13.7.2007

THE EXECUTIVE SUMMARY OF FINLAND'S NATIONAL ENERGY EFFICIENCY ACTION PLAN (NEEAP 2008–2010) 26.6.2007

Foreword and introduction

Promotion of efficient energy end-use has had a focal role in Finland's national energy policies for decades. The first separate programme for energy efficiency was launched in 1992 and the programme has been renewed on a regular basis (1995, 2000, 2002). The latest Action Plan for Energy Efficiency defined energy efficiency measures for the period 2003–2006, but the target year for energy efficiency improvements was 2010. In 2005, this Action Plan was incorporated into Finland's new National Energy and Climate Strategy. The existing national target, defined in the strategy, is to achieve an additional 5 % energy savings by 2015 by intensifying existing measures and by introducing new measures connected to the implementation of EU directives. In spring 2006, the new Finnish government decided that, as a part of the process to prepare a new national climate and energy strategy, the Action Plan for Energy Efficiency will be renewed by the end of 2008.

All national programmes on energy efficiency have included both target setting and a good number of fiscal, legislative and promotional measures aimed at meeting the set goals. Therefore the first National Energy Efficiency Action Plan, as the fulfilment of one obligation of the Energy Services Directive, is more looking at the effects from measures already in place and on those measures already in the pipeline to be implemented. Special emphasis has been given to those measures where the effect can be monitored or calculated and presented in energy units. In order to give a good view of the overall activity, Finland's first NEEAP also presents several measures that have not been included in the total energy savings. Since the directive consists of three 3-year periods, estimates on energy savings have also been presented for 2007, 2010 and 2013.

The national implementation of the Energy Services Directive was already started in Finland in 2005. In order to ensure the cost-effective and flexible implementation of the directive, the Ministry of Trade and Industry started negotiations on a new broad voluntary agreement scheme on energy efficiency for the period 2008–2016 with the Confederation of Finnish Industries in the spring, and in the autumn the MTI and the six largest cities established a working group to develop an agreement model for the large and medium size municipalities. The main obligation for all sectors was, in line with the ESD, the adoption of the 9 % target. With municipalities the other aim was to integrate all obligations targeted at the public sector into the agreement model.

Finland's ongoing voluntary agreement scheme, launched in 1997, covers 56 % of the municipal sector building volume, nearly all government owned buildings, nearly one fifth of the private service sector building volume and 85 % of the total energy use of Finnish industries. The aim for the new scheme is to further improve the overall coverage in order to ensure the achievement of the national energy saving target and to enable the establishment of the required broad monitoring and reporting system.

Officially the transposition of the Energy Services Directive was started on 17th February 2006 when the Climate and Energy Policy Network, the preparatory body for the Finnish Government's Ministerial Working Group for Climate and Energy Policy, established an inter-ministerial Implementation Group to start up the national implementation. The Implementation Group has representatives from the Ministry of Trade and Industry, Ministry of the Environment, Ministry of Transportation and Communication, Ministry of Agriculture and Forestry and Ministry of Finance. The Implementation Group also has a representative from the National Energy Agency Motiva Oy. The Implementation Group became operative on 14th April 2006 with the first task to develop an implementation plan and schedule for the directive as well as to draw up the first National Energy Efficiency Action Plan. The Implementation Group completed the NEEAP in early June 2007. Finland's NEEAP was submitted to the European Commission on June 26th after being approved by the five ministries involved.

The starting point and the general target

In chapter 2 Finland's NEEAP presents an overview of the energy end-use and intensity trends since the 1970s, the final energy consumption by sectors (Fig. 1 and 2). This chapter also presents how energy efficiency has been enhanced through programmes up to the present day, what are the existing national targets and what specific measures government platform (April 2007) intend to put in place in the near future. Finally, there is a detailed description on the principle of how the overall national indicative energy savings target has been calculated and how Articles 5 and 7 will be transposed in Finland.

