

Energy Efficiency Policies and Measures in Lithuania 2006



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Energy Efficiency Policies and Measures in Lithuania 2006

**Evaluation and Monitoring of Energy Efficiency in
the New EU Member Countries and the EU-25**

(EEE-NMC)

State Enterprise Energy Agency

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1 Executive Summary

Since 1990 the overall energy efficiency has improved significantly in Lithuania. A rough indicator for this is the development in the primary energy intensity, which from 1990 to 2005 has declined by almost 48.4%.

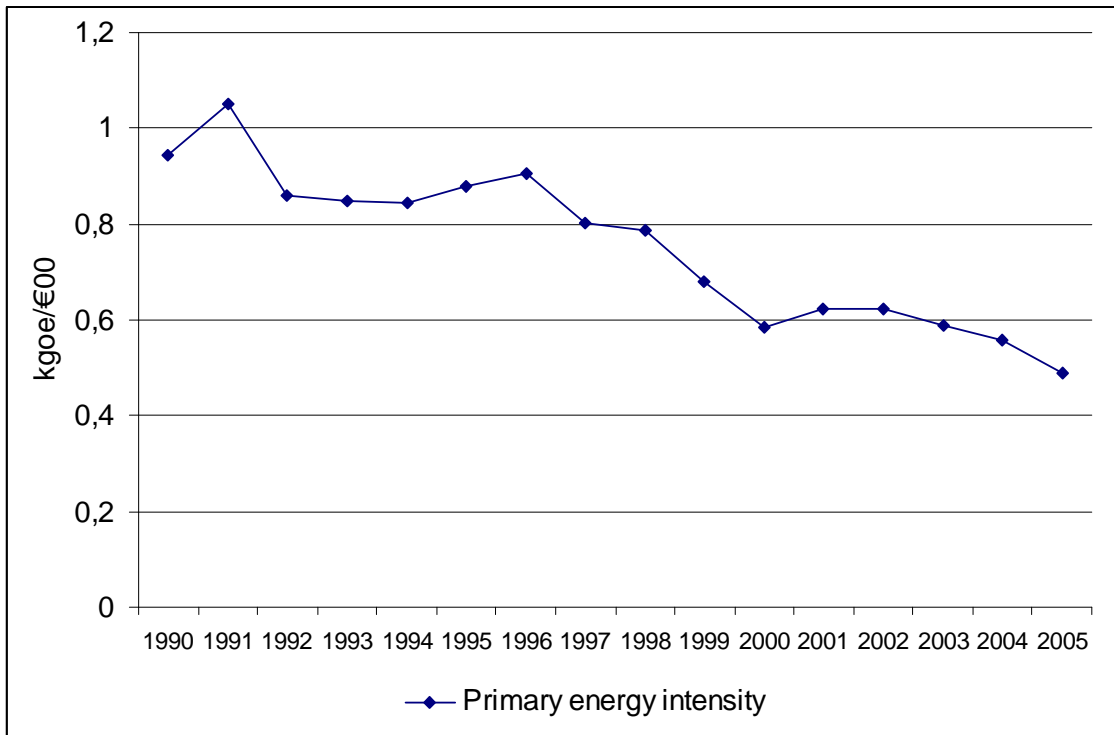


Figure 1.1 Primary Energy Intensity

Alternative indicator to the indicators currently used to describe the energy efficiency trends of final consumers at the overall level or at sector level.

ODEX – the alternative indicator currently used to describe the energy efficiency trends of final consumers – since 1998 the overall energy efficiency shows improvement by 13,1% (Figure 1.2).

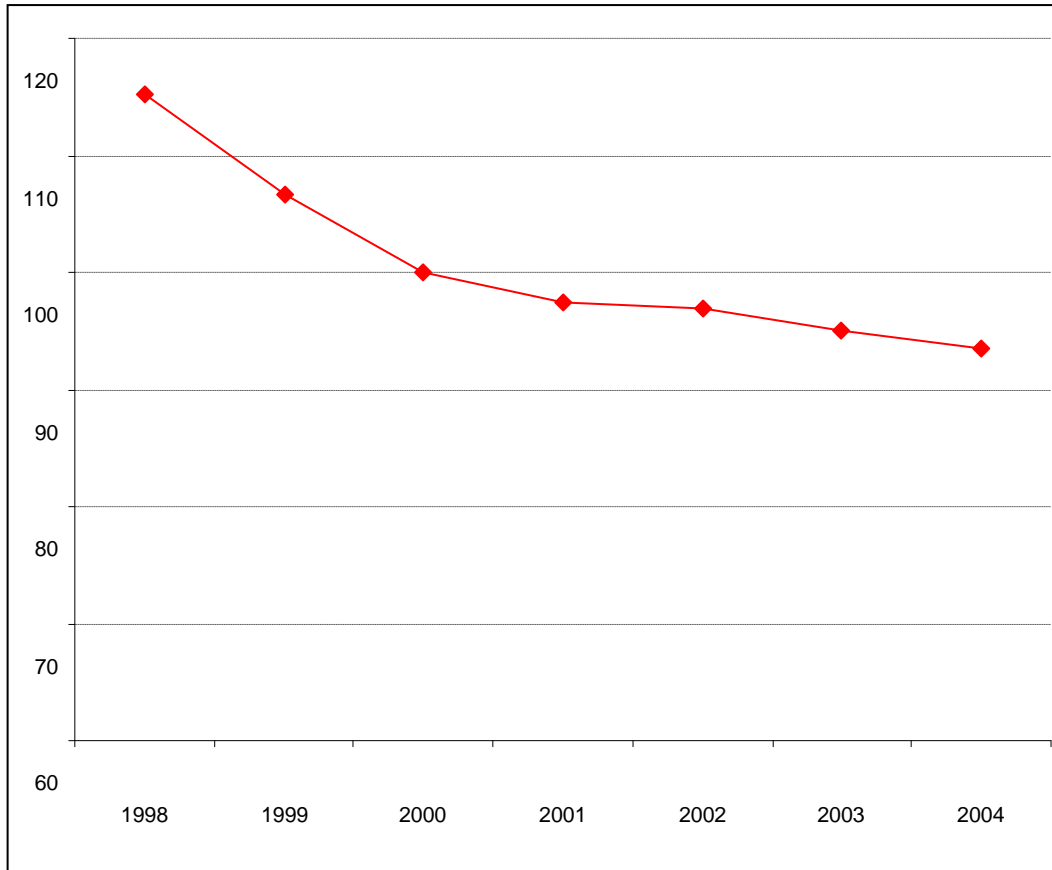
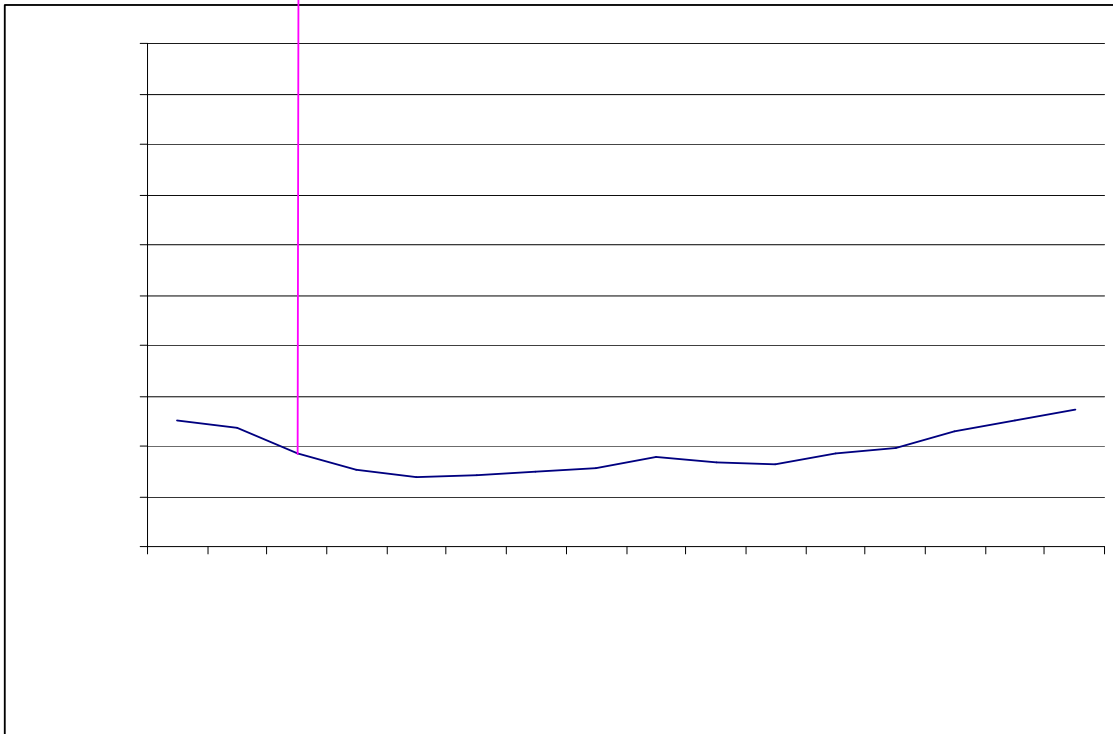


Figure 1.2 Energy Efficiency Index (ODEX)

2 The Background to Energy Efficiency

Overall economic context

Figure 2.1 below presents the trends in the main macro-economic indicators from 1990 to 2005. From 1990 up to 1994 the Lithuania experienced the economic recession and this fact is reflected in falling the Gross Domestic Products (GDP) and Gross Value Added in all sectors. From 1994 to 2005, Lithuania experienced an economic growth, which resulted in an increase of 88% in GDP at constant 2000-prices – from 9.53 billion Euros to 17.93 billion Euros. In the mentioned period, the average economic growth has been 8%/year, with one year of recession in 1999 (-1.7%).



Energy consumption trends

Lithuania imports oil and natural gas from Russia and internally produces energy from nuclear and renewables. The energy supply of Lithuania primarily depends on nuclear energy with significant shares of natural gas and oil. Nuclear energy presently accounts for the largest share in primary energy supply and a large percentage of the electricity generated (nearly 70% in 2005).

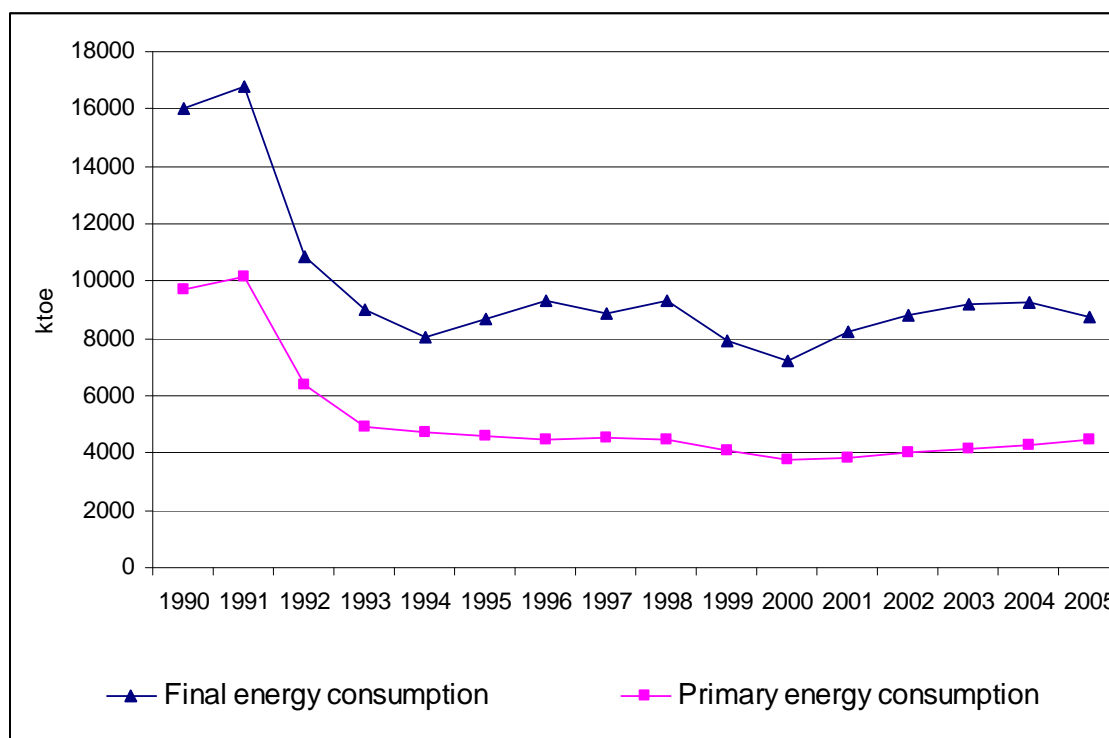


Figure 2.2 Primary and Final Energy Consumption

Figure 2.2 shows the trends of primary and final energy consumption from 1990 to 2005.

