Evaluation of the Energy Audit Programme in Finland

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EVALUATION OF THE ENERGY AUDIT PROGRAMME IN FINLAND

WITHIN THE FRAMEWORK OF THE AID-EE PROJECT

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1 Characterization of the instrument

The Energy Audit Programme (EAP) was launched in 1992. The central part of the programme is subsidies (40-50 %) to companies and organisations who decide to carry out energy audits of their buildings or processes. From the energy audits, saving potentials and saving measures are identified. The companies and organisations then decide whether to carry out saving measures or not. The EAP also includes many other elements to support the carrying out of energy audits: development of energy audit models, development of auditor's tools, training and authorisation of auditors, monitoring and quality control. The EAP is closely connected to the Voluntary Agreement (VA) scheme which started in 1997. The companies who join the VA scheme have committed themselves to carry out energy audits. The EAP has also been linked to a programme with the aim to support Energy Service Companies (ESCOs) in order to increase implementation of energy saving measures.

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

Targets on auditing volumes

Specific targets for the EAP regarding audit volumes have only existed in the first years of the programme (Väisänen and Reinikainen, 2002). The first target was set in 1993 and stated that by 2005, 80 % of the building volume (measured in m3) of the building stock in the service and industrial sectors should be audited. This was not an official target set by the government. Instead it was an internal target set by Motiva, which had the function of a starting point for the EAP. In 1995 it became clear that it would not be possible to reach the target by 2005 with the annual auditing volumes that existed. A working group nominated by the Ministry of Trade and Industry (MTI) analysed the situation and changed the target year to 2010 (still with the 80 % target).

When the Voluntary Agreement (VA) scheme was introduced in 1997, it contained specific targets regarding audit volumes which have also functioned as targets for the EAP. For the public service sector the target remained the same: 80 % of the building volume by 2010. For the private service sector the target is 80 % of the building volume by 2005. For the industry sector the target is 80 % of the total energy used in the sector by 2005.

Achievement of targets
In the public service sector 50 % of total building volume has been audited while in the private service sector the figure is 25 %. In industry energy audits have been carried out covering 70 % of the energy use of the sector (see further Ch 3.1.).

Targets on saving potentials
Neither the EAP or the VA scheme includes any specific targets regarding the volumes of saving potentials that should be identified. According to staff at MTI there is no point in setting such targets, since it is not possible in advance to know what kind of saving potentials that will be found in an energy audit (Väisänen, 2005-11-03)

Targets on energy savings
The EAP and the VA scheme do not have specific targets regarding total energy savings. Finland has a National Climate Strategy from 2001. According to the business-as-usual scenario of the strategy, Finland's greenhouse gas emissions in 2010 would be 14 Mt CO_2 above the 1990 Kyoto target (+0% increase on 1990 levels) (MTI, 2001). The objective is that about 25% of Finland's annual greenhouse gas reductions (i.e. 3-4 Mt CO_2) should be achieved by means of all different types of energy conservation measures, where energy audits and voluntary agreements play a key role (Motiva, 2005).

1.2 Period the policy instrument was active

The EAP started in 1992 and is still going on (2005). No end date is decided for the policy instrument.

1.3 Actions, Specific technologies and/or energy efficiency measures

Actions
Energy auditing is voluntary for companies and organisations. The EAP contains the following actions to support and enhance energy auditing:

- Subsidies to energy audits (40-50% of costs).
- Active promotion of energy audits.
- Development of energy audit models and tools for auditors (software, handbook).
- Training and authorisation of auditors.
- Quality control.
- Monitoring

The EAP is linked to the VA scheme, in which companies commit themselves to carry out energy audits. The VA scheme also includes investment subsidies for the implementation of energy efficiency measures (10-25% of costs).

Technologies/energy efficiency measures

Energy audits are obliged to identify all technologies and measures with a payback time of less than 10 years. The actual carrying out of energy efficiency measures is, however, voluntary for companies. In practice, saving measures with a payback time of 0-2 years have thus been the most common to be implemented. This means that introduction of new technology has not been a main outcome of the programme. Instead measures aimed at a more efficient use of existing technology have been the most common.

1.4 Target groups

The EAP has a broad scope regarding the target groups. Today the following target groups are included in the programme (Väisänen and Reinikainen, 2002):

- Private service sector
- Public service sector (municipalities, not government organisations)
- Industrial sector: non-process industry and process industry (energy intensive industry)
- Power plants and district heating

When the EAP started in 1992, it was targeted to all buildings and processes in the service and industrial sectors. Between 1992 and 1997 the main target groups where the private service sector, municipalities and non-process industries. Subsidies have been available for the energy intensive industry since the start. However, they did not carry out energy audits before 1998, when the VA scheme was introduced. With the VA scheme, subsidies for energy audits became available for power plants and district heating plants as well.

This evaluation report focuses on the results and efforts in the industry and service sectors. Industry accounts for a clear majority of the energy saved as a result of the programme, while the service sector has been part of the programme since the start. The power generation and district heating sectors, on the other hand, joined fairly late (1998) and are not a core part of the programme.

1.5 National context

In 2000, Finland's Energy Conservation Programme was presented, which is the policy framework for promoting efficient energy consumption and energy savings. The programme constitutes one part on the National Climate Strategy for Finland. The EAP and the VA scheme are two of the cornerstones of the Energy Conservation Programme. Another important priority of the programme is market diffusion of energy efficient technology (MTI, 2005).

1.6 International context (optional, in case relevant)

Finland has been a leading actor in the development of energy audit programmes. Motiva has been project leader for the EU-projects: Audit I and II.

1.7 Market barriers to overcome

The main market barrier to overcome is lack of information among market actors about energy saving measures that are profitable in the short time space. Through subsidies and the provision of competent energy auditors this market barrier has been addressed.

1.8 Organisations, which are responsible for implementation and execution

The following organisations/actors are involved in the implementation and execution of the EAP:

Ministry of Trade and Industry (MTI). The Energy Department of the MTI is the main responsible body for the EAP. They decide the annual budget which is available for energy audits. They also put into force guidelines and other official documents and regulations concerning the EAP. The MTI is, however, little involved in the practical work of running the programme.

Motiva. Motiva is a government agency, which has as its central aims to promote energy efficiency and the implementation of renewable energy, and to implement the Government's decisions in these areas. It operates as a state owned company, which gives it a considerable amount of independence in the management and implementation of policy instruments and programmes. Motiva has had the key responsibility for the operation of the EAP. Its main tasks include the following:

- Development of auditing tools, guidelines, monitoring system etc.
- Training and authorisation of energy auditors
- Quality control of energy audits
- Monitoring
- Data analysis and calculation of results
- Promotion of the EAP and communication of results
- Evaluation of the EAP

Employment and Economic Development Centres. The EEDCs are regional service centres of three ministries (among them MTI). There are 15 EEDCs in Finland and their task is to provide services to business, farmers and the public. The EEDCs have been responsible for day-to-day administration of the EAP, mainly regarding the handling of applications and payments of subsidies for energy audits. The per-

sonnel of the EEDCs handle applications as part of their daily routines and the share of their working time spent on the EAP is quite small.

