

Senet-study:  
Means of Promoting and Monitoring Energy Conservation  
Measures

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# 1 The National Energy Conservation Process of Finland

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## 1.1 Energy conservation policy

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The Program of the Finnish Government, agreed upon between the parties forming the Government at a given time, includes the major statements of the objectives and measures regarding the national energy policy.

In the current Government Program the energy issues are closely linked with the climate issues.

The main aim of the Program is to fulfill the national commitments of the Kyoto Protocol, taking into consideration the security of the functioning of the energy system as well as the conditions for the international competitiveness of the economy.

The factors of energy efficiency and renewable energy sources are emphasized.

Every new government will take its stance on the energy policy issues, incl. energy conservation, and formulate the strategy accordingly.

## 1.2 Strategy

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The latest strategy proposal concerning energy conservation is a part of and spelled out in the Energy and Climate Policy Outlines for the Near Future - National Strategy for Implementation of the Kyoto Protocol. The Government's Report to Parliament

The main factors giving cause to a new strategy were changes in the international operating environment during the past few years: the EU Directive on emissions trading and the Kyoto mechanisms.

The Kyoto Protocol is an element in the international treaty - the United Nations Framework Convention on climate Change (UNFCCC) - which most of the UN member states have joined. It entered into force in 1994.

- The Kyoto Protocol  
[http://unfccc.int/essential\\_background/feeling\\_the\\_heat/items/2878.php](http://unfccc.int/essential_background/feeling_the_heat/items/2878.php)
- United Nations Framework Convention on climate Change (UNFCCC)  
<http://unfccc.int/2860.php>

The Kyoto Protocol entered into force in 2005 after the minimum criteria concerning the number of signatories and the coverage in terms of the emissions had been met. The Kyoto Protocol commits the signatories to individual, legally-binding targets to limit or reduce their greenhouse gas emissions. The EU adopted a reduction target of 8 % by 2008–2012 compared with the level of 1990. This target was then allocated between the EU Member States so that e.g. for Finland it became 0 %, i.e. a need to reduce its greenhouse gas emissions back to the level in 1990.

The fulfillment of the requirements of the Kyoto Protocol within the EU is a part of the implementation of the European Climate Change Programme (ECCP).

- European Climate Change Programme (ECCP)  
[http://forum.europa.eu.int/Public/irc/env/eccp\\_2/home](http://forum.europa.eu.int/Public/irc/env/eccp_2/home)

In the spring of 2006, the Finnish strategy proposal is still being discussed in the national Parliament. The proposal was commented by various committees of the Parliament, which does not give a formal approval on the strategy to the Government but will conclude the process by instructing the Government with relevant resolutions.

The strategy was prepared under the leadership of the Ministry of Trade and Industry, supervised by the Ministerial Working Group of Climate and Energy Policy, headed by the Minister of Trade and Industry, the members being the ministers, state secretaries and special advisors from the ministries of Finance, the Environment, Transport and Communications, Agriculture and Forestry. The preparatory work was carried out by the Climate and Energy Policy Network, comprised of representatives from the ministries of Trade and Industry, Finance, Foreign Affairs, the Environment, Transport and Communications, Agriculture and Forestry.

The Ministry had several studies made to support the preparation. A large number of people from the administration and experts from interest groups representing energy producers and end-users were involved in the work.

One of the appendices to the strategy document includes a scrutiny of scenarios on alternative paths of the future development, another appendix deals with measures concerning energy conservation and efficiency.

The strategy does not introduce any totally new energy conservation measures but rather reiterates those already in use giving them additional weight. Experience has proven the serviceability of the following government instruments in fostering improvements in energy efficiency:

- supporting energy auditing
- applying the system of voluntary energy conservation agreements
- promoting combined production of heat and power
- supporting development and implementation of energy efficient technologies
- maintaining a high level of information activities on energy conservation

With these measures, complemented by the necessary legislative changes for the implementation of the directives concerned, the Government intends to secure the attainment of the energy conservation targets in areas that are outside the domain of the emissions trading directive.

## 1.3 Implementation

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### 1.3.1 Organisation

The Department of Energy in the Ministry of Trade and Industry is in charge of the implementation of the strategy on energy conservation. The Ministry has the regional network of the Employment and Economic Development Centres (TE-Centres) at its disposal. The main

role of the Centres is to administer the subsidy programs concerning e.g. energy conservation activities.

Most of the other ministries have also a role in the implementation of the strategy, the most relevant of them being: the Ministry of the Environment regarding the Building Code, planning, and subsidies to the housing sector, the Ministry of Transportation and Communications regarding improvements in the transport conditions, and the Ministry of Finance regarding the fiscal instruments.

The authorities on the county level have a role through their responsibility for regional planning, creating this way circumstances for e.g. communication and transportation.

The city authorities are responsible for city planning, as well as many functional aspects on the city level, that have an impact on energy consumption. The city authorities have also been delegated the task of allocating the government subsidy money for renovation of apartment buildings, including the investments in energy conservation.

The regional Energy Agencies carry out information dissemination and training work as well as projects dealing with energy conservation with individual clients in the public and private sectors, without being a part of the official administrative structure of the Government. However, the network of the Agencies covers only a part of the country.

The energy conservation strategy of the Finnish Government does not give any explicit target figures for the individual end-use sectors. Most of the conservation activity is based on voluntariness and market forces. The government subsidies and programmes can support directly only a minor part of the necessary efforts for reaching the overall target.

### 1.3.2 Instruments

The main instruments specified in the strategy for fostering energy conservation with support from the Government are:

- subsidies to energy audits and energy conservation investments
- financing to the development of energy efficient technologies and innovations
- financing to the development and implementation of innovative business ideas to promote better energy efficiency
- contracting work to Motiva, the Energy Efficiency Centre
- setting up and running of the voluntary energy conservation agreement system
- financing of the climate change communication program

The subsidy to cover part of the cost of an energy audit is normally 40 % of the eligible auditing costs and paid to the client. A municipality, if it is a party to the Voluntary Energy Conservation Agreement with the Ministry of Trade and Industry, may have 50 % of its eligible auditing costs covered with the subsidy.

The level of the subsidy to cover costs of an energy conservation investment is subject to the size and nature of the investment, varying from 15 to 40 %. The highest percentage is applied in cases where new, energy efficient technology is taken into use, and the lowest when conventional technologies are used.

The Finnish Funding Agency for Technology and Innovation (Tekes) is the main source for financial support to technology development as well as to the development of technology-related new businesses, including those furthering energy conservation.

Motiva, being an in-house consulting company mainly for the government organisations, prepares annually a work plan which is the basis of financing from the Ministry of Trade and Industry. A considerable part of this work plan deals with energy conservation projects: energy auditing, ESCO-activities, development of new methods, commercialisation of new technologies and information activities. Motiva is contracted also by some other ministries and government organisations for carrying out or managing projects dealing with energy conservation.

### 1.3.3 Schedule

The focus of the strategy is in the period of 2008–2012, following the current commitment period of the Kyoto Protocol. Targets are set and scenario studies carried out also further, to the years 2015 and 2025.

### 1.3.4 Monitoring

The development of the standard of energy efficiency on the national level is followed regularly by the Ministry of Trade and Industry with the help of the data in the energy statistics. The comparison of the total primary energy consumption with figures of the economic development, taking the structural and volume changes into account, gives an overall picture of the changes in the efficiency of the use of energy.

A more detailed picture is given on the basis of the data gathered by Motiva along with the energy audit reports. This is information of the energy consumption in each audited facility, broken down into consumption components: heat, electricity and water consumption, and estimates of feasibly realisable energy conservation investments.

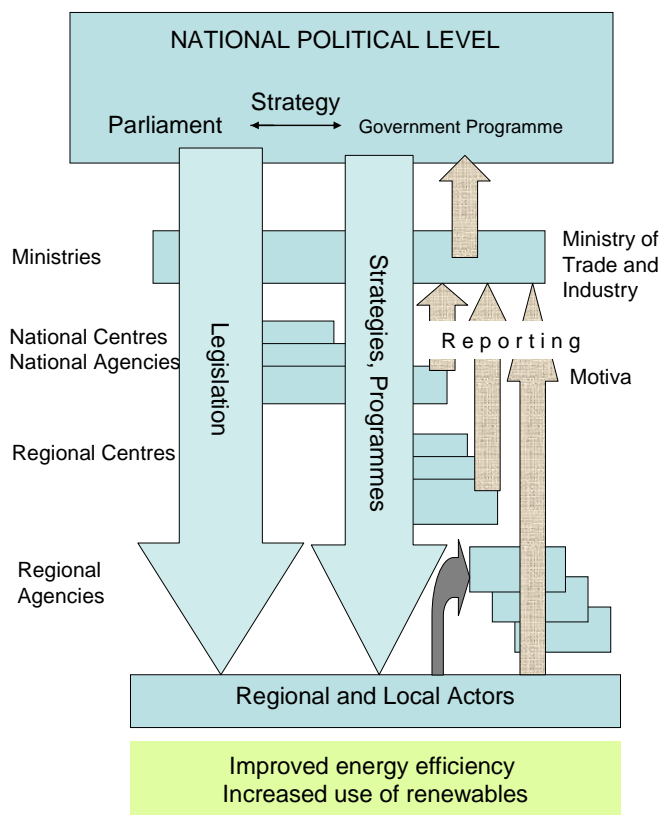
### 1.3.5 Results

The auditing reports show as average economically feasible energy conservation targets in buildings:

- 17 % in heat consumption
- 7 % in the use of electricity
- 7 % in water consumption

The feedback from partners to the Voluntary Energy Conservation Agreements shows that some 2/3 of the recommended conservation measures materialise within 3 years after the audit. The payback times of the investments made is in most cases shorter than 3 years.

### STEERING OF ENERGY EFFICIENCY THROUGH THE PUBLIC ORGANISATIONS



## 2 Fiscal and Financing Instruments for Promoting Energy Efficiency in Finland

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### 2.1 Energy pricing

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Energy is traded in the open market with market prices without any compensation elements for energy conservation. Subsidies are available to various phases of the wood fuel production chain but this does not have any impact on energy conservation.

Some benefit in the cost of energy can be derived in cases where the energy conservation measures give reason to revise the energy tariff by lowering the fixed fee.

### 2.2 Taxation

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Energy conservation investments do not enjoy any specific advantage above the normal taxation treatment.

The higher taxes for fossil fuels than for the renewable energy sources make energy conservation an option to switching over to renewables when cost savings are aimed at.

