce environmental harmful transport emissions? Politicians face tough choices. What are the costs of these proposals? Will the plan result in the expected impacts? What are the risks of a plan? Who wins, who loses? This thesis is about the practice of helping public decision-making by answering these kinds of questions. Four cases of policy-related *ex ante* evaluations are evaluated. *Ex ante* evaluation refers to forward-looking assessment of the likely future effects of new policies or proposals. The assessment methodologies used in these four cases are not unique, and are not invented or improved in this thesis. Scientific literature pays relatively much attention to transport policy impact modelling and methodologies for valuing policy impacts. Examples of these valuation methodologies are cost-benefit analysis, multi-criteria analysis and combinations of those two. Less is written about the practice of *ex ante* transport evaluation. This aim of this thesis is to fill this scientific gap by describing and analysing the practice of policy-related *ex ante* evaluation in transport, based on experiences of the author. The thesis attempts to answer the following questions: What are the strengths of the evaluation methods used? Have they resulted in a better understanding of the consequences of a choice? What are the weak or debatable points? Considering the weak points and bearing in mind the need for speed and pragmatism in practice, what improvements could be proposed?

Evaluation of public investment plans

The first case is a pragmatic method for evaluating public investments plans. Using this method, very different kinds of investment plans were evaluated for economic, social and ecological impacts. The research institutes involved were asked to develop a general appraisal method, on the basis of which they would rank the investment proposals. All the plans were labeled as either a 'solid plan', a 'possibly solid but upgradeable plan requiring improvements' or a 'weak plan'. Each individual investment plan was assessed according to the following criteria: a) legitimacy of the investment, b) benefit(s), c) cost-effectiveness, d) uncertainties and risks, e) alternatives.

Transport CO₂ emission reduction

The second case is an assessment of the carbon dioxide (CO₂) emission effects of policy options in 2010 compared to business-as-usual. Other criteria assessed in the method were

costs, cost-effectiveness, potential public and political support, potential side-effects. In the thesis the application of the method is described around the year 1999, when the method was used to evaluate whether transport policy options would contribute in meeting the Dutch so-called 'Kyoto target'. Policy options analysed included: fees and rebates in the purchase tax for new cars, speed measures and fiscal measures to decrease car use in commuting.

Cost-benefit analysis of transport infrastructure

The third case reviews the use of standardized cost-benefit analysis (CBA) since 2000 for 13 new large transport infrastructure projects in the Netherlands. New rail and port infrastructure formed the focus of Dutch policy in infrastructural planning in the 2000–2004 period.

Election manifestos

The fourth case is a method for calculating the environmental impacts of transport policy proposals on election manifestos. The method consists of making vague policy proposals concrete and, consequently, assessing the CO₂ and nitrogen oxide (NO_x) emission effects of these policy proposals in 2010 compared to business-as-usual. The method was used in 1994, 1998 and 2002; in 2006 a more qualitative analysis took place. The transport policy proposals in the election manifestos were aimed particularly at increased or decreased road investments, public transport and new transport pricing policies.

Strengths

Strong in three of the four cases is the attempt to being fairly complete in the assessment criteria. An additional strength is that though results may be rough, they seem robust. However, there are some important exceptions, as will be explained. The conclusion on completeness does not relate to the case of 'estimating the environmental impacts of Dutch election manifestos'. In this case the economic and environment assessments of election manifestos are published separately, which makes it difficult for the voter to see the 'complete' picture, i.e. the possible trade-offs of political proposals between the economy and the environment. Robustness means here that the consequences of a policy option assessed do not put the decision-maker on the wrong track. The results of the four impact analyses studied are uncertain, but the direction (increase or decrease) of the estimated impact and the size (small, medium, or large) estimated are concluded to be robust. Two exceptions are identified. In the case 'CO₂ emission reduction transport' the cost and cost-effectiveness estimates of the CO₂ options cannot be denoted as being robust, due to methodological problems and vagueness. And it is concluded that seven CBAs in the case 'CBA transport infrastructure' have weaknesses with respect to methods and assumptions.