Energy Auditors. The Energy Auditors can both be considered a target group of the EAP and one of the crucial actors for its implementation. The Energy Auditors are mainly mechanical and electrical engineers who work for consulting companies. An important part of the EAP has been the training and authorisation of Energy Auditors. In order for companies to receive subsidies for energy auditing these have to be carried out by at least two authorised energy auditors.

1.9 Available budget

The budget of the EAP can be divided into budget for subsidies and budget for other parts of the programme.

	Total costs (1992-2004)	Average annual costs	Share of budget
Subsidies	18.7	1.4	86 %
Other costs	3.1	0.24	14 %
Total	21.8	1.7	

Table 2. Budget costs of the EAP from 1992 to 2004 measured in million Euros (Motiva, 2005). Note: (i) The budget for other costs is a rough estimate and the real figures can vary somewhat. (ii) Employment costs of the MTI and EEDCs (amounting to about four man months/year) are not included.

In Table 2, it can be seen that the main part of the budget of the EAP has been dedicated to subsidies for energy audits: in total EUR 18.7 million, which means 86 % of the total budget. The average annual costs of subsidies is 1.4 million Euros. In practice this has varied between EUR 0.7 and 2.2 million depending on the amount of applications each year (Motiva, 2005). Other costs have, however, constituted a fairly large part of the budget. The following activities are included in other costs (Motiva, 2005)[1]:

- Marketing and development of models and tools (40 %)
- Quality control (25 %)
- Training of auditors (20 %)
- Monitoring and reporting (15 %)

[1] It should be noted that the budget for other costs is based on a rough estimate made by staff at Motiva and that the real figures can vary somewhat. Also the distribution between different parts of the programme do not constitute exact figures.

Total costs for carrying out energy audits between 1992 and 2004 are EUR 41.4 million (Motiva, 2005). This means that the costs of target organisations have been EUR 22.7 million (average of 1.7 million €/year) or 55 % of total costs.

Within the Voluntary Agreement scheme there are investment subsidies for energy saving measures. The total budget costs of these subsidies between 1998 and 2004 were EUR 14.4 million (Motiva, 2005-12-14).

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

No prior expectations existed

2 Policy theory

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

The aim of the Energy Audit Programme (EAP) is to encourage companies and organisations to carry out energy audits leading to energy saving measures being identified and carried out. The EAP consists of subsidies for energy audits as well as other activities to support and promote energy auditing.

A policy theory is a way to describe how a policy instrument is expected to lead to energy efficiency improvements. In the policy theory all the different steps of the implementation process are depicted and the main success and failure factors are identified. In Figure 1, the main steps of the policy theory for the Energy Audit Programme are shown together with indicators to measure whether the steps are successful or not. The most important factors that explain the success or failure of the different steps are also listed. The success and fail factors are analysed in detail in chapter 3. Below follows a presentation of the policy theory.

1. In 1992 the Ministry of Trade and Industry (MTI) launched the EAP. The government company Motiva was given task to run and administrate the programme.
2. 2a. From the start of the programme Motiva introduced a series of different activities in order to support and promote energy auditing.
   2b. Active promotion by Motiva was an important part of the programme from the start. The aim of promotion has been to make the EAP well-known among target groups and to create a good reputation for energy auditing.
   2c. In order to carry out energy audits there is a need for professional energy auditors. One element of EAP is therefore a programme for training and authorisation of energy auditors, which is organised by Motiva. The authorisation is individual for each auditor even though audits are carried out by consultant companies.
   2d. In order to facilitate energy auditing Motiva has been active in developing energy audit models and auditing tools. An energy audit model describes the different steps that should be taken when carrying out an energy audit. Different models have been developed for different kinds of energy audits. Auditing tools include an auditor's handbook and specific auditing.
3. Subsidies to companies and other organisations that carry out energy audits is a central component of the EAP and were introduced from the very start.

The subsidies have varied between 40 and 50 % of the auditing costs, depending on the time period of the programme and on the target sector.

4. As a result of the subsidies companies and organisation hire auditors and energy audits are carried out.
5. The next step in the policy theory is that energy saving potentials are identified. Also the monetary saving potentials are identified as well as the estimated costs of the measures that are suggested. In order to gather information on the total saving potentials of the programme Motiva has introduced a monitoring system as a part of the EAP.
6. The quality of the energy audits is an important aspect of the EAP. Since energy audits are carried out by many different auditors in different companies and organisations there has been a need for a systematic quality control. In the EAP all energy audits are checked and given marks according to their quality.
7. The last but most crucial step of the EAP is that companies and organisations actually carry out the energy saving measures that have been identified. Implementation of measures is completely voluntary in the EAP. The rate of implementation is also included in the monitoring system.

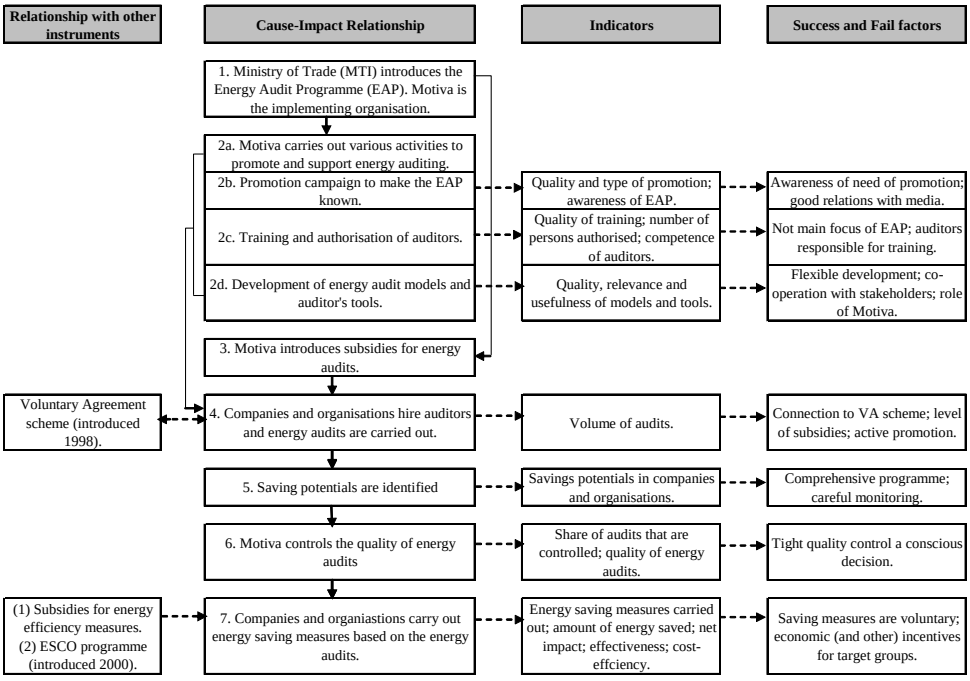

Figure 1 Overall picture of assumed functioning of the Energy Audit Programme: cause-impact relations, indicators, success and failure factors and interactions with other instruments.