Primary energy consumption exhibited a significant reduction over the period 1990–1994, and has been gradually increasing since 2000. Primary energy consumption in 2005 was 45.5% lower compared to 1990.

Final energy consumption showed a significant decrease over period 1990–1996, but has been steadily increasing since 2000. Final energy consumption in 2005 was 54% lower compared to 1990, as a result of declining industrial activity. Increasing energy prices and a high dependency on energy imports are important issues.

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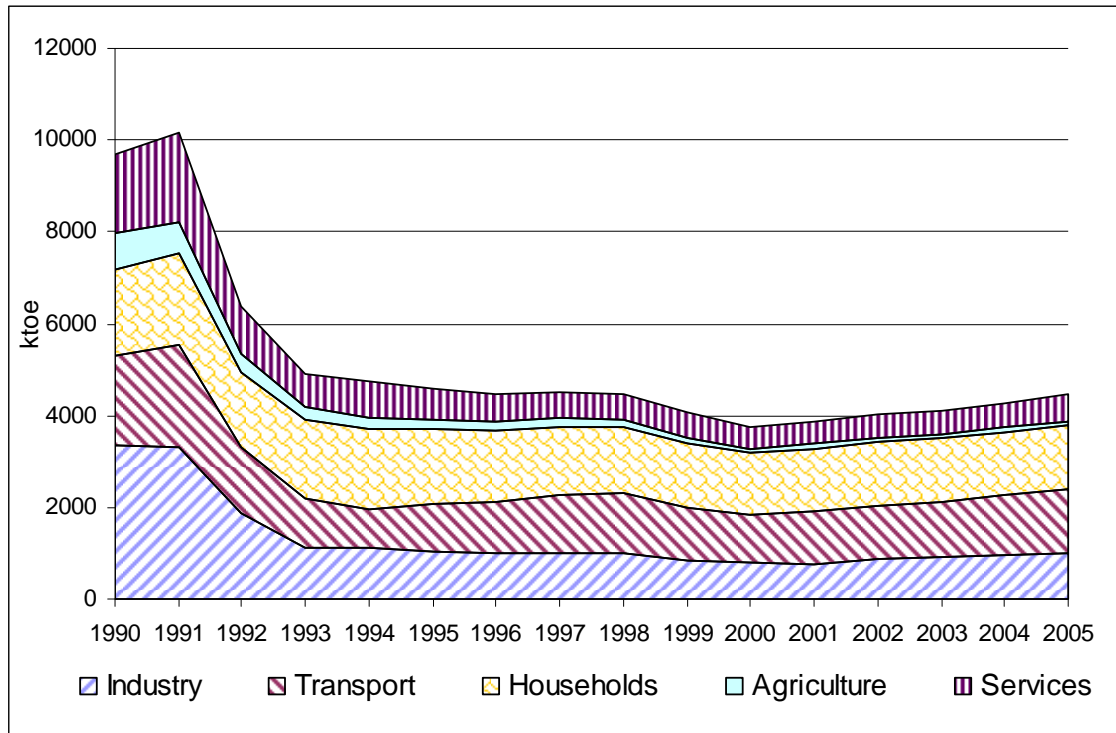


Figure 2.3 Dynamics of Final Energy Consumption by Sector

Figure 2.3 shows the trends of final energy consumption by sector from 1990 to 2005. Households and transport are the most energy-consuming sectors in Lithuania. Oil dominates in terms of energy consumed, while electricity, natural gas and renewable sources also hold significant shares.

The policy background to energy efficiency

In the Republic of Lithuania the State management of the energy sector is carried out according to the procedure established by Law on Energy. The key institutions managing the energy sector are the Ministry of Economy, Ministry of Environments, Ministry of Transport and Communications and Municipalities. A certain part of functions in the area activity of energy efficiency are delegated to State Enterprise Energy Agency.

The National Energy Strategy, National Energy Efficiency Programme, Law on Energy lays down the general guidelines for Lithuanian energy policy and energy efficiency activities in all sectors.

The Ministry of Economy is responsible for overall energy policies and programmes.

The Ministry of Environment concentrates on environmental policy and the design of management instruments (emission standards, permitting system, environmental impact assessment, economic instruments).

The Ministry of Transport and Communications is responsible for the measure in transport sector as well as the ministry of Agriculture is responsible for energy efficiency measures in agriculture sector.

Municipalities are responsible for the energy efficiency policy implementation at a local level.

Relying upon the requirements of mentioned documents lot of measures was designated to implement them in the various sectors. The types of measures and instruments include information/awareness; education/training/advisory instruments; voluntary agreements; research and development; financial instruments; and normative/legislative instruments.

The Seimas (Parliament) of the Republic of Lithuania, invoking Article 9 of the Republic of Lithuania Law on Energy approved the new edition of National Energy Strategy in 2007.

Pursuant to the National Energy Strategy for 2006–2010, with the view of increasing the efficiency of consumption of energy resources and energy, the use of renewable energy resources in all economic sectors, including in particular buildings and their engineering systems, technological processes in enterprises, equipment in enterprises, establishments and households, the district heating sector and transport, the following measures are envisaged:

- 1) to carry out the energy policy brought in line with sustainable development objectives, as well as to incorporate energy efficiency into the common national policy by co-ordinating sector actions, working out and applying relevant regulation;
- 2) To undertake applied scientific research, information and educational activities relating to energy efficiency, the use of renewable energy resources, as well as to broaden syllabuses of related subjects at general education schools;
- 3) To ensure the effective use, renovation and modernisation of existing buildings;
- 4) To strengthen the capacity of owners and managers of buildings and other participants of the market to maintain, renovate and modernise buildings, as well as to improve their energy characteristics;
- 5) To adopt the common system for building energy efficiency assessment, which is jointly developed by EU Member States;
- 6) To use resources of the EU structural funds to renovate multi-apartment houses in problem territories and public buildings by enhancing their energy efficiency;
- 7) To orientate the development of the industry sector towards up-to-date and environment-friendly technologies;
- 8) To improve the energy efficiency of equipment in enterprises, establishments and households;
- 9) To co-ordinate the development of all types of transport, giving priority to transport having less adverse impact on the environment;
- 10) To increase the efficiency of district heating systems.

As a result of the achievement of goals:

- 1) Decreasing heat consumption in existing buildings to 7%;
- 2) Increasing share renewables in National Balance of Primary Energy to 25% by 2025;
- 3) Increasing share electricity generated in CHP in National Balance of Electricity Generation up to 35% by 2025.

The National Energy Efficiency Programme (NEEP) points out the main trends and general measures to achieve an energy efficiency improvement and to increase use of renewables in all sectors. Programme has begun on 1992 and continues up to now. The NEEP has to be revised every five years. The last NEEP was approved in 2006 will continue till 2011 year.

Therefore the certain main directions for the implementation of the NEEP for the new period of 2006–2010 are foreseen:

- To renovate buildings and modernize their energy facilities;
- To use local, renewable and waste energy resources;
- To increase the energy efficiency in the industrial processes, district heating, CHP, household appliances and transport;
- To perform information, education and consultation activities.

To fulfil the provisions of the main programme's directions it is essential to implement the energy efficiency measures. The main measures to implement the revised and updated National Energy Efficiency Programme for 2006–2010 are:

- preparing of projects of legal acts and regulations, technical documents and so on that impact on increasing energy efficiency and using renewables;
- implementation the measures of practical activities in the field of information, education and consultation activities.

The Lithuanian Housing Strategy (hereinafter Strategy) prepared in compliance with the implementation measures of the Program of the Government of the Republic of Lithuania for 2001-2004, approved by Resolution No. 1196 of 4 October 2001. The Strategy provides for, by 2020, modernisation based on the economic feasibility principle of heating systems in the existing multi-apartment buildings, renovation and insulation of roof structures, change or replacement of windows and entrance doors, removal of joint defects of panel walls and increase of the thermal resistance of external walls, as well as reduction of heat energy consumption per unit of useful floor space up to 30%. The Strategy implementation period is until 2020.

3 Overall Assessment of Energy Efficiency Trends

Energy intensity trends

The development in the energy intensities of primary energy consumption and final energy consumption during the period 1990 to 2005 is shown in figure 3.1. Energy intensity is defined as the ratio between energy consumption and GDP. The final energy intensity does not include non-energy consumption.

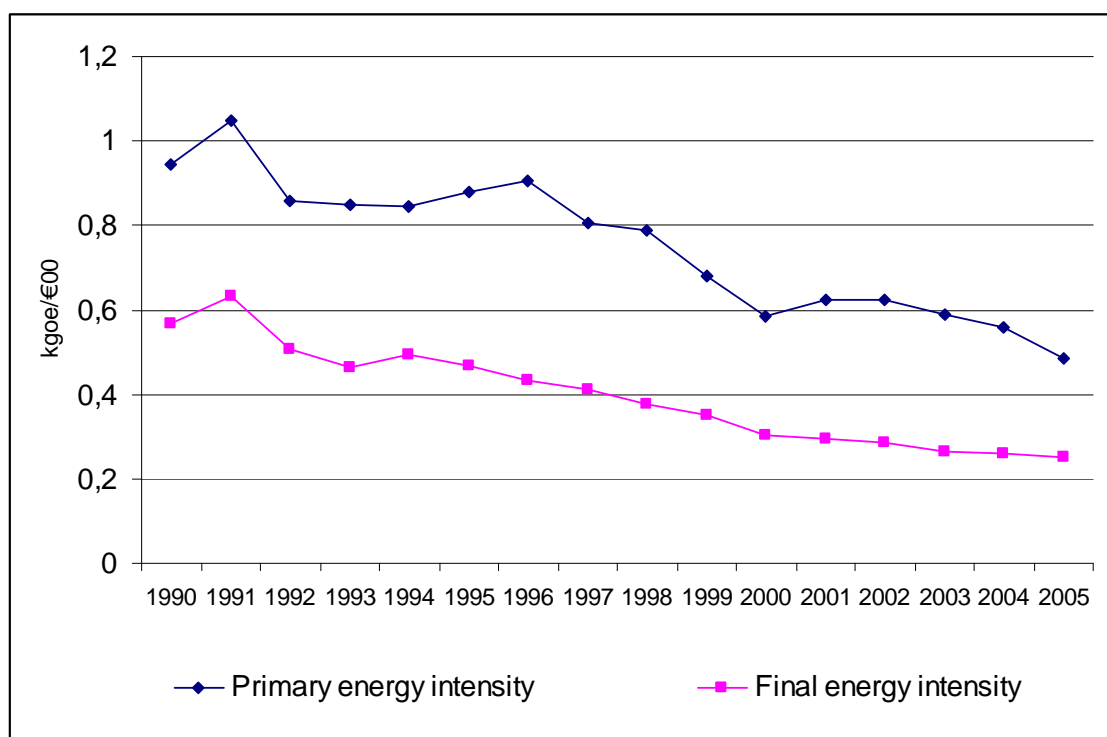


Figure 3.1 Primary Energy Intensity and Final Energy Intensity

In the period 1990–2005, primary energy intensity has fallen by 48.4%, whereas final intensity has fallen by 56.0%. Primary energy intensity fell from 0.944 kgoe/Euro2000 in 1990 to 0.487 kgoe/Euro2000 in 2005. Final energy intensity fell from 0.569 kgoe/Euro2000 in 1990 to 0.251 kgoe/Euro2000 in 2005.