Weaknesses

It is concluded that transparency and poor methodological choices are major weak points in the *ex ante* evaluation methods examined. The poor transparency of most CBAs is a critical cause for concern. Interviewed users of CBAs found the systematic research into costs and benefits of projects to be an improvement with respect to the 'old' Dutch appraisal practice, but most people interviewed attacked the lack of transparency in most CBA reports, calling them 'black boxes'. The poor definition of costs and cost-effectiveness is a major worry in the Kyoto-related transport policies case. After much discussion between the different researchers, it was decided to limit costs to 'out-of-pocket' money. This is a very limited approach since it has resulted in incomplete cost estimations. Seven of the thirteen CBAs evaluated have weaknesses with respect to methods and assumptions. The following methodological weaknesses have been identified in these seven CBAs: the non-uniform and sometimes incorrect treatment of uncertainty and long-term risks related to transport

infrastructure, the weak inclusion of some of the ecological effects and distributional impacts of infrastructure projects, and finally, the treatment of the wider, indirect or strategic economic effects of infrastructure.

Transparency and uncertainty

The four cases in this thesis show the importance of being clear about choices, assumptions and uncertainties. Without clarity, *ex ante* evaluations will become unused ‘black boxes’, or they may lead to wrong policy decisions. The cases show a different approach of dealing with future uncertainty. The Dutch government has stated the importance of testing policies and investment plans in different possible futures. Testing evaluates the future robustness of the impacts of a plan, giving policy-makers insight into the uncertainty related to *ex ante* estimates, instead of giving a false feeling of certainty as may have happened in two of the four cases, in which only one future was used.

Methods

All cases show the possibility of improving *ex ante* impact assessments of individual transport policy instruments or packages of these instruments. And of course it is useful for improving transport modelling, obtaining more empirical information on price and travel time elasticities, and gaining greater insight into behavioural responses due to specific transport policy proposals. However, these improvements are not the essence of this thesis. The four cases analysed show that these impact assessments are often sufficient for giving robust policy insights. Uncertainty in the final impact assessment of a policy option is caused more by the inherent uncertainty of the future (see above), or by incorrect or unclear application of ‘state-of-the-art’ methods, as in the transport infrastructure CBAs case and the transport CO₂ policy case.

Relative position

This does not mean that no improvements at all are foreseeable. The cases analysed point in two main directions: first, to the improvement of methods for estimating costs and cost effectiveness of transport CO₂ policies, especially the inclusion of intangibles; and second, to improvements of valuation methods for non-priced impacts of transport plans. In both cases the collective action problems might be addressed that could draw privately-expressed willingness-to-pay numbers into doubt. Current willingness-to-pay numbers for keeping a big, impressive car or for ‘saving’ the environment do not take account of the possibility that people especially want to maintain their relative status. It seems important to test whether people would in fact be willing to spend more for smaller cars, or for environmental amenities, if the result would be a significant decrease in absolute income but no change in relative income

Delft, July 2008, Jan Anne Annema

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Curriculum Vitae

Jan Anne Annema werd geboren op 23 september 1961 in Noordbroek. Hij volgde de middelbare school in Winschoten. Daarna studeerde hij scheikunde aan de Universiteit Utrecht, waar hij in 1987 het doctoraal examen aflegde. Hij werkte van 1987 tot 1990 als onderzoeker chemische stoffen bij de Stichting Natuur en Milieu in Utrecht. Van 1990 tot 1995 was hij onderzoeker chemische stoffen bij het Rijksinstituut voor Volksgezondheid en Milieu, Bilthoven. Daarna werkte hij tot 2006 als onderzoeker verkeer en vervoer bij eerst het Rijksinstituut voor Volksgezondheid en Milieu en daarna bij het Milieu en Natuurplanbureau in Bilthoven. Sinds 2007 werkt hij als onderzoeker bij het Kennisinstituut voor Mobiliteitsbeleid in Den Haag, en sinds 2008 ook één dag per week als universitair docent bij de Technische Universiteit te Delft.

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