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L'ENERGIA E L'AMBIENTE

ENERGY EFFICIENCY POLICIES AND MEASURES IN ITALY 2006

Monitoring of energy efficiency in EU 15
(EU Project ODYSSEE-MURE)

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Abstract

This report analyses the energy efficiency trends in Italy based on the energy efficiency indicators processed in the ODYSSEE database, maintained and updated in the IEE programme. These indicators are adopted by E.U. Committee as statistic informative base for the energy policies of the E.U. and they allow a comparison among the E.U. members.

This analysis focuses on the period 1990-2004. It also examines the policies and measures implemented in the field of energy efficiency, with a focus on the last years.

A more in-depth investigation was made for energy consumption and efficiency indicators in the Industry sector.

Key words: *Energy efficiency, final energy consumption, energy intensity, industry sector, energy policies and measures.*

Riassunto

Il presente rapporto analizza l'andamento dell'efficienza energetica in Italia basata sull'utilizzo degli indicatori di efficienza energetica elaborati dalla banca dati ODYSSEE, sviluppati ed aggiornati nell'ambito del programma IEE a cui l'Italia partecipa attraverso L'ENEA. Questi indicatori sono stati adottati ufficialmente dalla COMMISSIONE dell'U.E. come base informativa statistica conoscitiva per le politiche energetiche della Comunità e permettono un confronto fra i paesi membri della U.E..

L'analisi è relativa al periodo 1990-2004. Sono riportate le politiche, le misure e gli avvenimenti rilevanti per l'efficienza energetica e per l'ambiente, con particolare attenzione agli ultimi anni.

Un'analisi più approfondita sulla situazione dei consumi e dell'efficienza energetica viene fatta per il settore industria.

Parole chiave: Efficienza energetica, consumi finali di energia, intensità energetica, industria, politiche e misure energetiche.

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1 Executive Summary

In the period 1990-2004 primary and final energy consumption increased by 17.8% and 22.0%, respectively. The primary energy intensity drop by 3.0% in the period while the final energy intensity rose by 0.5%.

Energy efficiency indicator, ODEX, measures the progress in energy efficiency without the effect of structural changes or other factors such as climatic variations and changes in lifestyle. In the period 1990-2004 the ODEX index showed a light increase in energy efficiency, 3.9%, caused by an efficiency improvement in households and transport sector but counterbalanced by a bad performances in industry.

Energy efficiency of households and transport sector rose by 8.9% and 4.0%, respectively. The improvement in households was due to the installation of the technologies for the efficient use of energy in the end-users (increase in the use of fluorescent compact lamps and electrical appliances with higher efficiency, interventions for the thermal isolation of the buildings, etc). In the last years the increase in energy efficiency slow downed by a larger diffusion of electrical appliances such as air conditioner.

The increase in energy efficiency in transport sector depends on the rise in efficiency of cars (7.1%). The other transport modes showed greater improvement in efficiency but they represent a little part of the transport sector. These good performances are counterbalanced by a decrease in the efficiency of trucks, especially in the last years.

In the period 1990-2004 industry showed any improvement in energy efficiency but there were branches (chemicals, primary metals, cement and paper) that had rises in energy efficiency but the high worsening of other branches led to this result.

In February 2007 the Government presented the "National Plan for Energy Efficiency". The targets are the energy savings, the increase of energy efficiency in all sectors and the larger spread of the renewable energy sources (some objectives are fixed such as a photovoltaic power of 3000MW has to be installed within 2016).

2 The Background to Energy Efficiency

Overall economic context

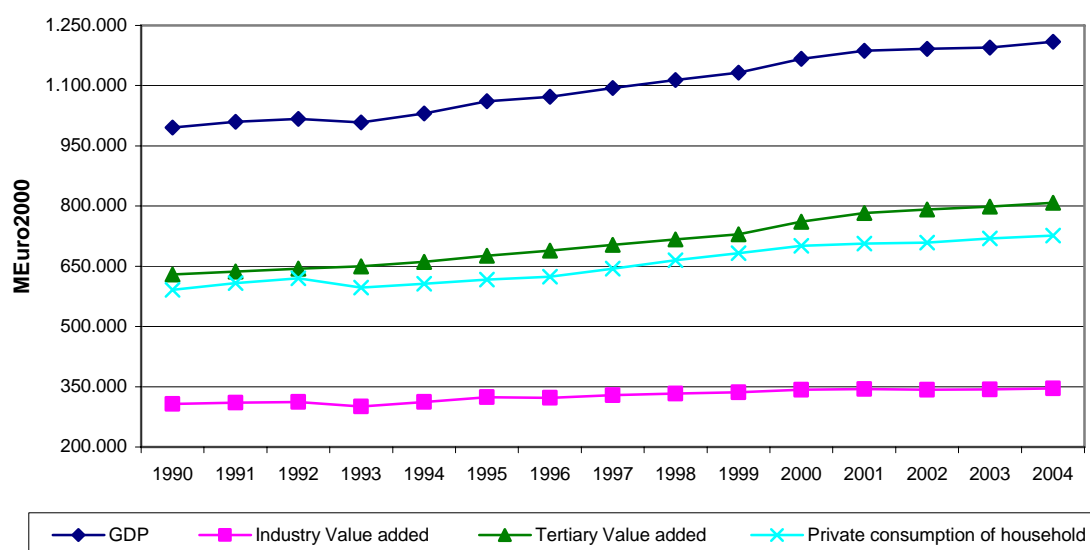
In the 2004 the Italian economy grew of 1.2%. The driving sector was the services sector that showed an increase of 1.2% against a +0.6% in industry (Fig. 2.1). After two years of stagnation GDP came back to raise and this shows that the economic recovery is in action stimulated by an increase of domestic demand. In the period 1990-2004 the increase was 21.4% with an annual rate of 1.5%.

The private consumption shows the same trend of GDP: in the period 1990-2004 the increase was 22.9% with an annual rate of 1.6%. In the second half of 90s the private consumption had an annual growth higher of GDP's while in the last years the trend seems to be reversed with the exception of 2003.

In the 2004 the value added of Industry increased by 0.6% confirming the recovery of 2003 after the fall of 2002. Primary metals and paper sectors showed the best performances (+6.4% and +3.6% respectively) while the worst were textile and metallic minerals sectors (-3.3% and -1.7% respectively).

Tertiary was the most active sector. It had a steady growth over the period 1990-2004 with an annual rate of 2.0%. In the last years this sector also showed a slowdown but its growth rate stayed highest.