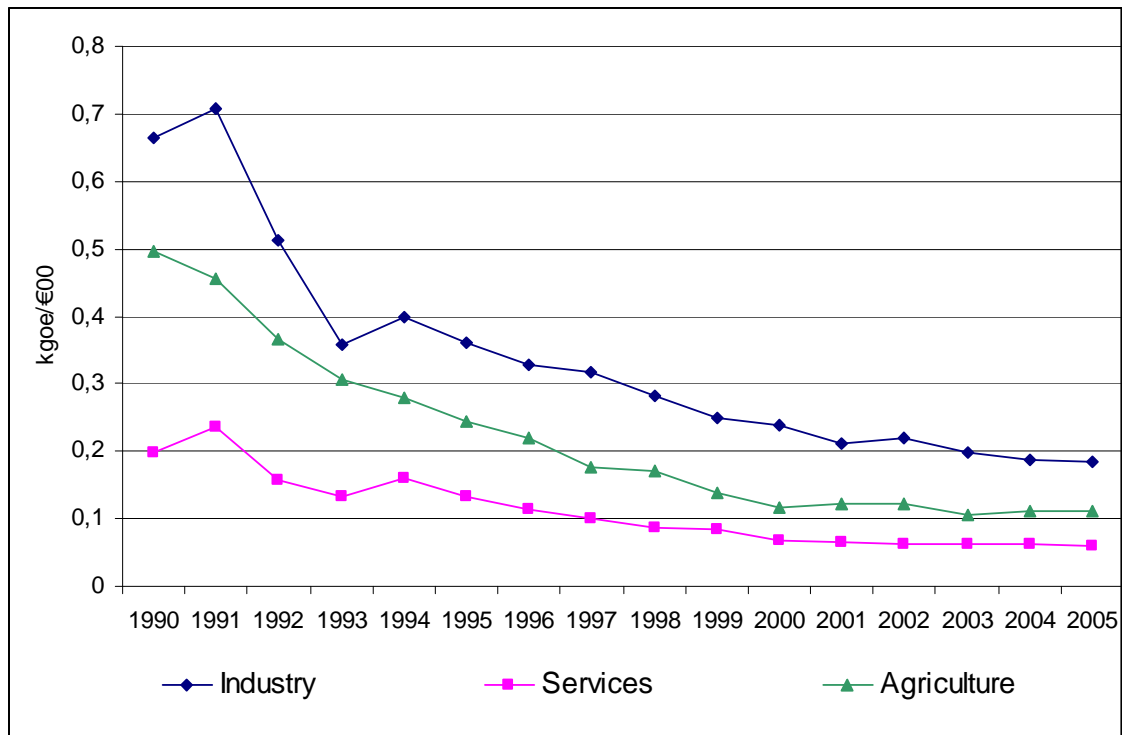


Figure 3.2 Final Energy Intensity by Sector

Figure 3.2 shows the trends final energy consumption by sector from 1990 to 2005. Decreasing intensities in all sectors were very high and make up about 70 percent during mentioned period.

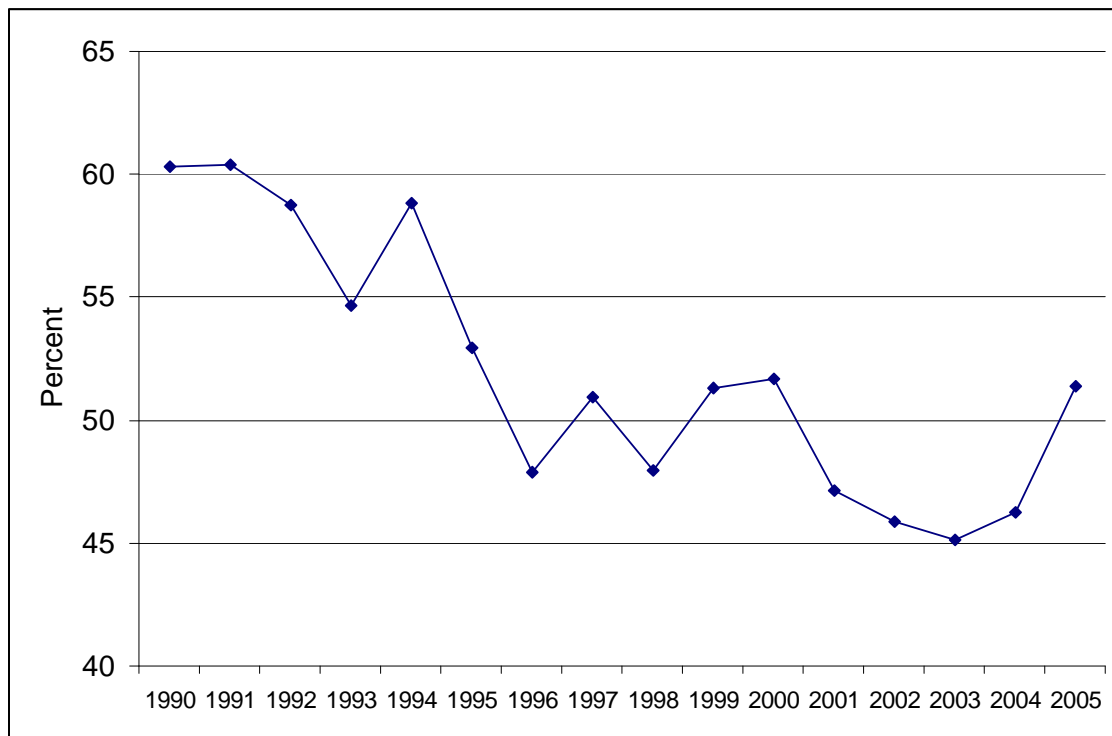


Figure 3.4 Ratio of Final Energy Consumption to Primary Energy Consumption

The ratio of final energy consumption to primary energy consumption can be regarded as an indicator of the efficiency of the total energy system. The difference between final energy consumption and primary energy consumption represents the consumption by extraction and refining, non-energy consumption, transformation losses during production of electricity and district heating and losses in the distribution of energy.

Figure 3.4 shows that the ratio of final and primary energy consumption during the period 1990 to 2005 has grown and fell down depending on the electricity production in nuclear power station and different amount of electricity export. During mentioned period the electricity production has made up about 80% from nuclear with a low efficiency (33%).

Energy efficiency

An alternative method to illustrate the development in energy efficiency for final energy consumers by consumption sectors is to use the “energy efficiency index” also called ODEX. This is done in figure 3.5, which shows the ODEX-indices (2000=100).

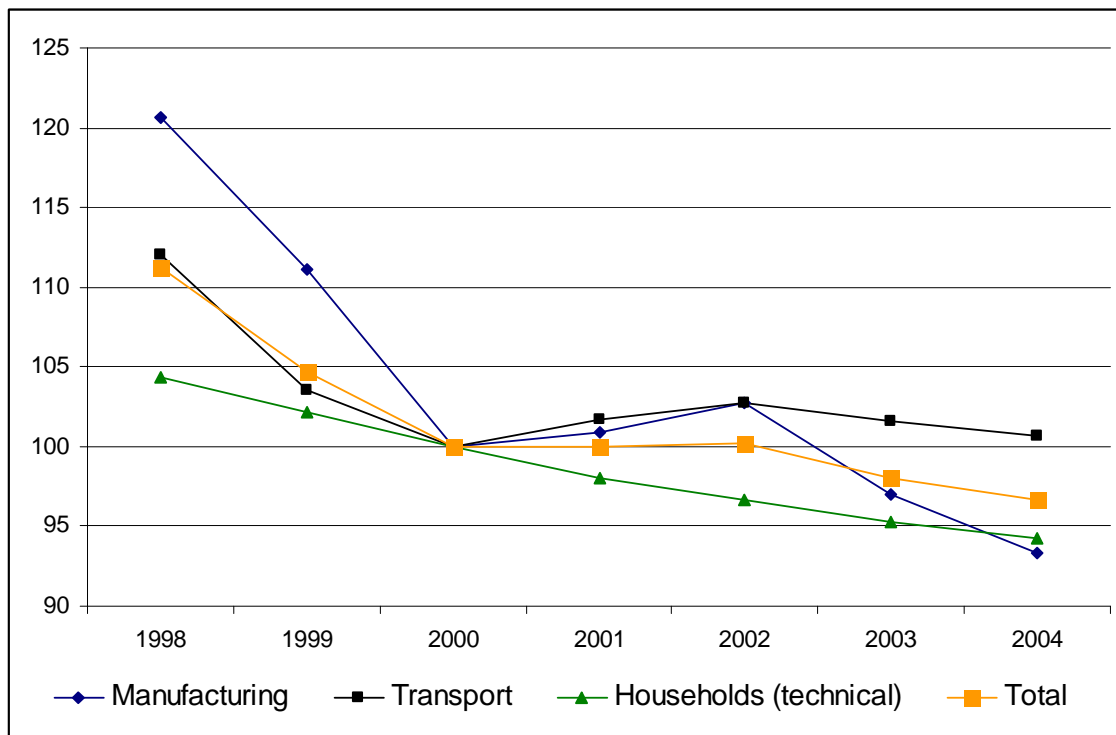


Figure 3.5 Energy Efficiency Indices for Final Consumption (ODEX)

For total final energy consumption there has been an improvement in energy efficiency of 13.1%, cf. that the ODEX index decreased from 111.2 in 1998 to 96.6 in 2004. All sectors have contributed to this development. The transport and industry sectors exhibit improvements in energy efficiency of 10.1% and 22.6% respectively. In households the improvement has been 9.7%.

4 Energy efficiency measures

4.1 Recent Energy Efficiency Measures

Residential Sector

During 2003–2006 some measures were implemented in residential sector of Lithuania:

- Building code on thermal techniques of envelopes of buildings STR 2.05.01:2005
- Lithuanian Hygiene Standard on microclimate in residential and public buildings – HN 42:2004
- Technical regulation on heating, ventilation and air conditioning – STR 2.09.02:2005
- The Program of Modernization of Multifamily Apartment Houses

The new addition of standard “Thermal Technique of Envelopes of the Buildings” (STR 2.05.01:2005) substituted the former standard STR 2.05.01:1999. Standard STR 2.05.01:2005 came into force on 19 August 2005.

The standard regulates the thermal technical designing of building enclosures (thermal insulation) in the buildings where the temperature inside during the heating season is kept higher than outside. The requirements of the above-mentioned standard are applied to new constructed buildings or renovated ones. The normative requirements for transmission heat losses of the buildings are higher in comparison with the former standard STR 2.05.01:1999.

For first time the requirements of Directive 2002/91/EC of the European Parliament and Council on Energy Performance of buildings were established to buildings at renovation, additional insulation level from outside and inside as well. The requirements limit energy consumption at building net level due heat transmission through envelope.

The requirements for air infiltration rate in buildings are given in regard to ventilation type.

Calculation methods for determination of building element design heat transmittance are included into edition. The default values of linear thermal bridges are presented in annexes of Building Code, as well as thermal properties of most popular building materials for user’s sake.

The calculation method of moisture behaviour is also given in the standard.

The comparison of U – values with ones in previous standards are shown in the Table 4.1.

