EVALUATION OF THE ENERGY INVESTMENT DEDUCTION SCHEME IN THE NETHERLANDS

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1 Characterization of the instrument

As of 1 January 1997 the fiscal measure Energy Investment Deduction Scheme (EIA) is in place. The policy objective of the EIA is to stimulate investments in energy saving equipment and renewable energy. The scheme offers Dutch companies tax relief on investments in energy efficient technologies and renewable energy technologies. Up to 44% of the investment costs may be offset against taxable profits, provided that the equipment appears on the so-called 'Energielijst' or meets specific energy savings criteria (e.g. in euro/GJ saved) (SenterNovem, 2005). The Energy-list includes descriptions of concrete technologies that are eligible for the EIA. Saving standards are given for technologies that are not described but might be eligible.

The EIA is a *generic* fiscal measure, which means that the measure is not restricted to one economic sector but applies to all economic sectors. This case study focuses on two sectors that might show a different use of the EIA, because of the different activities they exploit: the Dutch industrial sector and the service sector. We will focus more explicitly on the light industrial sector in this case study. An indirect glance is given to the building and agricultural sector, but these will not be studied in-depth. In annex 1 an overview is given on which business sectors are part of the service sector and light industry according to the BIK-code system used by SenterNovem.

1.1 Targets, including relation to end use sector and relation to national Kyoto target

The Energy Investment Deduction Scheme (EIA) was introduced in 1997 by the Ministry of Economic Affairs. At the introduction of the EIA its aim, which is an important criteria for evaluation, was not explicitly stated (PWC, 2001). No quantification of targets for energy savings *or* CO_2 emission reduction has been set at the take-off of this fiscal measure (Joosen *et al.*, 2004).

Within the framework of the Kyoto Protocol the Dutch Government defined climate change policies to reach the target of 6% CO_2 reduction in the period 2008-2012 compared to the 1990 level (VROM, 1999). According to recent figures this Kyoto obligation corresponds to an average emission space of 200 Mton CO_2-equivalents per year in the period 2008-2012 (VROM, 2005).
Next to this national target, for all economic sectors target figures for CO_2 emissions in the year 2010 are set. The target for CO_2 emissions resulting from the industrial and energy sector together is set at 112 million tonnes CO_2 in 2010

(ECN/RIVM, 2005). Future projections of energy use and emissions in the Netherlands differ according to assumptions on driving forces of the economy (GDP, population growth, international collaboration etc.). Direct CO_2 emissions from industry are 34.1 Mton in 2002 and expected to increase to 34.1-34.6 Mton in 2010 and 34.9-37.4 Mton in 2020 depending on economic and demographic assumptions defined. Direct emissions of CO_2 from the tertiary sector, composed of trade, services and the government, are 11.6 Mton in 2002. Sectoral CO_2 emissions decrease to 9.4-9.8 Mton in 2010 and 8.3-9.4 Mton in 2020, again depending on the assumptions made (ECN/RIVM, 2005).

Since no emission reduction target has been set that should be achieved by means of the EIA, it cannot be said if the EIA has been more or less successful than expected.

1.2 Period the policy instrument was active

The fiscal measure EIA started on 1 January 1997. Experiences with implementation of the comparable instrument VAMIL (as of 1991) served as an example. Each year an annual report on the functioning of the EIA is published. The focus is on giving a general overview of how the applications for EIA are spread between industries and techniques. Besides, a report is published which aim is to roughly calculate the annual energy saving effect of the instrument (in natural gas equivalents and TJ). Also the carbon reduction effect (in kton CO_2) and the cost efficiency of the EIA (in Euro per ton CO_2) are calculated. In the first year the 79% of the EIA budget was claimed without any campaign for promoting the new instrument (see Table 1).

1.3 Specific technologies and energy efficiency measures eligible under EIA

Goal of the EIA

The EIA is set up with two different goals (SenterNovem, 2004):

1. energy saving by means of stimulating investments in energy efficient assets and renewable energy, and;
2. improving the profitability of technologies.

The announcement of the Energy Investment Deduction in the Dutch State Courant described the aim as follows: “to foster investments that are of interest for an efficient use of energy” (State Courant 1996, nr.148/p.18). From this statement it seems that energy savings and not CO_2 emission reductions constitute the principal target of the EIA. According to the study from PWC (2001) the main goal of the EIA is to “stimulate investments in energy saving equipment”. In the evaluation part of this study we assume that energy savings are the main objective of the EIA and use energy savings as evaluation criteria.

The second part of the goal "improving the profitability of technologies" relates to lowering the financial barrier to invest in these technologies.

The Energy list

Assets that improve energy efficiency and meet certain energy criteria can qualify for EIA. The Energy list presents examples of investments that are eligible under the EIA. These assets are divided into five fields of application: buildings, processes, heat and power co-generation, transport and renewable energy sources (SenterNovem, 1998). Next to this classification technologies could be categorized in energy functions like, conversion, utilities, heating, energy recycling, cooling/freezing, lighting, control/management, drivers, ventilation, dryers/humidifiers and others. The list is not restricted to the assets described, but also investments that meet the generic energy criteria are eligible for EIA.

In principle, every year the Energy List is updated due to new developments in technology, standards, quality marks and certification. Companies also have the opportunity to contribute to the composition of the Energy list by submitting proposals with assets to be included in the list. These proposals are evaluated by representatives from the energy agency SenterNovem, the Ministry of Housing, Spatial Planning and Environment, and the Ministry of Economic Affairs. Important judgement criteria are that 1) the energy efficiency measure is additional and 2) the asset is not yet common practice. First of all, proposals are judged on the energy saving standard to be achieved, complemented with other criteria like maintenance, verification and conflicts with other policies.

Deductible investment

Until 2001, the percentage of the investment that is deductible from taxable income depends on the annual investment amount: the higher the investment, the lower the deductible percentage of investment. This changed with the introduction of a fixed deduction percentage of 55% in 2001. The deduction percentage no longer changed along with the height of investments like the years before. As of 2005, this percentage is lowered to 44% due to savings on the EIA budget. In 2005, the maximum sum of the annual investment per entrepreneur or fiscal unit that could apply for EIA is 108 million Euros. With an EIA deduction percentage of 44%, the net financial profit for companies, resulting from lower corporate- or income tax, amounts to about 13% of the total investment.

1.4 Target groups

The EIA scheme is open for all entrepreneurs that decide on making investments in energy conservation technologies and renewable energy technologies. Companies in all economic sectors can apply to the EIA scheme, on condition that they must be taxable (corporation tax is 29,6%) on the basis of the Law of income tax.

As said before, the target groups of the EIA are all economic sectors. In 2004, the sectors with highest investments were the energy production and distribution com-

panies and financial institutes, the building sector and other business services (SenterNovem, 2004).

Although the EIA is open for all entrepreneurs to apply, companies that participate in Long Term Agreements regarding energy or have agreed on an Integral Environmental Task with the national government are specifically pointed out as target group in the promotion of the EIA (PWC, 2001). Another specific aim of the EIA is to reach the Dutch SME sector (companies with up to 100 employees).

1.5 National context

Energy efficiency and renewable energy became important issues on the political agenda in the nineties. Different policy measures were formulated to support the energy efficiency policy of the Dutch government. The EIA is part of a broader context of energy efficiency policy in the Netherlands and is one of the instruments implemented to meet Kyoto targets. Next to the EIA several other instruments are used to support energy efficiency in industry and services.

LTA's

At the end of the eighties existing energy policy instruments were extended with the so-called Long Term Agreements (LTA's). On a voluntary basis, government and industry laid down energy efficiency goals in these LTA's. The LTA's were the primarily directed at the Dutch industrial sector, but also some branches within the service sector participated.
In industry the LTA's have contributed to making companies aware that energy efficiency measures can result in considerable cost savings and that active search for saving options can be profitable (ECN, 2005). A next generation of LTA's is ongoing until 2010.
The Dutch Benchmark Covenant on energy efficiency replaced the second generation LTA for companies with an energy use exceeding 0.5 PJ per year (102 companies).