### 2.3 Subsidies

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Government subsidies from the state budget are available for the energy auditing costs, energy conservation investment costs, information activity costs and technology development costs.

A client that has ordered an energy audit from an authorized auditor may apply for a subsidy to cover 40–50 % of the eligible auditing costs. The higher limit is applied in cases where the client is a municipality that has concluded an Energy Conservation Agreement with the Ministry of Trade and Industry.

In the allocation of investment subsidies priority is given to companies and public organizations that have joined the Voluntary Energy Conservation Agreement and base the investment on an energy audit carried out by an authorized auditor. The subsidy rate is 15–40 % of the eligible investment costs, depending on the novelty value of the technology applied. Using an ESCO-service as the instrument to realize the investment is considered a means that is eligible for the subsidy.

Typical criteria for the eligibility to the investment subsidy are: value of the investment € 25.000–150.000, simple pay-back time longer than 2 years, priority given to electricity saving investments.

The Ministry of the Environment has resources in its budget for subsidies to thermal renovations of apartment buildings. The applications for this subsidy as well as the decisions concerning the granting of the subsidy are handled on the local level by the city authorities.

There is also a budget allocation for information activities pertaining to energy conservation.

The Finnish Fund for Technology and Innovations is the major source for financial support to developing new energy efficient technologies and related business concepts.

#### 2.4 ESCOs

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There is a possibility to apply for government support to investments based on energy services provided by an Energy Service Company (ESCO). Financing is a typical element in an ESCO-contract whereby the service company commits itself to a total delivery including the arrangement of financing for the energy conservation investment. The ESCO gets payment for its services from the savings resulting from the investment.



An EU-regulation becomes official when it passes the Parliament after a thorough preparatory process taken care of by the Commission together with the appropriate representatives of the Member States. A directive is a piece of legislation binding the Member States. The directives do not necessarily include an explicit sanction clause leaving it to the Member States to make the decision on the binding force in their national legislation.

Other documents that do not have an official and binding status to the Member States are prepared and put out by the Commission on issues that are important for preparing the implementation of the EU-policies. There are several such documents also concerning energy conservation and energy efficiency.

Green Papers are discussion papers published by the Commission on a specific policy area. They are primarily documents addressed to interested parties, organisations and individuals, who are invited to participate in a process of consultation and debate. The consultations can be accessed on the Voice in Europe -website.

- Voice in Europe -website  
([http://europa.eu.int/comm/dgs/energy\\_transport/home/consultation/energy\\_en.htm](http://europa.eu.int/comm/dgs/energy_transport/home/consultation/energy_en.htm))

In some cases the Green Papers provide an impetus for subsequent legislation.

White Papers are documents containing proposals for Community action in a specific area. They sometimes follow a Green Paper published to launch a consultation process at the European level. While Green Papers set out a range of ideas presented for public discussion and debate, White Papers contain an official set of proposals in specific policy areas and are used as vehicles for their development.

### 3.1 Aspects of common energy strategy

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#### 3.1.1 Security of energy supply

The European Commission published the Green Paper *Towards a European strategy for the security of energy supply* [COM (2000) 769].

The document deals with the present energy demand and supply situation within the Union and the future outlook of the growing dependence on imported energy, namely oil and gas.

The objective of the long-term energy strategy of the EU should be to ensure uninterrupted physical availability of energy products on the market at an affordable price for all consumers, at the same time respecting environmental concerns and looking towards sustainable development.

The Green Paper outlines a strategy where higher preference should be given to the demand policy, including better efficiency in the use of energy.

- Green Paper:  
([http://europa.eu.int/comm/energy\\_transport/livrevert/final/report\\_en.pdf](http://europa.eu.int/comm/energy_transport/livrevert/final/report_en.pdf))

### 3.1.2 Green Paper on Energy Efficiency

In June 2005 the Commission published the *Green Paper on Energy Efficiency* [COM (2005) 265] as a continuum to the Green Paper on strategy. The motivation for the new Green Paper is in the need to identify concrete measures for tackling the increasing import dependence and meeting the targets of implementing the Kyoto Protocol.

The Green Paper on Energy Efficiency introduces the target of a 20 % efficiency improvement in the use of energy by the year 2020 compared with the current efficiency level. The realisation of this target would lead to energy cost savings of 60 billion euros and to a million jobs within the EU-region. Regarding the emissions reduction target 50 % of it could be reached this way.

The estimation is that 35 % is lost in the energy system from the primary energy to the final net energy utilised. Buildings, transportation and industry are currently the biggest end-use sectors. The highest potentials for efficiency improvements are estimated to be in transportation, buildings and the “other”-sector.

The Green Paper lists financial obstacles, insufficient regulatory action, lack of market for energy efficiency, lack of transparent and cost-reflective pricing and lack of information and education as challenges to be overcome when working towards the efficiency target.

The Green Paper proposes measures to be taken on the various actor levels: European, national, regional and local, industry, consumers and wider international fora. These should be dealt with in detail in an action plan. A new Action Plan on Energy Efficiency is on the agenda of the Commission.

- The Green Paper on Energy Efficiency:  
([http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2005/com2005\\_0265en01.pdf](http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2005/com2005_0265en01.pdf))

### 3.2 Directives on energy labelling

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Directives on energy labelling of the following groups of equipment have been approved in the EU:

- household equipment (92/75/EC)
- hot water boiler efficiencies (92/42/EC)
- refrigerators and freezers (96/57/EC)
- ballasts for fluorescent lamps (2000/55/EC)

These directives give a framework for providing the efficiency information of the products concerned but do not set any numeric energy efficiency targets for them, creating, however, conditions for free movement of the products within the Union to better facilitate the possibilities to energy conservation.

### 3.3 Directive on the energy performance of buildings (2002/91/EC) (<http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l00120030104en00650071.pdf>)

The energy use of buildings makes 40 % of the total energy demand within the EU-region. The objective of the Directive on the energy performance of buildings is to ensure,

that building standards across Europe place a high emphasis on minimising energy consumption.

This directive sets requirements on the calculation of the energy demand of buildings, the introduction of energy certificates and regular inspections of boilers and air-conditioning equipment. Under this legislation:

- a common methodology for calculating the energy performance of a building, taking into account local climatic conditions, will be applied throughout the EU;
- minimum standards for energy performance will be determined by Member States, and applied both to new buildings and to major refurbishments of existing large buildings;
- a system of building certification will make energy consumption levels much more visible to owners, tenants and users;
- boilers and air-conditioning systems above minimum sizes will be inspected regularly to verify their energy efficiency and greenhouse gas emissions.

Member states shall apply a methodology of calculation of the energy performance of buildings on the basis of the general framework set out in the Annex of the Directive.

The expression of the performance of the building shall include a CO<sub>2</sub>-indicator.

Based on the methodology, minimum energy performance requirements shall be set. These requirements may be differentiated between the various categories of buildings. Attention shall be paid at reaching proper indoor air conditions.

For new buildings with more than 1000 m<sup>2</sup> of floor area the feasibility of alternative heating systems have to be considered and taken into account before construction starts.

When existing buildings are renovated the energy performance has to be improved to meet the minimum requirements.

Member States shall ensure that, when buildings are constructed, sold or rented out, an energy performance certificate is made available. The certificate shall include reference values and be accompanied by recommendations for the cost-effective improvement of the energy performance. In public buildings the certificate shall be placed in a prominent place clearly visible to the public.

The requirement of inspecting boilers annually regards those fired by non-renewable liquid or solid fuel with an effective rated output of 20 kW to 100 kW. Boilers with an output of more than 100 kW shall be inspected at least every two years.

The requirement of regular inspections of air-conditioning systems is applied on systems of an effective rated output of more than 12 kW.

Member states shall ensure that the work required in this directive is carried out in an independent manner by qualified experts.

Member States were supposed to have brought into force the necessary national laws and regulations by January 4, 2006, to comply with this directive, but have the option of extending the implementation with 3 years.

The European Commission has set up the EPBD Buildings Platform as an information service for helping the implementation of the Directive. This service is supposed to be useful for practitioners and consultants, experts in energy agencies, interest groups and national policy makers.

- EPBD Buildings Platform:  
<http://www.buildingsplatform.org/cms/>

Finland was not ready to implement this legislation in the beginning of 2006 and is thus continuing the preparations in the spring of 2006.

The revisions in the current building regulations aim at applying the Directive so that in the case of a new building the performance reference will be given as the total efficiency of the building. The energy calculation method will be presented and that will be part of the design work. Minimum thermal requirements will be set to building parts.

The changes will result in more freedom in the design of buildings. The fulfilment of the building code will be checked during the design and building phases. Input data for the energy performance certificate will be produced in the design process. The indicated energy performance is based on calculated energy efficiency in kWh/m<sup>2</sup>,a.

It is proposed that for existing buildings energy performance could be expressed by the measured consumption of energy, but could also be calculated. Improvements in energy efficiency must be verified by building inspection.

The bill pertaining to the implementation of the EPBD in Finland proposes that an energy certificate shall be presented by the building owner when the building or part of it is put for rent or sale. In buildings providing services to the general public the certificate should be placed visible without the aforementioned conditions. Existing apartment buildings with less than 6 apartments will be excluded from the certificate obligation.

By requiring the setting of the reference values for the total energy efficiency in the design of buildings the new regulations will probably bring along some energy conservation effect. However, by not setting upper target values higher than the common practice is today the real conservation effect may remain modest.

#### 3.4 Directive on the promotion of cogeneration based on a useful heat demand in the internal energy market (2004/8/EC)

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([http://europa.int/eur-lex/pri/en/oj/dat/2004/l\\_05220040221en00500060.pdf](http://europa.int/eur-lex/pri/en/oj/dat/2004/l_05220040221en00500060.pdf))

The purpose of this directive is to create a framework for promotion of cogeneration based on useful heat demand in the internal energy market.

According to this directive Member States shall ensure that the origin of electricity produced in cogeneration units can be guaranteed as such. One or more competent bodies shall be designated to supervise the issue of the guarantee of origin.

The guarantee of origin shall specify the fuel source, specify the quantity of electricity and specify the efficiency reference values for separate production of electricity and heat the efficiency of cogeneration.

Member States shall establish an analysis of the national potential for high-efficiency cogeneration. The analysis shall be based on well-documented scientific data and distinguish between of cogeneration in industry, heating and agricultural applications. A separate analysis of barriers shall be included in the analysis.

Member States shall take the necessary measures to ensure that transmission system operators and distribution system operators guarantee the transmission and distribution of electricity produced from cogeneration.