Figure 2.1: Macro-economic indicators



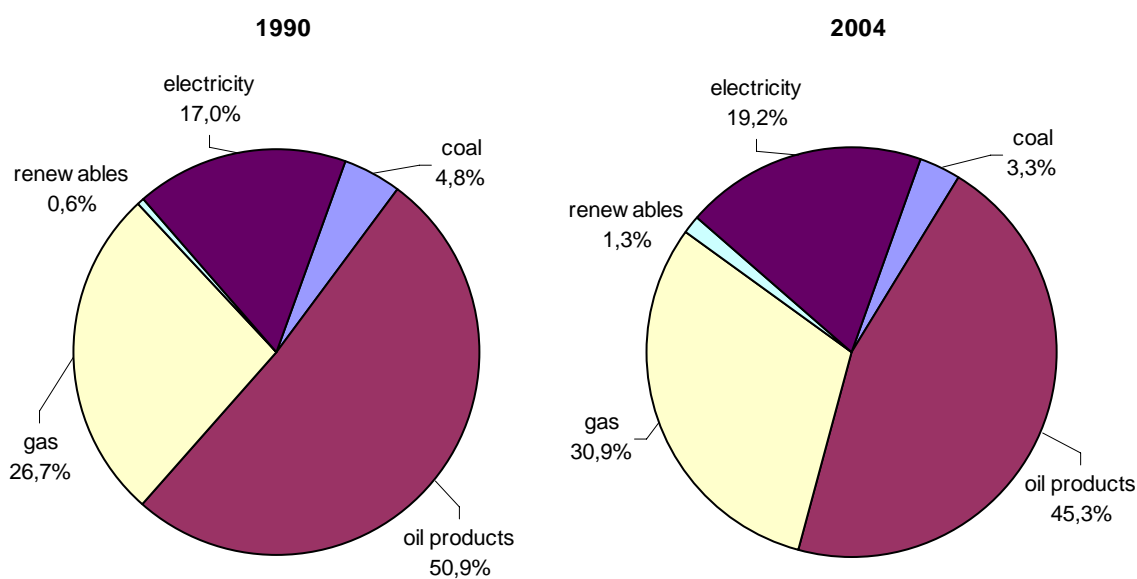
Energy consumption trends

In 2004 the final energy consumption remained stable around 132.5 Mtoe with a slightly increase of 0.6%. the raise over the period 1990-2004 was 22.0% with an annual growth of 1.6%

The consumption of all energy source was increased: the decreasing trend of solid fuels seems to stop in 2002, -29.7% over the period 1990-2002 and -17.4% over 1990-2004 (+16.1% in 2003). The recovery was due to the higher consumption of primary metals and non metallic minerals sectors. The consumption of oil products also increased even if slightly. The consumption of gas was quite stable. Gas was the energy source with highest growth rate (+41.3%) in the period 1990-2004, with the exception of the renewables. Electricity showed the highest growth rate in 2004.

These trends determined the consumption structure in 2004 (Figure 2.2).

Figure 2.2: Final energy consumption by energy sources



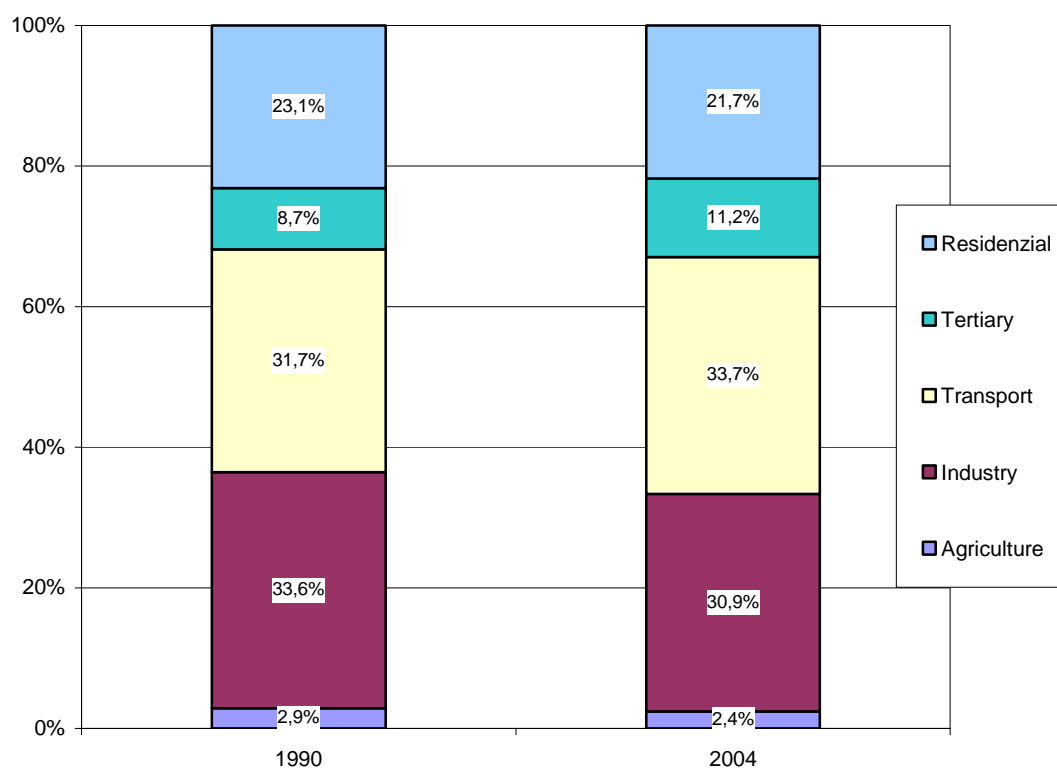
The main energy source remained oil products but its share fell down from 50.9% in 1990 to 45.3% in 2004. The shares of gas and electricity are increasing. As also renewable sources (+168.0%) even if their consumption is small (1.8 Mtoe). It should be mentioned that the amount of wood included in the final consumption by the official energy statistics (1.6 Mtoe in 2004) does not include the totality of consumed wood; non commercial wood (i.e. the wood not involved in commercial transactions) is not included. The actual total consumption of wood is estimated at about three times of the official statistic value.

The energy consumption of all end-users was stable in 2004. Only the transport sector showed a little increase in the total consumption. The transport sector had a constant growth while the other sectors were more dependent on the economic situation. In the period 1990-2004 the increase in final energy consumption was 21.8%. The tertiary sector showed the highest raise, +56.4%, followed by transport sector and households, respectively +29.5% and +14.5%. Industry and agriculture showed the lowest increase, +12.2% and +2.8%, respectively, even if in the period 1990-2004 all industry branches, except chemicals, had big increases.

The distribution of final energy consumption in the sectors (non energy uses excluded) is displayed in Figure 2.3.

The structure was kept on the same in the period 1990-2004 but with few changes. Industry and transport sector are the biggest energy users (their share is around 65%) but now their role is reversed because of the steady growth of transport sector. Tertiary sector rises over 11% while residential sector falls to 21.7% from 23.1%, caused also by the efficiency measures in this sector.