DECREE CO2-REDUCTION

This measure was launched in 1996 with the objective to reduce CO_2 emissions by supporting large-scale projects directed towards energy efficiency, renewable energy and direct reductions of emissions. Investment subsidies are given for projects that without support would have been undertaken later in time. At its start so-called first round projects were approved. Thereafter the measure worked with tender projects that were evaluated (European Commission, 2003). Since May 2004, SenterNovem is responsible for the execution of this regulation.
The projects that receive subsidy from the Decree CO_2-reduction could also apply for other fiscal facilities like for example EIA. The subsidised costs could be lowered when applying for EIA (http://www.co2-reductieplan.nl/).

EINP

At the start of the EIA a subsidy regulation for companies in the non-profit sector was added to it: the Energy Investment in Non-Profit sectors (EINP). The goal of this fiscal measure is to support investments in energy saving measures and/or renewable energy in the *non*-profit sector (IBO, 2001). SenterNovem has total responsibility for the execution of the regulation. The EINP addresses companies that can not apply for EIA because they are not taxable on the basis of the Law of income tax or personal tax. Instead of a fiscal incentive the EINP offers a subsidy for energy investments.

Applicants for EINP can also use the Energy List in their search for energy efficient technologies that are eligible. Under the EINP non-profit firms could obtain a subsidy, depending on the size of the investment, between 14.5% and 18.5% of the amount invested (IBO, 2001). In 2002 the EINP was abolished.

VAMIL/MIA

The VAMIL (Free Depreciation Environment Investment) and MIA (Environmental Investment Allowance) are both fiscal measures. The VAMIL is introduced in 1991 and gives applicants liquidity or interest advantage. Companies are free to choose how to write off investment costs in environmental assets. This fiscal measure supports environmental friendly behaviour by offering accelerated depreciation of environmental investments. The MIA is (like the EIA) a fiscal deduction scheme that covers investments in environmental friendly assets.

Legally there exist two Environmental Lists (like the Energy List), one for VAMIL and one for MIA. However, because of the large overlap of both regulations the Environmental List of 2004 for the first time bundled the two lists. For most assets both VAMIL and MIA could be obtained. The equipment on the list is categorized in: sustainable means of production, climate change, air pollution, nuisance and health, mobile equipment, external safety and precautionary measures, biodiversity and physical environment, feedstock savings and reuse, waste streams. Every year the Ministry of Environment and Spatial Planning (VROM) updates the list.

Some technologies, like combined heat and power installations (CHP) and wind turbines, could apply for both the EIA and VAMIL at the same time. These two measures together could result in a maximum reduction of about 24% on investments for companies paying corporate tax, which is 6% more compared to situations were only the EIA is applied for. In the Strategic Agreement of July 2002 (Balkenende I) it was stated that energy and environment regulations sometimes experienced free rider effects and over stimulation. The number of facilities that is eligible for EIA was reduced to limit the number of free riders. Furthermore, as of 1 January 2003 energy investments are excluded from the VAMIL regulation to reduce the effect of over stimulation of this type of measures.

1.6 Market failures to overcome

The EIA has been initiated by the government to overcome the disincentive to invest in energy efficient technologies and renewable energy. From a company's point of view investment in these technologies is not cost-effective or no top priority with limited investment funds. Therefore no incentive exists to invest. With a regulation like EIA the taxable income of companies and with that the amount of tax that must be paid to the Treasury is lowered. The barrier to invest in energy efficiency is lowered (and sometimes removed) by means of the EIA.
Users of energy consuming equipment seek to maximise return on investments and buy their equipment without considering the environmental externalities from carbon emissions. This is an undesirable outcome for the environment, and in conflict with the government's environmental objectives. The EIA is an attempt, although not primarily, to address this market failure. Secondly, also incomplete information might play a role here, and could affect the underinvestment in energy efficiency. End-users sometimes lack the ability or time to process and evaluate the information they have (Golove and Eto, 1996). For example, calculating the pay back time for a more energy efficient appliance is sometimes hard for people. Furthermore, end-users of the equipment may know the first (investment) costs of the equipment, but are unable to verify the potential savings. Also, the transaction costs for end-users to obtain information about energy efficient equipment could have impeded the adoption of those devices.

1.7 Organisations, which are responsible for implementation and execution

Ministry of Economic Affairs

The Ministry of Economic Affairs initiated the EIA in 1997. SenterNovem and the Dutch tax authority (Belastingdienst) are responsible for implementation of this measure.

Dutch tax authority

Before entering in financial obligations and within three months after purchase of the asset, which is eligible for EIA, an application form should be send to "Bureau Investeringsregelingen en Willekeurige Afschrijvingen (IRWA)" in Breda. This agency is a division of the Dutch tax authority (Belastingdienst). It registers the applications for EIA and checks if these are submitted in time and on completeness. If necessary, companies are asked to complement the application. Thereafter, approved applications are sent to SenterNovem.

SenterNovem

SenterNovem checks if the application meets the criteria as described in the Energylist. If so, SenterNovem issues a certificate with on it the investment sum. This certificate needs to be included in the tax declaration. The tax authority is responsible for setting the height of the tax deduction and grants the certificates in the tax declaration if it is in accordance to the tax law.

1.8 Available budget

The scheme took off in 1997 with a budget of 56.7 million Euros (125 million Dutch guilders) available for the EIA. The budget of EIA is now sufficient for investments in energy efficiency measures of about 1 billion Euros per year (PWC, 2001). Each year a new budget is set.

In September 2002 the EIA was closed for new applications because of insufficient budget. The overrunning of the budget was possibly caused by the increased uncertainty with entrepreneurs due to statements on budget cuts made by the new government (Strategic Agreement, 3 July 2002). The Strategic Agreement announced that 500 million Euros for energy and environmental issues would be restructured. As a result, entrepreneurs might have decided to make investments in energy efficiency measures or renewable energy earlier in time. Especially, early applications and premature claims for wind turbines and turnkey applications in greenhouse farming were submitted. However, a high number of these applications was also withdrawn again.
Concerning the spending of the budget available for EIA, we see in the first years of EIA that the budget is not used to its full extent. In 1997, 79% of the available budget has been spent. As of the year 2001 the budget and the expenditures for EIA became more well-balanced. Even overrunning of the budget took place some years (see table 1).

Table 1 Available budget, sum of reported investments and number of applications for EIA (SenterNovem, 1997-2005)

Year	Budget EIA (million Euro)	Government expenditures EIA (million Euro)	Reported sum of investment (million Euro)	Number of applications for EIA	Average amount per application (Euro)
1997	56.7 (fl.125)	45	430	10.366	41.500
1998	79.4 (fl.175)	74	656	14.145	46.400
1999	104.4 (fl. 230)	70	587	17.408	33.700
2000	150	100	693	25.815	26.900
2001	160	173	1.054	28.139	37.600
2002	167	200	1.344	17.228	78.000
2003	144	110	834	15.518	53.700
2004	161	175	1.384	11.146	124.200
2005	137	N/A	N/A	N/A	N/A

1 Euro = 2.20371 NLG (last day was February 28, 2002)

1.9 Available information on initial expected effectiveness and cost-efficiency of the instrument

At the start of the EIA no clear emission reduction targets for either energy savings or CO_2 reduction was set. A first ex-post evaluation of the EIA (for the period 1997-2000) was carried out by PriceWaterhouseCoopers by order of the Dutch government (PriceWaterhouseCoopers, 2001). They conclude that the policy objectives of the EIA are not defined clearly, which hinders a verification of the effectiveness and cost-efficiency of the instrument.