([http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2003/com2003\\_0739en01.pdf](http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2003/com2003_0739en01.pdf))

The purpose of this directive is to make the end-use of energy more economic and efficient by establishing targets, incentives and the institutional, financial and legal frameworks and by developing a market for energy services and for providing energy saving programs and other measures.

This Directive shall apply to providers of energy efficiency improvement measures, energy distributors, distribution system operators and retail energy sales companies and final customers.

This Directive requires action to be undertaken by the Member States, with the fulfilment of its objectives depending on the effects that such action has on the final consumers of energy.

Even though Member States commit themselves to making efforts to achieve the target figure of 9%, the national energy savings target is indicative in nature and entails no legally enforceable obligation for Member States to achieve it. In aiming to achieve their national indicative target, Member States may set themselves a target higher than 9%.

Member States shall ensure the availability of efficient, high-quality energy audit schemes which are designed to identify potential energy efficiency improvement measures and which are carried out in an independent manner, to all final consumers.

Member States shall ensure that, in so far as it is technically possible, financially reasonable and proportionate in relation to the potential energy savings, final customers for electricity, natural gas, district heating and/or cooling and domestic hot water are provided with competitively priced individual meters that accurately reflect the final customer's actual energy consumption and that provide information on actual time of use.

Taking full account of the national organisation of market actors in the energy sector and in order to favour the implementation of energy services and of the measures to improve energy efficiency provided for in this Directive, Member States should have the option of making it compulsory for energy distributors, distribution system operators or retail energy sales companies or, where appropriate, for two or all of these market actors, to provide such services and to participate in such measures.

The use of third-party financing arrangements should be stimulated.

The energy services, energy efficiency improvement programmes and other energy efficiency improvement measures put into effect to reach the energy savings target may be supported and/or implemented through voluntary agreements between stakeholders and public sector bodies appointed by the Member States.

The voluntary agreements which are covered by this Directive should be transparent and contain, where applicable, information on at least the following issues: quantified and staged objectives, monitoring and reporting.

The public sector in each Member State should set a good example regarding investments, maintenance and other expenditure on energy-using equipment, energy services and other energy efficiency improvement measures. Therefore, the public sector should be encouraged to integrate energy efficiency improvement considerations into its investments, depreciation allowances and operating budgets. Furthermore, the public sector should endeavour to use energy efficiency criteria in tendering procedures for public procurement.

The public sector may initiate energy-efficiency pilot projects and stimulate energy-efficient behaviour of employees. In order to achieve the desired multiplier effect, a number of such actions should be communicated in an effective way to individual citizens and/or to companies, whilst emphasising the cost benefits.

Member States shall ensure that information on energy efficiency mechanisms and financial and legal frameworks adopted with the aim of reaching the national indicative energy savings target is transparent and widely disseminated to the relevant market actors.

With a view to achieving a high level of technical competence, objectivity and reliability, Member States shall ensure, where they deem it necessary, the availability of appropriate qualification, accreditation and/or certification schemes for providers of energy services, energy audits and energy efficiency improvement measures

One or more public sector authorities or agencies are to be appointed to take care of the overall monitoring of the process set up to achieve the targets.

Member States shall submit to the Commission their Energy Efficiency Action Plans.

This Directive will enter into force in the spring of 2006. The implementation in the member states shall be executed within three years from that.

### 3.6 Directive on eco-design requirements of products

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([http://europa.eu.int/eur-lex/en/com/pdf/2003/com2003\\_0453en01.pdf](http://europa.eu.int/eur-lex/en/com/pdf/2003/com2003_0453en01.pdf))

It is estimated that over 80 % of all product-related environmental impacts are determined during the product design phase. Integrating environmental considerations as early as possible into the product development process is therefore crucial to introducing improvements to products.

This is a framework directive which will be followed by implementing measures establishing eco-design requirements, and does not set any immediate obligations. The Commission may base the adoption of the implementing measures on the following criteria to the energy using products:

- significant volume of sales and trade
- significant environmental impact
- significant potential for improvement
- the entire life-cycle of the product shall be considered
- negative impacts to the user or the operating conditions shall be avoided

This directive aims at ensuring the free movement of energy-using products within the EU, improving the overall environmental performance of the products and preserving the interests of both industry and consumers in ecological design.

This directive is applicable to any product using energy to perform the function for which it was designed. Hence, the scope is very large, but the directive gives criteria for selecting products that can be covered by implementing measures. However, motor vehicles are excluded from the scope because they are already subject to a vast number of regulatory and voluntary measures.

Manufacturers of products relevant to the implementation of this directive shall perform an assessment of the environmental aspect of a representative product model throughout its life-cycle.

### 3.7 Papers from the European Commission on Corporate Social Responsibility (CSR)

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The European Commission has published three official documents on CSR: the Green Paper Promoting European Framework for Corporate Social Responsibility [COM (2001)366], the Communication from the Commission concerning Corporate Social Responsibility [COM (2002)347] and the Communication from the Commission: *Implementing the Partnership for Growth and Jobs: Making Europe a Pole of Excellence* [COM (2006)136].

- EU Commission on CSR: ([http://europa.eu.int/comm/enterprise/csr/official\\_doc.htm](http://europa.eu.int/comm/enterprise/csr/official_doc.htm))
- COM (2002)347: [http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2002/com2002\\_0347en01.pdf](http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2002/com2002_0347en01.pdf)
- COM (2006)136: [http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2006/com2006\\_0136en01.pdf](http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2006/com2006_0136en01.pdf)

According to the Commission's documents CSR is a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis.

In the newest communication the Commission announces backing for a European Alliance for CSR. This is an open alliance of European enterprises to further promote and encourage CSR. It is not a legal instrument to be signed by enterprises, but rather a vehicle for mobilising the resources and capacities in the interests of sustainable development, economic growth and job creation.

The Communication identifies 8 areas which the Commission will emphasise in further promoting CSR:

1. awareness-raising and best practice exchange,
2. support to multi-stakeholder initiatives,
3. cooperation with Member States,
4. consumer information and transparency,
5. research,
6. education,
7. small and medium-sized enterprises, and
8. the international dimension of CSR.

In the documents from the Commission the environmental aspects have a lot of weight. This includes also energy conservation as a means to reach the targets of the CSR-policies of the enterprises and public organisations.

## 4 Energy Auditing in Finland and Some Other European Countries

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### 4.1 Overview

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Programme level energy audit activities, both pure energy audit programmes (EAP) and other programmes (OP) where energy audits play an important role, are quite well represented in the EU Member States and Norway as well as in the Central and Eastern European Countries (CEECs). Although the number of programmes does not give a full picture of the size and coverage of the activity, some level of energy auditing can be said to exist more or less in all countries.

In the EU Member States and Norway the total number of pure energy audit programmes is 13 in 7 countries, including Finland. In other programmes, where energy audits are included, the number is 29 in 15 countries. The number of other than programme level activities promoting energy audits is 18. In the CEECs there are 3 energy audit programmes and 11 other programmes. In addition, there are 15 other than programme level activities promoting energy audits.

### 4.2 Programme elements

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An energy audit programme is built of 12 basic elements: goals, legislative framework, subsidy policy, administration, audit models, key players, monitoring, training, authorisation, quality control, auditor's tools, promotion and marketing. Each of them requires first a rough planning of the principles followed by detailed planning of the implementation. The three basic elements: legislation, subsidies and promotion & marketing are the implementing instruments that deal with the questions of getting the energy audits started and of reaching a sufficient energy audit volume.

#### 4.2.1 Goals

The goal setting is connected to the target sectors of the programme and the realistic penetration of energy audits, to average saving potentials and finally to the realistic realisation rate of the proposed measures.

The goals for an energy audit programme are normally given in numbers of the annual and total energy audit volumes for sectors defined as target sectors for the activity. When the total coverage is defined there will also be a question on the lifespan of the activity. In parallel with the volumes alone the goals should determine also the intended concrete effects to be achieved by an energy audit. A smaller volume of more detailed energy audits might bring in better savings than a large number of very light walk-through-type energy audits.

The set goals have a strong effect on the total expenditure of the programme and on the manpower needed to both implement the audits and to co-ordinate the programme. The goal setting has an effect on most of the other 11 basic elements.

#### 4.2.2 Legislation

Energy audits may have a connection to the existing legislation even when the activity is based on a totally voluntary approach. If legislative changes need to be done, the programme developer has to know all those authorities that must agree on the changes. This means e.g. that taxation related incentives or new subsidy schemes might not be possible without a change in the legislation.

#### 4.2.3 Promotion and marketing

Irrespective of whether the energy audits are initiated by voluntary or mandatory means there is always a need for promotion or marketing or both. Promotional activities by a government organisation or a national energy agency can effectively support the marketing efforts of the energy auditors. Even when the energy audits are mandatory there is a need to raise the awareness among those organisations obligated to implement the audits.

#### 4.2.4 Subsidies

One option to support energy audits is to use subsidies as an incentive instrument. The effect of the subsidy can be very sensitive to its level. The commitment of the clients is dependent on the amount of money they are investing in the audits themselves. The higher the subsidy level is the higher the total cost of the programme becomes. If a mandatory audit scheme is applied in the municipal or residential sector, subsidies may be necessary in some countries for social reasons in order to lighten the economical burden to the clients.

#### 4.2.5 Key players

Two of the four key players in an energy audit program are self-evident: the client and the auditor. The other two players are called the Administrator and the Operating Agent. Without the Administrator there is no programme as the whole set-up is expected to be initiated by a government level body. The Operating Agent is responsible for running the programme. Normally the Operating Agent is a neutral organisation working under the supervision of the Administrator.

#### 4.2.6 Administration

An energy audit program includes several operational activities for which the program developer needs to plan the administration structure. This should be done in co-operation with representatives of the four key players.

#### 4.2.7 Monitoring

All energy audit programmes need some level of monitoring the provision of information and feed-back to justify the existence of the programme in the long run. The planning and development of a monitoring system is a long process and therefore should be started at an early stage of the programme. The data available for the monitoring is mainly the data, which is recorded in the energy audit reports.

#### 4.2.8 Audit models

One fact that is not always understood is that different target sectors need different energy audit models. A paper mill and a single-family house cannot be audited by using one standard model – or if done so, the guideline describing the model is so general that there isn't really anything to be called an audit model. From the theoretical viewpoint the type of an energy audit model can be either scanning or analysing. This basic option depends on the goal setting principle. Scanning models are used when the goal is to “point out” where there are opportunities to save energy. Analysing models are used when the goal is to propose concrete energy saving measures. This difference between the models in relation to the goal setting is very important to understand.