2.2 Interaction with other policies

The EAP has interacted with the following policy instruments:

The Voluntary Agreement (VA) Scheme. The interactions between the EAP and the VA scheme have been very strong. Staff at the MTI and Motiva express it as if they are almost two parts of the same policy instrument, or at least that the two policy instruments are "married" to each other (Väisänen, 2005-11-03; Hietaniemi, 2005-11-04). When the VA scheme was introduced in 1998, energy audit volumes had been going down for some time and energy audits in the energy intensive industry were not very common. The VA scheme came to serve as an important boost to the EAP, since those companies and organisations who sign a contract for a voluntary agreement commit themselves to carry out energy audits. Companies joined the VA-scheme in order to avoid other mandatory policy instruments regarding energy saving. It is uncertain what would have happened to the development of auditing volumes without the VA scheme, and it can be even argued that the VA scheme actually functioned as a lifesaver the EAP. On the other hand, the existence of the EAP was of great value for the development, negotiation and implementation of the VA scheme. Motiva and the MTI could provide companies with an already available system for carrying out energy audits, which made it easier to launch the VA scheme.

The Energy Service Company (ESCO) Programme. The Finnish ESCO programme was developed and implemented in direct relation to the EAP. An ESCO is a company that takes responsibility for financing energy efficiency measures for other companies. The investment for the ESCO is paid back by the savings that are made from the energy efficiency measures. The motivation to have an ESCO programme was that Motiva and the MTI were not satisfied with the level of implementation of energy saving measures – mainly in industry – with a medium pay-back time (appr. 2-5 years) (Väisänen, 2005-11-03; Koski, 2005-11-04). Energy service companies were identified as an actor that was well suited to take care of these type of investments. The ESCO programme was launched in 2000 and consisted of measures promote the ESCO concept and facilitate the development of an ESCO market (e.g. through standard contract model and subsidies to ESCO projects). The ESCO market is starting to grow but has not been so successful as policy makers had expected (Väisänen, 2005-11-03; Koski, 2005-11-04).

3 Evaluation

3.1 Subsidies to, and carrying out of, energy audits (Indicators 3 and 4)

The level of subsidies for carrying out an energy audit has been between 40-50 % of the auditing costs, depending on the sector and the year. The budget for subsidies has been big enough to guarantee that subsidies have been available for all companies and organisations who have applied. The total costs for subsidies for the years 1992-2004 are EUR 18.8 million, while the total auditing costs are 41.4 million Euros (see Table 1, Ch. 1.2).

In Table 1 the total audit volumes in the different sectors, for 1992-2004, are presented. For public and private services, audit volumes are measured as the volume of audited buildings (m3). In total 123 million m3 have been audited in the service sector. This amounts to 50 % of total building volume in public services and 25 % in private services. Thus, especially in the private service sector, there is still much to do in order to reach the target of 80%.

For industry audit volumes are measured as the size of the energy consumption of those buildings and processes that have been audited. Between the years 1992 and 2004, energy audits have been carried out covering an energy consumption of 110 TWh per year, which corresponds to 70 % of the energy use of the industry sector. Thus, for industry the target of 80% by 2005 is close to being achieved.

	Number of audits	Building volume Million m3	Industry (heat, fuels, electricity) TWh/a	Share of total building volume/ energy consumption in the sector	Subsidy MEUR	Audit costs MEUR
Public services	3554	59		50 %	4.8	10.4
Private services	1545	64		25 %	3.3	7.5
Industry	1013		110	70 %	9.6	21.3
Total	6228	123	110		18.8	41.4

Table 1. Energy audit volumes and costs for the years 1992-2004. (Data gathered from Motiva, 2005).

When looking at the chronological development of audit volumes and granted subsidies, some interesting observations can be made. During the first couple of years (1993-1994) audit volumes were on a fairly high level and the programme got a good start. Then between 1995 and 1998 annual audit volumes decreased markedly and the EAP seemed to come into a crisis. This was the case in both the service and industry sectors. Then again, in 1998-1999, after the VA scheme was launched, audit volumes increased again and have since then been lying on a fairly stable and fairly high level. Between 1999 and 2003 annual subsidies to audits have been between EUR 1.7 and 2.0 million (1995-1998 it was around EUR 1 million).

Success and failure factors

Several factors are important to explain the development and level of audit volumes in the EAP.

The main reason why the EAP got a good start, with relatively high audit volumes, was a combination of an *active promotion campaign* and luck in the form of *favourable market conditions*. For a discussion of promotion activities see Ch. 3.2. Regarding market conditions, when the EAP was launched in the early 1990s, Finland was in a recession. This meant that there was an wish among clients to reduce their expenses making energy audits an interesting option. At the same time there were a lot of consulting companies who were looking for work, which meant the timing of EAP was perfect for them. According the to staff at the MTI, it would have been very difficult to have a successful start of the programme if the market conditions would have been different (Väisänen, 2005-11-03).

The importance of *market conditions also explain the decrease in auditing volumes* from 1995 and onwards. The market was recovering from the recession and this showed in a lower demand for energy audits from clients. By this time, though, the EAP had been firmly established and had become “the normal way of life”. For this reason there was never any immediate risk that the programme would be cancelled by a political decision, even though auditing volumes decreased. However, it was not a sustainable situation that the programme depended on the development of the market situation, and if the low auditing volumes had persisted for a longer time the programme would probably not have survived.

As mentioned earlier, the most important factor to guarantee the long term stability and success of the EAP was its *connection to the Voluntary Agreement (VA) scheme* (for details see Ch. 2.1). In fact, in retro perspective the VA scheme can be viewed as a life-saver of the EAP. The decision to introduce the VA scheme was the outcome of a separate decision process and it did not have as a main aim to support the EAP. However, the staff at Motiva and the MTI quickly realised, and took advantage of, the important synergy effects between the two programmes.

When comparing auditing volumes in different sectors it can be seen that the EAP has been more successful in the industry sector while the coverage in the private service sector has been lower. Two interlinked factors help to explain this outcome. First, the industry sector consists of fewer and larger actors. A handful of large companies account for a majority of the energy use of the sector. In the private service sector the situation is the opposite, with a large number of small actors each owning one or a few buildings, making co-ordination, promotion and monitoring more complicated. Second, the VA scheme has been more focused on the industry sector. When the VA scheme was introduced 6-7 of the largest companies, accounting for 60% of energy use, immediately signed agreement contracts (Hietaniemi, 2005-11-04). There was a common decision among industrial actors to join the VA scheme in order to avoid the risk that the government would introduce more mandatory policy instruments (Hietaniemi, 2005-11-04). Today 85 % of industrial energy use is covered by the VA scheme (Motiva, 2005-12-14). It has been more difficult to make companies in the private service sector join the VA scheme and only 23 % of the building stock in the sector is included (Motiva, 2005-12-14; Väisänen, 2005-11-03). A majority of the companies who have joined the VA scheme have carried out energy audits, while few of those who are outside have done it. In the planning of the second period of voluntary agreements, starting 2008, there are ideas how to increase the coverage of the private sector by making agreements more tailor-made for sub sectors and different kinds of companies (e.g. small and large energy users) instead of having the same type of agreements for all (Koski, 2005-11-04).

The *level of subsidies* has also been a factor influencing auditing volumes. One important reason why subsidies were originally set at 50% of auditing costs was that the MTI normally considers a 50/50 division as the maximum level of government co-financing (Väisänen, 2005-11-03). Staff at Motiva argue that the subsidy level is the best one also from a strategic point of view. Too low subsidies (below 30%) would deter many companies from carrying out audits and would risk affecting auditing volumes dramatically. Too high subsidies (above 70%) might mean that companies do not take the results of the energy audit seriously since they have not put their own investment into it. The risk is that many audits would be carried out but that they would not lead to implementation of saving measures (Väisänen, 2005-11-03).