1.10 Side effects

The EIA might have positive side effects on the Dutch economic sectors in a way that it triggers both innovation capacity in companies and at the technology suppliers' side. Suppliers are probably more willingly to invest in development of specific measures when their customers can apply for tax deduction. The spin-off effects of the EIA are currently investigated in a project ordered by SenterNovem.
If the EIA works properly it should have a positive effect on the development and implementation of innovative technologies. The Energielijst should trigger technology suppliers to take an extra step forward in supplying energy efficient technologies.
Another side effect of the EIA could be that other air emissions (e.g. sulphur) could be reduced.

2 Policy theory

2.1 Cause-impact relations, indicators and success and failure factors

A policy theory includes the policymakers' assumptions on how the instrument will function and how it will reach the targeted effect. Building blocks of the policy theory are cause-impact relations of the instrument (see Figure 1), relationships with other instruments and success and failure factors. First, cause-impact relations are drawn up and after that indicators to monitor the effect of the various steps of the process in a quantitative way are determined. Success and failure factors that have affected the functioning of the EIA in a positive or negative way are defined to monitor learning experiences.

1. **The government introduces the EIA, allocates a budget and draws up the Energielijst with products that can apply for EIA.**

2. **The government gives publicity on the EIA to companies (this action does not specifically target the industrial and service sector).**
   In 1997 the EIA was introduced. The assumption is that for an instrument to work properly, the market should be familiar with the functioning of the instrument.

3. **Suppliers adapt their range of products in such a way that their products are eligible for EIA (based on the Energy List).**
   As said before, the Energy List describes all techniques that are eligible for the EIA. Techniques on the Energy List are already proven technologies, but are not very much in demand due to small or no economic benefits or because they are unknown or unfamiliar. It is assumed that the Energielijst triggers suppliers to market the technologies appearing on this list. Those techniques that appear on the Energielijst have a better performance with regard to energy efficiency and become more attractive to companies when the EIA is applied. Suppliers on the other hand become more interested in developing techniques that appear on the Energy List, because these probably have a higher chance for take off compared to techniques that do not.

4. **Companies make proposals to add new techniques to the Energy List.**
   Each year companies have the opportunity to propose techniques to be added to the Energy List. It is assumed that after implementation of techniques that do

not yet appear on the Energy List customers do propose the technique to be included.

5. **Companies make plans for investments in energy saving techniques.**
   The assumption is that saving energy becomes evermore an important issue in the management of companies. Companies are specifically looking for technologies that could lower their energy use per unit output. This attention for energy efficiency partly is a consequence of policies like Long Term Agreements and Integral Environmental Tasks, because these instruments address this issue.

6. **The Energy List of the EIA draws attention from companies on energy saving techniques, by which:**
   1) investments in specific technologies are done earlier in time
   2) investments are made in a different technology, which is more energy efficient.
   It is assumed that the Energy List helps companies to decide on cost-effective measures. It helps companies to compare different energy saving measures on basis of their cost-effectiveness more easily. It is assumed that in a situation without EIA companies would invest in technologies that do not save or save less energy and that they do their investments later in time.

7. **Companies decide to invest in an energy saving technique and apply for EIA.**
   With or without support from suppliers/consultants companies make their investment decision and apply for EIA within three months after purchase of the asset.

8. **SenterNovem/Dutch tax authority evaluates the application for EIA and decides on approval or rejection.**
   Bureau IRWA takes care of performing a first administrative check of the application. As a second step they send the application to SenterNovem where they make a tax credit stating that the application is eligible for EIA.

9. **The technique is implemented and starts operation in companies.**
   Energy is saved.

2.2 Interaction with other policies

The EIA does not operate in isolation, but interacts with other policy instruments directed at energy efficiency. In this paragraph it is described where in the process (cause-impact chain) these other instruments relate to the EIA and how they affect the functioning of the EIA.

VAMIL

For specific investments one could apply for both the EIA and VAMIL regulation at the same time (see paragraph 1.5 for a description of the VAMIL). As a result the direct fiscal benefit for these investments could be as high as 24%, because the tax relief of the two regulations is summed up.
The possibility to combine EIA and the VAMIL was abolished in 2003 (SenterNovem, 2003). For the industry this adjustment implies a decrease of the direct fiscal benefit from about 24% to 19% (Ybema et al., 2002). Consequences of the abolition of the VAMIL for the service sector are quite small, since cost consideration does not play an important role in decisions on energy saving (Ybema, 2002).

Long Term Agreements

Several Dutch economic sectors participate in Long Term Agreements on energy efficiency with the government. Both the service sector and industrial sector are involved in the second period of Long-Term Agreements. By means of the LTA's sectors are informed on the possibilities for energy saving and financial support within the framework of the EIA. Participating companies might apply for the EIA in order to fulfil the agreements on energy efficiency. Companies with energy consumption higher than 0.5 PJ per year are united in the Benchmarking Covenant instead of the LTA.

Energy Performance Standards

The EIA is not limited to specific economic sectors or industries, but can possibly interact with instruments that are linked to just one sector, like the Energy Performance Standard for new buildings. Within the context of the Energy Performance Standard the service sector has to comply with certain standards on energy efficiency in buildings. To achieve this standard in energy efficiency the investments made in energy saving measures can apply for EIA as well.

Above instruments together constitute the largest part of the Dutch policy package on energy efficiency. The LTA's and Benchmarking Covenant are instruments that prepare agreements between parties to commit to energy efficiency. The EINP and EIA are 'pull'-instruments that make investments in energy savings economically attractive. Because of the large scale of the EIA and EINP these instruments have become the pivot of the policy package on energy efficiency. These instruments raise commitment for the agreements as settled on the 'push' side. The EIA complements instruments like the LTA's and Benchmarking Covenant. An evaluation of LTA's on energy efficiency by the Utrecht University (1997) shows that companies, which are connected to an LTA, make more frequently use of financial measures like the EIA. An evaluation by (Joosen, 2004) showed that the LTA's are less successful in the service sector.
The former overlap of the VAMIL and EIA, which resulted in over stimulation of certain investments, has been overcome by excluding the energy investments from the VAMIL regulation.