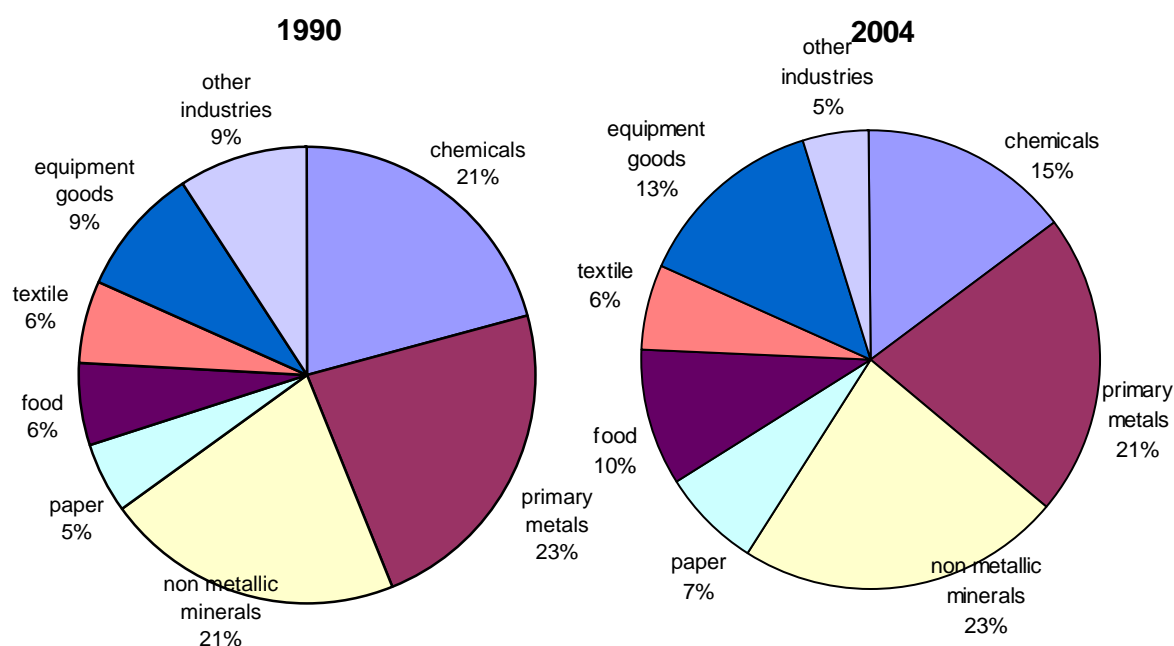
Figure 2.3: Final energy consumption by sectors



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In 2004 manufacturing sector consumed 40.5 Mtoe of energy, stable compared with 2003. All branches showed an increase even if little, the only exception is textile that displayed a cut of 8.8% confirming the decreasing trend of the last years. The energy structure of manufacturing is presented in Figure 2.4.

Figure 2.4: Energy consumption of manufacturing by branches



Primary metals, non metallic minerals and chemicals are the main branches but in the period between years 1990-2004 their share falls from 65% to 59%. In particular it's the chemical sector that showed the highest decrease from 21% to 15%. On the contrary food and equipment displayed the greatest increase: +82% and +65%, respectively.

The transport sector is the main final energy consumption sector. In 2004 it consumed 44.6 Mtoe of energy, +1.7% compared with 2003 and +29.5% in the period 1990-2004. Road transport is the main transport mode with 89.7% of total consumption (Figure 2.5) and +2.0% in 2004. Air transport is the mode that showed the highest growth in the period 1990-2004: +82.8%. After 2001 and 2002 the air transport consumption came to back to increase both in passenger and goods.

Navigation and railways represent only 1.9% of total consumption with great decrease in the period 1990-2004 but without a decrease in passenger and goods. These are the modes that showed the best improvement in efficiency.

In 2004 energy consumption of residential stayed stable around 28.8 Mtoe. Only the consumption for electrical appliances and lighting was increased by 3.2%. This end-use

showed the highest increased in the period 1990-2004, +35.0%, followed by space heating, +15.0%, and hot water, +4.3%. Cooking had a drop: -9.7% (Figure 2.6).

Figure 2.5: Energy consumption of transport sector by transport modes

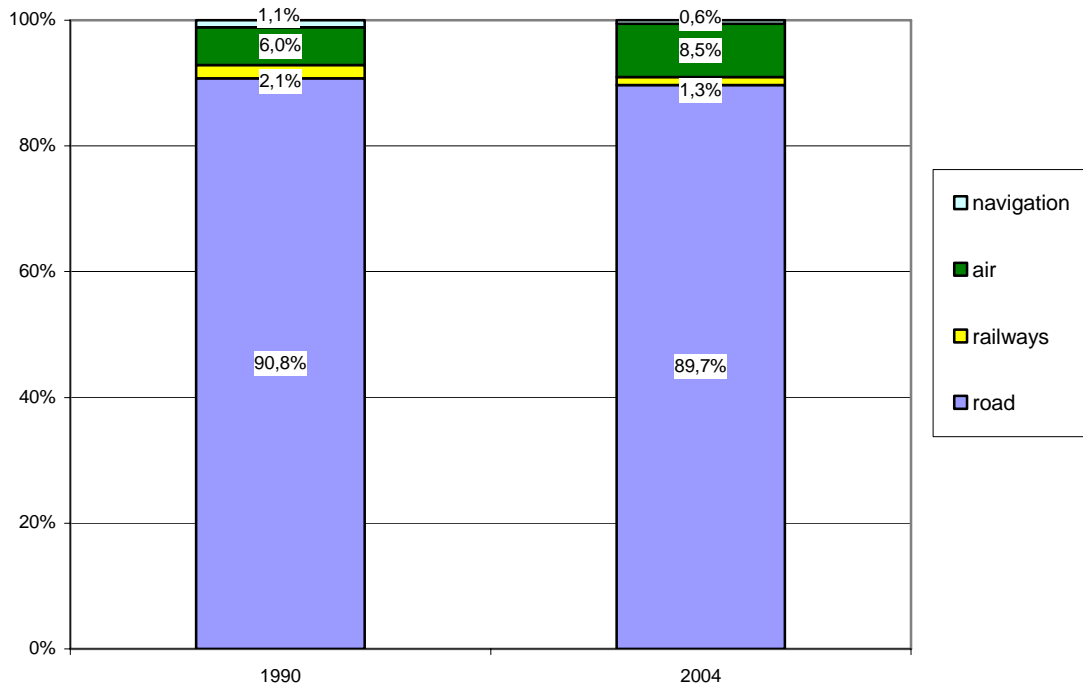
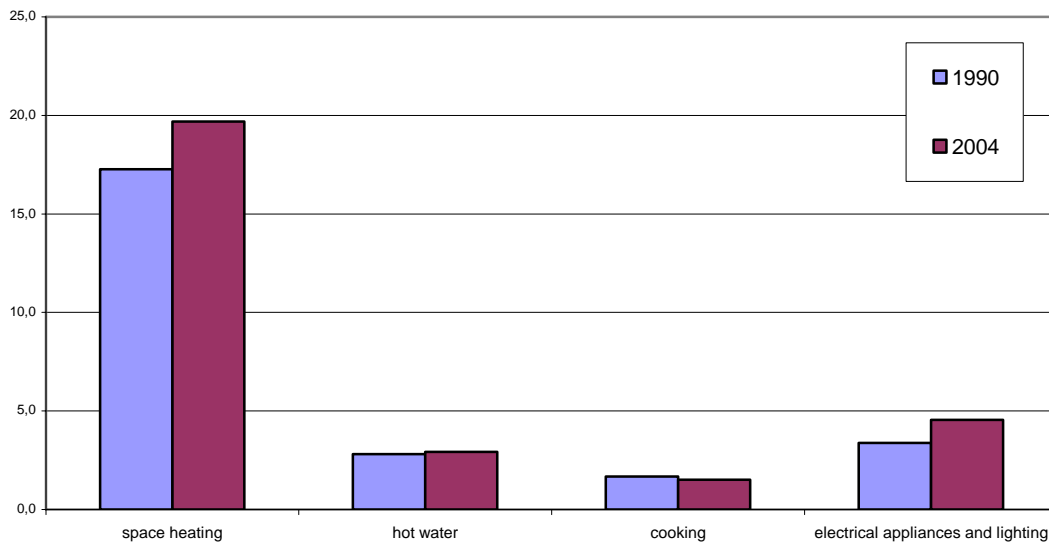