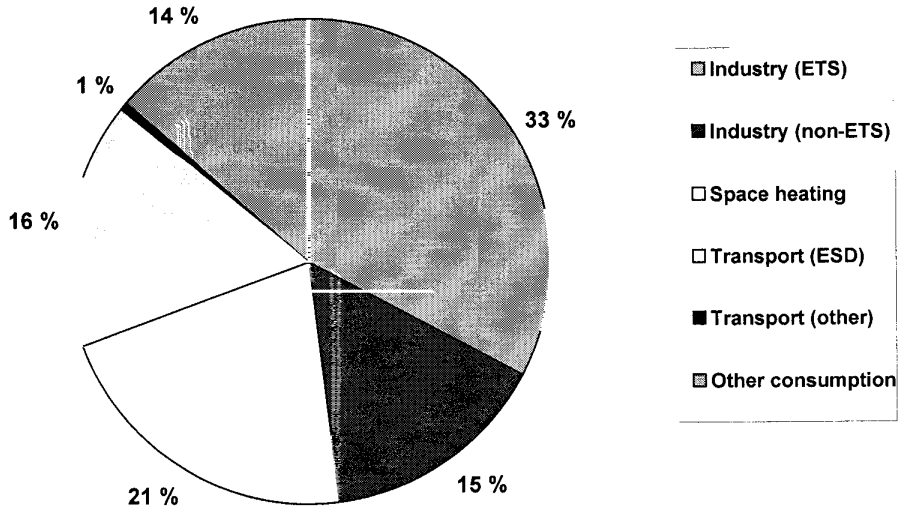

Figure 1 Total energy end-use (301 TWh) by sectors in year 2005

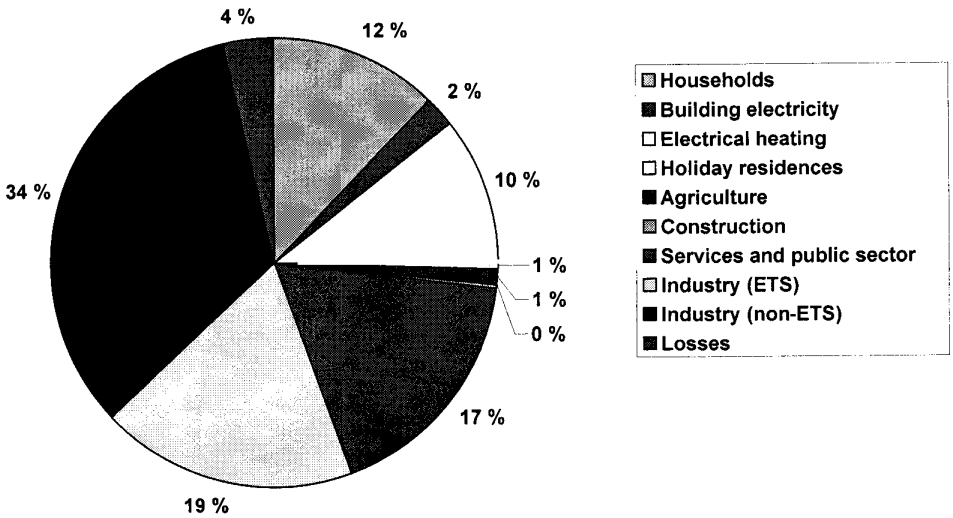

Figure 2 Electricity consumption (84.8 TWh) by sectors in 2005

The overall national target has been calculated by Statistics Finland. In order to separate the sites under the Emissions Trading Scheme, the ETS register was examined site by site. Since the ETS register does not include data on energy use, except the amount of fuels based on which the amount of emissions is calculated, the information on site-level electricity and heat and fuel consumptions were taken from other databases. Finland's overall energy saving target has been calculated as the average from 2001–2005, but due to the large amount of manual work needed, the data on non-ETS industry energy consumption is from 2005 only. Statistics Finland has, however, ascertained that, compared to calculating the average from the period 2001–2005, the effect on the total ESD consumption presented in table 1 is marginal.