#### 4.2.8 Training

Some level of training is an essential element in an energy audit program. The Operating Agent is normally given the responsibility for arranging the auditor training. A compromise has to be made between a comprehensive training content and the maximum acceptable length of the training course. The answer can be found by setting the criteria for the access to the training and the level of competence to be reached through the training.

The training of energy auditors is closely connected to two other basic elements i.e., authorisation and quality control. The aim of all these three is equal – to ensure the quality of the audit work.

#### 4.2.9 Authorization

Authorization can be defined as a license, which enables the auditors to operate within the program. Authorization can either be restricted to those auditors only that have unquestionable skills to perform or, it can be used as a mean to control the minimum performance of all energy auditors.

The performance of an auditor can be pretty well ensured if the authorization is limited only to the area of high professionalism. But providing a training scheme aiming at multi-level and multi-area authorisation can be very laborious to administrate. The Operating Agent needs to see that the complexity is in proportion to the available resources and the magnitude of the program.

#### 4.2.10 Quality control

Quality control is tightly connected to training and authorisation. A well-motivated aim is to ensure the quality of energy audits in a cost-effective way.

The cost of improper energy audits, resulting from a non-existent quality control, is estimated at 10 to 15 % of the money spent on the audits. This estimate represents the amount of poor quality audits found by the quality controllers even in a smoothly running programme. Quality control ensures that the same mistakes are not likely to be repeated by the same auditors in the future.

#### 4.2.11 Auditors' tools

One way for the Operating Agent to improve the programme is to provide the energy auditors with tools that have an effect on the quality and cost-effectiveness of their work. The selection of the different possible tools varies from printed marketing material to software for calculations and published key figures for the rough first estimates on the level of energy efficiency of the facility to be audited.

The tools are not for the auditors only. The reporting tools e.g. can significantly improve the Operating Agent's work and reduce the administration costs.

### 4.3 Finland

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Energy auditing has been one of the main tools in Finland's energy conservation activities since 1992. The latest report of the Government to the Parliament on the Energy and Climate Policy Guidelines for the Near Future implies continuation of the implementation of the national Energy Audit Program (EAP).

- <http://www.motiva.fi/en/areas/energyaudits>

#### 4.3.1 Energy Audit Program (EAP)

There is one Energy Audit Program in Finland. The EAP is run by Motiva Oy (the Operating Agent), a state owned company.

The Energy Department of the Ministry of Trade and Industry (MTI) is the Administrator, responsible for all official decisions.

Most of the energy auditors work in consulting companies. The clients are from the industry, service and energy sectors.

By the end of the year 2005 about 6 400 energy audits had been carried out and reported.

### **Elements**

Finland's EAP is one of the oldest energy efficiency grant schemes applied. It is a full-scale program, with all elements included.

### **Goals**

Coverage targets for energy auditing have been set in the Voluntary Energy Conservation Agreements. E.g. for the municipal buildings the target is commonly set at 80 % of the building volume. The target year was 2005 in many of the agreements.

Other targets than those in the agreements do not exist on the national level.

### **Legislation**

There is no legislation concerning or influencing the need for energy audits.

### **Promotion and marketing**

Besides the market actors offering energy auditing services most of the promotion and marketing is done by Motiva as a part of its work program financed by the Ministry of Trade and Industry. The most important tool for this purpose is the internet site of Motiva ([www.motiva.fi](http://www.motiva.fi)). A lot of printed material for distribution has also been produced.

### **Subsidies**

Within the frame of the EAP the energy audits are subsidized by 40 to 50 %. The higher percentage is applied with municipalities that have joined the Voluntary Energy Conservation Agreement.

The cumulative amount of subsidies to audits in all relevant sectors during the period of 1998–2005 is estimated at 12 million euros and respectively the value of the cumulative savings at approx. 215 million euros. In terms of final energy consumption the annual savings have exceeded 1 TWh.

### **Key players**

Most of the energy auditors work in engineering and consulting companies.

The clients are from the industry, real estate companies, public and private services, and the energy sector.

### **Administration**

The Ministry of Trade and Industry has ordered the administrative services for supporting the EAP from Motiva. Motiva acts between the Ministry and the market developing the auditing procedures, training auditors and disseminating information in order to activate both the demand and the supply side actors on the market. Motiva also maintains the audit data bank, provides information of the auditing activities and their results in the reports to the Ministry.

The administrative function for the subsidy scheme is in the regional Employment and Economic Development Centres (TE-Centres) of the Ministry.

### **Monitoring**

All reports from the subsidized audits are sent to Motiva for checking and quality control. Along with this the essential data and other results are transferred from the reports to the data bank maintained by Motiva.

Using the data from the bank Motiva puts together an annual report of energy auditing for the Ministry.

### **Audit models**

There are audit models for different facilities, ranging from simple service sector buildings to process industry and power production. A separate audit model exists for apartment buildings.

For process industries and power plants there are energy analysis models applied for the specific conditions in those types of facilities.

There are various types of audits made available, depending e.g. on the age of the facility to be audited. The critical determinants for choosing the proper auditing scheme, besides the type of the facility, are its age and the phase of its life-cycle. The basic auditing model being for an existing, non-audited building, additional models have been developed for the commissioning phase of a new or renovated building, walk-through audits for a quick overview of the conditions, and a follow-up audit model to be applied in buildings that had been audited several (e.g. 10) years ago or that have experienced essential changes in their use.

### **Training**

Motiva arranges training of auditors a couple of times a year, depending on the demand. The training program is for two days, one day in common for the HVAC and electricity experts and one day separately for these two groups of experts. The training is concluded with a test work.

Participants to the training program typically come from engineering and consulting companies, but experts come also from the customers' side, like municipalities, big real estate owners and industry.

### **Authorization**

Successful passing through the training entitles the expert to the authorization. This gives him the right to carry out energy audits supported with the government subsidy. The authorization is valid for the time being.

### **Quality control**

The reports of all the audits that are receiving government subsidy are delivered to Motiva whose experts carry out the quality control.

### **Auditors' tools**

The authorised auditors are all the information and training material published by Motiva and the computer program *Motiwatti* to be used as a tool in the audit process. Use of *Motiwatti* is necessary in order for producing the audit report in the required format.

#### 4.3.2 Other programs including energy auditing

##### **Voluntary Energy Conservation Agreement Scheme**

The aim of the Voluntary Energy Conservation Agreement Scheme is to help reduce the specific energy consumption and to develop and introduce methods that would allow energy efficiency to be integrated into everyday operations in a building or other facility. The agreements are made between the Ministry of trade and Industry and an organization or company in the public or private sector. In some cases other ministries have also become parties to the agreements. Crucial measures according to the agreement are energy auditing and the appropriate energy saving measures.

The Scheme, first launched in 1997, has been a significant implementing instrument also for energy audits. The coverage of this program level activity is high. 85 % of the total energy use in the industry and over 50 % of the building stock of the service sector are within the Scheme. All enterprises and organizations within the Scheme have an obligation to implement energy audits. Therefore the set goal for the EAP, which is to have 80 % of industrial energy use and of the service sector building stock audited by the end of year 2010, should be met.

The target sectors of the Scheme are in principle all energy end-users and suppliers. By the end of the year 2005 the Ministry had agreements or respective programs with the following sectors:

- Industry
- Municipalities
- Real estate & construction
- Power generation
- Electricity transmission and distribution
- District heating
- Transport/trucking
- Transport/busses
- Oil sector

The administration of the VAS has been divided between the Ministry, Motiva and the branch associations. In each agreement the responsibilities have been divided in a different way, but in practice Motiva is the Operating Agent for the scheme and is responsible for the total monitoring and reporting to the Ministry.

#### **The Condition Assessment Scheme**

The Condition Assessment Scheme is a part of a wider scheme, which aims at improving the condition and maintenance of residential sector buildings. The aim of the program is to promote systematic renovation, based on a long-term plan on maintenance and repairs, and to prepare the building owners for future investments.

The Ministry of the Environment has been supporting condition assessments in residential sector buildings since 1993.

The Administrator of the Condition Assessment Program is the Finnish Housing Board, which is part of Finland's Environmental Administration. Local municipal housing authorities act as Operating Agents and are responsible for handling the subsidy applications and payments as well as for the quality of the assessment work.

The target groups of the Scheme are blocks of flats and terraced houses.

#### 4.3.3 Energy audits in other contexts

##### **Environmental Management Systems**

The Environmental Management Systems (EMS) have continuously been an area of "other activities", where Motiva has made efforts to influence the decision makers to adapt good practices on energy issues – primarily to include energy auditing in the EMS.

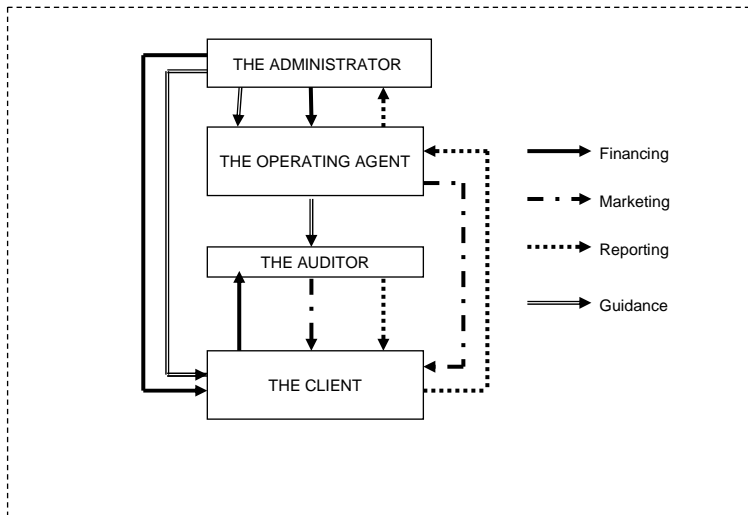
##### **Condition assessments in the tertiary sector**

The condition assessments in the tertiary sector are very popular among the Finnish building owners. In order to benefit from the interest of building owners on condition assessments the

Ministry of Trade and Industry and Motiva have co-operated with the Ministry of the Environment to develop The Guidelines for Condition Assessment in Tertiary Buildings, which contains information on how to combine an energy audit and a condition assessment.