Figure 2.6: Energy consumption of households by end-uses



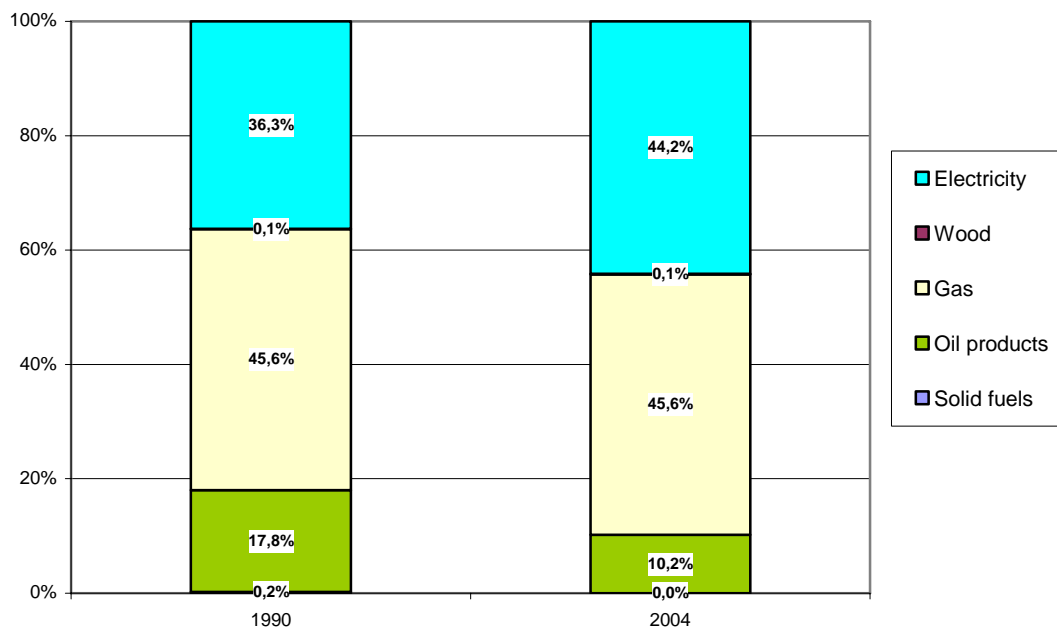
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The structure of energy consumption didn't have significant changes: the share of space heating kept on stable around 69%, electrical appliances and lighting was increased from 13% to 16% while the other end-uses dropped.

Tertiary sector had a slight decrease in energy consumption in 2004: it's consumption was around 14.8 Mtoe. Apart some years, tertiary sector showed a constant and high growth rate: in the period 1990-2004 there was an increase of 56.4%.

The growing energy demand was satisfied through electricity and gas: the first was increasing by 90.3% and the second by 56.3%. As a consequence, the structure of energy consumption remained the same but it's possible to notice the growing role of electricity, the decreasing share of oil products and the gas consumption as main energy source (Figure 2.7).

Figure 2.7: Energy consumption of tertiary sector by energy sources



The policy background to energy efficiency

National targets are the improvement of energy efficiency, the reduction of greenhouse gas emissions, the security of energy supply and spread of the renewable energy sources.

The promotion of energy efficiency in end-use sectors is one key tool to curb polluting atmospheric emissions and, in particular, greenhouse gas emissions from the energy system. The first step in this way were the Law Decrees enacted by the Ministry of Production Activities of 20th July 2004.

The system introduced by these decrees foresees that the energy and natural gas suppliers have to achieve an obliged quantity of primary energy savings for the years 2005-2009, starting from 1st January 2005.

The Regulatory Authority for Electricity and Gas certified the achievement of the energy savings target for 2005 and 2006: in these two years the savings was 500,000 toe while the target had to be 156,000 toe in 2005 and 312,000 in 2006. The actions for the energy savings were in electrical uses (lamps and electrical appliances with low consumption) and thermic uses (boiler with high efficiency, action on building covering) of civil sector, in energy production and distribution system in civil sector (photovoltaic panels, district heating), in improvement of efficiency in public lighting and various actions in industry.

The achievement of the target avoided emissions for over 1,360,000 tonne of CO₂.

3 Overall Assessment of Energy Efficiency Trends

Energy intensity trends

The primary energy intensity and the final energy intensity (i.e. ratio between primary or final consumption and GDP) are the indicators generally used to assess the energy efficiency of the overall economy and final consumers.

In Italy the primary energy intensity is stable around 0.15 toe/1000 EC00: it shows a decreasing trend, -3.0% compared with 1990. In the period 1990-2004 GDP increased at a higher rate than primary consumption: 21.4% against 17.8%; only in 1995, 1998 and 2003 the growth rate of primary consumption was higher and primary intensity increased (Figure 3.1).

The final energy intensity is stable around 0.11. Both primary and final intensity showed a fall in the period 1993-2002: in 2002 -4.1% and -3.3%, respectively, compared with 1990. This was the result of small increases in consumption and higher growth rate in GDP. In the last years higher increase in energy consumption, especially for tertiary and households, and a GDP practically steady caused a rise in energy intensities.

The trends of final and primary intensities are linked into the ratio final to primary intensity. This indicator is increasing because of final intensity decrease slower compared with primary intensity: +2.5% between 1990-2004.

Figure 3.1: Energy intensity (toe/1000 EC00)

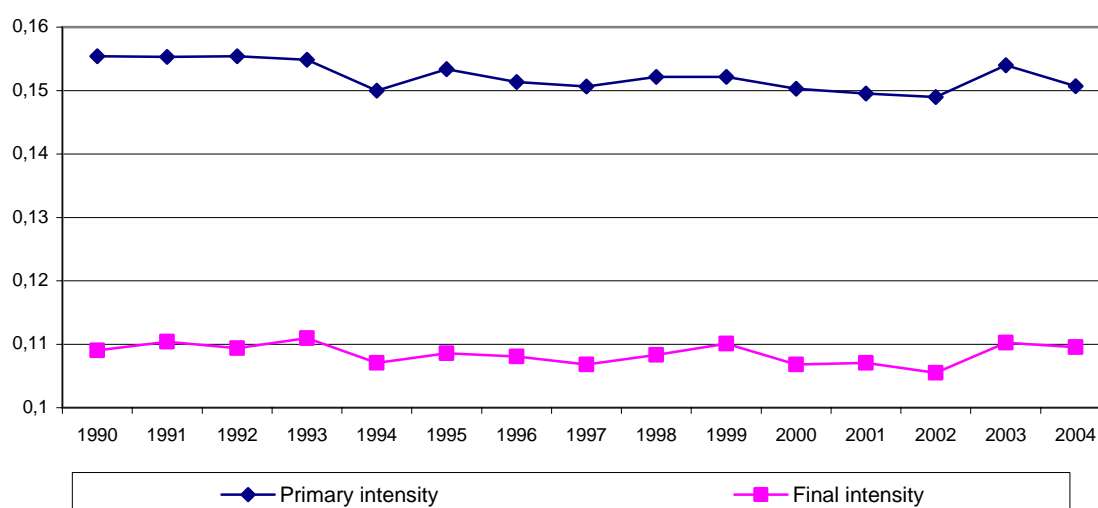


Table 3.1 – Variations in primary and final energy intensities in Italy (%/year)

	1990-1995	1995-2000	2000-2004	1990-2004
Primary intensity	-0,52	-0,41	0,07	-0,22
Final intensity	-0,18	-0,33	0,65	0,03

Energy efficiency

In 2004 the transport sector was the sector with the highest increase in energy consumption: +1.7%, due to increases in road transport and navigation while railways and air transport showed decreases. As a consequence the energy efficiency index stayed stable around 96.0. The small progresses in efficiency are due to strong weight of road transport, particularly to goods transport by trucks. Water, rail and air transport are the most efficient transport modes but their share is under the 35% in goods transport and under 10% in passenger transport. Road transport also showed an improvement in the efficiency of cars but was counterbalanced by a decrease in the efficiency of trucks, especially in the last years.