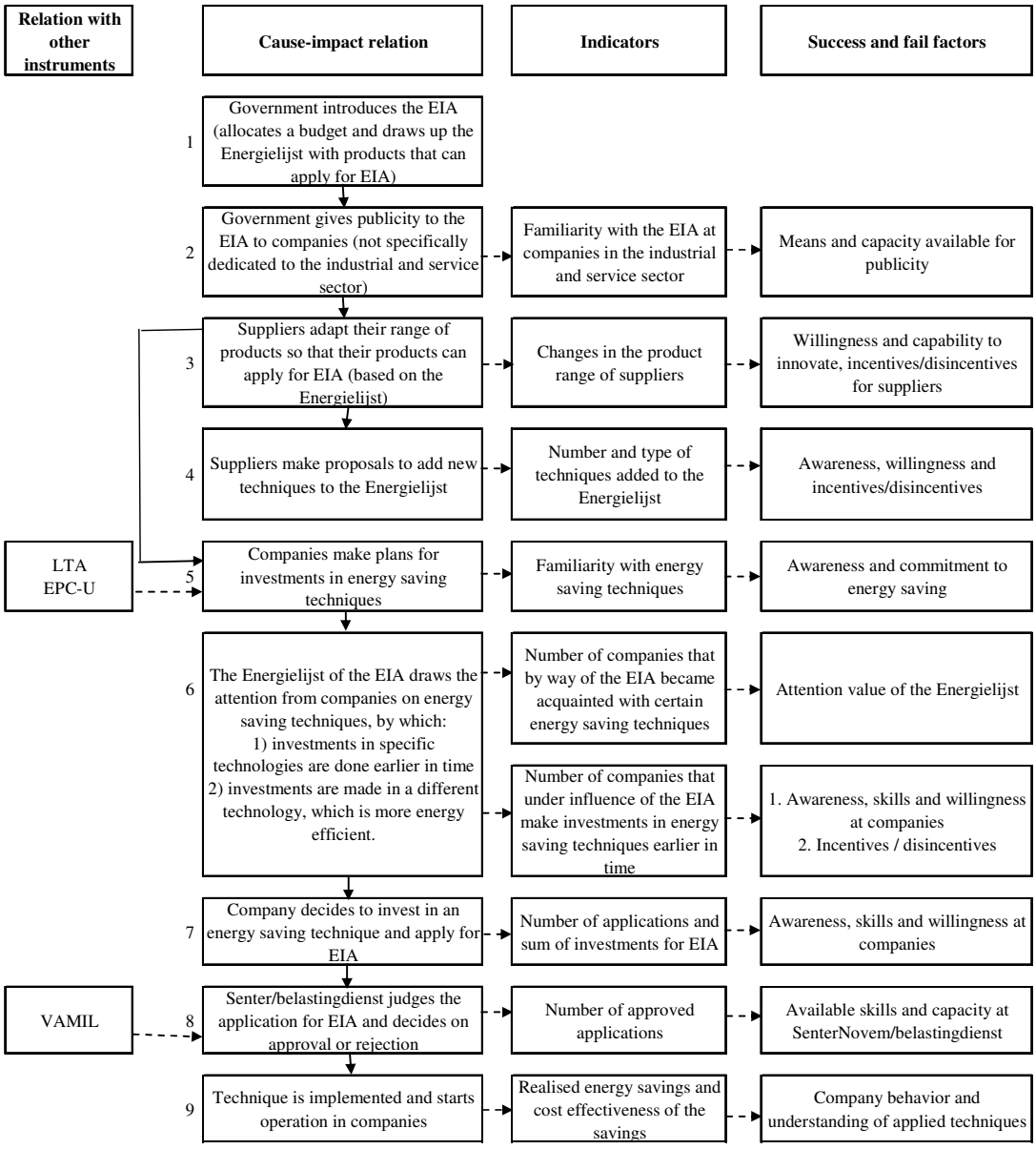

Figure 1 Overall picture of assumed functioning of the EIA: cause-impact relations, indicators, success and failure factors and interactions with other instruments

3 Evaluation

The cause-impact relations that make up the policy theory of the EIA are tested here. If possible, the hypotheses about the function of the EIA are tested on basis of quantitative information. Between brackets you find the number of the cause-impact relation to which the evaluation refers.

3.1 Familiarity with the EIA (2)

The EIA took off without much effort to prepare the market for this new fiscal measure. Before opening of the EIA no preliminary investigation has been done on the need for this regulation by target groups. Senter organized a Helpdesk and sent a mailing to 40.000 relations on the opening of the EIA. Although no specific actions were undertaken to promote the EIA, experience with the implementation of this kind of fiscal measures was already gained with the VAMIL (PWC, 2001).

SenterNovem has conducted a telephone survey in March and October 2002 on the familiarity of the EIA. A distinction is made between companies that participate in LTA's and companies that do not. Of the small LTA companies (<100 employees) 42% was familiar with the EIA, for large LTA companies (> 100 employees) this percentage was 72% (DGM, 2001). Concerning companies that do not take part in LTA's, 31% of the small companies and 70% of the large companies are acquainted with the EIA. Furthermore, 90% of all accountants and 70% of the installation companies were acquainted.

3.2 Suppliers change their product range (3)

It is assumed that technology suppliers adapt their product range under influence of the Energy List. They also propose to take up new energy efficient technologies on the Energy List (see cause-impact relation 4).
Up to now no studies have been performed to investigate the possible effect of the EIA on changes in the supply of technologies. SenterNovem recently started a study on the spin-off effects of the EIA. In this study it will also be investigated how the product range of suppliers changed under influence of the Energy List. SenterNovem already indicated that the EIA certainly plays a role in the supply of energy saving techniques. It is assumed that suppliers do adapt their supply of techniques in such a way that these are eligible for EIA. On the other hand the Energy List could also inhibit development when technologies are not updated or removed in time.

3.3 Companies make proposals to add new techniques to the Energy List (4)

The EIA actually leads to actions both on the supply side and demand side. On the supply side technology suppliers are willingly to change their product range and also want to add new techniques to the Energy List. The number of proposals of techniques to be included in the Energy List varied over the years, with an average of almost 50 per year (Personal Communication, 2006).

3.4 Familiarity with energy saving options (5)

On the demand side we see that the attention for energy saving options depends on the importance of energy within that organisation in terms of costs, policy options or production dependency. In energy intensive and non-profit organisations the attention for energy efficiency is increasing (PWC, 2001). No specific data are available on the familiarity of the EIA in the light industry and service sector. It is assumed that if energy issues are important within an organisation, the familiarity with energy saving options also increases.

As of 1997, the EIA received more applications each year (see Table1). This indicates that energy saving has become an issue for many companies. The Energy List could also play a role in increasing the familiarity with energy saving options. Next indicator points out to what extent the Energy List has a role in informing entrepreneurs on possibilities for saving energy.
The reason that the number of applications is declining from 2002 onwards is that many frequently applied techniques which have become common practice have been removed. As consequence the overall number of applications has dropped accordingly.

3.5 Attention value of EIA (6a)

The attention value means that a subsidy gives information on new technologies to suppliers and users, which could result in accelerated introduction of these technologies. Within the context of the EIA the attention value is defined by the number of companies that by way of the EIA become acquainted with certain energy saving techniques. The assumption is that by means of fiscal support of the EIA information on energy saving techniques is spread and the attention of entrepreneurs, consultants and suppliers is drawn upon those techniques. As a result, the investment decision is done earlier in time (see paragraph 3.6). Unfortunately, there are no specific figures known on the attention value in the service sector and light industry. Therefore the attention value for EIA in general is assessed.

The Energy List plays an important role with regard to the attention value of the EIA. In a study by Aalbers et al. (2005) experimental research is used to assess the optimal design of investment subsidies. The results of the experiments show that

the effectiveness of subsidies is almost zero when there is no list available beforehand with subsidised technologies. It is concluded that measures working with lists are effective because they improve the attention value of the regulation. Companies are stimulated to search for techniques that improve their management. The results stress the importance of operating the right communication strategy by the government by means of a list of subsidised technologies (Aalbers et al., 2005).

The attention value of the EIA has been addressed in a study of Ecofys (2000), within the framework of an extensive evaluation on the effectiveness of energy subsidies. By means of a questionnaire, which 622 respondents returned, the attention value of the EIA was quantified. The study did not show an important attention value of the EIA. On basis of so-called 'saying behaviour' of the respondents it appeared that the attention value of the EIA is of minor importance within companies. For 57% of the applicants for EIA it is not possible to verify if the measure had attention value to them and 40% of applicants for EIA said that the measure had no attention value to them. Only 3% state that the EIA definitively had attention value to them. Within the group respondents that indicates themselves as free-riders, which says as much as that without the EIA they would have invested in the same technology, only 2% says that the EIA had attention value to them. This relatively low attention value implies that applicants for EIA are already aware of what types of technologies are on the market. A possible explanation for a low attention value could be that the sector is already informed on energy saving measures by means of their participation in LTA's. The overlap between the EIA and LTA's might have a significant effect on the attention value.

PriceWaterhouseCoopers also conducted a study where the attention value of the EIA is investigated. Fifty eight in-depth interviews with representatives of ten economic sectors were conducted. It is concluded that de EIA actually has a clear attention value. More specifically the Energy List has obtained a prominent position in investment decision processes within companies. The influence of the attention value was however not strong enough to push the financial-economic assessment of energy saving measures to the background. Financial criteria continued to be the decisive factor for investments (Van der Lande, 2001). This conclusion is opposite to the conclusions drawn in the study Ecofys (2000), because the attention value is more widely interpreted; if the regulation positively influences the awareness for energy efficiency this is also indicated as attention value.