Sector	Average energy end-use 2001–2005 (GWh)	Share of the target (GWh)
Households	56 820	5 110
Transportation	47 210	4 250
Industry (non ETS)	44 620	4 020
Services	30 940	2 790
Agriculture	10 240	920
Construction and machinery	7 870	710
Total ESD consumption	**197 700**	**17 800**

Table 1 Energy end-use averages by sector from period 2001–2005 and the corresponding 9 % shares. Energy end-use for industry is from 2005.

Chapter 3 Energy efficiency improvement measures by sectors

In chapter 3 the NEEAP presents descriptions on the various energy end-use sectors and some background information relevant in relation to their energy use. For each sector, this is followed by descriptions of those energy efficiency improvement measures in place and if new measures are already in the pipeline, and also a description where there is relevant information available. The classification used with the measures is a) legislative measures, b) fiscal instruments, c) energy audits, d) agreements, e) training and campaigns and f) other measures.

The following measures have been presented either in chapter 3 or in chapter 4.3, where there is a preliminary list of those measures for which calculations on energy savings cannot yet be carried out. Measures for which the energy savings have been calculated and included in the overall savings are underlined.

3.1 Households

- Law (1241/1997) on the energy efficiency of household appliances
- Energy Labelling
- Household tax deduction

3.2 Buildings and construction

- Building code 2003
- Subsidy scheme on apartment buildings
- Subsidy scheme on detached and semi-detached houses
- Voluntary agreements on energy efficiency (AESS)
- Höylä I and II programmes for oil-heated houses
- Procurement competition "Renovation window"
- Voluntary energy labelling for windows
- Energy Expert training scheme
- Heat-pumps in detached houses
- Low energy buildings
- Energy audits in the residential sector
- Energy certification (2002/91/EU)
- Promotion of radiator network balancing

3.3 Public sector/municipalities

- Subsidy scheme on energy efficiency
- Energy audits in municipal public buildings
- Voluntary agreements on energy efficiency (KUESS/KEIS)
- Training campaign for maintenance personnel
- Training campaign for civil servants and elected officials
- EPC projects in municipal buildings

3.4 Public sector/government entities

- Energy audits in government buildings

3.5 Private services

- Subsidy scheme on energy efficiency
- Energy audits in private sector buildings
- Voluntary agreements on energy efficiency (KRESS)
- Environmental labelling scheme for buildings (PROMISE)
- Improving energy efficiency in cooling systems (KYTE)

3.6 Industry

- Energy efficiency requirement in the environmental permit
- Subsidy scheme on energy efficiency
- Energy audits in industry
- Voluntary agreements on energy efficiency (TESS)
- EPC projects in industry
- Improving energy efficiency in compressed air systems (PATE)

3.7 Transportation

- Government Degree on the obligation to present the fuel consumption and CO2-emissions of new cars (1247/2002)
- Wintertime speed limits
- Agreement on improving the fuel efficiency and reducing the CO2-emissions of new cars (EU agreement)
- Voluntary agreement on energy efficiency/Truck and van transport sector
- Voluntary agreement on energy efficiency/Public transport
- Ecodriving training for passenger car drivers
- Optimal tire pressure in passenger car and van traffic
- Guidelines on environmental and energy efficiency aspects in procurement of transportation services
- Traffic system planning

3.8 Agriculture

- Subsidy scheme on energy efficiency

3.9 Energy sector

- Voluntary agreement on energy efficiency/Power plants
- Voluntary agreement on energy efficiency/Elect. transmission and distribution
- Voluntary agreement on energy efficiency/District heating
- Informative billing
- Promoting fuels switch from oil to district heating
- Customer advise

3.10 Horizontal measures

- Energy taxation
- National Energy Agency Motiva
- Regional Energy Agencies
- Energy performance contracting
- Energy efficiency as a purchase criteria
- Information campaigns
- Regular monitoring of energy consumption

Chapter 4 Assessment of the energy saving effects

Chapter 4 contains information on all those existing and planned measures for which a verifiable or estimable amount of energy savings can be presented in line with the general framework described in Annex IV of the Energy Services Directive.