3.2 Promotion of energy audits (Indicator 2b)

Promotion activities became an important element of the EAP at an early stage of the programme. When the programme started in 1992, energy auditing was a relatively unknown concept among companies and organisations, and it was a slow process to achieve market acceptance for energy audits (Väisänen, 2005-11-03). For that reason, Motiva organised a comprehensive promotion campaign during the first years of the EAP. The promotion included presentations and seminars with client organisations, active contacts with the media and articles in newspapers and journals. The results of the promotion campaign was that within a couple of years the EAP was well-

known among target groups and an interest had been created in energy auditing (Väisänen, 2005-11-03). The promotion also managed to establish a trust in the quality of energy audits. Though, promotion activities were most intense at the start of the EAP, it has been a continuous part of the programme, with more focused activities sometimes. The motivation has been to maintain the visibility and reputation of the EAP and expand it to new companies and organisations. According to staff at MTI/Motiva the promotion activities have been effective and central to the success of the programme (Väisänen, 2005-11-03).

Success and failure factors

An important factor making promotion successful was that Motiva at an early stage realised the need for systematic and professional promotion activities. A key factor was the good relations with media. Motiva often assisted journalists so that they could find interesting cases and good material. Media coverage was both positive and frequent, and according to staff at MTI/Motiva there have been no examples of negative publicity (Väisänen, 2005-11-03).

3.3 Training and authorisation of auditors (Indicator 2c)

Training and authorisation are two important elements of the EAP. Training is organised as a two-day course and is divided into training for technical and electrical energy auditors. The course gives the basics of how energy auditing is carried out within the EAP (i.e. about the audit models, the handbook, the monitoring system etc.) (Väisänen and Reinikainen, 2002). Those who take the course, thus need to have an engineering background. The authorisation requirements for energy auditors are fairly light (Väisänen and Reinikainen, 2002). After finishing the course the person has to pass an exam which he/she can do as homework. This means that he/she has time to check how to solve the questions and has the possibility to get help with the exam. Authorisation is personal and not linked to the consultant company the person is working for.

The fact that the training and authorisation process is not extensive is something of a compromise. To make sure that all auditors have sufficient knowledge and skills, would require a training period of several weeks with practical field work, as well as a more stringent authorisation procedure (Väisänen and Reinikainen, 2002). The reasons for having a lighter process are practical and pragmatic. A longer training course would be difficult to implement since consultant companies are unwilling to send their employees for a longer time. Two days has been considered the maximum. Resource limitations within Motiva is the main reason for not having a tighter authorisation process From the point of view of MTI and Motiva, training, authorisation and quality control are three interlinked elements of the EAP, which together aim at assuring the quality of energy audits (Väisänen, 2005-11-03; Hietaniemi,

2005-11-04). Since Motiva has light training and authorisation, much effort has been put into quality control, which is very strict (see Ch. 3.5)

Taking the limitations into account, training and authorisation functions well. Even though the training course is short it is considered as good and valuable by energy auditors. The competence of auditors is also on a satisfactory level, which shows in the quality control, were most energy audits have an adequate quality (Väisänen, 2005-11-03).

Since training is subsidised by Motiva the costs for consultant companies are low. This means that they send more people to training then what is obligatory needed. In total, around 1,500 people have become authorised energy auditors during the whole period of the EAP (1992-2004). Of these, only 100-200 are active as energy auditors (Koski, 2005-11-04). The advantage of this is that there is a pool of available energy auditors, if demand increases rapidly. The disadvantage is the risk that there are energy auditors who have few practical skills and whose knowledge is not updated.

An important drawback of the authorisation system is that authorisation is permanent. Thus, Motiva has no possibilities to withdraw an authorisation if an auditor carries out poor audits and shows that he/she is not suitable for the job (Väisänen, 2005-11-03).

Success and failure factors

An important factor influencing the shape and performance of training and authorisation has been how to best manage the limited resources of the programme. It was a conscious decision by the programme developers to have a light training and authorisation and focus on a strict quality control (Väisänen, 2005-11-03). Thus, the aim has been to put into place a training and authorisation scheme with an acceptable level with as few resources as possible.

Despite its limited size, the training course is appreciated by energy auditors. This can be explained by the fact that it is given by experienced energy auditors who are still active in the field, and that there is an active feedback from those who take the course, which is used to improve it (Väisänen, 2005-11-03).

The problem with a permanent authorisation reflects the difficulties to make changes regarding principle aspects of the programme, and highlights the importance of carefully prepared decisions. The decision to have permanent authorisation was made early in the programme and it was not properly understood that this could have negative effects (Väisänen, 2005-11-03). As long as the ongoing EAP is continued, it is in practice impossible to change this decision. This is partly a legal question of withdrawing something that has no withdrawing criteria but also a question of inadequate resources to re-evaluate over 1000 authorisations. Instead the problem of less serious

auditors has been handled through the tight quality control and informal pressure on auditors (Väisänen, 2005-11-03).

3.4 Development of energy audit models and auditor's tools (Indicator 2d)

Energy audit models and other tools have the function to give guidance and support to energy auditors and facilitate auditing. There are today nine *energy audit models* in the EAP, each aimed at a specific type of energy auditing[2]. The models contain guidelines on what should be included in an energy audit, including a model table of content and a *best practice report* (Väisänen and Reinikainen, 2002). Other tools for auditors include a *software* specifically designed for energy auditing (MOTIWATTI 2.0) and a *handbook for auditors*. Through the software the building to be audited can be modelled into the programme and simulations on energy savings can be made. The software reduces the workload of an energy audit be automatically calculating effects that would otherwise have to be calculated manually. The auditor's handbook contains instructions and guidelines that are relevant for all types of energy audits.

The energy audit models as well as the other tools are considered to be highly useful and of good quality by energy auditors and client organisations (Väisänen, 2005-11-03; Koski, 2005-11-04). Though there are many different models it seems that there is a need for them all, since the different types of energy audits have different challenges and requirements.

Success and failure factors

Key factors explaining why energy audit models and other tools have become an important and successful part of the EAP, are that the development work has been flexible and characterized by a continuous and close dialogue with the users (Väisänen, 2005-11-03). At the start of the programme only one energy audit model existed, and the programme developers initially thought that this would be enough. However, since energy auditing in large scale was something new the developers were open for changes and improvements of the model. It soon became clear that one model was not enough, and as new actors and sectors started carrying out energy audits, there has been a need for new models. Thus, the demand for several energy audit models has come from the market itself and was not a theoretical idea created by the programme developers (Väisänen, 2005-11-03; Hietaniemi, 2005-11-04).

Concerning the development of the specific models, dialogue and co-operation have been key terms. When the need for a new model is identified, experienced auditors are contracted to make a first version of the model. Then comments are gathered

[2] Examples of models are Building Energy Audit (for service sector buildings), Post-acceptance Energy Audit (for new and renovated service sector buildings) Industrial Energy Audit (for light industry) and Process Industry Energy Analysis (for energy instensive industries) (Väisänen and Reinikainen, 2002).

from other good auditors, normally leading to some modifications. The final tuning and adjustments based on one or a few pilot-projects are made before the model is finally published. The development of a new model takes at least one year (Väisänen and Reinikainen, 2002).