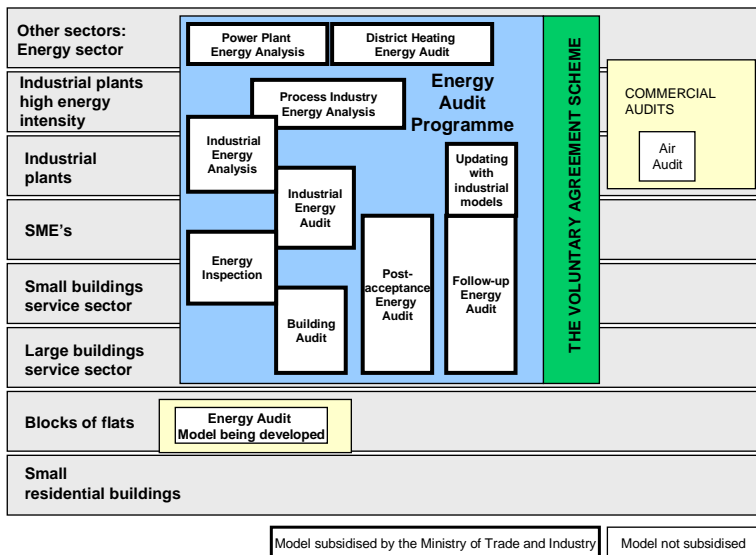
## THE FINNISH ENERGY AUDITING SCHEME



Helsinki 24.8.2004  
Seppo Silvonon



## Audit Models



Helsinki 24.8.2004  
Seppo Silvonon

Since the first oil crisis in 1973, France has endeavoured to increase its energy independence through the exploitation of indigenous resources, the diversification of energy supplies and use and the improvement of energy efficiency through energy management policies which included the set-up of energy regulations, financial incentives related to energy investments and the set up of the specialised energy and environmental protection agency, ADEME.

The National Programme for Energy Efficiency (PNAEE<sup>1</sup>) is the practical translation as regards energy issues in the French Climate Change Programme.

An agreement was concluded between the Government and the national agency for the environment and energy management (ADEME) clarifying the Agency's operational responsibilities and objectives.

- <http://www.ademe.fr>

##### 4.4.1 Energy audit programs

France launched a full scale energy audit programme called "Aide à la Décision" (Decision Making Support Scheme or DMSS) in 1999. This EAP has complete management procedures, detailed guidelines, a monitoring procedure and a charter for auditors. The programme was launched by ADEME which subsidises audits by different percentages according to the used auditing model. The DMSS is targeted at all sectors (building, industry) excluding individual houses, for which a self-auditing tool is available through the internet. Energy audit models have been developed also for street lighting and transportation fleets of vehicles. ADEME administrates and operates the whole scheme, local handling being dealt with at the local level by its regional subsidiaries (Delegations Regionales), whereas technical matters are undertaken by the technical central department for each sector (building, industry, transportation, DSM,...) .

##### 4.4.2 Other programs related to energy auditing

The Clean Air Act of December 1996 made it mandatory to provide information on the realised energy costs to the coming occupant in any real estate transaction. This measure is applied to all buildings that are rented or sold be they residential or non-residential, existing or new built. Although this arrangement does not imply energy audits for the residential sector, they are compulsory for the non-residential buildings.

##### 4.4.3 Other activities related to energy auditing

The PNAEE has settled that ADEME, together with the Ministry of Housing and in cooperation with local authorities should launch 26 "city pilot projects" by the year 2006. Thereby all building owners in a community, a city or a rural area, should undertake energy au-

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<sup>1</sup> Programme National d'Amélioration de l'Efficacité Énergétique - December 2000

dits. The consequent investments are supported with up to 40 % of the extra costs or up to 10 % of the cost for a list of techniques.

In practice, OPATBs, although being a programme in itself with its own rules (selection of sites by a Jury, specific animation/communication on site for the whole duration of the project,..) as regards audits apply the DMSS. It can be also regarded as one implementing procedure for audits.

## 4.5 Germany

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<http://www.bafa.de/1/de/aufgaben/energie.htm>

### 4.5.1 Energy policy of the Federal Republic of Germany

Since the beginning of the 1990s the federal government policy has given increased emphasis to global warming issues and the target was set to reducing CO<sub>2</sub>-emissions by 25 % before 2005, compared to 1990 levels. The main policy targets are an efficient and environmentally harmless energy supply, increased use of renewable energy sources and a more efficient use of energy in the industrial, commercial and private sectors. Essential boundary conditions are economic sustainability and security of energy supply.

The German federal government's energy conservation policy is basically market-oriented. Framework conditions created by the federal government are supposed to support the market-economy process, e.g. by information measures, financial incentives, and legal measures (such as the new eco-tax on energy consumption). In addition, the federal government makes use of voluntary self-commitments of the industry where appropriate.

Subsequently, the federal energy policy includes promotion programmes for a more rational use of energy, increased use of renewable energy sources, R&D of new materials, innovation, rehabilitation, physical improvement, investment support, economical and regional development, environmental information dissemination activities. The programmes are tailored for special target groups, in most cases for the housing, service or industrial sectors, where the SME-companies have a special emphasis. Terms of the programmes vary from three to five years, but those can be continued if the programmes are found effective.

In Germany, energy auditing is generally considered as an advisory or consultancy service provided by qualified experts. The federal state, the states and municipalities promote the use of external energy experts in improvements of energy efficiency, if in-house resources are not adequate. An energy auditing procedure is standardised by the Federation of German Engineers, VDI, in a direction "VDI-Richtlinie 3922 Energieberatung" and applied generally as an element in various energy efficiency improvement programmes.

The energy auditing concept as a stand-alone activity is being executed by large German companies on their own, most often by in-house resources. As regards SME's, which most often lack in-house resources for energy auditing, the federal government supports energy audits by financing up to 40 % of the costs of an externally delivered audit (max. 1600 euro). However, energy audits are most often being carried out by companies taking part in the so-called eco-audit system based on the EU-ordinance on eco-audit of June 29, 1993.

#### 4.5.2 Energy policies of the states

The Federal Germany consists of 16 states, which have constitutionally guaranteed extensive rights of self-government. The states follow federal energy policy or carry out their own energy policies. The energy policies of the states include typically programmes for renewable energy sources, rational use of energy, environmental, municipal energy conservation, economical promotion, training, information dissemination etc.

#### 4.5.3 Regional and municipal energy saving activities

Large cities and regions may have their own concepts for energy saving, information dissemination and other such activities. These are often linked to the municipal energy management and energy contracting services. Energy auditing is typically included in these procedures.

#### 4.5.4 Energy audit programs

##### **The Federal Energy Conservation Programme “Energiesparberatung vor Ort”**

In 1991, the Federal Ministry of Economics (BMWi) launched an energy saving promotion programme called “Vor-Ort-Beratung”, as a part of national policy to reduce CO<sub>2</sub> emissions. The programme has been running since then and is considered very effective, especially in the rehabilitation of old buildings. A resolution to continue the programme was made in 1998.

The programme gives subsidies for the following audit phases carried out by qualified engineers:

- Phase 1: Present situation
- Phase 2: Documentation and proposals for energy efficiency enhancements
- Phase 3: Personal advice by engineers at the time when the documentation is handed over.

Credit institutions give low interest loans for investments recommended in the audits.

Goals of the programme are to improve the thermal insulation and heating systems, by promoting energy certification and other energy saving measures in new and existing buildings built before 1984 in the old States and 1989 in the new states, respectively, and to increase energy saving awareness among the building owners and end users. The goals are pursued by technical and financial aid provided by numerous local actors. The programme gives financial support to building owners to procure energy audit services. All building owners are, in principle, eligible to get support from the “Vor-Ort-Beratung” programme are provided that the whole building is audited. Also flat owners have to include a formal audit of the heating system and the structural condition of the building in the service applied.

Several states and credit banks have additional programmes for financing investments recommended in the audits. The programme is extended to SME's and religious buildings. If they are used for residential purposes, maximum support for an energy audit carried out by a consultant is limited based on the building size counted in flats per building.

The consultants shall have adequate professional experience on energy auditing and proven skills to carry out reliably the defined “Vor-Ort-Beratung” tasks. The information and advising agent of the programme is Bundesamt für Wirtschaft (BAW) in Eschborn. The energy audit services are authorised to engineers and consulting companies around the nation. The RKW e.V. (Rationalisierungs Kuratorium der Deutschen Wirtschaft) carries out a qualification procedure and maintains a list of authorised agencies and companies by regions.

The federal “Vor-Ort-Beratung” programme covers all states and a few states have established their own “Vor-Ort-Beratung” programmes such as the “Gebäudecheck Energie” by the State of Northrhine-Westphalia. As the programmes are diversified, very little collective information on the results, total volumes of audited buildings and implemented energy saving measures is available.

#### 4.5.5 Other programs with energy audits

Municipal energy improvement programmes and energy contracting programmes apply commonly energy auditing in various steps. The first phase of standardised energy audit, Present Situation, is widely used to clarify the actual status of the building and the technical systems, operational routines and occurred energy consumption and costs. Energy auditors may be used also in later stages to generate new ideas for improvements and to teach how site inspections are carried out in practice. Design tasks, cost estimates, economic calculations and implementation plans are also often ordered from the same engineering offices.

#### 4.5.6 Other activities including energy audits

Commercial energy audits and more comprehensive energy analyses are available from several specialised consulting firms around the country.

### 4.6 Austria

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The goals for the Austrian energy policy are: Security of supply, cost-efficiency of the energy supply, environmentally benign energy supply, social acceptability of the energy supply system. In order to achieve these objectives the federal government especially makes use of the following strategies: Promotion of the rational use of energy (improvements in energy efficiency) and of the renewable sources of energy.

In June 2002 the national climate strategy passed the Council of Ministers, suggesting additional measures in the sectors space heating/buildings, transportation, industry, waste, agriculture and forestry and energy supply, where energy audits might be included especially for industry and buildings.

- [www.eva.ac.at](http://www.eva.ac.at)
- [www.oekv-energy.at](http://www.oekv-energy.at)
- [www.wifi.at](http://www.wifi.at)

#### 4.6.1 Energy audit programs

None.

#### 4.6.2 Other programs with energy audits

##### **The Branch Concepts for industry and trade**

The Branch Concepts were started as a regional activity in Upper Austria and have since been adopted in several regions. The Branch Concept means that in a pilot study 10 to 15 companies of one sector/branch are investigated in an energy audit, identifying their main energy-related processes, forming energy indicators and proposing energy saving measures. The results from these pilot cases are disseminated to the sector companies encouraging them to implement similar actions. The concept introduces best practises within the branch increasing also the awareness of the rational use of energy.