The study of Aalbers (2005) concludes that the attention value of a regulation strongly improves when technology lists are used. Although the 'improvement' of the attention value is not quantified in this study the conclusions drawn by Ecofys (2000) seem to be opposite. The conclusions of the Ecofys study might not fully represent the attention value of the Energy List as it is at the moment, because the Energy List has been updated after the year 2000.

The role of the Energy List in providing information on new technologies is less important than expected based on the assumptions made. The largest part of entrepreneurs is already informed on the energy saving technologies. It seems that entrepreneurs have other channels to inform them on existing energy efficient technologies. Possibly there is a strong interaction with the Long Term Agreements.

3.6 Number of companies that under influence of EIA make investments in energy saving techniques earlier in time or in different techniques (6b)

Fiscal measures or subsidies try to persuade entrepreneurs to invest in energy efficient techniques earlier in time or to invest in techniques that use less energy compared to the situation were there is no subsidy available. Under influence of a fiscal measure it becomes attractive to invest in techniques that save relatively more energy and which do not give direct economic benefits in a situation without subsidy.

It should be defined whether the investments in energy efficient measures reported to the EIA would also have been done if the EIA was not available. Applicants that have benefited from the EIA but would have done the same investment on the same time are defined as so-called 'free-riders'. Policy measures like subsidies always experience free-riders. It is however important to gain insight in the free-rider percentages, because of its effects on the effectiveness of the policy instrument and actions to reduce the amount of free riders.

Several studies are conducted to determine free-rider effects of the EIA and related instruments like the VAMIL and EINP. Two important studies are of Ecofys (2000) and PWC (2001). Both concluded that the EIA experiences free-riders.
Ecofys (2000) conducted a study that addressed the number of free riders for different fiscal measures. In 2001, the EIA showed a free-rider percentage of 64% on basis of a comparison with the critical payback time for investments. On basis of an evaluation of own investment behaviour the percentage of free-riders within the population turns out to be 52%.
The free-rider group could possibly include companies that thanks to the EIA (and more specifically the Energy List) became acquainted with new technologies, although these technologies were profitable for them. Without the subsidy, the entrepreneurs would not be informed on the benefits of the technology and probably have invested in a different one. This specific group is not regarded as free-riders and therefore the free-rider percentage is corrected for this. For 3% of the respondents the EIA certainly had attention value, for 57% of the respondents it is not clear whether the EIA had attention value or not. The share of free-riders could decrease to a minimum of 22% when the 57% respondents also experienced the attention value of the EIA (Ecofys, 2000).

To fight these free rider effects the Ministry of Economic Affairs together with SenterNovem adjusted the Energy List of 2002 and following years. Categories of techniques that were very popular among entrepreneurs and at the same time experience a high free-rider effect were removed from the list. No new research was performed after 2001 on free riders for EIA as a whole. However, each year SenterNovem checks the Energy List on possible techniques with a large share of free riders and conducts studies on specific techniques and sectors.

3.7 Number of applications and sum of investments for EIA (7)

In this case study we differentiate between the service sector and the so-called 'light' industry (the non-ETS sectors) to assess possible differences of the functioning of EIA between these sectors. The service sector has already been studied in Joosen et al. (2004) for the period 1997-2002 whereas the 'light' industry has not been subject of study before. Energy investments in each of these two sectors make up about 10% of total investment sum of EIA per year (SenterNovem, 2005).

Figures on the number of applications and investments should be handled with care. There could be more applications for EIA per energy saving measure, because each partner within a partnership needs to apply for EIA (SenterNovem, 2005). The sum of investment submitted equals the partners' share in the partnership. In fact, the number of applications is about 40% higher than the number of reported assets.

Light industry

The Dutch industrial sector is represented by the BIK codes 15 to 37 (see Annex 1.). Since there is no standard way to differentiate between *light* industry and *heavy* industry, the selection of what should comprise the heavy and what should comprise the light industry has been done on basis of energy use. In table 2 the sum of investment is given for the light industry on the level of *sub sectors*. This implies for example that BIK-codes 15 and 16 are grouped together to the sub sector manufacture of food and drugs.

Investments in the light industry increased from 37 million Euros in 1997 to 111 million Euros in 2004 (Table 2). The sub sector manufacture of food and drugs (BIK codes 15 and 16) is responsible for 55% of total investments in the light industry. Over the period 1997-2005, the light industry made highest investments in combined heat and power installations with capacities higher than 2 MW, technical measures for saving energy in existing equipment and processes and membrane installations. About 59% of the applications in the light industry have been done for the sub sector manufacture of food and drugs.
Compared to the heavy industry, the light industry submitted a lot more applications for EIA each year (Figure 2). The heavy industry invests in relatively expen-

sive technologies when compared to the light industry. The average sum of investment per application over the period 1997-2004 is about four times higher.

Table 2 Overview of investments in the light industry 1997-2004, for BIK-codes 15 to 37 Source: (SenterNovem, 2005)

million Euro	1997	1998	1999	2000	2001	2002	2003	2004	Total
TOTAL INVESTMENT EIA	430	656	587	695	1058	1343	839	1396	**7004**
TOTAL LIGHT INDUSTRY	37	81	90	117	86	73	66	111	**661**
Manufacture of food and drugs (15+16)	21	55	52	26	37	44	48	86	**369**
Manufacture of textiles (17+18)	0	2	1	2	2	5	0	2	**14**
Manufacture of leather and footwear (19)	0	0	0	0	0	0	0	0	**2**
Manufacture of wood, cork and related products (20)	5	2	12	4	6	2	6	3	**40**
Manufacture of paper, cardboard, and paper products + publishing, printing and reproduction of recorded media (21+22)	2	5	4	5	8	3	1	1	**28**
Manufacture of machinery and equipment n.e.c. (29)	1	3	2	4	2	6	2	2	**24**
Manufacturing of office equipment and computers (30+31+32+33)	3	4	9	21	10	3	7	8	**65**
Manufacturing of other transport equipment (34+35)	1	6	3	29	14	2	0	1	**55**
Manufacture of furnishing; manufacture of other goods (36+37)	5	4	6	26	6	9	1	7	**65**

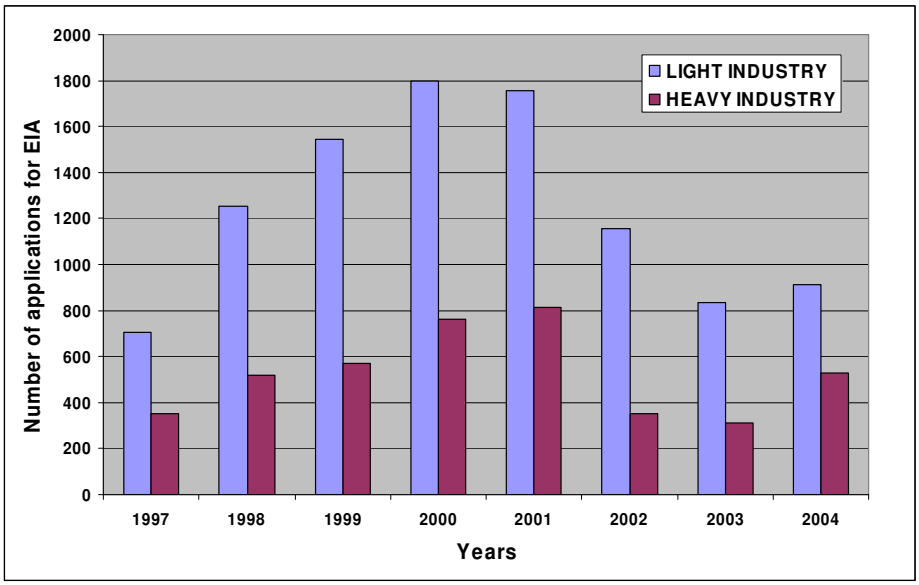

Figure 2 Number of applications for EIA Source: (SenterNovem, 1997-2005)

The light industry is a very heterogeneous sector; during the period 1997 - 2005 applications for EIA covered 160 different energy technologies.