This is confirmed by unit consumption of passenger transport and goods transport (Figure 3.3)

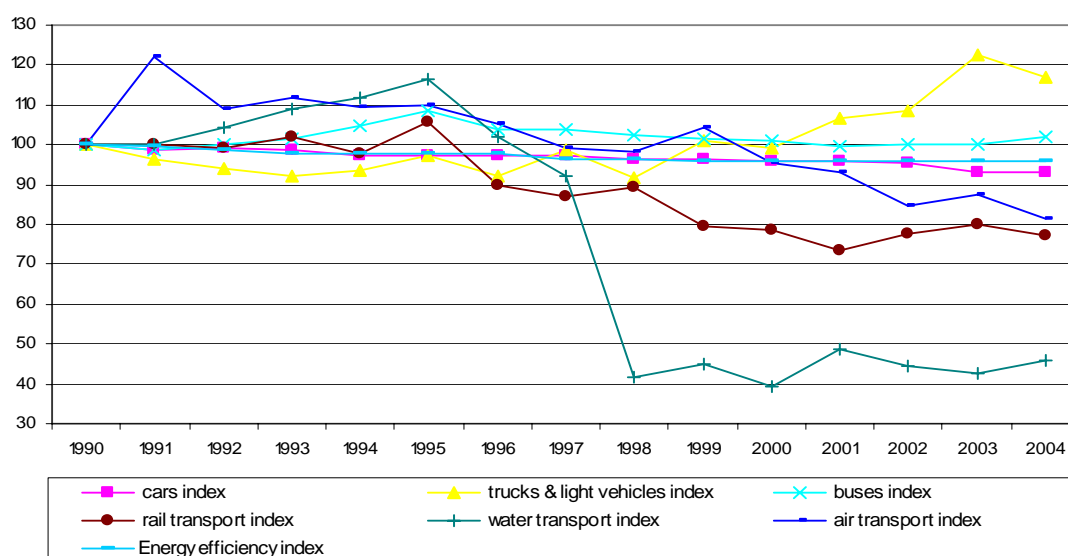
Figure 3.2: Energy efficiency in transport sector (index 1990=100)

Figure 3.3: Energy unit consumption of passenger transport and goods transport

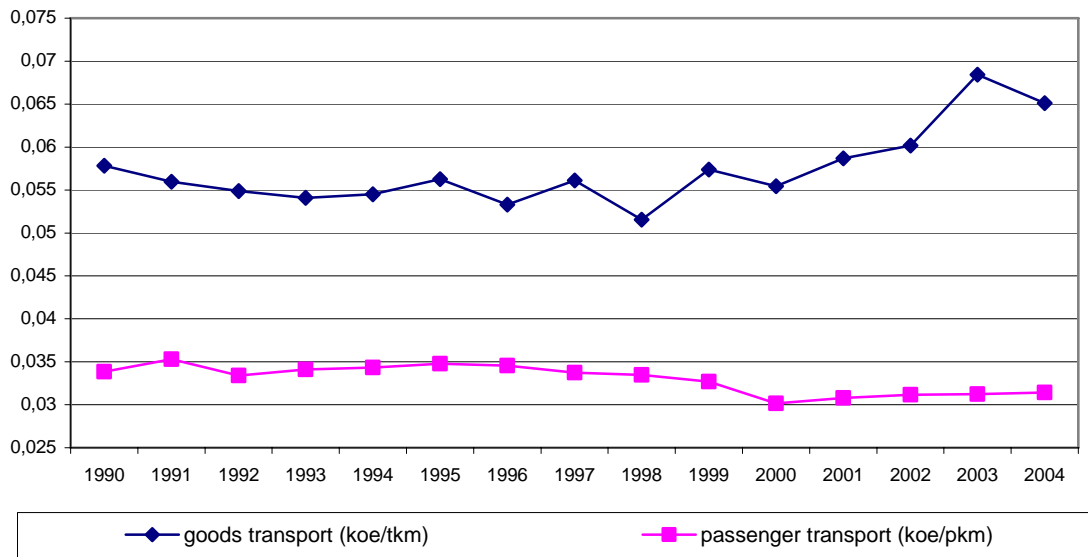
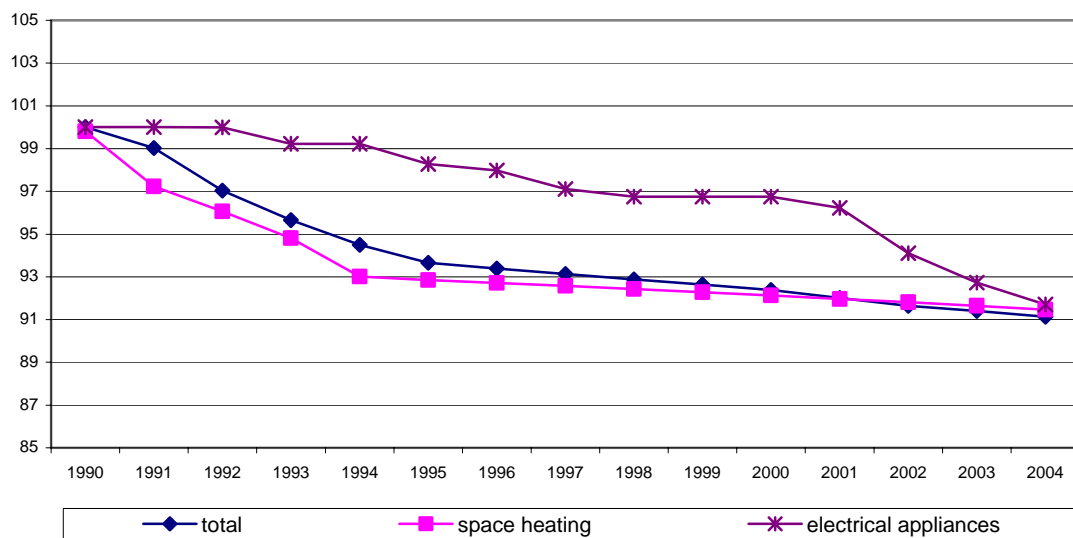


Figure 3.4: Energy efficiency in households (index 1990=100)



The households sector showed the best result in improvement of energy efficiency: in 2004 the index was 91.1 with a increase in energy efficiency of 8.9%. This result is the consequence of different actions and situations.

First of all there was the substitution of oil products with gas and electricity that are more efficient. Many actions carried out to improve the efficiency: increase in the use of fluorescent compact lamps and electrical appliances with higher efficiency, interventions for the thermal isolation of the buildings, etc. In the last years the improvement in efficiency

was slowed down by an increase in electrical appliances, especially air conditioner, that caused a rise in energy consumption.

The households unit consumption per dwelling is showed in Figure 3.5. The trend is the same of unit consumption for space heating (space heating is 68.9% of total energy consumption). This trend is determined by fuel substitution, end-use efficiencies, heating system and type of dwellings.