The development of a new model is quite a large project requiring both resources and time. The launching of a new model furthermore has important impacts on the programme. Therefore the decision to develop a new model has to be made carefully. An important factor facilitating the decision making process has been the close relations, and high level of trust, between Motiva and the MTI (Väisänen, 2005-11-03). In general the MTI has always agreed in advance on the development of new models and therefore Motiva's resources, to carry out the work, have been adequate. However, the MTI has also functioned as a moderating force and has occasionally questioned the real need for a particular model, obliging Motiva to carefully analyse the situation (Väisänen, 2005-11-03).

The role of Motiva has in general been important for the possibilities to develop models and tools in an effective way (Väisänen, 2005-11-03; Hietaniemi, 2005-11-04). First, the small size of the organisation has meant that decisions could be made quickly and has enhanced flexibility. Second, the fact that it was given relatively free hands to develop the EAP, has given it a high ability to act. Third, many of the staff at Motiva had previously worked as energy consultants themselves, and therefore understood the business and the needs of consultants and clients. It has also facilitated dialogue and co-operation between Motiva and consultants.

3.5 Quality of energy audits (Indicator 6)

As mentioned earlier quality control is an important element of the EAP were Motiva has spent much effort and resources. In principle, all energy audit reports are included in the quality control[3], where it is checked that the general and specific guidelines are followed, that the numbers presented are realistic, that the content is technically correct and that the proposed measures are relevant and realistic (Väisänen and Reinikainen, 2002). The reports are given points and are graded from failed to excellent. If a report is failed it has to be corrected. Also advice is given if certain parts of the work should and could be improved in the next projects.

According to staff at Motiva the quality of energy audits varies depending on the companies and persons who carry out them. The quality is, however, in general good enough and the clients rely on the audits (Koski, 2005-11-04).

[3] The exception is if one project consists of several audits, in case of which, only some of them are controlled (Väisänen and Reinikainen, 2002)

Success and failure factors

The main reason why the quality of energy audits is at an acceptable level is of course the tight quality control. The fact that all energy audit projects are checked makes it impossible for auditors and companies to compromise with quality. The importance of quality control could be seen in 1996-1997 when quality control was neglected due to resource problems. This resulted in a marked decline of quality of audits, and it took much time and effort to correct the situation (Väisänen and Reinikainen, 2002).

Staff at Motiva, argue that an important part of quality control is actually done before auditing is carried out, by educating and helping the client organisations to put demands on auditors before energy auditing is starting (Hietaniemi, 2005-11-04; Koski, 2005-11-04). If the clients know what they want and are able to hire the best suited auditors for the task this improves the quality of audits and can lead to the avoidance of having to do unpleasant and time-consuming corrections afterwards.

As mentioned in the chapter 3.3, Motiva does not have formal powers to punish auditors who do poor audits. However, this is to some extent regulated by the market itself. There is competition between consultant companies and a good reputation is very important in order to stay in business. For this reason energy auditors have a strong incentive to carry out audits with good quality (Hietaniemi, 2005-11-04). And Motiva can reinforce this process by informing clients about auditors and consultant companies who are not serious.

3.6 Identification of energy saving potentials (Indicator 5)

An on-line monitoring system (MOTICOP) has been developed specifically for the EAP (Väisänen and Reinikainen, 2002). When a subsidy is granted basic data of the applicant and on total energy consumption of the building or process is filed. When the audit report is submitted to Motiva and subjected to quality control, data is collected on actual present consumption, identified saving potentials and saving measures, and costs and profitability of measures. Aggregated data from all energy audits give figures on total saving potentials in different sectors.

Saving potentials are identified for the consumption of heat, electricity and water. Potentials are calculated both in terms of energy use (or water consumption) and financial costs. The costs of the required investments for the energy saving measures are also calculated. In Table 3 total saving potentials between 1992 and 2004 can be found for the service and industry sectors (excluding the energy intensive process industry which are monitored via the VA scheme).

	Heat		Electricity		Water		Total savings	Investment cost
	GWh/a	**MEUR/a**	**GWh/a**	**MEUR/a**	**Mm^3/a**	**MEUR/a**	**MEUR/a**	**MEUR**
Service sector	690 (16.7%)*	17.9 (15.7%)	179 (6.9%)	12.2 (8.4%)	1.1 (7.4%)	2.2 (7.5%)	32.0 (11.2%)	58.5
Industry , <10 GWh/a	187 (23.8%)	4.6 (23.9%)	49 (7.3%)	3.1 (9.2%)	0.5 (11.3%)	0.8 (14.6%)	8.5 (14.5%)	18.7
Industry , 10-70 GWh/a	380 (19.5%)	8.2 (19.2%)	99 (6.5%)	4.8 (7.6%)	1.1 (10.1%)	1.4 (10.7%)	14.4 (12.1%)	30.8
Industry , 70-500 GWh/a	348 (11.7%)	5.4 (14.4%)	33 (3.4%)	1.6 (4.7%)	1.4 (14.9%)	0.6 (15.6%)	7.6 (10.0%)	13.3
Industry > 500 GWh/a	1,202	14.6	197	6.8	6.9	0.2	21.6	79.9
Industry, total*	*2,117*	*32.8*	*378*	*16.3*	*9.9*	*3.0*	*52.1*	*142.7*
Total saving potentials	**2,807**	**50.7**	**557**	**28.5**	**11.0**	**5.2**	**84.1**	**201.2**

Table 3. Saving potentials identified by energy audits within the EAP, 1992-2004. *Percentage figures in brackets refer to saving potentials as a share of consumption in 2004. (Data gathered from Motiva, 2005).

*Does not include saving potential of the process industry, which are monitored via the VA scheme.

For heat consumption the identified saving potentials are 2.8 TWh/year and for electricity the figure is 0.6 TWh/year, which means a total identified energy saving potential of 3.4 TWh/year. The industry sector accounts for almost 75 % of the identified saving potentials. In financial costs the total saving potentials are 84 million EUR/year (including water consumption) while the required investments are EUR 201 million.

There have been no prior expectations about saving potentials. The view of programme developers has been that it is not possible to estimate saving potentials in advance, since this is the very purpose of energy audits (Väisänen, 2005-11-03). At the time of the start of the EAP there were also no other countries with energy audit programmes to compare with. Instead, the focus has been to create the conditions for as good audits as possible and to follow what the outcome of the programme. It should be noted that quality control checks the technical quality of audits and to what extent saving potentials and costs are realistic. It does, however, not analyse whether the energy audit has managed to identify all, or a majority, of the saving potentials

that exist. This would require a bigger effort approaching the carrying out of a new energy audit.
In general, staff at MTI and Motiva are satisfied with the level of saving potentials that are identified (Väisänen, 2005-11-03; Koski, 2005-11-04). One observation could be made regarding the payback times of identified saving measures. In the EAP, energy auditors have instructions to identify all measures with a payback time up to 10 years. However, in reality most of the identified saving potentials have a short payback time (0-2 years), while fewer measures with a medium to long payback time are suggested. To some extent this reflects the fact that there are more measures with a short payback time, but staff at Motiva also suspect that there are measures which are just not identified (Koski, 2005-11-04). The reason could be that "it is human from the auditors and clients point of view to concentrate on the area were implementation is most probable" (Koski, 2005-11-04).