The Branch Concepts are targeted to service and industrial sector buildings and processes (mainly SME) and cover today: metal industry, joineries, brick and ceramics industry, sawmills, plastic industry, butchers, bakeries, office buildings, hotels and restaurants, supermarkets, nurseries, hairdressers, printing houses, laundries, gardeners and breweries. According to the branch the identified savings range from 5 to 55 % of the energy consumption, representing cost savings of the same range.

In general the Branch Concepts are administered by the Chamber of Commerce (the regional Ecological Enterprise Advisory Offices) together with the responsible authorities and/or regional energy agencies (this differs from region to region). In regions with an own energy agency this agency often acts as the operating agent.

##### **Energy audits in the industry**

The Austrian Energy Consumers' Association (Österreichischer Energiekonsumenten Verband ÖEKV) is a country wide independent organisation founded by the Austrian Industry Association (IV) and the national Chamber of Commerce (WKÖ).

The ÖEKV audits are free to the client companies. The main target groups are the industrial companies in energy intensive branches. The free audit consists of 5 person days' work. The Ministry of Economy and Labour provides ÖEKV with a yearly sum of about 50.000 € to cover the cost of the audits.

More than 400 ÖEKV audits have been carried out since 1981. The audit volume is between 25 and 30 audits per year, on the average. The energy savings range from 3 to 10 % of the annual energy consumption.

##### **Energy saving programme for the federal buildings**

Following the energy saving programme for the federal buildings the energy consumption of more than 500 federal buildings is being optimised by making use of EPC (energy performance contracting). The experience shows that energy cost savings actually achieved

through EPC-projects applied to federal buildings typically range from 15 to 40 %, depending on the specific case and its initial situation.

#### 4.6.3 Other activities including energy audits

ECOPROFIT is an ECOlogical PROject For Integrated environmental Technology. It is targeted to the industry focusing on pollution prevention, efficient use of energy being one of its elements.

The ECOPROFIT program is targeted mainly at SME but is open to all companies not depending on the company size or branch. There is a special scheme for very small enterprises. It is in general administered by a regional/local authority and supported by consultants.

#### **Energy audits for existing buildings**

In Austria there is a great variety of energy audits for existing buildings. When setting up a program for existing buildings the intention was rather to offer support to the building owners who are going to refurbish their building than to perform energy audits on a certain number or a specific group of buildings. Whether particular goals have been set up in the context of reducing the energy costs, energy consumption or emissions, depends on the specific program.

#### **ÖKO-Audit / EMAS**

Since 1993, the Council Regulation (EEC) No 1836/93 of 29 June 1993 allows voluntary participation by companies in the industrial sector in a Community Eco-Management and Audit Scheme (EMAS). The objective of the scheme is to promote continuous improvements in the environmental performance of the industrial activities.

- Council Regulation (EEC) No 1836/93 of 29 June 1993  
<http://europa.eu.int/comm/emas>
- Eco-Management and Audit Scheme (EMAS)  
<http://www.emas.lu/>

#### 4.7 The Netherlands

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During the international climate conference in Kyoto (1997), the Netherlands committed itself to reducing greenhouse gases by 6 %. This represents 50 megatons of CO<sub>2</sub>-equivalents during the period from 2008 to 2012 with respect to autonomous growth. The Kyoto-commitment is the basis for activities and programmes both with regard to energy efficiency and environment.

The Dutch government's goal for improving the energy efficiency is 33 % of the total energy consumption in the Netherlands by 2020 compared with 1995. A lot of effort will be

put to reach this goal. The Dutch government has already taken a number of initiatives to intensify energy saving and environmental policies.

- <http://www.senternovem.nl/>

#### 4.7.1 Energy audit programs

##### **EMA Programme**

The Energy and Environmental Advice (EMA program) was finalised in 2000.

The EMA programme was an individual Energy Audit Support Programme. EMA was also a commonly used Energy Audit Model within the Long Term Agreements. The goal of the EMA programme was to stimulate all companies and organisations with residency in the Netherlands to make a systematic and complete investigation of measures leading to energy savings and lower the environmental pollution.

The target groups were all small and medium-sized enterprises (SMEs), governmental and non-profit organisations. The SME's have special attention as they often lack know-how and financial possibilities. All small and medium sized companies could apply for support to undertake an EMA-audit on a voluntary basis. The audit had to be carried out by an external independent advisor, and the maximum support was 50 % of the costs.

#### 4.7.2 Other programs with energy audits

##### **Long Term Agreements**

Since 1992 long-term agreements (LTAs) on energy conservation have been concluded with industry, commercial and non-profit service providers, energy conversion and agriculture. LTAs are voluntary agreements between the Ministry of Economic Affairs and a particular business sector regarding efforts to improve energy efficiency within the Netherlands.

In the first long-term agreements (LTA I), the business sectors voluntarily agreed on improving energy efficiency with 20 % by the year 2000. Since 1992 long-term agreements to improve energy efficiency have been signed with 31 sectors from industry and 10 sectors from services sector.

The most commonly used energy audit models within the Long Term Agreements are the audit model within the EMA programme and the Energy Potential Scan (EPS). EPS is developed by Philips Electronics.

Some agreements within the LTA I will not be terminated until 2010, for instance the railways and supermarkets.

In 1999 the Dutch government introduced a new long-term agreement scheme. The LTA II is divided in two different agreements. For the large companies, the agreement is called the Energy Efficiency Benchmarking Covenant. In 1999, the Dutch government concluded the Energy Efficiency Benchmarking Covenant with the industry. Thereby, the energy-intensive industry pledges to be among the world leaders in terms of energy efficiency for processing installations by no later than 2012.

For the medium-sized companies, the agreement was signed in 2001 with 15 industrial sectors.

Both LTAs focus on the accomplishment of the measures identified in the energy audit.

### **Energy Performance Advice**

Energy Performance Advice (EPA) is a support scheme for private homes. Owners of homes built before 1998 can apply for an EPA, starting by approaching a local EPA adviser. The adviser will pay a visit and see what energy-saving measures are to be taken. The advice is without obligation. If the homeowner decides not to implement any measures, there will be a charge for the advice.

An EPA consists of different elements. First the EPA adviser determines the energy use of a home. Then the advisor determines which energy-saving measures are possible; for example additional insulation, double-glazing or a new high efficiency boiler. In addition, the adviser calculates the costs and gives information of the availability of subsidies.

Quantitative information concerning the performance of the energy conservation market is available through the mechanisms where the authorities are involved. Because there is no function related to this that would be based on legislation the information comes from voluntary energy conservation activities where public support is involved.

Motiva, acting as the national Energy Information Centre, gathers information as a part of its function in the Energy Auditing Program and in the Voluntary Energy Conservation Agreement Scheme. The *Motiwatti*-program is used as the auditing tool for the necessary calculations and data handling. The audit report is essentially based on this data. The data on the current energy and water consumptions, the recommended energy conservation measures and the calculated pay-back times are transferred from the reports into the *Motikyttä*-data base. Also information from the reports based on the Energy Conservation Agreements is put into the data base. Based on this data energy conservation activities and their results can be monitored and reported to the Ministry.

Many municipalities and big real estate owners have their own monitoring systems. The information from those systems is available to the national level only if the actor is a party to an agreement with the Ministry.

## 5.1 MOTIWATTI

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### 5.1.1 General features

Motiwatti 2.0 programme is a tool for energy auditors for the inspection and computation of the factors concerning the energy and water consumption in buildings. Based on the consumption figures the auditor can use the programme to calculate appropriate savings measures. The instructions for using the Motiwatti-programme are given in the training program for energy auditors.

The basic idea in *Motiwatti* is that the measured and calculated consumptions of the audited building are equal.

The auditor describes the technical details of the building, like the wall structures, ventilation/air-conditioning equipment, electrical equipment etc.), and creates a model of the building. Thereupon various conservation measures can be applied in the modelled building.

The *Motiwatti*-calculation is based on several modular calculations and communication between the modules.

The calculation of the heat losses from the spaces is linked to the ventilation calculation so that incoming airflows are taken as heat losses or heat loads, depending on their temperature level.

The electricity module is linked to (1) the ventilation calculation through electric heating and the fan energy of the ventilation equipment, through the electric space heating to (2)

the space, and through the electric heating of domestic hot water and process water to (3) the water consumption module.

To get the total consumptions of heat and electricity the losses in the energy supply have to be added to the net consumptions of heat and electricity.

There is no production loss included in the water supply. The component calculation gives the cost of water supply.

### **The total energy demand of the building**

*Motiwatti* can be applied both in cases of a single energy source or many sources. In a simple case heat is supplied by a district heating system. The heat source can be individual or centralised.

In the case of individual energy source production efficiency, the share of the total net heat demand as well as the emission coefficients have to be known.

The prices of heat and electricity as well as the efficiencies of energy production are given separately for each energy form

### **Normalizing the heat demand**

In *Motiwatti* the calculation results are always given normalized using the reference degree-days given in the initial information for the calculations. A table of degree-days is given for the normalization.

The heat demand values from the space and ventilation air heating are taken automatically as normalized for the electricity calculations.

### **Comparison of the real heat consumption with the calculated values**

The auditor gives the historical consumption data from the past max. 3 years and chooses the reference year. The auditor has the possibility to specify the non-normalized constant share of the consumption, typically representing the share of the domestic hot water.

### **Calculation of the space heating demand**

Instead of calculating the heat demand for the whole building as a single total figure following the Building Code *Motiwatti* can handle several separate spaces for which the calculations are made individually. The heat demand of the ventilation equipment and the total heat demand of ventilation have been added to the calculation concept.

### **Heat losses through the envelope**

The structural elements dealt with by the program are:

- external walls
- roof structure
- floor structure
- windows

*Motiwatti* does not take the heat transmission between spaces into consideration.

*Motiwatti* can be used for the most common calculation needs. The program is not good for more sophisticated cases, like buildings with a lot of glass surface in the envelope or with high internal loads).

### **The default structures for a new auditing object**

Without any initial information the program starts with a single rectangular space with certain dimensions representing the whole building. The directions of the windows and their shares of the envelope surface area assumed. The thermal properties of the structures are given default values depending on the type and age of the building. There is a data base for this information in *Motiwatti*.

### **Losses of the control system and energy supply**

The loss calculations for the control system of heat distribution are done according to the Building Code. Production loss values are based on the efficiency coefficients given by the auditor for various production modes.