Finland's overall 9 % indicative target for energy savings is 17 800 GWh. The interim target for the third year, in line with the overall target, is 5 900 GWh. The total energy savings from those 14 energy efficiency measures for which the energy savings have been calculated is 12 707 GWh in 2016. The precondition to achieve this amount of savings is that the overall national effort to enhance energy efficiency is maintained at least at the present level throughout the period 2008-2016.

Chapter 4.1 Summary of energy savings

The total amount of energy savings is presented in Table 7.

Sector	2007 GWh	2010 GWh	2013 GWh	2016 GWh
Households				
Buildings	3 960	5 934	7 863	9 573
Public sector/municipalities	84	69	66	66
Public sector/government				
Private services	144	90	102	102
Industry (non-ETS)	1 286	1 307	743	640
Transport	869	1 142	1 299	1 387
Agriculture	480	659	809	938
Energy sector				
Horizontal				
ESD-savings total	**6 824**	**9 201**	**10 882**	**12 707**

Table 7 Summary of energy savings by sector (GWh)

In some sectors the trend of energy savings is declining. This is because the lifetime of certain measures will come to an end during the period 2008–2016, and this effect has been taken into account in the calculation. In order to compensate these reductions in savings, new measures are being planned. For some of the new measures, estimates on the saving potentials have been calculated. However, since these measures are not yet in place and there are some uncertainties concerning e.g. the final activity level achieved, these savings have not been included in the total savings.

Actions to make up the existing shortfall vis-à-vis the national target

The most important new measure for the period 2008–2016 to make up the existing shortfall vis-à-vis the national 17.8 TWh target is a broad voluntary agreement scheme on energy efficiency. The amount of savings this new scheme or set of schemes is estimated to bring in is in the range of 2 800–4 700 GWh. If this can be achieved, the total savings in 2016 will be in the range of 15 500–17 400 GWh.

This new VA scheme, which is administrated by the Ministry of Trade and Industry, will cover industry, private and public service sectors and the energy sector. The Ministry of the Environment, the Ministry of Transportation and Communication and the Ministry of Agriculture and Forestry are also in the process of either developing new agreement schemes or renewing the existing schemes in their sectors. Although there is not yet enough information available to estimate the level of savings from these other sectors (residential, transportation and agriculture), these agreements will evidently contribute to the fulfilment of the 5 TWh gap existing at present. The NEEAP also presents a list of measures in chapter 4.3 for which energy savings have not yet been calculated. Therefore some additional savings should be possible to take into account when the harmonized calculation methodologies are available.

In accordance with Annex II of the directive, the Member States may use a default factor of 2.5 for savings in electricity. In Finland the energy savings of electricity and heat and fuels are, in general, realised in a ratio of 20/80. By using the default factor of 2.5 and including the estimated saving from the new voluntary agreement scheme, the total savings in 2016 would be in range of 19 400–22 200 GWh.

Chapter 4.2 Energy savings per sector

In chapter 4.2 the NEEAP presents all the existing measures that have been included in the ESD-savings and those new measures that will significantly contribute in making up the existing 5 TWh gap. For those measures that have been included in the ESD-savings there is a reference to an annex where the measure and the calculation methodology used have been described in detail.

Appendix	Energy efficiency measure	2007 GWh	2010 GWh	2013 GWh	2016 GWh
KTM-05	Voluntary labelling of windows	51	222	421	650
KTM-06	Heat-pumps in detached houses	934	1 529	2 111	2 531
KTM-07	Höylä I and II programmes	1 766	2 232	2 639	2 959
YM-01	Building Code 2003	1 029	1 771	2 512	3 253
YM-02	Subsidy scheme on apartment bldg.	180	180	180	180
	Total savings from buildings	**3 960**	**5 934**	**7 863**	**9 573**

Table 8 Summary of energy savings from buildings (GWh/a)