In the years 1997 - 2004, almost 80% of the total investments are covered by 21 types of technologies from the Energy List. The technology top ten represents almost 63% of the total sum of investments (Table 3). In the light industry the spread of different types of technologies is higher compared to the service sector. Two types of energy efficiency measures, being technical services for the purpose of energy efficiency at *existing* and *new* equipment or processes, have a share of 27% in

total sum of investment. It is remarkable that both measures are generic measures, which means that the technologies or processes should comply with an efficiency standard described in the Energy List and are not explicitly mentioned in the Energy List.

		1997	1998	1999	2000	2001	2002	2003	2004	Total
	INVESTMENTS LIGHT INDUSTRY	37	81	90	117	86	73	66	111	**661**
1	Technical provisions at existing equipment or processes	9	9	16	10	11	16	17	36	**124**
2	Technical provisions at new equipment or processes	0	0	14	4	3	4	9	21	**54**
3	Insulation of existing constructions	5	5	8	12	10	4	0	1	**46**
4	Combined heat and power > 2 MW	3	28	2	0	0	0	7	2	**41**
5	Feed-in system of brake energy of electric motors	0	0	0	27	12	0	0	0	**38**
6	Anaerobic fermentation installation	0	0	0	19	3	4	0	0	**25**
7	CO2/NH3 cascade cooling system	0	0	0	0	2	6	2	13	**23**
8	Heat pump or heat pump boiler	0	1	2	8	7	5	0	0	**23**
9	Energy efficient lighting system	1	3	3	6	7	1	0	2	**22**
10	Biomass combustion installation with utilization of heat (and power)	1	2	3	6	2	2	2	1	**18**
11	Other	18	35	43	26	30	30	30	35	**246**

Table 3 Sum of investment of the top ten most important measures in terms of investment in the light industry Source: (SenterNovem, 2005)

Service sector

The service sector is not classified on the level of sub sectors, BIK-codes are used to define different types of services. In Table 4 the service sector is split up into eight industries with highest announced investments. The category ‘other’ includes several industries with relatively small sums of investment. Table 5 gives an overview of the measures taken in the service sector that are responsible for 95% of the total investment sum. The category ‘others’ includes the remaining measures, which are sufficient for 5% of total investments. In the first years of the EIA a significant share was invested in energy efficient cooling and refrigerating systems. In the year 2000 this technique is removed from the Energy List. As of 1999 we see a shift to large investments in heat pumps or heat pump boilers and isolation.

Table 4 Overview of investments in the service sector 1997-2002, for BIK-codes 50 to 93 Source: (SenterNovem, 1997-2002) (Joosen et al, 2004)

	1997	1998	1999	2000	2001	2002
Total EIA million Euro	430	656	587	693	1054	1344
UTILITY SECTOR	29	46	61	108	132	70
Real estate activities (70)	3	3	9	24	32	15
Retail trade (52)	13	16	11	7	15	4
Financial intermediation (65)	2	7	7	15	16	17
Wholesale trade and commission trade (51)	3	5	8	9	11	4
Activities auxiliary to financial intermediation (67)	0	0	1	12	20	5
Other business activities (74)	2	3	7	5	10	6
Other service activities (93)	1	1	3	6	8	5
Other	5	11	15	29	21	14

Table 5 Sum of investment (million Euros) of the top-10 measures in the service sector Source: (SenterNovem, 1997-2002)

	1997	1998	1999	2000	2001	2002
Total EIA million Euro	430	656	587	693	1054	1344
UTILITY SECTOR	29	46	61	108	132	70
Isolation	5	8	18	29	31	14
Energy efficient lighting system	3	7	11	24	28	6
Heat pump or heat pump boiler	0	0	5	14	31	19
HR-glass	1	2	3	12	15	12
HR-boiler	2	3	4	9	10	4
Energy efficient cooling or refrigerating system	12	13	5	0	0	0
Cold or heat recovery system from ventilation air	1	1	3	5	4	3
System for energy monitoring or energy analysis	0	2	1	2	5	0
Weather dependent heating	0	0	1	4	3	1
Other	5	9	9	9	7	12

3.8 Number of approved applications (8)

As already mentioned, it might occur that for one asset more applications are submitted, since each partner within a partnership is obliged to apply for EIA. Therefore, instead of the number of approved applications the amount of approved investments is analysed here.

In each annual report of the EIA the total investment sum of submitted applications is given as well as an estimation of the approved investment sum. At the time of publication of the annual report not all applications are processed yet, therefore an estimation of the number and the investment sum of approved applications is given. For the year 2004 for example, the total sum of investment was 1.384 million Euros while an amount of 978 million Euros expected to be approved given the corrections of SenterNovem and assumed withdrawals of applications. Generally, about

75%-88% of the total announced investments for EIA are approved by SenterNovem.

Table 6 Reported and approved sum of investment for EIA (SenterNovem, 1998-2004)

Years	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Reported sum of investment (million Euros)	430	1.445	1.290	1.486	1.054	1.344	834	1.384
Approved by SenterNovem (million Euros)	298	1.088	1.030	1.232	900	1.100	630	978
Correction -%	31%	19%	18.5%	15%	12%	15%	20%	25%
Corrected investments (million Euros)	131	253	239	218	126	202	154	326
Withdrawals (million Euros)	1	104	21	36	28	42	50	80

3.9 Net impact (9a)

Defining the realised energy savings resulting from the EIA is not a straight forward operation, because of several issues:

- With the available data it is not possible to determine which part of the energy savings is directly caused by the EIA without interference with other policies like Long Term Agreements.
- The data on free riders percentages are from the year 2000 and are not defined for all selected technologies in the 'light industry'. For the technologies where data on free-riders percentages are missing either the average for the total EIA or percentages of comparable technologies are used. Besides, due to adaptation of the Energy List due to research in the year 2000 it can be expected that the free-rider percentage has decreased.
- The actual energy savings per technique are not monitored. The energy lists hold techniques that comply with the criteria set for energy savings within the framework of the EIA. However energy savings are not monitored in practice. The energy savings and CO_2 reductions reported by SenterNovem are established by applying ex-ante energy saving figures for techniques that are responsible for the bulk of reported investments. For the remainder a generic energy saving number is applied.

These issues have consequences for the calculation of the net impact in a way that the results are surrounded with uncertainties. Although energy saving techniques are not monitored, the net impact of the EIA in the service sector and light industry is defined.

The net impact of the EIA in the service sector and light industry is calculated as follows:

- For 9 techniques in the service sector and 10 techniques in the light industry energy saving factors are defined (Euro/GJ) for the period 1997-2004. These energy saving factors are defined by making use of evaluation reports of SenterNovem complemented with reports and expertise within Ecofys. For further calculations *average* energy saving factors are used.
- For the category 'other measures' we assume energy savings that equal the average energy savings of the respectively 9 and 10 techniques that represent 63% and 95% of the total investment sum. A weighted average is calculated for the energy saving factor.
- The free-rider percentages are defined per technique in order to calculate the net impact of EIA (without free-riders). In reports of (Beer de et al., 2000) and (Joosen et al, 2004) a lower and upper percentage for free-riders is given. The lower percentage represents the part of free-riders that certainly did not experience the attention value of the EIA. These are the so-called 'real' free-riders. The upper boundary gives the share of free-riders that could possibly experience attention value of EIA. We will use average free-rider percentages in our calculations and do not take into account that free-rider percentages most likely have decreased past years.
- Each year, SenterNovem publishes a report on the energy saving effect of the EIA. For the top-20 techniques the net energy saving effect is calculated, on basis of energy efficiency indicators per technique (Nm3/NLG.jr). The energy savings and CO_2 reduction (in kTon CO_2/jaar) of the EIA in total are obtained by extrapolating the top-20 figures.