### **Heat losses through the envelope**

The calculations follow the Building Code.

### **Heat consumption of the building**

The calculations are made for the following:

- heat losses of each space: through the envelope, ventilation heat demand, heat demand of the infiltrated air
- heat demand of the supply air (in the supply air equipment)
- heat loads in each space
- losses in the heat supply systems

The heat demand of the whole building is the sum of the net heat demand of the individual spaces and the losses in the supply system.

The total heat demand of ventilation is divided into the need of the ventilation system and other heat demand.

#### **Calculation of the impact of the solar radiation**

The loads of electricity to be utilised in the *Motiwatti*-calculations are picked up from the electricity calculation module where the impact of each individual piece of equipment on the heat load is specified. Unless this is not possible a certain percentage of the electricity consumption has been chosen.

The radiation conditions are case-specific for each building effected by the dimensions, structure and directions of the window surfaces, shading and other environmental factors.

*Motiwatti* provides the possibility of calculating the radiation impact on heat demand.

#### **Consideration of the running hours**

*Motiwatti* provides the possibility of calculating the energy needs on an hourly basis.

In addition, the running times and supply air temperatures of the ventilation system can be set separately for each quarter of the year.

#### **Calculation of heat recovery**

*Motiwatti* uses the utilisation rate of heat recovery given by the auditor. Alternatively, a temperature efficiency may be calculated on the basis of given temperature values.

#### **Heat loads of hot water**

It is assumed in *Motiwatti* that there are no heat loads coming from the hot water system.

#### **Energy calculation of the electric equipment**

Regarding the energy released from lighting and other electric equipment *Motiwatti* gives the options of using calculations based on power or on energy. When using the power as the starting point the calculations are based on the product of the power or specific power and the annual running time. In each option the data for the equipment has to be given by the auditor.

*Motiwatti* provides automatically the data concerning the electricity used by the ventilation fans, electric heating in the ventilation system or space heating.

## Calculation of energy conservation measures

*Motiwatti* allows calculations of both gross impacts of single measures and net impacts of combined measures. The measures may concern any factor with a numeric value within *Motiwatti*. Adding new elements, like new ventilation or electric equipment, wall etc., is not possible.

After the auditor has chosen the conservation measure e.g. concerning the ventilation system, and fed the input values based on his choice, e.g. the efficiency of the heat recovery system, *Motiwatti* calculates the consumptions of heat, electricity and water before and after the conservation measure. The auditor has to give the value of the investment as well as the prices of the consumables. Also the changes in the power values of electric equipment have to be fed manually as the auditor's estimates.

The pay-back time of the investments is calculated simply without an interest rate.

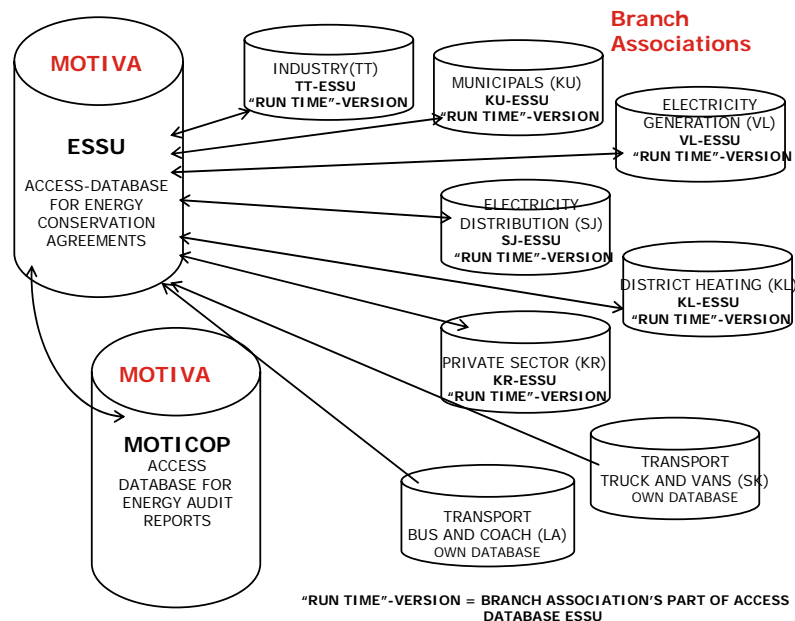
## 5.2 MOTIKYTTÄ

Motikyttä is a data management system used for handling the information received from the energy audits and in the reports from the parties to the Voluntary Energy Conservation Agreements.

**Motiva**

## Voluntary Energy Conservation Agreements

### Main principles of data management



*Motikyttä* (translated in the scheme as MOTICOP) is the part of the data management system run Motiva where the data and other information from the energy audit reports is stored. *Motikyttä* and the other Access-database ESSU interact with each other. ESSU contains the information on the Voluntary Energy Conservation Agreements.

### 6.1 Energy statistics/Statistics Finland

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The main statistical information on the national level is collected and published by Statistics Finland. Figures for energy efficiency can be calculated using the energy data and performance data from other sectors.

The data for the statistics is provided partly by the central organizations in the energy field, partly collected by Statistics Finland from the big end-users of energy, the Energy Market Authority, other authorities, and research institutes. Some data is based on calculations. The statistics law sets certain obligations to big energy users to deliver information of their energy use.

The statistics show energy production and consumption by source, production mode and sector (manufacturing, transportation, heating of buildings and others), energy prices, taxes, imports and exports and greenhouse gas emissions from energy production. The statistics are published four times a year.

- [http://www.tilastokeskus.fi/tup/index\\_en.html](http://www.tilastokeskus.fi/tup/index_en.html)

Motiva has put together a report of energy use in Finland. In this report the development of the energy intensities and factors affecting them have been studied starting from the year 1990.

- [http://www.motiva.fi/fi/kirjasto/energiakayttosuomessa/katsastusenergiakayton\\_ominaiskulutuksiin/](http://www.motiva.fi/fi/kirjasto/energiakayttosuomessa/katsastusenergiakayton_ominaiskulutuksiin/) (in Finnish).

### 6.2 Data from energy audits

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The energy consumption data in the audit reports delivered to Motiva is stored in *Motikyttä*, the data base for the audit information.

A lot of data and information regarding the energy audits and their results are published in Motivas website.

- (<http://www.motiva.fi/fi/toiminta/energiakatselmustoiminta/energiakatselmuksetkm/tilastotietoa/>, in Finnish)

### 6.3 Data from municipalities

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Association of the Finnish Local and Regional Authorities collects energy information from the municipalities. The information includes total energy consumption data by source of energy and specific consumptions of heat, electricity and water in buildings.

Based on this information conclusions can be made of the conservation results and efficiency development.

e3Portal is a tool to support energy consumption and conservation management primarily in municipalities. It is an internet-based service providing the possibility to monitor energy and water consumption in a single building and in the whole municipality. The information can be used as background for decision making e.g. concerning the climate strategy. The data from same type of buildings makes it possible to set benchmarking levels for consumption. The municipalities using the e3Portal-service use it for storing the information from the energy audits, conservation investments, costs and estimated savings.

The portal provides also information of the software and services for energy consumption monitoring as well as of technologies available to energy conservation investments.

e3Portal contains a simple tool (WebEtana) for calculating the target consumptions based on the main characteristics of the building. The real consumption data can be compared with the calculated target figures to get an indication of the effectiveness of the energy conservation measures.

## 6.5 Programs for monitoring of energy consumption on the building level

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Consumption monitoring is a necessity in a goal-oriented energy management system. Programs are available on the market for all common needs of monitoring. Use of internet for this purpose is becoming more common. Services are available for consumption data collection, processing and reporting. Energy companies offer monitoring services to their customers. A trend has been to integrate energy consumption monitoring in the larger context of facility management programs.

When considering the choice of a program for consumption monitoring attention should be paid at least to the following factors:

### **General:**

- the main purpose of the building (public, office, commercial, service, apartment, industry)
- for own use or for an external service
- a system for each building or centralized

**Measuring points:**

- number of points
- consumables to be measured (heat, electricity, other)
- normalized consumptions
- types of current meters, availability of pulse output
- frequency of updating the consumption information (hour, day, week, month)
- size of the main fuse
- technology of the measuring points
- reading automatically or manually
- planned investments in measurements
- the automation level of the buildings, supplier, age
- existing monitoring system

**Data management:**

- transfer mode of information to the monitoring system
- computers and software available for consumption monitoring
- availability of internet-connection
- number of authorized people to handle the information
- number of simultaneous users need for user hierarchy
- use of server in a local network
- need to link the information with a facility management program
- data bases used by the client

**Reporting:**

- is internet available for reporting
- preferred way of reporting ( paper, e-mail, www, other)
- alarms from consumption changes
- standard reporting in figures and/or graphically
- particularity of reporting (hour, day, week, month)
- way of analyzing the report (internally, externally)

**Future outlook:**

- development of the building stock
- development of the facility management system
- investments in metering

**Other:**

- personnel resources available for consumption monitoring
- need for expansion of the service

The most commonly used programs in municipalities are KIPI, KULTI and KULU.

Other programs are:

- CUSOFTWARE: <http://www.kuparisolutions.fi/tuotteet.html>
- FIMX: <http://www.fimx.net/main.php?pid=10002>
- HUKI: <http://www.huki.fi/>
- KIHA: <http://www.kiha.net/>
- OMAHA: <http://www.fatman.fi/palvelut/>
- RAUINFO: <http://www.rauinfo.fi:8080/Intro.do?language=en>
- RYHTI: [http://www.granlund.fi/frameset\\_etusivu.htm](http://www.granlund.fi/frameset_etusivu.htm)
- WATTSON: <http://www.kuparisolutions.fi/>

Many of the programs are primarily for building systems management having monitoring elements for consumptions of heat, electricity, water and cooling energy. These are integrated with the building automation systems that provide the necessary information for the monitoring and reporting purposes. The measurement frequency can be set according to the needs. The clients' systems may communicate through the internet the information to an external service provider for the actual monitoring and reporting work.

#### 6.5.1 KIPI

The cost monitoring program of the KIPI program family can handle the heat, electricity and water consumption data which can be combined with the unit cost data to get the costs of the consumptions. The program can also be linked to the internet which can be used for feeding in, storing and reviewing the consumption data.

The KIPI-program can be installed either in a single computer or in a network server. Reporting is based on the data fed in. The consumption data of one year can be compared with the data of another year, with the heat consumption normalized.

### 6.5.2 KULTI

The KULTI-program is made for consumption monitoring in buildings. It contains registers for the buildings and their meters.