Appendix	Energy efficiency measure	2007 GWh	2010 GWh	2013 GWh	2016 GWh
KTM-01	Energy audits in municipal buildings	84	69	66	66
	Total savings from the municipalities	**84**	**69**	**66**	**66**

Table 9 Summary of energy savings from the municipalities (GWh/a)

Appendix	Energy efficiency measure	2007 GWh	2010 GWh	2013 GWh	2016 GWh
KTM-02	Energy audits in private sector buildings	144	90	102	102
	Total savings from the private sector	**144**	**90**	**102**	**102**

Table 10 Summary of energy savings from the private sector (GWh/a)

Appendix	Energy efficiency measure	2007 GWh	2010 GWh	2013 GWh	2016 GWh
KTM-03	Energy audits in industry	759	846	604	640
KTM-04	Voluntary agreements on energy efficiency	527	461	139	0
	Total savings from industry	**1 286**	**1 307**	**743**	**640**

Table 12 Summary of energy savings from industry (GWh/a)

Appendix	Energy efficiency measure	2007 GWh	2010 GWh	2013 GWh	2016 GWh
LVM-01	Ecodriving training/passenger cars	100	130	161	189
LVM-02	Voluntary agreement/Public transport	16	31	42	42
LVM-03	Voluntary agreement/Truck and van	21	188	251	262
LVM-04	Optimal tyre pressure	732	793	845	894
	Total savings from transport sector	**869**	**1 142**	**1 299**	**1 387**

Table 13 Summary of energy savings from transport sector (GWh/a)

Appendix	Energy efficiency measure	2007 GWh	2010 GWh	2013 GWh	2016 GWh
MMM-01	Subsidy scheme on energy efficiency	480	659	809	938
	Total savings from agriculture	**480**	**659**	**809**	**938**

Table 14 Summary of energy savings from agriculture (GWh/a)

Chapter 4.3 Other energy saving measures

In this chapter the NEEAP presents as a list those existing measures which are bringing in energy savings, but for which there is not enough data available to carry out the calculations. For some measures, e.g. taxation, it has been assumed that a harmonised methodology will be available for the second reporting in 2011. With some measures there is an overlapping with already included measures, but further analysis has been postponed due the tight timeframe to produce the first NEEAP. With some measures it is also necessary to estimate if the amount of work needed to collect adequate information for the calculations is in balance with the amount of savings verified.

List of references

The NEEAP contains a lot of information and figures from various databases and monitoring systems as well as from reports that have been published on specific energy efficiency measures, e.g. on energy auditing and on the ongoing voluntary agreement scheme. Most of these reports are available in Finnish.

Key figures of the NEEAP

The two main schemes with existing bottom-up monitoring systems are Finland's Energy Audit Programme and the Voluntary Agreement Scheme. The following five figures present the coverage and volumes of these schemes. In the private and public service sectors the total coverage of the bottom-up monitoring methodology is 37 % and in the non-ETS industry roughly 40 to 50 %.