Table 4.1 Comparison U – Values of Some Exterior Building Elements in Dwellings and Public Houses

	External walls		Windows		Roof	
	Dwellings	Public houses	Dwellings	Public houses	Dwellings	Public houses
Standards in the former USSR	0,9		2,6-3,0		0,8-1,0	
RSN 143-92	0,3		1,9		0,31	
STR 2.05.01:1999	0,26·κ	0,30·κ	1,9·κ	1,9·κ	0,18·κ	0,20·κ
STR 2.05.01:2005	0,20·κ	0,25·κ	1,6κ	1,6·κ	0,16·κ	0,20·κ

Implementation of new edition of building standard allowed decreasing energy consumption in the new constructed buildings by 15–20% in average compared to consumptions of buildings constructed according to the former standard STR 2.05.01:1999

The Program of modernization of multifamily apartment houses started in 2004. The Program foresees increasing energy efficiency in multifamily apartment houses due to renovation and modernization of building envelopes and modernization of heating systems in buildings. At the same time the legal and economic measures promoting renovation of multi-family apartment houses were implemented. The Program tasks are to renovate about 70% of multifamily apartment houses up to 2025 and to achieve decreasing of energy consumption by 30% compare to 2004.

Transport Sector

In 2003 by Decree of Ministry of Transport and Communications of Lithuania No. 3-275 has been approved "The Rules for Performance of State Technical Inspection of Road Vehicles " The aim of inspection is to carry out the fulfilment of safety requirements and to control the emission of harmful substances as CO

agement, development and implementation of training programme for energy managers were conducted for industries.

In the recent years the consultants provided services for industries as follows:

- Assistance for enterprises and municipalities in dealing with tasks of effective energy producing and rational use of energy;
- Analysis of Energy sectors in enterprises;
- Consultations and studies on the questions of rational energy use, and burning of fuel waste;
- Energy auditing in buildings and industry;
- Modernization of energy equipment, possibility studies on adjustment of new equipment, creation of solutions of problems concerning effective use of energy in industry;
- Assistance in implementation of projects on renewable energy sources use;
- Determination of environment problems and search of clean technologies for environment;
- Trainings of specialists, organization of seminars under the requests of enterprises.

Tertiary Sector

During 2003–2006 some measures were implemented in Tertiary sector of Lithuania as follows:

- Building code on thermal techniques of envelopes of buildings STR 2.05.01:2005
- Lithuanian Hygiene Standard on microclimate in residential and public buildings – HN 42:2004
- Technical regulation on heating, ventilation and air conditioning – STR 2.09.02:2005
- Lithuanian Education Improvement Project in 2002–2006
- Program of Renovation and Modernization of Libraries in 2003–2013
- Program of Renovation Research Institutions and Universities in 2003–2006
- Structural Funds Support for Renovation of Public Buildings in 2004–2006

- Activities of Lithuanian Energy Consulting Companies
- Other Legislation

The first three measures had a large impact on the decreasing heat losses in new constructed and renovated buildings.

The Ministry of Education and Science of Lithuania has implemented the project “Education Improvement Project C Component” financed by the World Bank (WB). The purpose of Component C was to improve the use of the funds allocated to education by reducing energy consumption in the schools participating in the Project and to use the saved funds for improvement of the quality and access of education. Therefore, the aim of long-term development of Component C is to use the funds saved as a result of 62 renovated schools for improving education quality.

During the period of 2002–2005, the municipalities and Counties have implemented 62 renovation projects in the appropriate basic schools, in the course of which they have introduced a considerable number of energy efficiency measures such as, heat regulation and control, insulation of building structures or their replacement by new ones (windows, roofs, walls, doors), improved hygienic conditions and learning conditions for children with disabilities.

The results of project assessment and monitoring showed that thermal energy savings per heating season recalculated to normal year made up 11,6 GWh or 27% compare to thermal energy consumption before renovation.

The Structural Funds supported the renovation of public buildings to reduce energy consumption in public buildings. The investments were put into improving energy efficiency of these buildings by repairing and/or reconstructing building envelope and improving thermal characteristics. The investments were put also into repair and/or reconstruction of energy systems (engineering and technological-engineering) thus improving energy characteristics of public buildings.

During 2004-2006 periods the support was designated to 82 objects for renovation of public buildings. In the refurbished buildings it is expected to save more than 40 GWh annually.

Cross-cutting measures

The National Energy Efficiency Programme (NEEP) points out the main trends and general measures to achieve an energy efficiency improvement and to increase use of

renewables in all sectors. Programme has begun on 1992 and continues up to now. The NEEP has to be revised every five years. The last NEEP was approved in 2006 will continue till 2011 year.

Therefore the certain main directions for the implementation of the NEEP for the new period of 2006–2010 are foreseen:

- to renovate buildings and modernize their energy facilities;
- to use local, renewable and waste energy resources;
- to increase the energy efficiency in the industrial processes, district heating, CHP, household appliances and transport;
- to perform information, education and consultation activities.
- To fulfil the provisions of the main programme's directions it is essential to implement the energy efficiency measures. The main measures to implement the revised and updated National Energy Efficiency Programme for 2006–2010 are:
 - preparing of projects of legal acts and regulations, technical documents and so on that impact on increasing energy efficiency and using renewables;
 - implementation the measures of practical activities in the field of information, education and consultation activities.

The Procedure for the Promotion of Sales Electricity Produced from Renewable and Waste Energy Sources establish the general criteria, conditions and requirements for the promotion of purchasing and generation of electricity produced from renewable and waste energy sources. The Procedure approved in December 2001 by Resolution of the Government of the Republic of Lithuania and amended in January 2004.

The Procedure is mandatory to producers and persons who connect the electrical equipment of producers to the power grid or purchase electricity generated by producers and transferred to distribution and transmission grids.

The promotion of electricity generation and purchasing, with the some exception specified in the Procedure, shall be carried out with respect to wind power plants, biomass power plants and solar power plants. The Procedure describes the order on connection of power plants to the grids and on the quotas for generated electricity.

4.2 Lessons from Quantitative Energy Efficiency Measure Evaluations

The Ministry of Education and Science of Lithuania has implemented the project “Education Improvement Project. C Component” financed by the World Bank (WB). The goal was to improve educational achievements of students attending grades 5–10 in basic schools. The main objectives of the project were to enhance the quality of teaching and learning in basic schools through developing professional competencies of teachers and improving learning conditions at basic schools.

The Lithuanian Education Improvement Project was divided into four components. The assignment was intended for Component C, which is described below.

The purpose of Component C was to improve the use of the funds allocated to education by reducing energy consumption in the schools participating in the Project and to use the saved funds for improvement of the quality and access of education. Therefore, the aim of long-term development of Component C is to use the funds saved as a result of 62 renovated schools for improving education quality.

During the period of 2002–2005, the municipalities and Counties have implemented 62 renovation projects in the appropriate basic schools, in the course of which they have introduced a considerable number of energy efficiency measures such as heat transfer and distribution systems, heat regulation and control, insulation of building structures or their replacement by new ones (windows, roofs, walls, doors), improved hygienic conditions and learning conditions for children with disabilities.

For the purpose of assessment economic efficiency and economical benefit of renovation of the schools, the monitoring of schools renovation was carried out in the ones.

The evaluation of energy savings will be performed on two different ways:

1. Assessment of energy savings on all schools from 2002 to 2005,
2. Monitoring (in addition to the assessment) on 8 schools.

Impact of implemented energy saving measures was analyzed and assessed through carrying out the following tasks:

1. Obtained information from renovated schools, which was used for estimation of task performed as well as the necessity and effectiveness of energy saving measures.
2. Planned energy savings were evaluated and analysis of economical calculations used in energy audits was made.

3. Benefit of renovation measures in renewed school buildings was verified, problems and defects as well as improvement of hygienic conditions were pointed out.

The results of energy saving assessment and monitoring showed that thermal energy savings per heating season recalculated to normal year made up 11,6 GWh or 27% compare to thermal energy consumption before renovation.

5 In-depth View on the Industrial Sector

Overall context (industrial growth, prices)

In this report industry includes mining and quarrying (except oil and gas extraction), manufacturing (except oil refineries), and construction. The manufacturing is the dominating element in this sector. In 2005 the share of manufacturing was more than 94% of the energy consumption and 74% of the gross value added.

The industry sector plays a decisive role in the development of the national economy. After the crisis at the beginning of 1990s caused by transition of Lithuania to the market economy, industrial outputs, after 1996, started gradually to go up.

During the period 1996 to 2005 the value added at constant 2000 prices within industry increased by 112.5% from 2.2 billion Euro to 4.7 billion Euro cf. figure 5.1. The value added in manufacturing industry increased by 111.1%, in construction – 122.4%, in mining and quarrying – 57.2% in the same period.

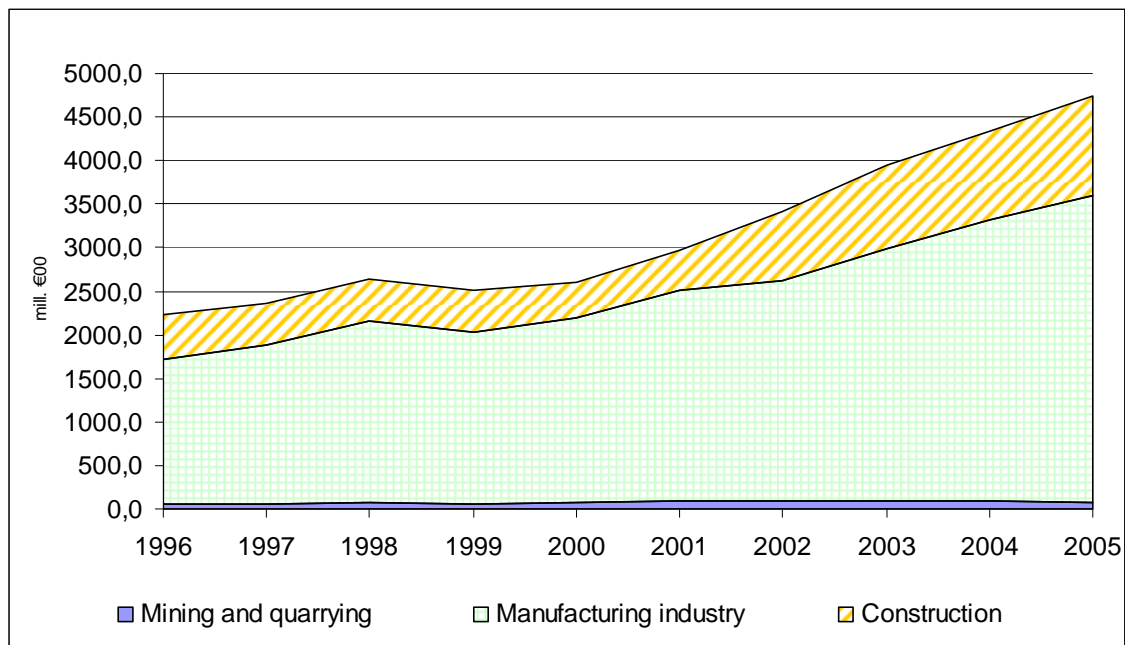


Figure 5.1 Value Added in Industry (Euro 2000 Prices)

Energy consumption trend

As shown in Figure 5.2 the final energy consumption in industry has decreased from 3.3 Mtoe in 1990 to 1 Mtoe in 2005.