The building data and consumption data are fed in manually. The data is stored in a Paradox-data base. Unit cost data can be linked with consumption data to get the consumption costs. The program can be installed in a single computer or in a network server. The user interface is Windows-based.

The consumption reports can be printed in text form or in graphic form.

- KULTI: <http://www.nomenal.fi/kulti/laskenta.html>

### 6.5.3 KULU

KULU is a Windows-application for monitoring, analyzing and management of energy, water and other consumptions in buildings, industry and other types of consumers. The program is offered in various versions depending on the needs of the client, from a single occupant to a manager of large building masses.

The standard version of KULU is based on VisualBasic and database.

The web-version makes it possible to feed in, read and report using the internet.

The main meter readings of heat, electricity and water consumption are taken manually and fed into the program. Automatic meter reading is also possible. In that case the data is transferred to the program via a modem or a communication link. The measured data is stored in a Focus-data base.

The KULU-program allows printing of reports of heat, electricity and water consumptions in a numerical and graphic form. The heat consumption figures are normalized.

Monitoring of the consumption costs is possible both by building and by single measurement.

- KULU: <http://virtual.vtt.fi/virtual/proj6/kulu/general.htm> (in English)

## 6.6 Consumption monitoring services

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All energy suppliers have the possibility to provide their customers with consumption information. This is realized on various levels, the most detailed and advanced ways being applied in the sales of electricity. Distant reading of meters is becoming commonplace.

Some examples of the services available in Finland are the following:

- EnerKey (<http://www.enerkey.com/>)
- Enerseuranta.net (<http://www.enerseuranta.net/>)
- KuluNet (<http://www.kulunet.com>)



## 7 The Role of Information Activities in the Promotion of Energy Conservation in Finland

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The status of information activities has been high in the promotion of energy conservation in Finland since the first national energy conservation program in the mid-1970's. The emphasis is manifested clearly in the fact that the Energy Information Centre Motiva was set up by the Government in 1993 with information dissemination on energy conservation as its main mission. Later this mission was extended to cover also the field of renewable energy sources.

The field of information dissemination is extensive and challenging and implies a variety of activities. An essential feature in every information activity is the involvement of actors from the authorities', energy users' or energy producers' side, all depending on the case in question.

### 7.1 General

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Motiva Oy, as the national Energy Information Centre, is the main actor in exercising extensive and versatile information dissemination work pertaining to the furthering of energy conservation in Finland. Most of the work is done through projects funded by the Ministry of Trade and Industry.

There are two main areas of information services: programs for communication on energy conservation and renewable energy sources. The objective is to activate energy users to work for better energy efficiency and higher share of renewable energy sources.

Projects are set up with representatives of authorities, market actors and individual consumers to implement actions that profit the parties in their endeavours.

- <http://www.motiva.fi/energiansaastonviestinta> (in Finnish)

### 7.2 The basic information processes

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The basic information processes are used for producing information material and developing models for activities to support the dissemination of information on energy conservation.

#### 7.2.1 Internet

The main tool for information dissemination from Motiva is the internet where a lot of information is available. The target was to have 400 000 visits to the site in 2005. The target was exceeded clearly, as the number of visits was 550 000.

- [www.motiva.fi](http://www.motiva.fi)

### 7.2.2 Informing the press

The press makes the most important group among the media for dissemination of news. The communication is interactive. The main instrument in raising the interest of the press is the press releases. These are published either by Motiva alone or in co-operation with project partners in the matter concerned. The press releases have an extensive circulation through the e-mail.

Through programs for radio and TV channels a vast amount of consumers can be reached. This can be done cost-effectively by contributing the program producers with expertise in the subjects to be covered.

### 7.2.3 Publications

Motiva puts out its newsletter Motiva Xpress four times a year. The circulation is 5200. There is no subscription fee for the newsletter.

Best practice cards are produced of energy conservation measures with good results and brochures of new methods of energy conservation.

The stock of printed material available from Motiva consists of 160 various items. There is a specific internet-based system for ordering the publications.

## 7.3 Events

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The events that serve the purpose of effective information dissemination are seminars, training events and exhibitions. The motivation for the participation in an event is subject to the suitability of the subject for the current focus of activities. Targeted seminars are arranged regularly e.g. in the area of energy services (ESCO-activities). Feedback from the participants is collected through an electric inquiry system. The display material is available for loan.

## 7.4 Energy awareness week

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The Energy awareness week is arranged to raise the publicity value of the topic of energy conservation among consumers, companies and public organizations. Motiva gives material and information support through an extranet to the participants who arrange the program of the week according to their individual interests and possibilities. The aim is to make the awareness of energy conservation to remain in the organizations involved. More than 200 companies and organizations arranged specific energy conservation activities in Finland during the week in 2005.

- [www.energiansaastoviikko.fi](http://www.energiansaastoviikko.fi) (in Finnish)

## 7.5 Energy issues in education

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### 7.5.1 Co-operation with schools

Motiva has set up a network of actors related to education in order to be able to promote the integration of the energy conservation subject in the education programs and materials.

There is a specific section for information to schools and kindergartens on Motiva's internet-pages.

Primary schools are active in participating in the Energy conservation week. Energy companies are active in sponsoring the schools by supplying material that they buy from Motiva.

### 7.5.2 Co-operation with education authorities

Motiva participates in the work of the energy education committee which looks after the position of energy issues in the curricula on the various education levels and prepares proposals for improvements to the authorities.

## 7.6 Follow-up of the publicity

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The two main indicators followed in terms of the publicity of the work done for information dissemination are the number of visits to Motiva's internet site and daily news review covering the daily printed news media in Finland.



Impact assessment of the energy conservation measures is possible only regarding those measures that have received subsidy from the government. This is true only if there is a condition pertaining to that in the subsidy agreement. This is true in the case of subsidies to energy audits and the subsequent energy conservation investments. Reporting of the activities is also required from the parties that have joined the Voluntary Energy Conservation Agreement.

Motiva, as the national Energy Information Centre, has the obligation to show estimates of the energy conservation and emission reduction results of its own activities both in the planning phase and after implementing the actions.

The reporting procedures included in the implementation of the Directive on Energy End-use Efficiency and Energy Services set new requirements to the information handling regarding the changes in the end-use efficiency of energy. For this purpose data collection and handling has to be developed further.

## 8.1 Follow-up of the Energy Conservation Program

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### 8.1.1 Purpose

A review of the activities and results following the implementation of the 2001 Climate Strategy of the Finnish Government was carried out to support the preparation of the new Energy and Climate Strategy proposal.

### 8.1.2 Implementation

The responsibility for the review work was with the Energy Department of the Ministry of Trade and Industry. The review method was to list the proposed actions from the old strategy and then gather information for the verification of results achieved.

The main sources of information were: the decisions on subsidies to energy audits and energy conservation investments, data on energy audits and the voluntary energy conservation agreements in Motiva's data bank, and information of the various development, information and promotion activities in Motiva's annual activity reports. An evaluation report of the agreement system was also available for the review.

### 8.1.3 Results

The review lists energy conservation activities carried out and shows savings figures based mainly on energy audits and the subsequent investments. With data and other information

missing e.g. from the residential and transportation sectors it was not possible to give a total figure for the achievements.

The strategy set an aggregated target figure for the emissions reductions until the year 2010 but not a separate figure to be applied on energy conservation. Based on this it may be concluded that assessing the adequacy of the past level and volume of conservation activity for the future needs is not possible.

## 8.2 Assessment of the impacts of Motiva's activities

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### 8.2.1 Purpose

A major part of the work done by Motiva aims at contributing to emissions reductions according to the national target of Finland.

Most of the plans for activities to be financed by the Ministry of Trade and Industry can be accompanied with an emission impact assessment.

### 8.2.2 Implementation

The efficiency and emission impact assessments are based on the immediate impacts during the activity to be performed and the consequential impacts after that. The calculations are based on estimated effectiveness, volumes and duration. A uniform set of emission coefficients is applied depending on the source of energy saved.

### 8.2.3 Results

The calculations and estimates give indicative results of the efficiency and emission impacts of the activities controlled by the Ministry of Trade and Industry. This is not a full picture because some activity takes place under other parts of the government organisation and a lot in the market place without any impact assessment.

## 8.3 Other assessment activities

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Motiva participates in the EIE OYSSEE/MURE-project the purpose of which is to maintain the information bank of energy efficiency indicators with the help of data delivered by the participating countries. Indicators are calculated on aggregate level for industry, transportation, services and households. Motiva provides the data and reporting from Finland to the system.

MURE (Monitoring of Energy Efficiency in EU-15 and Norway) is a data base of measures relating to efficient use of energy. It can also be used as a simulation tool for calculating costs and savings of energy conservation measures. The data base covers households, transportation, industry and services as well as energy production modes like solar heating, heat pumps and CHP.

- MURE : [www.odyssee-indicators.org](http://www.odyssee-indicators.org)

Work is done in Motiva to provide preconditions for setting electricity saving targets for various appliance groups, the first of which are freezers, refrigerators and lighting.

Motiva participates in the EU Working Group on IPMVP (International Performance Measurement & Verification Protocol). Verification of the changes in energy efficiency and reporting thereof as a part of the implementation of the Directive on energy end-use efficiency and energy services sets new requirements to data collection and management.

- IPMVP: [www.ipmvp.org/download.html](http://www.ipmvp.org/download.html)

Motiva has developed a simple calculation tool for estimating the amount of CO<sub>2</sub>-emissions caused by single energy users. The instructions give data for calculating CO<sub>2</sub>-emissions in the case of district heating, individual boiler plant with different fuels, and use of electricity. For electricity there are two emission coefficients: one from the supplier of electricity to specific the end-user, the other as the average for power production in Finland. If the user has own electricity production the coefficient shall be calculated on that basis.

- Calculation tool for estimating the amount of CO<sub>2</sub>-emissions:  
<http://www.motiva.fi/fi/kirjasto/energiankayttosuomessa/co2paastolaskenta/co2laskentaohje.html>, in Finnish

Motiva with its partners has developed a simple calculation program to help estimate the CO<sub>2</sub>-emissions caused by alternative ways of carrying out activities in the office environment and arranging mass events.

The calculation can be made for heat and electricity consumption, mobility, transportation and paper consumption. The program was first applied at the time of the World Championships in Athletics in Helsinki in 2005.

- Calculation program: <http://www.ilmastolaskuri.fi/ClimateCalcMain/default.aspx>, in Finnish and in English