Success and failure factors

A successful identification of saving potentials depends on the other elements of the EAP previously discussed: existence of competent auditors, effective tools to support auditing and a tight quality control. Another factor that is important is that there is a true dedication among target groups about the importance of energy savings. This factor is even more important for the implementation of saving measures and will be further discussed in the next section.

The existence of a comprehensive monitoring system has been essential in order to collect information on saving potentials and other data. The monitoring system was costly to develop and takes a lot of work to keep going. It was, however, a conscious decision to put the system in place, and programme developers feel that it is worth it.

3.7 Implementation of energy saving measures (Indicator 7)

Until 2000, monitoring activities of the EAP included three follow-up questionnaires (1995, 1996 and 2000), which were made to check implementation rates of the identified saving potentials (Väisänen and Reinikainen, 2002). In the studies, a representative selection of the companies and organisations in the different sectors was included. The subsidy decisions include a 3-year obligation for the applicants to submit information, if requested by Motiva or the MTI, on those measures proposed in the energy audit report. From 2000, monitoring on implementation rates has been taken over by the VA scheme, were companies annually have to report the saving measures they have implemented or are planning to implement (Suomi, 2005-11-04).

Based on the information from target groups Motiva has estimated that in the service sector around 70 % of the proposed energy savings are later implemented. In the industry sector the figure is 60 % (Motiva, 2005).

No prior targets exist about achieved energy savings. Motiva and MTI are in general satisfied with the implementation of energy savings and are of the opinion that the programme has been successful (Väisänen, 2005-11-03; Hietaniemi, 2005-11-04; Koski, 2005-11-04; Suomi, 2005-11-04). Both in the service and industry sectors implementation rates are fairly high. The main disappointment of the programme might be that relatively few measures with a medium to long payback time have been implemented. Instead, implementation of energy savings has been mostly in measures with a short payback time (0-2 years). While this is maybe natural (easy measures are implemented first) it has been seen as a problem by programme managers. In order to tackle the problem they have identified Energy Service Companies (ESCOs) as an actor that could be well suited to take care of measures with a medium term payback time (2-5 years) (see Ch. 2.2). So far the ESCO market shows promising signs but has not really taken off as expected.

Success and failure factors

In both the EAP and the VA scheme, the implementation of energy saving measures is totally voluntary for companies and organisations. This is a central feature of the Finnish model which differentiates it from energy audit and voluntary agreement programmes in many other countries. The only requirements are that companies in the VA scheme are committed to carry out energy audits and that auditors should suggest measures with a payback time up to 10 years. Then the company can in theory decide not to carry out any measures at all. For such an approach to be successful it is of key importance that companies and organisations feel that energy efficiency is important and that they have a genuine interest in carrying out energy saving measures. The main incentives for companies to carry out savings are the following (Väisänen, 2005-11-03; Hietaniemi, 2005-11-04; Koski, 2005-11-04; Suomi, 2005-11-04).

- *Economic*. Saving measures are a means for companies to cut energy costs. However, since energy efficiency is not a primary issue for most companies and organisations, investments with a too long payback time (normally more than 2 years) will not be realised.
- *Investment subsidies*. Within the VA scheme companies get 15-20 % investment subsidies for carrying out saving measures. Saving measures with new technology and those carried out by ESCOs get 20-25 % subsidy.
- *Goodwill*. Especially for larger companies and for municipalities it can be important to be able to show that they are actively doing something to improve the environment. If this at same time is economically profitable the decision is easier to make.
- *To avoid stronger policy tools*. As discussed in Ch. 3.1. an important driver for the industry to join the VA scheme was to avoid the risk that the government would use stronger policy tools such as taxes or regulations. Even if this is maybe not an important factor for each company to carry out energy saving measures it is still important to show that the model actually leads to savings.

A result of the voluntary nature of the programme is that there are no tensions between Motiva and the target groups. Companies and organisations see the EAP as a tool for them to reach energy efficiency and they see Motiva as an organisation that is there to help them. Staff from Motiva regularly meet with company staff to discuss the results of energy audits and to give advice on which saving measures that they should focus on (Hietaniemi, 2005-11-04). In the industry sector this dialogue is made easier since only around 10 companies account for 80 % of the energy consumption.

3.8 Net impact

The cumulative savings during the period 1992-2004 were about 29 PJ (8 TWh), of which industry accounted for about 70 % (Motiva 2005). This means an average annual energy saving of 2.2 PJ/year. However, during the first years of the EAP the effectiveness was rather low and relatively few energy saving measures were achieved. Between 1999 and 2004 the programme has been running more effectively and the estimated annual energy savings during this period was 3.6 PJ/year (1 TWh/year). Around 80 % of these savings came from the industry sector. In these figures the energy intensive process industry is not included since these companies are monitored under the VA scheme. The annual savings of the energy intensive industry is around 2.5 PJ/year (0.7 TWh/year) while the cumulative savings are 9 PJ (2,5 TWh.)[4]

The free rider effect

When implementing a policy instrument there is always a risk of free riders. In this case the free rider effect is energy saving measures that would have been carried out autonomously, without the existence of the EAP. Within the EAP no priority has been given to the monitoring or evaluation of the free rider effect. The policy makers are of the opinion that the vital aim is that saving measures are actually carried out, and as long as this has been the case they have not seen it as an important priority to determine the extent of the free rider effect.

There are two aspects of the free rider issue. First, the question is whether *energy audits* would have been carried out without the EAP? Since subsidies are fairly generous and since energy audits were rare before the EAP it can be assumed that most of the audits would not have been carried out without the EAP. Thus, regarding the first aspect, the free rider effect is very low. Second, the question is whether any of the *energy saving measures* would have been implemented without the EAP. This would imply that measures would have been identified and implemented even without the carrying out of full energy audits. One aspect that points to a high free rider effect is

[4] In the monitoring of the VA scheme there is no seperation between measures that come as a result of energy auditing and othe measures taken by companies, which means that all the savings in the process industry cannot be attributed to the EAP. For this reason it is not possible to add together the results of the process industry with the other sectors.

that most measures that have been implemented have a payback time of 0-3 years[5]. If assuming that measures with a payback time of less than 2 years would have been carried out autonomously, the free rider effect would be high. However, it can be argued that such an assumption is precarious to make for an energy audit programme, since the very purpose of the instrument is to identify measures that were not known before. The fact that many measures with a short payback were identified instead suggests that there was a large potential to carry out relatively easy measures, and that these measures were not carried out before. It can be assumed that measures with a short payback time will be more scarce as the programme develops. Another way to estimate the free rider effect is to relate the energy saving to the total consumption of the target groups involved. It can be assumed that autonomous energy savings are about 1% per year and that all savings above 1% are policy induced. Between 1999 and 2004 the annual energy saving was 3.6 PJ/year (1TWh/year) for the companies and organisations in the service and industry sectors. The total annual consumption of the buildings and sites where measures were carried out during this period was 54 PJ/year (15 TWh/year) (Motiva 2006). The relative energy savings are thus 6.7%, of which 5.7% can be regarded are policy induced. This means that energy savings of about 3.1 PJ/year are policy induced, which corresponds to 86% of the energy savings. These results are in line with an informal enquiry by Motiva to the active energy auditors, which represents the only attempt to measure the free rider effect. The energy auditors estimated that about 10-15% of the achieved energy savings via improved measures found in energy audits would have been improved if there had not been any energy audits (Motiva 2006).