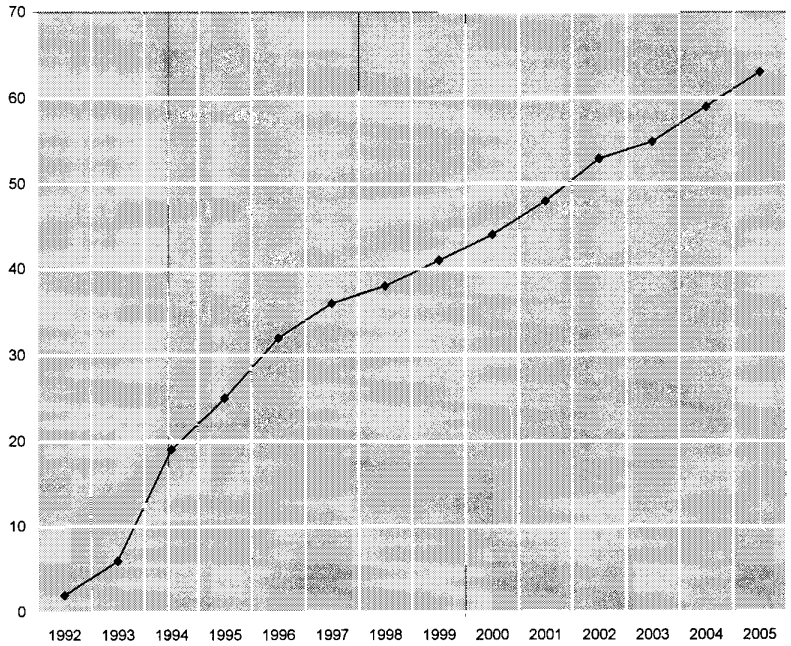

Figure 7 Cumulative volumes (Mm^3) of energy audits in municipal public buildings. Total volume of public buildings in Finland is 123 Mm^3

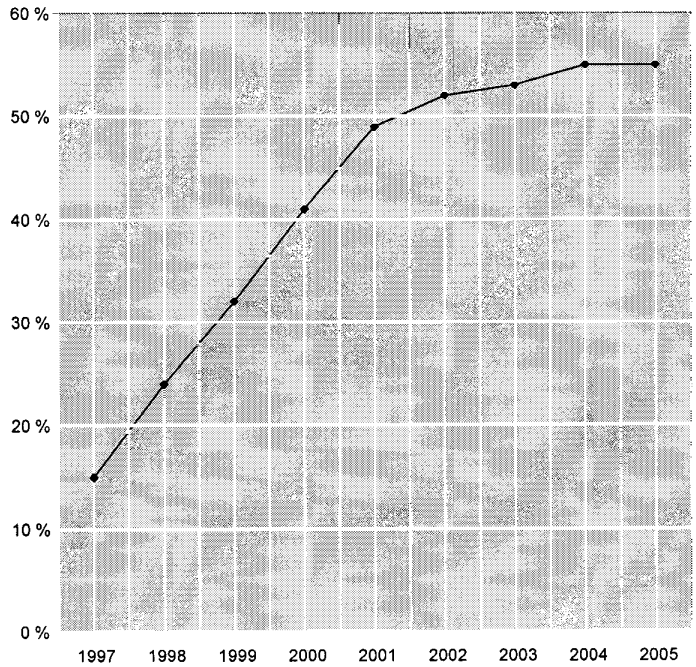

Figure 8 Coverage of voluntary agreements in the municipal sector. The coverage is calculated as a ratio between the building volume of public buildings of the joined municipalities and the total volume of 123 Mm^3.

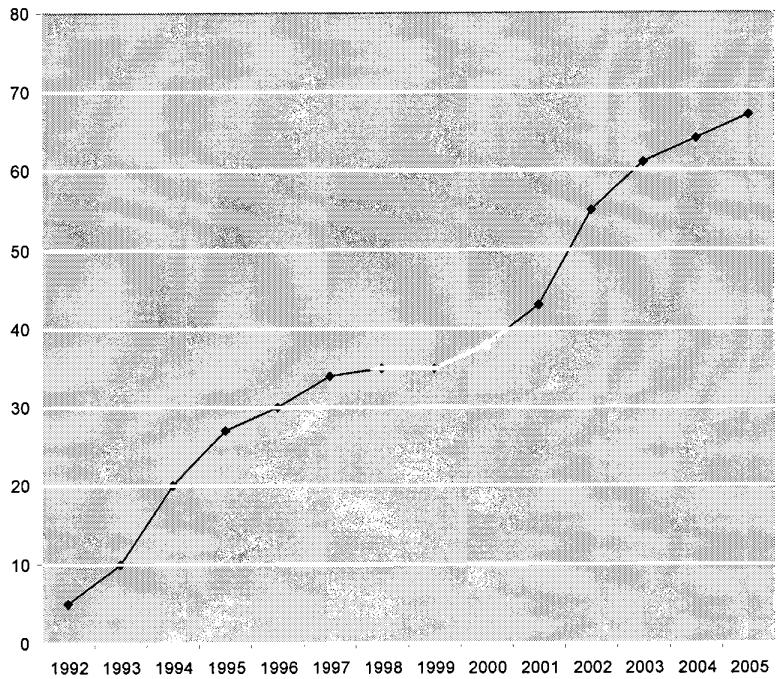

Figure 10 Cumulative volumes (Mm^3) of energy audits in private service sector buildings. The impact of the voluntary agreement scheme, launched in 1999, is clearly seen in the annual energy auditing volumes.