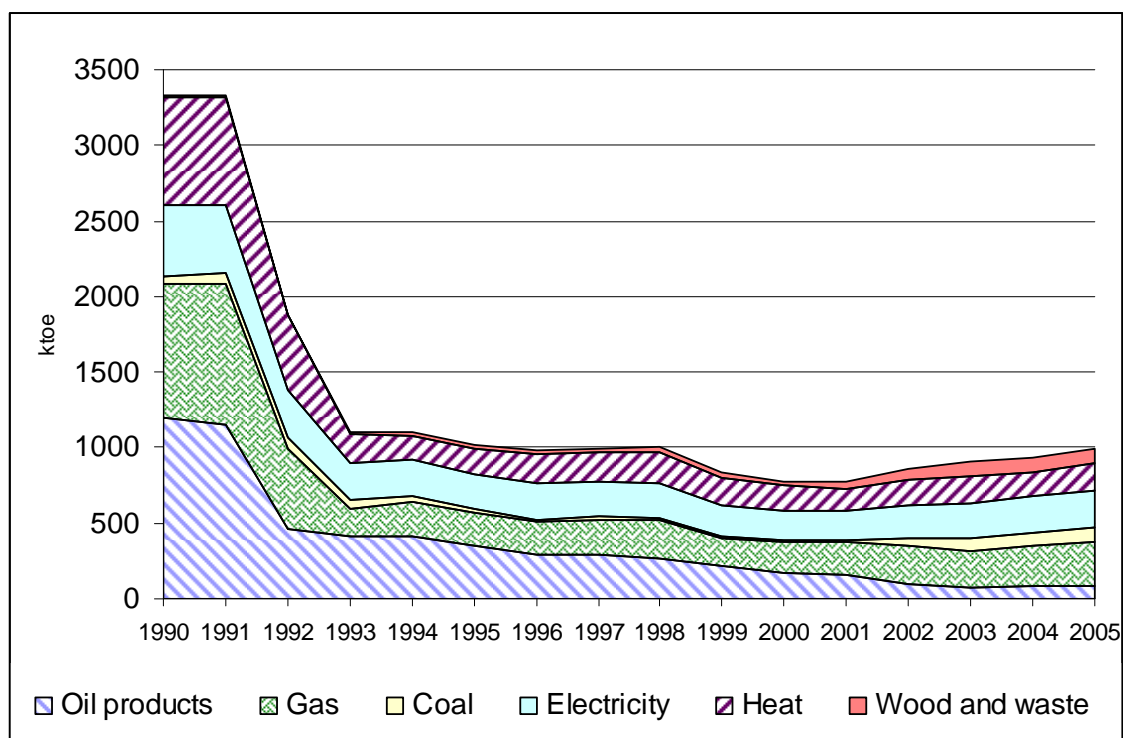


Figure 5.2 Energy Consumption in Industry by Energy Type

Consumption of oil products decreased from 1196 ktoe to 91 ktoe, natural gas – from 886 ktoe to 290 ktoe, electricity – from 469 ktoe to 244 ktoe, heat – from 716 ktoe to 174 ktoe in the period from 1990 to 2005. Consumption of coal and wood waste increased respectively by 50% and 9 times at the same period.

Since 1992 natural gas has substituted the oil products to a significant degree. For this reason the natural gas and electricity was the most important energy sources in industry in 2005.

During the period 1990 to 2005 the total energy consumption in manufacturing has significantly decreased by 70.7% from 3152 ktoe to 940 ktoe as shown in Figure 5.3.

The most energy consuming branches in 1990 as well as in 2005 were Non-metallic minerals, Food, beverage and tobacco and Chemicals branches. The branches consuming less energy were Textiles & clothing, Metal products and Pulp, paper and printing.

The most changes experienced the non-metallic minerals branch in which the energy consumption dropped by 78.1% from 1147 ktoe to 198 ktoe.

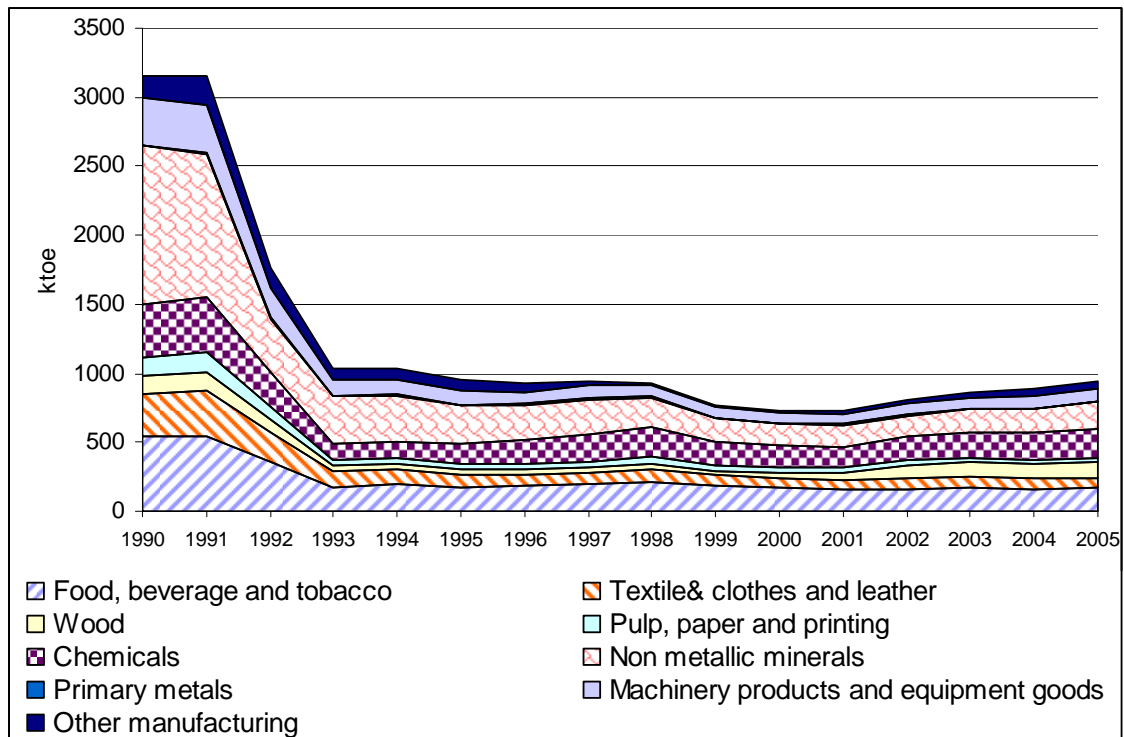


Figure 5.3 Energy Consumption in Manufacturing by Branch

Energy intensity trends

From 1990 to 2005 the energy intensity in industry has decreased from 0.44 toe/Euro 2000 to 0.21 toe/Euro 2000 or by 52%, cf. figure 5.4.

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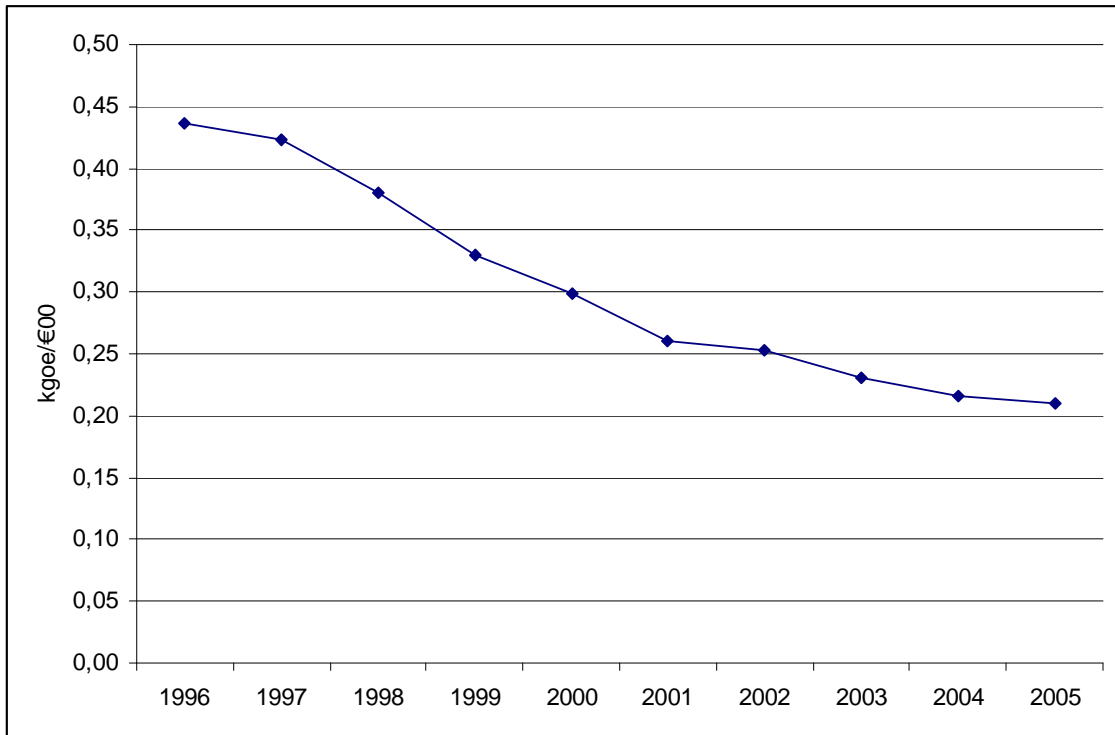


Figure 5.4 Energy Intensities in Industry

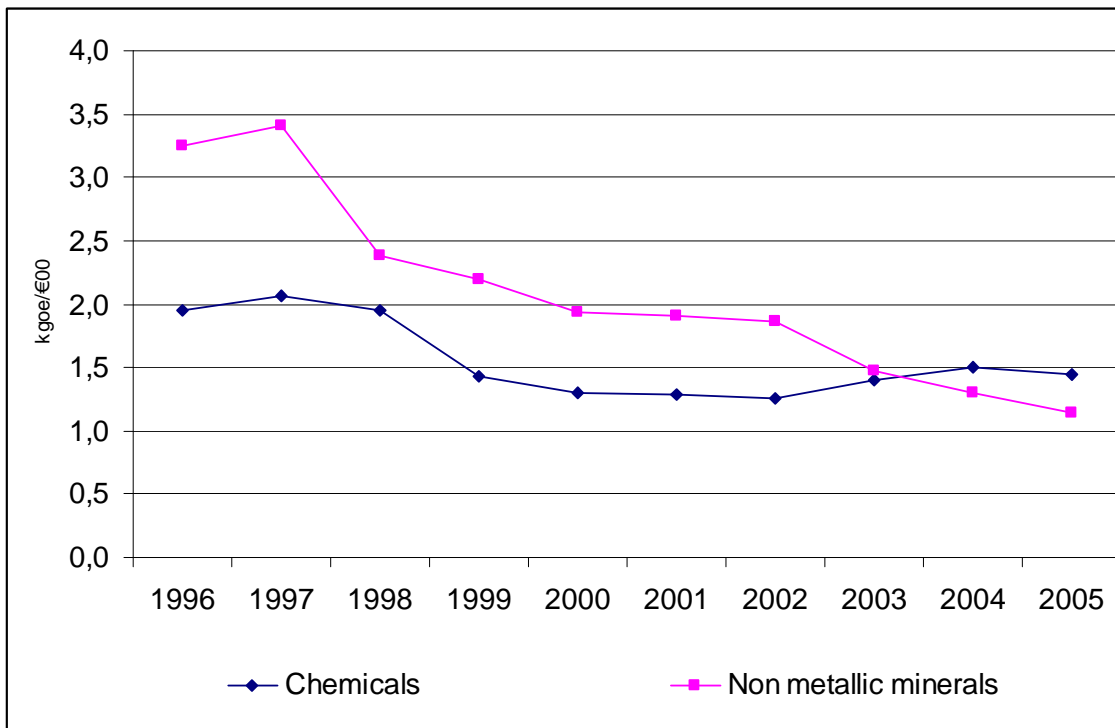


Figure 5.5 Energy Intensities in Manufacturing in High Energy Intensity Branches

The highly energy intensive branches comprise: Non-metallic minerals and Chemicals (figure 5.5). The tendency of dynamics of Non-metallic minerals branch energy intensity was dropping by 64.8% from 1996 to 2005. The tendency of dynamics of Chemicals branch energy intensity remained the similar to Non-metallic minerals branch intensity changes up to 2002 and after that period begun to grow. The increasing mentioned intensity grew by 14% in 2005.