In conclusion it can be stated that the free rider effect is difficult to determine but that it probably does not exceed 15% of the energy savings. Thus, when taking into account a possible free rider affect the net impact is between 24.5 and 29 PJ, while the net annual savings (1999-2004) are between 3.1 and 3.6 PJ/year.

Uncertainties

Uncertainties in data collection and calculation of results. First, all data collection is based on information from energy auditors and companies, which introduces a risk of bias in the data. Staff from Motiva and the MTI agree that there is such a risk but argue that there are no incentives for companies to send false information, since they do not get any direct benefits from reporting higher implementation rates (Väisänen, 2005-11-03; Hietaniemi, 2005-11-04). Second, energy saving results are calculated by summing up the identified saving potentials and multiplying this with the implementation rates reported by companies. No real life measuring is thus done on the actual energy saving that each measure results in. This obviously introduces uncertainty into the results. Taking these uncertainties into account, the programme managers are of the opinion that the data is reliable enough and argue that it is not possible to get

[5] Exact figures on payback times have not been obtained.

more reliable data with reasonable costs (Väisänen, 2005-11-03; Hietaniemi, 2005-11-04).

Connections to the VA scheme. Since the EAP and the VA scheme are so closely connected it is very difficult to determine how big part of the savings that come from the EAP and how big from the VA scheme. In practice the two programmes should really be seen as two integrated parts of one bigger programme.

Spill-over effects. Another factor that might imply an underestimation of results are spill-over effects. Some of the larger multinational industrial companies in Finland have carried out energy analyses in all their factories around the world. This has lead to energy savings that have not been accounted for in the EAP (Hietaniemi, 2005-11-04). Also, staff at Motiva, reason that the knowledge of energy efficiency that auditors receive in the programme is not only used when carrying out audits. This kind of thinking will also be used by consultant companies in other occasions, such as the implementation of new projects and the construction of new buildings. The size of these spill-over effects are, however, impossible to estimate or quantify.

3.9 Target achievement

An objective of Finland's National Climate Strategy is that by 2010 energy conservation measures account for a reduction of CO_2 emissions of 3-4 Mt CO_2/year. Based on an average emission factor of 340 kg CO_2/MWh the average annual energy savings (2.2 PJ/year) correspond to an annual emission reduction of 210,000 tonnes CO_2/year. The annual energy savings between 1999 and 2004 (3.6 PJ) correspond to an annual emission reduction of 340,000 CO_2/year.

3.10 Cost efficiency

The cost-efficiency of the policy instrument is here defined as the ratio between costs and benefits of an instrument and the amount of energy saved and expressed in euro per final energy saved (GJ). Below, the cost-efficiency for various groups is calculated.

3.10.1 Society

Total costs of society is calculated as the sum of costs for government and end-user. These are EUR 128.9 million. By taking the default values of 4 % interest rate and a 10 year depreciation period for the eneregy efficiency measures, the depreiciated costs for society are EUR 15.5 million.

3.10.2 Government

The cumulative effect of energy savings, carried out by companies and organisations within the EAP between 1992 and 2004, is between 24.5 and 29 PJ (including possible free rider effect). However, as discussed above, it is not possible to distinguish the effects of the EAP and the VA scheme. For this reason two examples are included in the calculations of government cost efficiency, one with expenses only for the EAP and one also including expenses of subsidies within the VA scheme.

The total government expenditure of the EAP (1992-2004) has been EUR 21.8 million. By taking the default values of 4 % interest rate and a 10 year depreciation period for the energy efficiency measures, the depreciated government cost is EUR 2.6 million. The ratio between government costs and energy savings is then in the range of 0.09-0.11 €/GJ.

If the costs of investment subsidies within the VA scheme is included the total government expenditure is EUR 36.2 million, which means a depreciated government cost of EUR 4.3 million. The ratio between government costs and energy savings is in this case 0.15-0.18 €/GJ.

3.10.3 Other organisation

Not applicable.

3.10.4 End-user

Audit costs for the end-users are EUR 22.7 million when government subsidies are subtracted (see Ch. 1.2). In Chapter 3.6 (Table 3), it was shown that investment costs were EUR 201 million if all saving potentials identified between 1992 and 2004 would be realised. Relating this to implementation rates (70 % in service sector and 60 % in industry) this means that total investment costs are about EUR 125 million. To this should be subtracted the investment subsidies of EUR 14.4 million, which means that investment costs for end-users are EUR 111 million. Total costs for end-users are thus EUR 133 million. With 10 years depreciation time and 15 % interest rate, the depreciated cost of end-uses is EUR 27 million for the measures. Total saving potentials are 32 million €/year for service sector and 52 million €/year for industry. When relating this to implementation rates the total savings of end-users is about 54 million €/year. This means that the annual cost for end-users is in fact an annual return of around 27 million €/year. Finally, the ratio between end-user return and energy savings is 0.9-1.1 €/GJ.

If subsidies are included the costs for end-users is EUR 166 million and the depreciated cost is EUR 34 million. In this case the annual return for end-users is 20 million€/year and the ratio between end-user return and energy savings is 0.7-0.8 €/GJ.

4 Conclusions

4.1 Net impact, effectiveness and cost efficiency

It can be concluded that the EAP has been a generally successful programme. Most of the steps of the policy theory have functioned well and the problems that have appeared have been handled competently. The most important quantitative outcomes of the programme can be summarised as the following:

- *Net impact* is a cumulative energy saving of 29 PJ. If the possible free rider effect is included the net impact is 24.5-29 PJ. These figures have, however, to be interpreted cautiously, since connections to the VA scheme and spill-over effects are not included.
- *Effectiveness* has not been possible to calculate since no targets on energy savings exist.
- *Cost efficiency,* as a ratio between costs and energy savings (including free rider effect), is for government 0.09-0.11 €/GJ without costs for the VA scheme or 0.15-0.18 €/GJ, including these costs. For end users the result of the EAP is an annual return and the ratio between return and energy savings is in the range of 0.9-1.1 €/GJ.

4.2 Success factors

Flexible planning approach. In order to understand the challenges of developing the EAP it is important to see that the programme was the first of its kind in Finland and elsewhere. Though experience of energy auditing existed, the programme developers had very little prior experience of how to develop a comprehensive auditing programme. A flexible and step-by-step planning approach was therefore essential for success. The programme started in a very simple form and gradually grew and became more mature and complex as the management needs and demands of target groups were understood better. Also, if something did not work as expected or if a new challenge arose, this was handled by modifying the programme or adding new elements. Examples of this flexible approach are the development of audit models and auditor's tools, the development of training and quality control, the incorporation of the VA scheme and the introduction of the ESCO programme.

Clear vision of objectives and central elements of the policy instrument. The flexible planning approach does not by itself explain the success of the programme. It was also important that programme developers early on had clear visions about the

objectives and central elements of the programme. Most crucially, based on earlier experience of energy auditing, there was an understanding that an effective energy audit programme needed more than only subsidies for auditing (Väisänen, 2005-11-03). From the start it was clear that training, monitoring, quality control, tools and models would be central elements of the programme. How these things were to be organised was, however, relatively unknown at the outset.