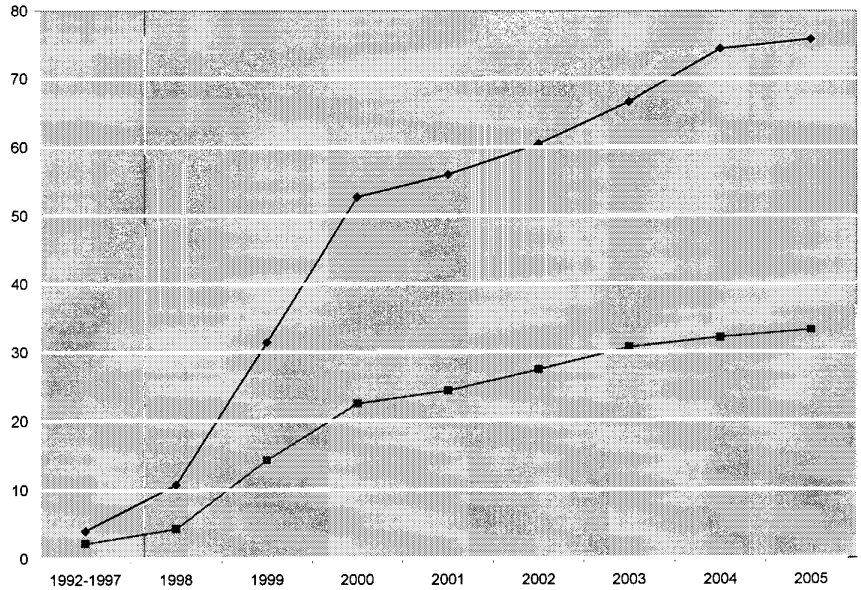

Figure 11 Cumulative volumes (TWh) of energy audits in industry. The upper line is the audited consumption of heat and fuels and the lower of electricity. In 2005 the energy consumption of Finnish industry was 120 TWh in heat and fuels and 44 TWh in electricity. The impact of the voluntary agreement scheme, launched in 1997, is clearly seen in the annual energy auditing volumes.

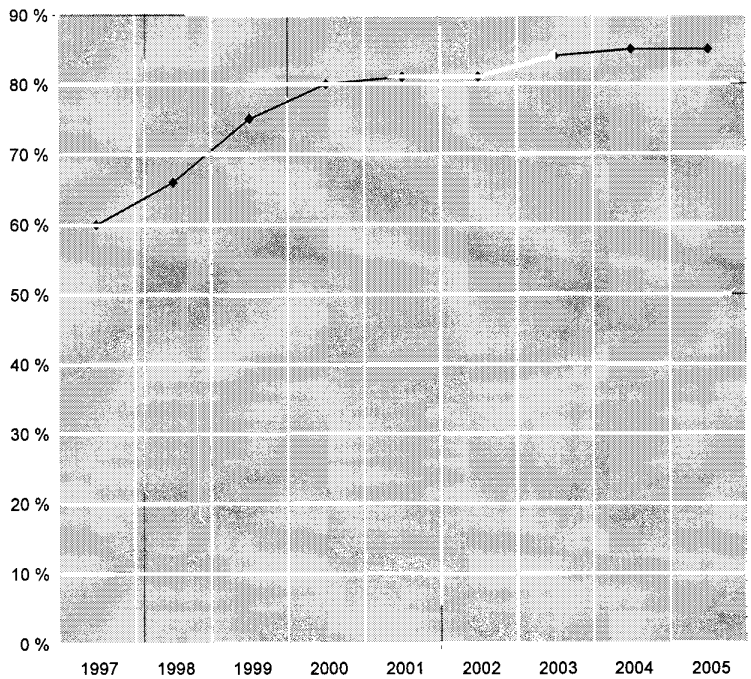

Figure 12 Coverage of voluntary agreements in industry. The coverage is calculated as a ratio between the energy end-use of the joined industrial companies and the total energy end-use of Finnish industry.