First, the gross impact of the EIA in both sectors is calculated; this figure still includes free-riders. The net impact, corrected for free-riders, is given thereafter.

Table 7 Gross and net impact of the EIA in the light industry sector, 1997-2004 (SenterNovem, 1997-2004)

	LIGHT INDUSTRY	Inv. 1997-2004	Energy saving factor	Gross Energy savings		Free-riders	Net Energy savings	
		(million Euro)	Euro/GJ	PJ (primary)	Mton CO2	%	PJ (primary)	Mton CO2
	Technical provisions at existing equipment or processes	€ 124	19	6	0.43	46%	3.52	0.24
	Technical provisions at new equipment or processes	€ 54	23	2	0.16	46%	1.30	0.09
	Insulation of existing constructions	€ 46	666	0	0.00	13%	0.06	0.00
	Combined heat and power > 2 MW	€ 41	23	2	0.12	33%	1.19	0.08
	Feed-in system of brake energy of electric motors	€ 38	40	1	0.06	36%	0.62	0.04
	Anaerobic fermentation installation	€ 25	99	0	0.02	36%	0.16	0.01
	CO2/NH3 cascade cooling system	€ 23	32	1	0.05	36%	0.46	0.03
	Heat pump or heat pump boiler	€ 23	215	0	0.01	34%	0.07	0.00
	Energy efficient lighting system	€ 22	65	0	0.02	20%	0.27	0.02
	Biomass combustion installation with utilization of heat (and pov	€ 18	16	1	0.08	36%	0.74	0.05
	Other	€ 246	110	1	0.08	36%	0.80	0.05
	Total	**€ 907**		**19**	**1.25**	**36%**	**11.98**	**0.80**

Table 8 Gross and net impact of the EIA in the service sector, 1997-2002 (SenterNovem, 1997-2002)

SERVICE SECTOR	Inv. 1997-2004	Energy saving factor	Gross Energy savings		Free-riders	Net Energy savings	
	(million Euro)	Euro/GJ	PJ (primary)	Mton CO2	%	PJ (primary)	Mton CO2
Isolation	€ 104	100	1.04	0.07	26%	0.77	0.05
Energy efficient lighting system	€ 78	108	0.72	0.05	35%	0.47	0.03
Heat pump or heat pump boiler	€ 70	132	0.53	0.04	33%	0.35	0.02
HR-glass	€ 44	427	0.10	0.01	30%	0.07	0.00
HR-boiler	€ 32	122	0.26	0.02	23%	0.20	0.01
Energy efficient cooling or refrigerating system	€ 30	461	0.07	0.00	28%	0.05	0.00
Cold or heat recovery system from ventilation air	€ 18	799	0.02	0.00	31%	0.02	0.00
System for energy monitoring or energy analysis	€ 10	848	0.01	0.00	0%	0.01	0.00
Weather dependent heating	€ 10	704	0.01	0.00	0%	0.01	0.00
Other	€ 50	108	0.46	0.03	28%	0.33	0.02
Total	**€ 446**		**3.24**	**0.22**		**2.30**	**0.15**

The energy savings in the light industry are achieved over a period of seven years while the energy savings in the service sector result from five years. The gross effect in the service sector is relatively small. In this sector high investments need to be made to avoid 1 GJ primary energy; according to the relatively high energy saving factors. On average, with the same amount of money one could save more energy in the light industry than in the service sector.
A note to these results is that the net impact of the EIA probably should be somewhat lower because of the overlap with Long Term Agreements in the light industry and the EPN in the service sector. Some 15% of the companies in the service sector participate in Long Term Agreements in the light industry this figure is about 10% (SenterNovem, 2005). If the investments announced by these companies are allocated to the LTA's, the net impact of the EIA will reduce with 10% and 15% for respectively the light industry and service sector.

3.10 Cost efficiency (9b)

The cost efficiency of the EIA shows the costs and benefits of the instrument in relation to the amount of energy saved and/or emissions reduced. The cost efficiency of the EIA is viewed from different perspectives, society, government and the end-user, because the design of policy instruments has different consequences in terms of costs and benefits for each of these groups.

Table 9 shows the EIA poses largest costs on the government and gives largest cost benefits to the end-users. However, the cost efficiency figures for society, government and end-users are surrounded by large uncertainties. Significant uncertainties do exist (among others) in the additional costs for energy saving technologies and energy prices. The distinction between the light industry and the service sector is sustained wherever possible.

Table 9 Cost efficiency for government, end-users and society of EIA in the period 1997-2004 (Joosen et al., 2004)

	Light industry		Service sector	
Cost efficiency	€/GJ	€/ton	€/GJ	€/ton
Government	0 à 2	7 à 31	1 à 3	8 à 45
End-users	-7 à 0	-100 à 4	-12 à 1	-198 à 12
Society	-4 à 1	-53 à 8	-4 à 2	- 71 à 26

3.10.1 Government

The Dutch government, who executes the regulation, faces two types of expenditures for EIA. First, the government loses tax income because entrepreneurs get tax relief on their fiscal profits. Besides, the government has expenses for paying the project costs made by SenterNovem and the IRWA.

Companies that get tax relief on their fiscal profit on one hand and the government loses tax income on the other hand. The fiscal benefit of companies can change from year to year depending on the deduction percentages for EIA. With a tax deduction of 55% the net financial benefit for entrepreneurs is about 18% (SenterNovem, 2004). In Table 1 the government expenditures (in million Euros) for total EIA are given. It shows that the total expenditures for EIA reach almost 800 million Euros in the period 1997-2003. Assuming an average net financial benefit of 15% the government expenditures for EIA in the light industry are nearly 100 million Euros for the period 1997-2004.

SenterNovem makes costs for executing the EIA regulation. In 1999 the EIA department at SenterNovem increased to 40 fte, compared to 8 fte's the year before. Since 1997 an increasing number of employees deal with evaluating the applications and indirect activities like a Helpdesk and communication for example (PWC, 2001). The IBO study (2001) estimates project costs at 3-4% of deferred tax income, based on project costs of 300 guilders per application. In this case study we base our calculations on project costs of 40 fte by SenterNovem.

The cost efficiency for the government is calculated at 0-2 Euro/GJ and 7 to 31 Euro/ton CO_2 for the light industry and at 1 to 3 Euro/GJ and 8 to 45 Euro/ton CO_2 for the service sector. The fact that the EIA is a policy instrument based on financial support already implies costs for the government. Notwithstanding the large uncertainties the government costs are quite favourable for both the industrial sector and light industry.

3.10.2 End-user

When it comes to defining the costs as the user that has implemented the saving measure experiences all additional costs that the end user needs to make compared to a reference situation has to be defined. In some cases it is straightforward to make assumptions on additional costs. For example, ventilation measures have additional costs of 100% because the reference situation is 'no ventilation'. For technologies such as combined heat and power and gasification plants the reference situation and therefore the additional costs are not so obvious, because it is not always clear what the costs of the reference technology are[1].

End-user benefits are twofold: tax relief on profits and savings on energy. Additional costs for the service sector are estimated at 235 million Euros with government support of 65 million Euro. In the light industry the additional costs are somewhat higher, namely 320 million Euros and governmental support was 100 million Euros in the period 1997-2004.

Figure 1 presents the outcomes of the calculations on end user costs. On average the benefits offset the additional costs for investments in saving measures (cost-efficiency is negative). Energy saving measures in the service sector have higher cost-efficiencies compared to the light industry (see table 9). This is not surprising since investments in the light industry often involve high capital investments that push down the cost efficiency.

3.10.3 Society

The costs for the society reflect all additional costs that have to be made by society as a whole compared to the reference situation of no EIA in place. The costs for society exclude transfers between the government and the end-use, because these transfers are a zero sum game for society as a whole (Joosen and Harmelink, 2005). In order to calculate the costs for society we apply energy prices without taxes (energy tax and VAT), because at national level costs for one sector cancel out benefits in another sector. These so-called shadow prices are set at the level of commodity prices for gas and electricity in the Netherlands.