Active promotion of the policy instrument. During the first years of the EAP, promotion activities were very intense and this managed to create a general awareness and legitimacy of energy auditing in the market.

Training of auditors. The establishment of a systemized training scheme for auditors helped to increase the legitimacy of energy audits and has contributed to the quality of audits. The use of consultant companies as energy auditors has probably helped making the policy instrument knows, since consultants have close contacts with companies.

Co-operation and dialogue with stakeholders. Another important factor was that the development of the EAP has been very much characterised by a co-operative and dialogue oriented planning approach. To a large extent, the adding of new elements to the programme, has come as a result of demands and feedback from stakeholders. Primarily consultant companies, but also target groups, have been actively involved in the development of the different elements of the programme, such as energy audit models and auditor's tools. Experienced energy auditors are also responsible for the training of new auditors.

Changes kept to a minimum. Though flexibility has been a key aspect of the programme, somewhat contradictory, another important rule has been to make as few changes as possible (Väisänen, 2005-11-03). First, because of the complexity of the programme, a change in one element of the programme could affect many other parts, which can lead to need for costly modifications if a proper analysis is not made before. Second, there can be a considerable time lag between a change and its effect, which means that continuous fine tuning of the programme is not possible. Third, market actors tend to prefer stability which means that too many changes has the risk of creating a loss of confidence in the programme. Though the programme has been modified continuously, every change has been analysed carefully and radical changes in the programme have been avoided (even when prior decisions have proven to be bad, see Ch. 3.3).

Interlink ages of policy instruments. The programme managers have been aware of, and actively taken advantage of, the important synergy effects between different energy efficiency policy tools. As has been shown, the introduction of the VA scheme was of absolute importance for the long term possibilities to have high auditing volumes in the EAP. Likewise, the existence of the EAP was important to

have an effective VA scheme. The introduction of the ESCO programme was motivated primarily as a way to increase implementation of saving measures identified in the EAP.

Flexible and competent implementing agency, which was given considerable freedom. An organisation such as Motiva has been an essential for the development and management of the EAP. Motiva was established in 1993 with one of its central tasks being to develop the EAP. Prior to this, such activities were managed by the MTI. According to staff at the MTI, the EAP would probably only have lasted a few years if the MTI would have been responsible, since they would not have has resources to develop it and since government ministries do not usually operate long-term programmes (Väisänen, 2005-11-03). Motiva was free from the duties and responsibilities of a government ministry was able to focus on a long-term management of the EAP. The organisation got enough resources and relatively free hands to develop the programme. Another advantage is that it is a small organisation which means short decision paths and more flexibility. The staff of Motiva came from energy and consultant companies and thus had good knowledge of the market. It has also been important that there have been good relations and confidence between Motiva and the MTI, meaning that staff at Motiva have been given support along the way.

Long-term political support. Political support is always essential for the success of policy programmes. In this case initial support was achieved because staff at the MTI has personal interest in energy auditing and managed to make it a priority of the government (Väisänen, 2005-11-03). In order to maintain political support it was essential to be able to show that the programme lead to real results, thus monitoring and information have been central. For decision makers, it is important to understand the time lag between the implementation of measures and results, since it implies a risk that a potentially successful programme could be terminated if results are slow to materialise in the beginning.

Systematic and thorough monitoring. The existence of a thorough and detailed monitoring system has been important both to keep track of the development of the programme in different sectors and to show to decision makers and the public that the programme achieves real outcomes.

Luck. Finally, it should be pointed out that a complex programme probably needs a lot of good fortune to succeed. In this case, there are a few striking examples of lucky coincidences. First, as discussed above, the role of Motiva has been very important. However, the creation of Motiva was a result of a lucky combination of available finance and political will at that specific moment in time (Väisänen, 2005-11-03). Though, a need for Motiva had been identified it was not perceived as the crucial actor that it later became. In fact the organisation was supposed to exist for 3 ½ years only, but after three years a decision was made to make it permanent.

Second, as discussed in Chapter 3.1, the EAP happened to be introduced when market conditions were favourable, which gave it a good start. Had it been launched a few years earlier or later, it might not have been able to show good results from the start and political support might have disappeared.

4.3 Failure factors

No major fail factors have been identified. However, since the policy instrument was new, both in Finland and internationally, planning and implementation was characterised by much trial and error and learning by doing. Other countries that implement a similar energy audit programme could probably have a smoother process, based on experience in Finland and other countries.

4.4 Learning experiences

Many important lessons can be drawn from the results of this evaluation. Much of the learning experience is of a rather general nature and does not apply only to the development of energy audit programmes. Some of the lessons are especially valuable for countries that are planning to develop and implement a new and complex policy instrument where little prior experience exists.

- **Use a flexible planning approach.** When implementing a complex policy instrument it is vital have certain flexibility in planning and implementation. It is better to start simple and develop the programme over time than to try to plan everything from the start. Countries who want to introduce an energy audit programme can learn much from the Finnish experience and will can thus probably have a quicker start of the programme.
- **Be clear about the central elements of the policy instrument.** Even though many practicalities are unclear at the start it is important to have a clear vision of what the instruments should do and what its central elements are. For the design of energy audit programmes there does today exist considerable experience and knowledge, from the EAP in Finland and from energy audit programmes in other countries. Two EU-projects, AUDIT I and II, have collected and systematized this knowledge. In the guidebook to programme developers, the basic conclusions are that there are 12 central elements of an energy audit programme and that these can be combined and designed in different ways (Väisänen et. al., 2003) (see also other AUDIT reports at Motiva's homepage: www.motiva.fi).
- **Active promotion is essential.** Especially in the initial phase of the policy instrument, promotion activities are needed in order to make the instrument well-known among market actors.
- **Include stakeholders in programme development.** The involvement of stakeholders is vital, both to get a good market acceptance of the instru-

ment and to make sure that tool and energy audit models are well suited to the needs of the users.

- **Make careful analysis of necessity and effects before making important changes in the policy instrument.** Market actors tend to want stability and are very sensitive to constant changes in a policy instrument. Changes must therefore be highly motivated. Sometimes it is better to accept a slight malfunctioning of the instrument than to make changes with uncertain side effects.
- **Implementing agency must be competent and know the market, and be given sufficient freedom to manage the instrument.** The use of a small and independent implementing agency, such as Motiva, can be vital for the success of the instrument. It is also good if the staff is familiar with how the market works and how market actors behave.
- **Long-term and stable political support is essential.** Especially for a new and complex policy instrument long-term political commitment is needed, since it can take some years before the instruments show good and measurable results. Political short-sightedness has the risk of terminating policy instruments with high potentials.
- **Include monitoring from the start of the policy instrument.** Monitoring is essential in order to be able to make proper evaluations and necessary modifications of the instrument. Monitoring also makes it possible to show that the instrument actually has an impact, which can increase political support. It is best to include monitoring from the start to get comprehensive data. However, as in other aspects of programme development, flexibility in the design of the monitoring scheme is needed.

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Suomi, Ulla, 2005-11-04, group interview*. Product Group Manager, Motiva.

Väisänen, Heikki, 2005-11-03. personal interview. Senior Adviser, Energy Department, Ministry of Trade and Industry. Employed at Motiva from 1992 where he was main responsible for the development of the EAP.

*The first three persons in the list were interviewed together in a group interview but answered individually to questions from the interviewer.