Case study on early measures of three major consumer goods retail companies

In order to analyse the situation with the early measures of three major consumer goods companies in Finland, representing 75 % of the total market, a study was launched in December 2006. By using the bottom-up methodology, a comprehensive data collection was carried out on those measures that were considered to bring in the most significant unit savings. The first analysis indicated that if all the shops existing in year 2005 would be technically at the same level as in 1995, the total energy consumption would be roughly 60 % higher than it was in 2005. This is mainly due to the broad utilisation of heat-recovery systems, which has taken place during the last 10 years. In Table 11, this can be seen in the heat consumption, which is only 3 % higher than in 1995, although the total floor area has more than doubled during the same period.

It is evident that the energy efficiency has increased significantly but still, all this increase cannot be translated into actual energy savings by these companies. After several sensitivity analyses there was finally an agreement that the level of real energy savings, as an average from all three companies, is 15 % in electricity (213 GWh) and 39 % in heat and fuels (235 GWh). This nearly 450 GWh annual energy saving has not yet been taken into account in Finland's total savings because the lifetime of this saving has not been analysed in detail and, to some extent, it may also be overlapping with the 102 GWh savings presented in Table 10.

A rough estimate on the achieved saving can also be given via top-down methodology. Table 11 present the changes in volumes between 1995 and 2005. The total energy consumption has doubled, but at the same time the total floor area has increased by 2.29, which alone indicates nearly a 15 % increase in energy efficiency. Consumption of electricity has increased by almost three times, but in addition to the more than doubled floor area, the amount of deep freeze and cold stores per shop has increased by 70 %. The third matter affecting the use of electricity is the 20 % increase in the weekly opening hours. In general it can be estimated that even with electricity the total consumption would have been at least one third higher without implemented measures and without improvement in the overall energy efficiency. The increased amount of electricity consumption has been well utilised in heating, where the change is marginal. This rough top-down analysis confirms the level of savings calculated via bottom-up methodology.

Variable	Change in volume 1995–2005	Change without the EEI measures
Electricity consumption	2.86	(3.79)
Heat and fuels consumption	1.03	(2.67)
Energy consumption total	2.00	(3.26)
Total floor area	2.29	
Weekly opening hours	1.20	
Deep freeze and cold stores	1.70	

Table 11 Energy consumption and key parameters presenting the changes in the consumer goods sector between 1995 and 2005

Top-down analysis on energy savings in oil-heated detached and semi-detached houses

The Höylä I and II programmes are showing significant savings from oil-heated detached and semi-detached houses. Based on energy statistics, these bottom-up savings can also been seen via top-down methodology. Although there has been a 3.2 % increase in the number of oil-heated houses, the total consumption has decreased by 18 % during the period 1995–2005. The energy use per house has decreased by 20.5 %. Roughly three quarters of the savings have taken place during the latter 5-year period. Based on the statistics, the absolute reduction is 1.44 TWh, which is in line with the calculated energy saving of 1.38 TWh (2005) through the Höylä II monitoring system. Taking into account the increase in the total number of houses (8 000) and the average consumption of 26 MWh/house, the top-down net energy savings can be estimated to be in the range of 1.6–1.7 TWh.

	1995	**2000**	**2005**
Detached houses	6 919 GWh	6 589 GWh	5 636 GWh
Semi-detached houses	1 114 GWh	1 083 GWh	953 GWh
Total energy consumption	8 033 GWh	7 672 GWh	6 589 GWh
Total number of houses	250 000	256 000	258 000

Table 3 Energy consumption and number of oil-heated detached and semi-detached houses (source: Statistics Finland)