Society costs are calculated at -4 to 1 Euro/GJ and -53 to 8 Euro/ton CO_2 for the light industry and at -4 to 2 Euro/GJ and -71 to 26 Euro/ton CO_2 for the service sector.

[1] The costs for end-users are depreciated according to the type of the measure (building related or installation) using a discount rate of 15%.

4 Conclusions

4.1 Net impact, effectiveness and cost efficiency

The EIA started in 1997 with its focus on realising energy savings in all economic sectors by providing tax deduction on income. In the period 1997 to 2004 primary energy savings (corrected for free riders) in the light industry reached 12 PJ and in the service sector 2.5 PJ over the period 1997-2002. Net CO_2 reductions are calculated at respectively 0.8 Mton and 0.15 Mton. Largest energy savings in the light industry stem from technical provisions at existing equipment/processes. In the service sector insulation of buildings is a common measure to take with financial support of EIA. The type of businesses that both sectors undertake is quite different and therefore the possibilities to save energy. The light industry invests more in building related energy measures while in the service sector energy saving measures are mainly related to the processes and equipment used.

It is difficult to state to what extent the EIA has reached its targets, because targets have not been set. It is not possible either to state whether the energy savings are achieved at minimum costs.

The cost efficiency for measures in the light industry and service sector are calculated for the government, end users and society. Because the EIA is a financial support scheme the government bears costs for reserving the budget. Next to this the government also makes project costs. Cost efficiency for the government turns out to be 5-30 €/ton CO_2 reduced for the light industry and 10 to 45 €/ton CO_2 reduced for the service sector. For both the end-users and society, the benefits of the EIA seem to offset the costs (table 9). Because the costs are surrounded by uncertainties the costs of EIA for society as a whole can turn out either positive or negative.

4.2 Success factors

Since 1997 the EIA turns out to be a reliable instrument for entrepreneurs. In general, the EIA is characterized by its good continuity over the years and its simplicity.
This simplicity is mainly because of the Energy List that provides users with an easy-reference manual on how to apply for EIA. It also makes users acquainted with the possibilities to save energy, by describing all technologies for which EIA is available. Overall, the efforts that need to be undertaken by the users to get the EIA are quite small. The required knowledge of the users is limited because the

technologies eligible for EIA are described in the Energy List. A precondition for the usefulness of the Energielijst is that it should be updated on a structural basis. The fact that the Energielijst is an 'open' list where new technologies can be added contributes to its success.

One drawback of the Energy List that should be mentioned here is that the attention value of the Energy List is uncertain. Regulations working with lists like the Energy List are said to be more effective compared to regulations that do not (Aalberts et al., 2005). However, this is not supported by research of (Ecofys, 2000) where the attention value of the EIA turns out to quite low: only 4% of the users said that the EIA had attention value for them. Therefore the importance of the Energy List is uncertain.

The commitment of stakeholders definitively has had a positive influence on the performance of the EIA. The EIA is a well-known instrument among entrepreneurs. Although the effort undertaken to introduce the EIA at its start was minimal many entrepreneurs know their way to the EIA when making decisions on energy saving investments. On the other hand the government recognizes the importance of the EIA and sets a new budget each year.

The EIA fits well within the package of policy instruments that is directed towards energy efficiency improvements in the Netherlands. These instruments also contribute to the success of EIA because they push the need for investments in energy efficiency measures.

4.3 Failure factors

SenterNovem and the bureau IRWA are both responsible for a part of the execution of the EIA. The processing time of EIA applications is investigated by PricewaterHouseCoopers. The study reports that end users were not satisfied with the time that was needed to deal with their application in 2001. For 50-60% of the applications Senter needed 91 days. As of 1997 the amount of time needed by SenterNovem improved and SenterNovem aimed at a maximum processing time of eight weeks by the end of 2002. The time need could be further reduced by streamlining bureau IRWA and SenterNovem (PWC, 2001). In 2005, the time to process an EIA applications reached 58 days overall (Personal Communication, 2006).

Concerning the ambition level of the EIA information is needed on the goals that are set. Because the EIA has been initiated without stating any specific aims in terms of energy saving potential and reduction costs, it is difficult to evaluate the ambition level of the EIA. Without these initial targets it is more difficult to monitor and evaluate the EIA.

We already saw that the EIA experienced rather high percentages of free-riders that have a negative impact on the effectiveness of the EIA. To fight these free rider effects the Ministry of Economic Affairs together with SenterNovem adjusted the Energy List since 2002. Categories of techniques that are very popular among entrepreneurs and at the same time experience a high free-rider effect are removed from the list. The cost effectiveness of the EIA could be further improved when the government puts more emphasis on removing techniques with a high free-rider percentage from the Energy List and set up a monitoring system (discussed in 4.4.).

4.4 Monitoring and evaluation

It is of great importance to put up a monitoring system that evaluates the EIA on a structural basis. The EIA is evaluated each year, but does not include the results of day-to-day operations of the assets that received EIA. Monitoring the effects of the EIA generates valuable information which can be used to increase the cost-efficiency of the EIA.
At the moment implemented techniques are not structurally monitored during day-to-day operation and therefore essential information is missing. The net impact (total energy savings) is determined on basis of energy saving factors without any monitoring during operation of the techniques. A monitoring system that generates information on the realised energy savings of the implemented technology would be very helpful to understand relevant saving factors and net impact. However, this type of monitoring will pose additional costs which could be very high if monitoring takes place on an individual basis. A the moment this monitoring is not done, because it would ask too much efforts (time and money) from technology users to realise it.
A monitoring system could also be helpful to make the EIA more technology-specific. Free riders can be excluded to a significant extent by means of consequently and accurately updating the Energielijst. With one condition that the rentability of similar techniques is more ore less the same for companies.

4.5 Summary: learning experiences

In the early years of the EIA we see that the budget of the EIA is not used to its full extent. For a new regulation that comes into place it is important that target groups are aware of its existence. Good communication from the side of the government or other responsible body is necessary for an effective start of the regulation in place. In case of the EIA this causes no significant problems because entrepreneurs get their information elsewhere. Probably via other policy instruments such as the Long Term Agreements. However, when the claim on the budget is low the attention value of a regulation definitively should be improved somehow.
Several years experience with EIA also shows that it is important to develop a process to improve and update the regulation every year. During the first years of the EIA not much attention was paid to the uptake and removal of techniques from

the Energy List. However, this turned out to be a very important action because the effectiveness could be improved significantly by doing this. Free-riders percentages could be reduced.

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ANNEX 1

Industry BIK-codes 15-37

- § 15 Manufacture of food and drugs
- § 16 Manufacture of tobacco
- § 17 Manufacture of textiles
- § 18 Manufacture of clothes: prepare and fur painting
- § 19 Manufacture of leather and footwear
- § 20 Manufacture of wood, cork and related products
- § 21 Manufacture of paper, cardboard, and paper products
- § 22 Publishing, printing and reproduction of recorded media
- § 23 Oil processing industry
- § 24 Manufacture of chemicals and chemical products
- § 25 Manufacture of rubber and plastic products
- § 26 Manufacture of glass, ceramics, cement-, lime- and plaster products
- § 27 Manufacture of primary metals
- § 28 Manufacture of metal products (no machines and transport equipment)
- § 29 Manufacture of machinery and equipment n.e.c.
- § 30 Manufacturing of office equipment and computers
- § 31 Manufacture of other electric equipment
- § 32 Manufacturing of radio, television and communication equipment
- § 33 Manufacturing of medical, measurement and control equipment
- § 34 Manufacture of motor vehicles, trailers and semi-trailers
- § 35 Manufacturing of other transport equipment
- § 36 Manufacture of furnishing; manufacture of other goods
- § 37 Preparation of recycling