The energy efficiency of the whole economy is evaluated on the base of energy efficiency index of sectors. In 2004 the index of final consumers was 96.1, in the period 1990-2004 the improvement in efficiency was small: only 3.9%. This result is determined by manufacturing: in the period there wasn't any improvement in efficiency and this had a negative effect because of the role of industry has in the whole economy.

The energy savings of the period are reported in Figure 3.7.

Figure 3.5: Unit consumption of households per dwelling

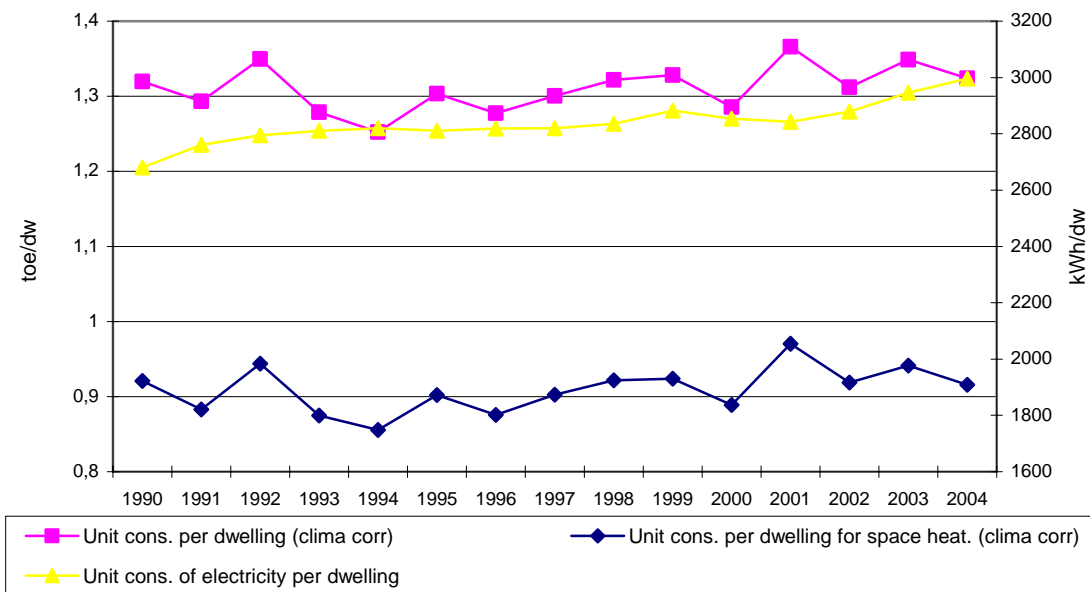


Figure 3.6: Energy efficiency index (1990=100)

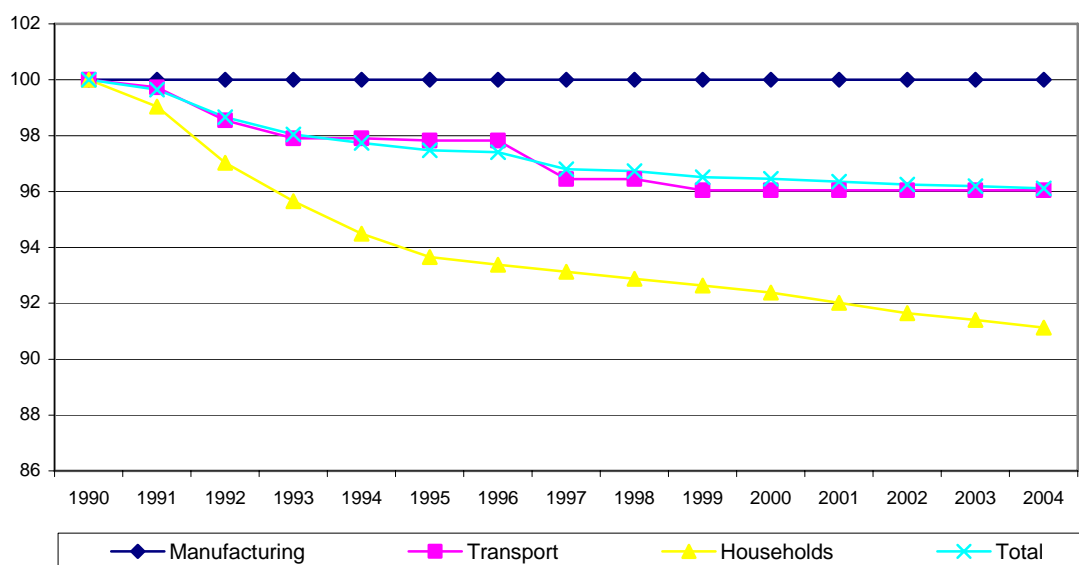
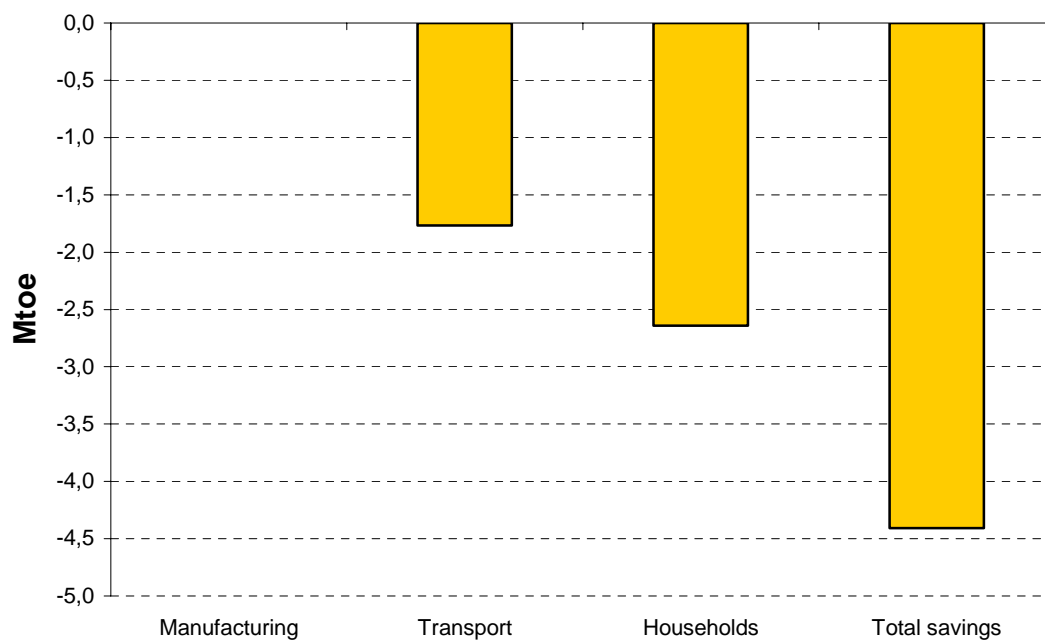


Figure 3.7: Cumulative energy savings in 2004 (compared to 1990)



CO₂-emissions and energy efficiency

The CO₂ emissions by sectors are showed in Figure 3.8.

In the period 1990-2004 the CO₂ emissions increased by 8.9%. There was an increasing trend for all the sectors followed by a big fall in 2000, except for the transport sector. In the last years, apart from 2003, the CO₂ emissions showed a decreasing trend, only the transport emissions kept on increasing.