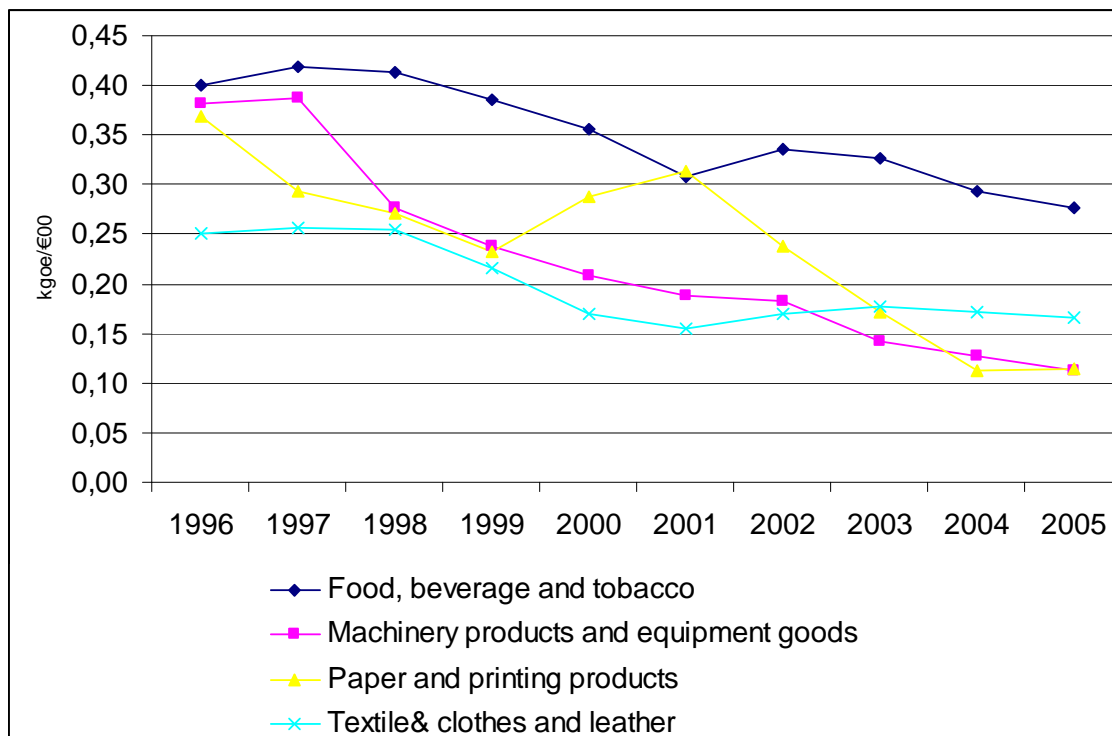


Figure 5.6 Energy Intensities in Manufacturing in Low Energy Intensity Branches

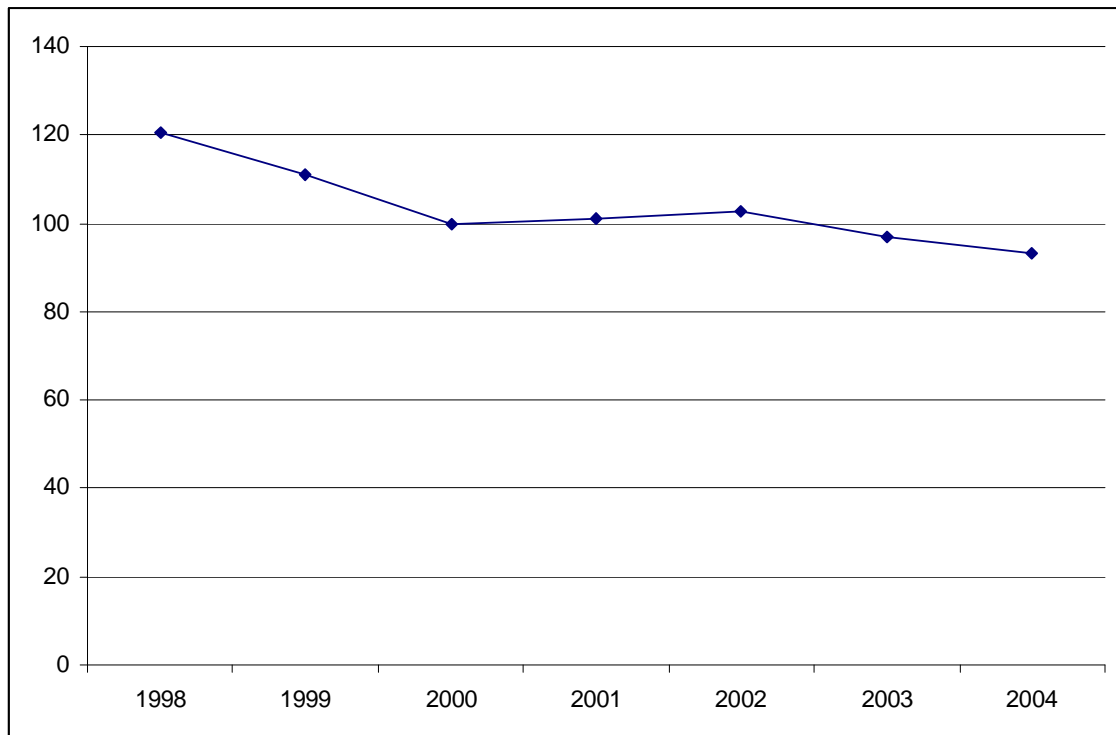
The low energy intensive branches comprise:

- NACE 15-16 Food, beverage and tobacco
- NACE 21-22 Paper and printing products
- NACE 28-35 Machinery products and equipment goods
- NACE 17-19 Textile & clothes and leather

Figure 5.6 shows that tendency of dynamics of low energy intensity branches is dropping from 1996 to 2005. The highest decreasing of energy intensity was achieved in Machinery products and equipment goods and Paper and printing products branches. The lowest energy intensity was in the same branches at end of analyzed period.

Energy efficiency (Odex)

The efficiency of the manufacturing industry (measured at the level of 8 branches – in terms of energy used per production index or per ton – and aggregated for the whole sector) progressed by 22.6% from 1998 to 2004 (Figure 5.7).



6 Energy Efficiency in District Heating

used fuel in DH in 1997–2005. The Natural gas was the main fuel used in DH during the mentioned period. From 1998 the heavy fuel oil was substituted by natural gas and wood. Natural gas accounts for the largest part of the total amount of fuel used for the generation of heat energy (over 80%), while the share of wood has increased up to 12% in 2005.

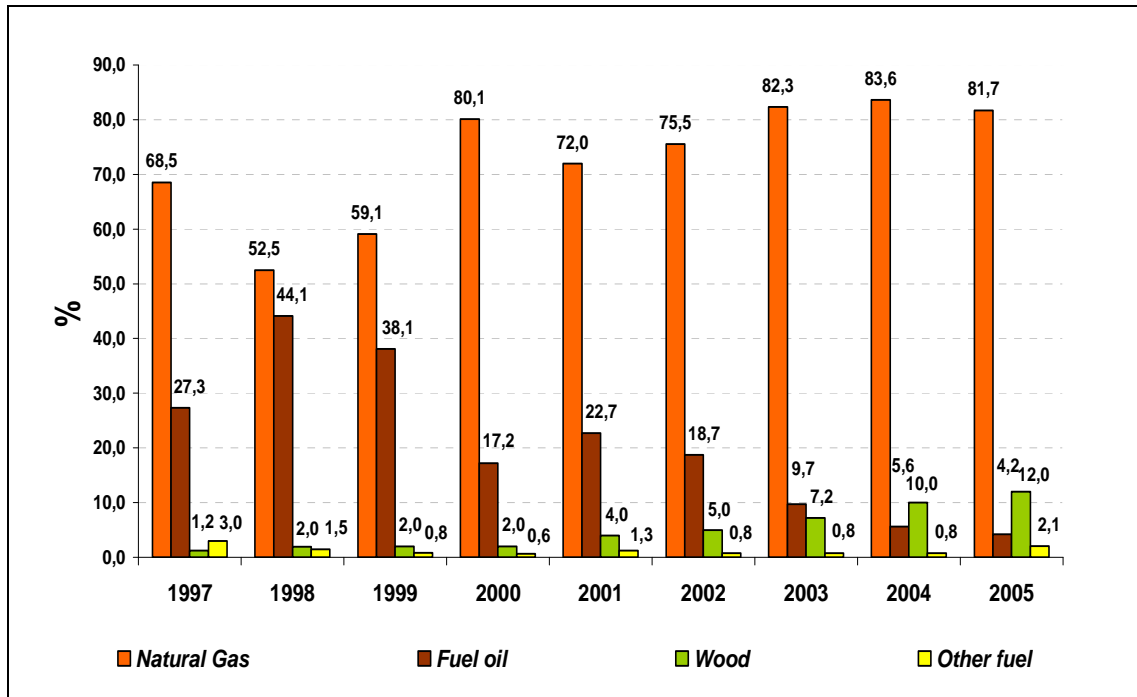


Figure 6.2 Fuels used for DH production

The existing DH systems are as inheritance of former Soviet Union and usually do not correspond to the requirements of heat consumers. For that reasons have been taken a lot of legislation measures to increase energy efficiency in DH as National Energy Strategy, Law on Energy, Law on Heat, National Energy Efficiency Programme, Law on the Associations of Multi-Family House owners, Law on Construction Law on Territorial Planning Resolution on the Directions of Heat Sector Development Other Legislative Acts. The following main measures are reflected in the mentioned legislation:

- Methodical development of heat sector according to the Municipal heat plans;
- Extension competitive relations in heat sector;
- Increasing efficiency of energy generation in heat sector;
- Reduction environmental pollution for heat generation;
- Increasing energy efficiency of heat consumption in household sector;

- Modernization heating systems in buildings;
- Implementation legal and economic measures promoting renovation of multi-family apartment houses.

All measures impacts on three main parts of DH that is on heat generation, heat transmission and end users. All implemented measures allowed to increase efficiency in generation, to decrease heat transmission losses and to decrease heat losses in buildings.

Implementation measures in heat generating stage such as modernising and construction new CHP plants, improving of existing equipment, using of economizers, changing burners in more effective, automatization of burning processes and etc. allowed decrease transformation losses in heat generation.

Old DH system pipelines are being replaced with new ones in order to ensure reliable and safe supply of heat. Advanced technologies are employed in the pipeline replacement process; trenchless pipe-laying techniques are applied. The dynamics of heat transmission losses is shown in figure 6.3. The graphs shows decreasing losses by 12.7 percentage points from 32.3% in 1996 to 19.6% in 2005.

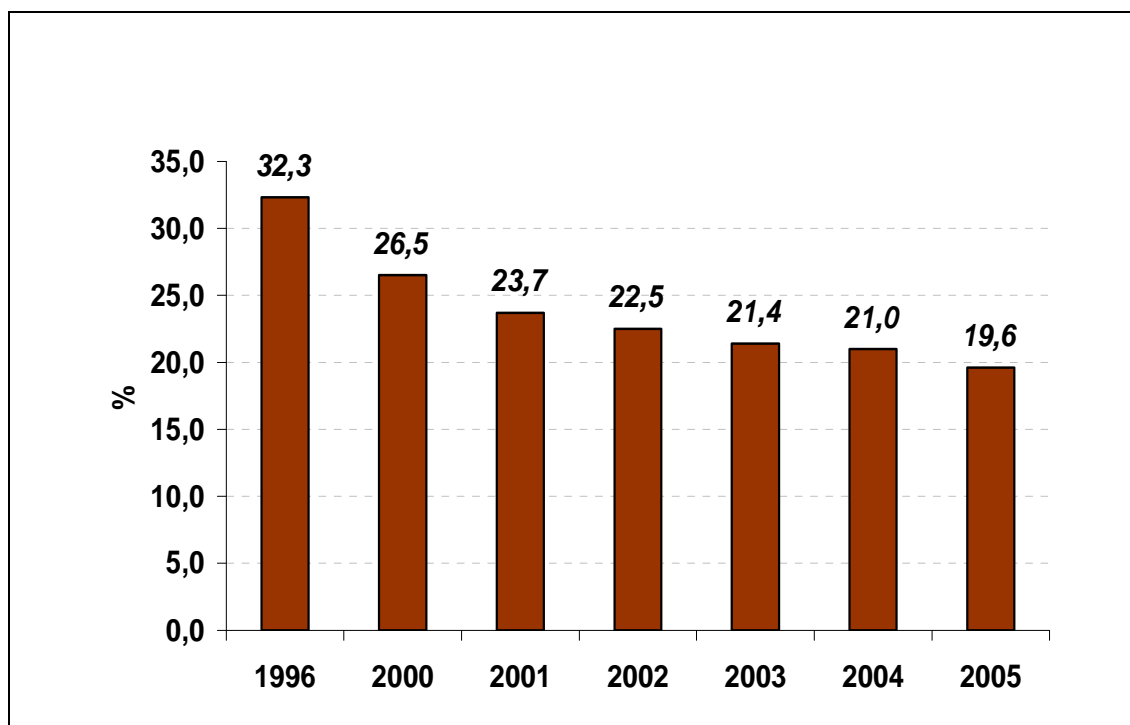


Figure 6.3 DH transmission losses

The heat supply systems modernised by installing new automated heat substations in the buildings, with the hot water prepared in heat exchangers. The measures implemented in heat generating and transmission stages as well as implemented in buildings allowed the heat tariffs remain approximately at the same level. The dynamics of average heat prices in DH systems is shown in figure 6.4.