The transport sector displayed the biggest increase, +28.3%, while the industry had a fall of 9.0%.

Figure 3.8: CO₂ emissions by sectors



4 Energy Efficiency Measures

4.1 Recent Energy Efficiency Measures

In the following the recent energy efficiency measures are illustrated (more details can be found in the MURE database www.mure2.com).

Residential Sector

The Legislative Decree n. 192/2005 sets the principles and the methods to improve the energy consumption of the buildings with the purpose to promote the development and the integration of the renewable sources and the energy diversification and to contribute to the reduction of greenhouse gas. Each building must have an energy certificate that includes the energy efficiency data and the reference values stated by law in order that citizens can evaluate and compare the energy performance of buildings.

Transport Sector

The government enacted the Legislative Decree n. 128/2005 to promote the use of bio-fuel and other renewable fuels instead of gasoline and diesel in transport. The national objectives are a consumption of biodiesel and renewable fuels equal to 1.0% of total consumption of gasoline and diesel in transport within 31st December 2005, and equal to 2.5% within 31st December 2010. These aims will be achieved with several actions. A first action is reported in the Law n. 311/2004: from 1st January 2005 to 31st December 2010 the biodiesel is exempted from the excise tax in the limits of an annual amount of 200,000 tons. The mixture diesel-biodiesel with a quota of biodiesel inferior or equal to 5% and with the characteristics of diesel provided by regulations can be introduced in the consumption.

Mobility Urban Plans were adopted to cut energy consumption and air and acoustic pollution with the substitution of public and private vehicles, the extending of “car restricted areas”, organization of moves of job-home employees of great firms.

Tertiary Sector

The project named as “Comune Solarizzato” (Solar City) is a concrete action for promotion and dissemination of RES in Italy. It was planned to experiment development strategies in real time for the enhancement of solar technology in the public sector by involving:

- Major Italian energy operators (associated in ASSOLTERM);

- Main Italian R&D institutes and associations (ENEA, ISES – International Solar Energy Society, Italian Universities);
- A number of local bodies and authorities, interested to develop the market of RES.
- European companies engaged in similar efforts.

Promoter of the project is Environment Ministry, which has planned to involve the following partners for a sound and consistent implementation of the project: ENEA (Italian Agency for Environment, Energy and New Technologies), 12 Provincial Governments gathered in a coordination institution named as “UPI - Province Solarizzate”, 8 Municipal Authorities of Provincial Capital and 130 Municipal Authorities gathered in the coordination “ANCI - Comuni Solarizzati”, 2 Mountain Communities, 2 Regional Governments, 1 National Naturalistic Park Authority.

The project goal is to install a surface of 24,000 m²/year of solar thermal collectors (in a time span of three years from 2002 to 2005) on public buildings of Municipal Authorities in the Central and Southern Italy, for a total amount of 72,000 m² of solar thermal equipment.

The installation will be executed by 400 workers of public utility organized in 47 new micro-companies (shaping a network of its own) in school structures, sports centres, public swimming pools, and other public buildings.

Cross-cutting measures

The Law Decrees by Ministry of Productive Activities (now Ministry for Economic Development) and Ministry of the Environment of 20-07-2004 deeply reform the promotion of energy savings concerning final uses by introducing an innovative system.

The system introduced by these decrees foresees that the energy and natural gas suppliers have to achieve an obliged quantity of primary energy savings for the years 2005-2009, starting from 1st January 2005. Nowadays the obligation refers only to suppliers having more than 100,000 final users on 31st December 2001, while further decrees will define the norms for the suppliers under that threshold.

In order to meet these obligations and achieve the fixed energy savings the suppliers could:

- develop projects for final users for improving the energy efficiency of the technologies already installed or concerning the ways of usage. The projects could also be done by some controlled companies or by the ESCO (Energy Service Companies);
- buy the “white certificates” certifying the achieving of energy savings.

The so-called “white certificates” are issued by the GME (Gestore Mercato Elettrico) in favour of subjects – suppliers, companies controlled by them and companies working on energy services sector – who have achieved the rate of energy savings established. The emission of the certificates is done by a communication of the Energy Authority which certifies the energy savings achieved. The Authority, in fact, has to verify and control that the projects have been realized in accordance with the decrees and the norms defined by the Authority itself.

The projects and measures can be implemented to mainly residential buildings and households and the measures are divided in two categories:

- Measures aimed at reducing electricity consumption
 - electrical re-phasing to the final user.
 - electric motors and related appliances: installation of electronic systems of frequency control, equipment and managing optimisation of electric-motorized pumping systems, installation of high efficiency motors and mechanisms of driving power transmission.
 - lighting systems: installation of automatic turn-on, turn-off, and intensity regulation systems (like natural illumination systems), enhancement of public lighting equipment efficiency, installation of high-efficiency systems (like lighting appliances, power suppliers, regulators).
 - electricity leaking: installation of stand-by low-consumption appliances or devices for reducing stand-by consumption of existing appliances, stand-by positioning systems for seldom-used appliances, systems of automatics turn-off for stand-by appliances
 - measures for the use of energy sources more suitable for electricity, i.e. the replacement of electric boilers for sanitary hot water or dishwashers, washing machines and other domestic appliances, with devices fed on either other energy sources or more efficient, or district-heating devices.
 - reduction of energy consumptions for thermal uses, through the installation of systems or devices that decrease hot water demand.
 - reduction of energy consumptions for air conditioning: thermal insulation of buildings, installation of devices controlling sun radiation during summer months (like selective glasses, external solar insulators), applications of bioclimatic, solar-passive and solar-assisted cooling techniques.
 - high-efficiency household appliances and office equipment: installation of high-efficiency refrigerators, washing machines, dishwashers, boilers, ovens, water

circulation pumps, installation of high efficiency personal computers, printers, fax devices.

- Other measures
 - installation of more efficient devices for the combustion of non-renewable energy sources.
 - measures of substitution of other sources of energy with electricity, like drying with microwaves devices, fusions and cooking with conveyance and/or radiation ovens, etc.
 - air conditioning of areas and heat recovering in air-conditioned buildings with the use of renewable sources of energy;
 - installation of pieces of equipment for the improvement of renewable energy sources to end users, like: use of solar panels for hot water production, use of both geothermal heat and that from cogeneration or geothermal plants, fuelled by vegetal produces, organic waste, for heating purposes and the heating supply in residential buildings.
 - information and awareness-raising campaigns spurring end users into the reduction of energy consumption and the rational use of energy.

4.2 Patterns and Dynamics of Energy Efficiency Measures

In figure 4.1 the graphs of spider's web illustrate the patterns of energy policies and measures in Italy.