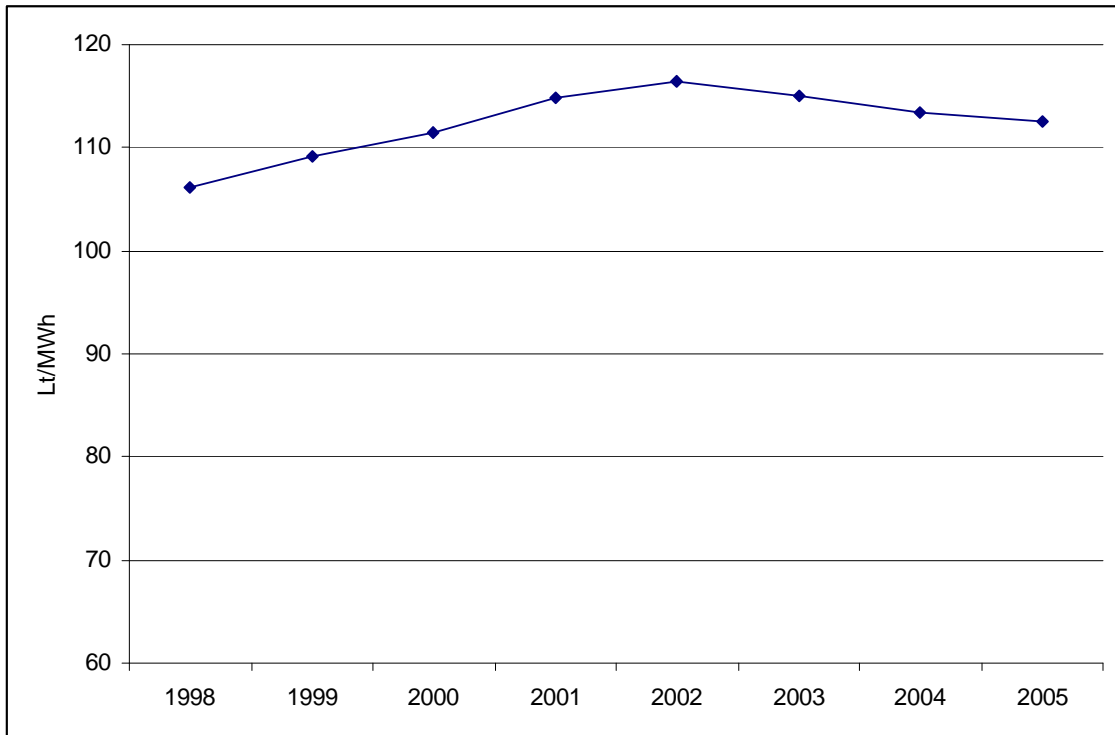


Figure 6.4 Average heat prices in DH systems

7 Outlook: Future National Developments under the EU Energy Efficiency Directive

In accordance with the requirements laid down in the Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services the Lithuania prepared and approved the Energy Efficiency Action Plan (hereinafter – the Action Plan) for the period 2008–2016 which provides national energy savings targets, description of their calculation and an overview of its strategy for the achievement of these targets. The Action Plan provides measures under implementation and measures planned to be taken, which are necessary by aiming to increase energy end-use efficiency, ensuring the achievement of the national energy savings target for 2008–2016.

The national energy savings target has been set in the National Energy Strategy, approved in the 18 January 2007. The foregoing Strategy is a key strategic document of the energy sector, setting out energy development directions until 2025.

The above-mentioned Strategy notes that in pursuance of implementation of strategic and development objectives and given the results of implementation of the objectives set out in previous strategies, one of the most significant tasks is being established: as of 1 January 2008, to save 9% of final energy over the period of 9 years in comparison with the level of final energy consumption in 2005.

The Plan of Implementation Measures of the National Energy Strategy will set out an intermediate energy savings objective for the period of 2008–2010: from 1 January 2008, within a three-year period, to save 1.5% of final energy if compared with the average final energy consumption level during 2001–2005.

It has been accepted that during the period of 2008–2010 energy savings on average will reach 0.5 percent per year. The overall energy savings during 2008–2010 will make 1.5% of final energy, i.e. an intermediate energy savings target as calculated in accordance with the provisions set out in the Directive equals to 54 ktoe. The remaining 7.5 percent of the final energy will be saved during the period of 2011–2016.

The national energy savings target for the period of nine years (2008–2016) as calculated according to the requirements laid down in the Directive equals to 325 ktoe. National official energy savings target is 9 percent of the final energy consumption amount, which corresponds to 400 ktoe.

The Action Plan includes the following measures under the implementation to increase the energy efficiency in households and public sector:

- Implementation of Lithuanian Housing Strategy
- Implementation the Program of Multi-Family Apartment Building Implementation. The Program tasks are to renovate about 70% of multifamily apartment houses up to 2025 and to achieve decreasing of energy consumption by 30% compare to 2004.
- Implementation of the requirements of Technical Regulation for Building Construction STR 2.01.09:2005 “Energy performance of buildings. Certification of Energy Performance” approved by the 20 December 2005.
- Supporting of the modernization of public and residential buildings by using the EU Structural Funds.
- Reduced rate of Value Added Tax equal to 9% (standard VAT rate is 18%) applying for services related to construction, renovation and insulation works of residential buildings, which are financed partly by the State and Municipalities budget resources as well as with soft credits granted by the State.
- Exemption of pollution charge for legal entities that implement the measures reducing pollution at least by 5%.

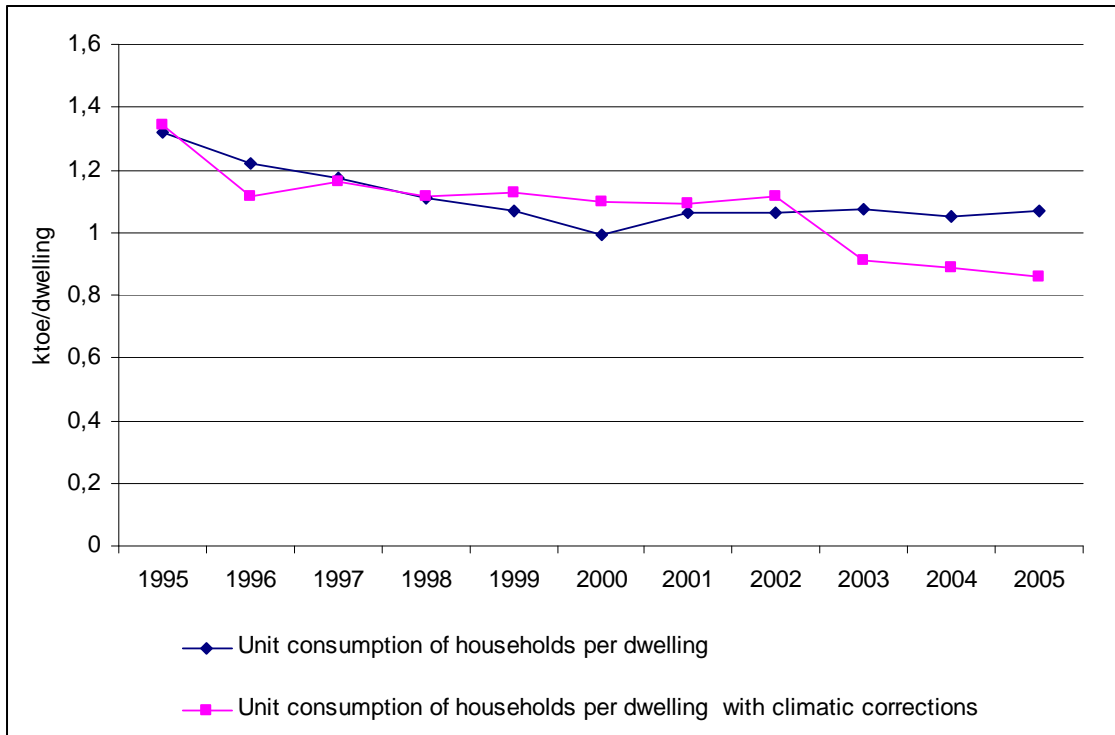
The Action Plan includes the following measures to be taken in future to increase the energy efficiency:

- Assigning to authorities or agencies the overall control and responsibility for overseeing the framework set up in relation to the target of energy savings.
- Creating and legalizing of energy efficiency monitoring system for already implemented energy saving measures and performing the mentioned one.
- Preparing and implementing of energy efficiency improvement programme in the transport sector.
- Preparing of recommendations for use energy efficiency criteria in tendering procedures for public procurement.
- Ensuring the dissemination of best practice on energy efficiency among public sector bodies.
- Implementation the new Excise Duties and increasing the rate of excises for energy products.

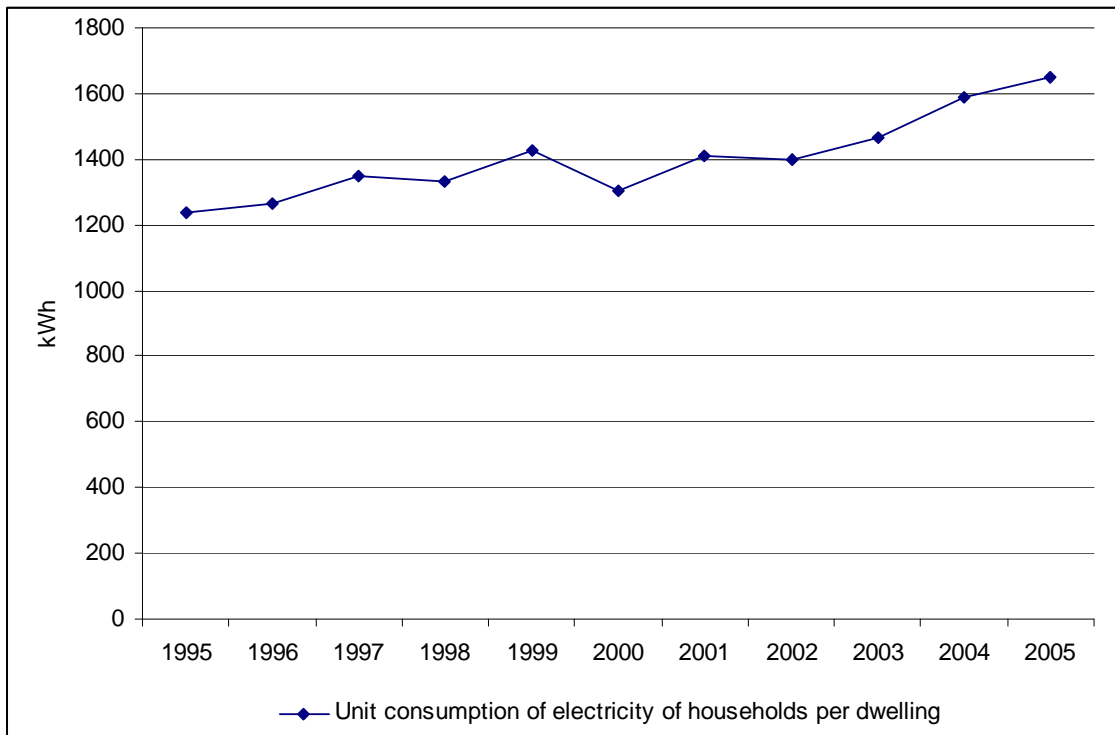
Annex 1

Selected Graphs on Energy Efficiency Trends

Unit consumption per Dwelling



Unit consumption of electricity per dwelling



Annex 2

Energy Efficiency Measure Summary by Country

MURE (Mesures d'Utilisation Rationnelle de l'Energie) is a database on measures for energy efficiency. The database provides information on energy conservation measures which have been carried out in the 25 Member States of the European Union, and enables the simulation and comparison at a national level of the potential impact of such measures. MURE database of Lithuanian measures have been created in 2006 and the results can be seen in the four tables below.

Table 1 MURE II Households

Measure Code	Title	Status
LT2	Thermal Techniques of Building Enclosures from 1992	Not in force, completed
LT3	Thermal Technique of Envelopes of the Buildings from 1999	Not in force, completed
LT4	Thermal Technique of Envelopes of the Buildings from 2005	Ongoing
LT5	"Energy Efficiency / Housing Pilot Project" (EEHPP)	Not in force, completed

Table 2 MURE II Transport

Measure Code	Title	Status
LT1	Public Technical Inspection of Vehicles	Ongoing

Table 3 MURE II Industry

Measure Code	Title	Status
LT1	Training Courses	Ongoing
LT2	Regional Energy Agency	Ongoing

Table 4 MURE II Tertiary

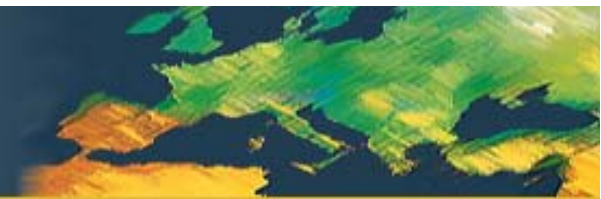
Measure Code	Title	Status
LT1	Thermal Techniques of Building Enclosures from 1992	Not in force, completed
LT2	Thermal Technique of Envelopes of the Buildings from 1999	Not in force, completed
LT3	Thermal Technique of Envelopes of the Buildings from 2005	Ongoing
LT4	Education Improvement	Not in force, completed
LT5	Renovation of Research Institutions and Universities	Not in force, completed
LT6	Training Courses	Ongoing
LT7	Regional Energy Agency	Ongoing

Table 5 MURE II General Cross-Cutting

Measure Code	Title	Status
LT1	National Energy Strategy	Ongoing
LT2	National Energy Efficiency Programme	Ongoing
LT3	Lithuanian Housing Strategy	Ongoing
LT4	Sales of Electricity Produced from Renewable Energy Sources	Ongoing

Annex 3

Country Profile



Energy Efficiency Profile : Lithuania

June 2007

Energy Efficiency Trends

Overview

Since 1998 the overall energy efficiency has improved by 19%, as known by the energy efficiency index (ODEX). This is more than the EU average (5%). All the sectors participated to this improvement.

Industry

The energy efficiency of the whole industry sector improved by about 23% between 1998 and 2004. It is measured at the level 8 branches in terms of energy used per production index or per tonne produced and then aggregated for the whole sector.

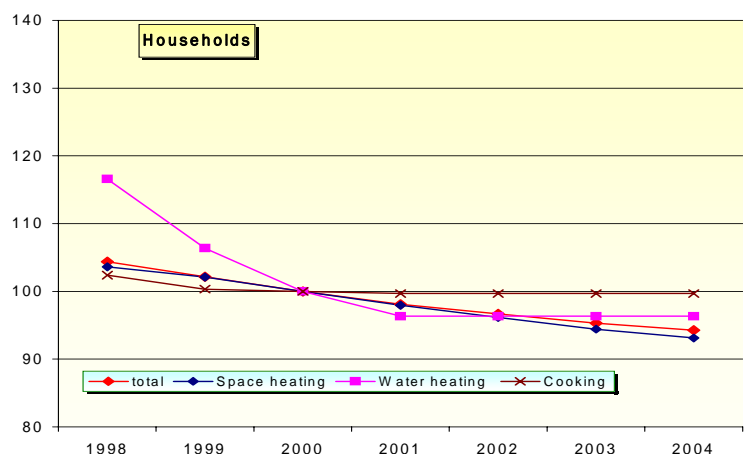
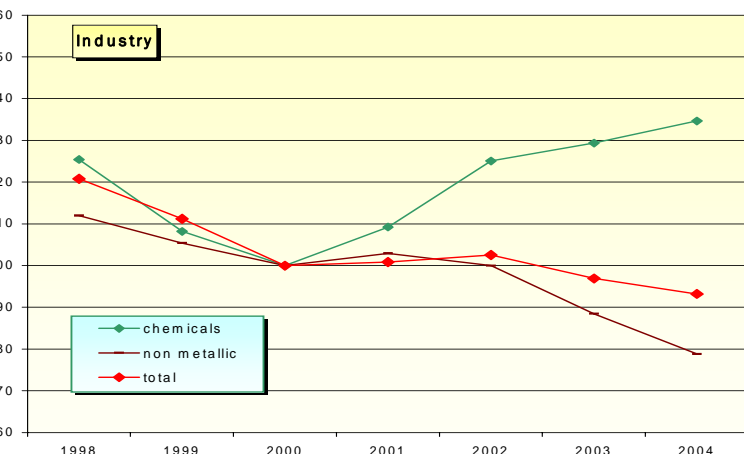
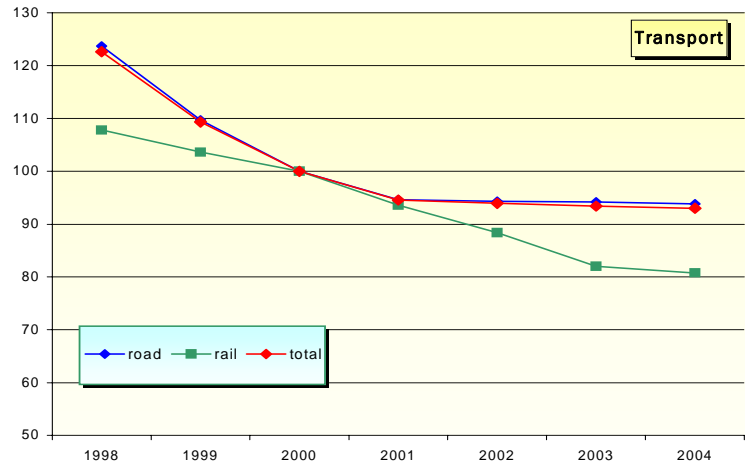
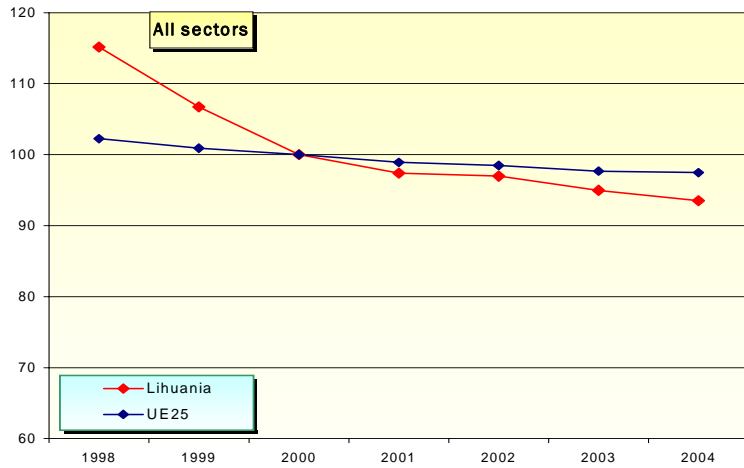
Households

The energy efficiency of household sector is closely connected to the energy efficiency of space heating due to cold and long heating seasons in Lithuania. The energy efficiency of households has improved by 10% between 1998 and 2004.

Transport

In 2004, the energy efficiency index of the transport sector improved by 20% compared to 1996. Only road and rail transport are considered. Road transport is the prevailing mode of transport in the country and energy efficiency of whole transport sector is closely connected to the energy efficiency of road transport. The energy efficiency improvements achieved is due to the renovation of the stock of road transport and the penetration of more efficient vehicles.

Energy efficiency index



Energy Efficiency Policy Measures

Institutions and programmes

In the Republic of Lithuania State management of the energy sector is carried out according to the procedure established by Law on Energy. The key institutions managing the energy sector are the Ministry of Economy, Ministry of Environments and Municipalities.

A certain part of functions in the area activity of energy efficiency are delegated to State Enterprise Energy Agency.

The following documents lay down the general guidelines for Lithuanian energy policy and energy efficiency activities in all sectors:

- National Energy Strategy
- National Energy Efficiency Programme
- Law on Energy

Households and Services

The Energy Efficiency Housing Pilot Project in Lithuania was implemented in 1996-2001. Results of this pilot project showed that average comfort adjusted savings accounted for 25%.

The Lithuanian Education Improvement Project focused on the improvement of energy efficiency in 62 basic schools in 2002-2005. Ex post evaluation estimated savings at 11,6 GWh or 27%.

The implementation of new building standard in 2005 (STR 2.05.01:2005)" allowed decreasing energy consumption in the new constructed buildings by 15 - 20% in average compared to buildings constructed according to the previous standard.

Transport

Taxation of mobile pollution sources (road, rail, water and air transport modes) play an important role in increasing energy efficiency.

The updated Rules for Performance of State Technical Inspection of Road Vehicles set safety requirements for road vehicles and for the control of emissions of harmful substances as CO, CnHm and fume. The theoretical evaluation showed that technical inspection activities decreased harmful substances emissions by 20-25%.

Energy prices and taxes

There are no CO2 taxes in Lithuania.

The "Lithuanian Law on Excise Duty" establishes the level of excise duty as follows: rate of LTL 1318 / tonne (4382 Euros/ t) on unleaded petrol , LTL 1934/t for leaded petrol, LTL 1002/ t for kerosene , and LTL 1002/t on gas oil.

Selected Energy Efficiency Measures

Sectors	Title of Measure	Since	Evaluation impacts
Residential Services	Building Code on Thermal Techniques of Buildings Enclosures (STR 2.05.01:2005)	2005	
Residential	Energy Efficiency Housing Project	1996	
Tertiary	Lithuanian Education Improvement Project in 2002-2006	2002	
Residential	Program of Modernization of Multifamily Apartment Houses	2004	
Transport	The rules on Public Technical Inspection of Vehicles	2003	
Transport	Law on Excise Duty	2001	

Source: MURE data base

www.mure2.com
www.odyssee-indicators.org



Annex 4

Data Situation and Data Quality

The main contributors of data used for constructing the energy efficiency indicators are:

State Enterprise Energy Agency

Department of Statistics to the Government of the Republic of Lithuania

Association of companies for road vehicle technical inspection

The State Enterprise Centre of Registers of vehicles

Lithuanian Energy Institute

Lithuanian District Heating Association

National Control Commission for Prices and Energy

The data collection and the dissemination of data to the technical co-ordinators ENERDATA s.a., Fraunhofer and ISIS have been done by the State Enterprise Energy Agency.

Most time series concerning energy and economics data are available for the period 1990–2005, except value added of industry branches at constant prices, Indices of industrial production and some data on transport sector, on electrical appliances in households etc.