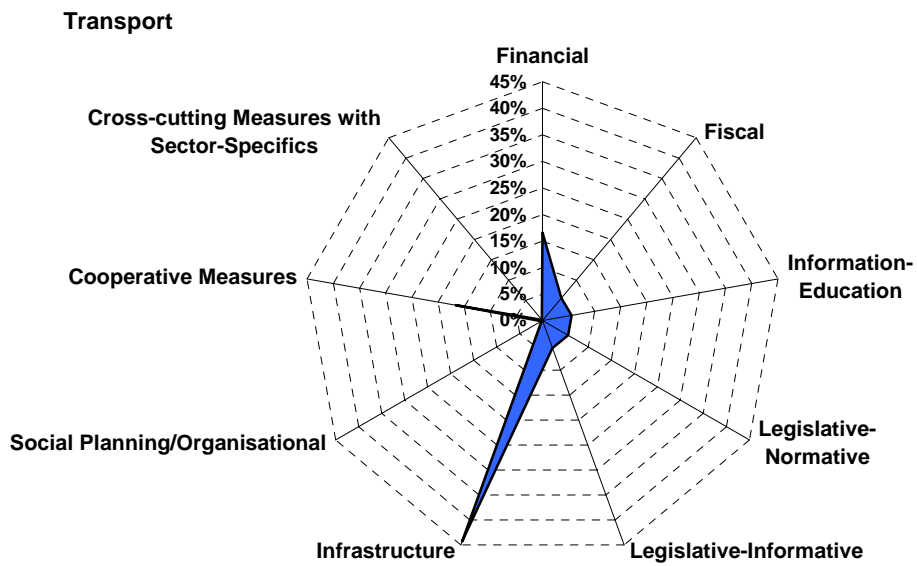
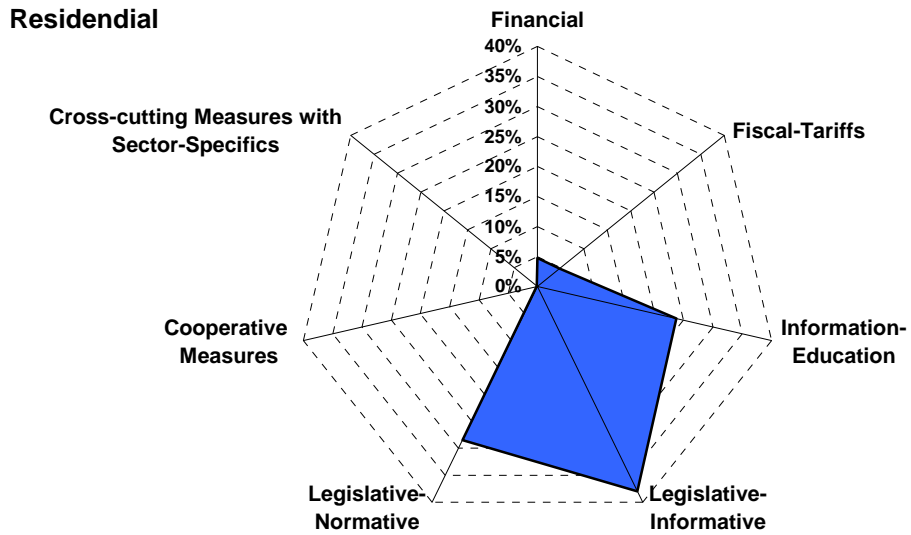
In the **residential sector**, legislative measures, both normative and informative (labelling of household appliances), are dominant followed by education and information (energy behaviour).

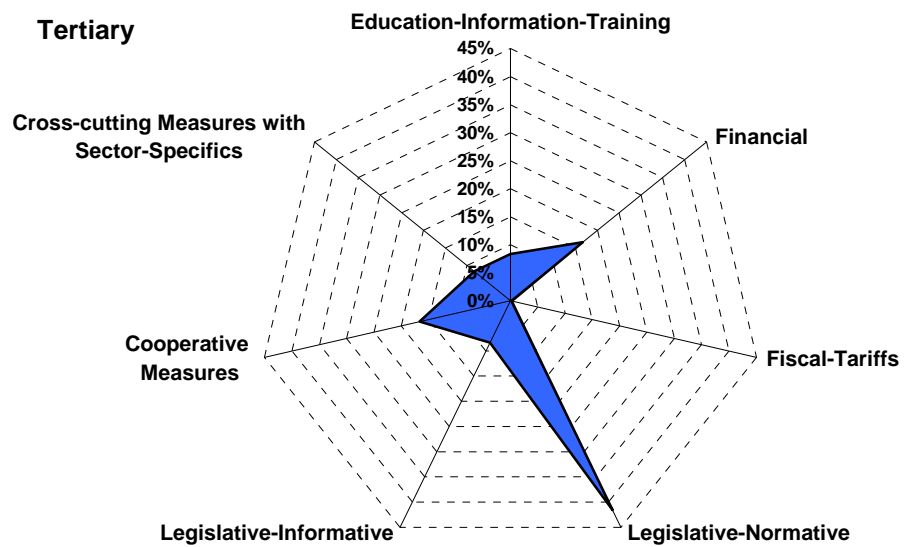
In the **transport sector**, the most important measure is infrastructure followed by financial and fiscal measures. This situation probably will change soon because of the actions set up for this sector.

In the **industry sector** there wasn't any measure since 1990.

In the **tertiary sector**, all types of measures work. The main measure is legislative/normative, followed by financial and cooperative measures.

Figure 4.1: Patterns of policy and measures in Italy 1990-2004





5 In-depth View on the Industrial Sector

Overall context

In the period 1990-2004 the value added at constant 2000 price of industry and manufacturing grew by 12.4% while the industry production index grew by 8.2%. The growth of the valued added of manufacturing was quick in the period 1993-2000 (2.9%/y), in these last years the valued added is decreasing (-3.2% from 2000).

All manufacturing branches grew in the period with the exception of textile that fell by 10.5%. Paper and food showed the biggest increases: +27.2% and +24.5%, respectively. This situation is also reflected by the production index: +40.5% for paper and +22.9% for food.

Figure 5.1: Value added of manufacturing branches (index 1990=100)

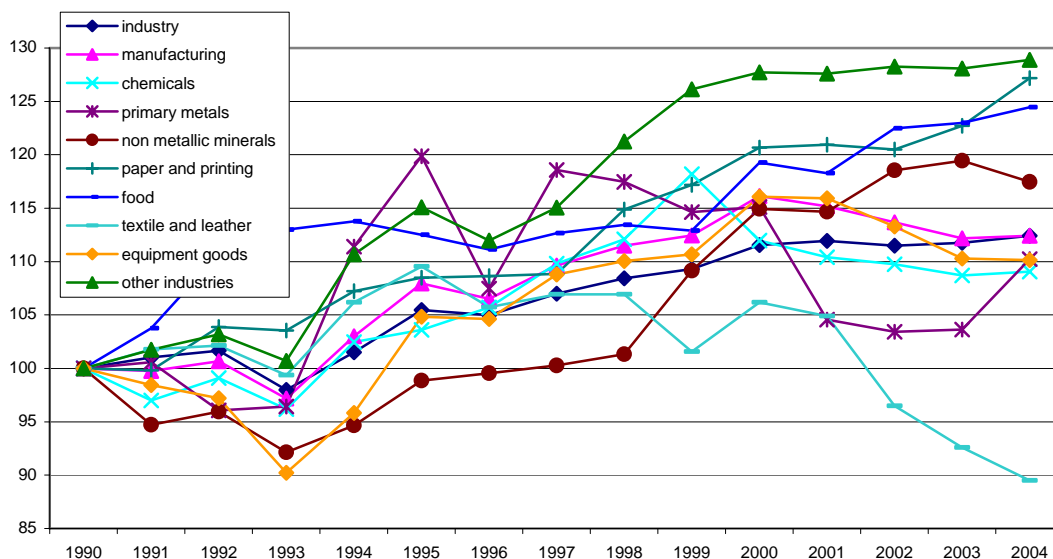
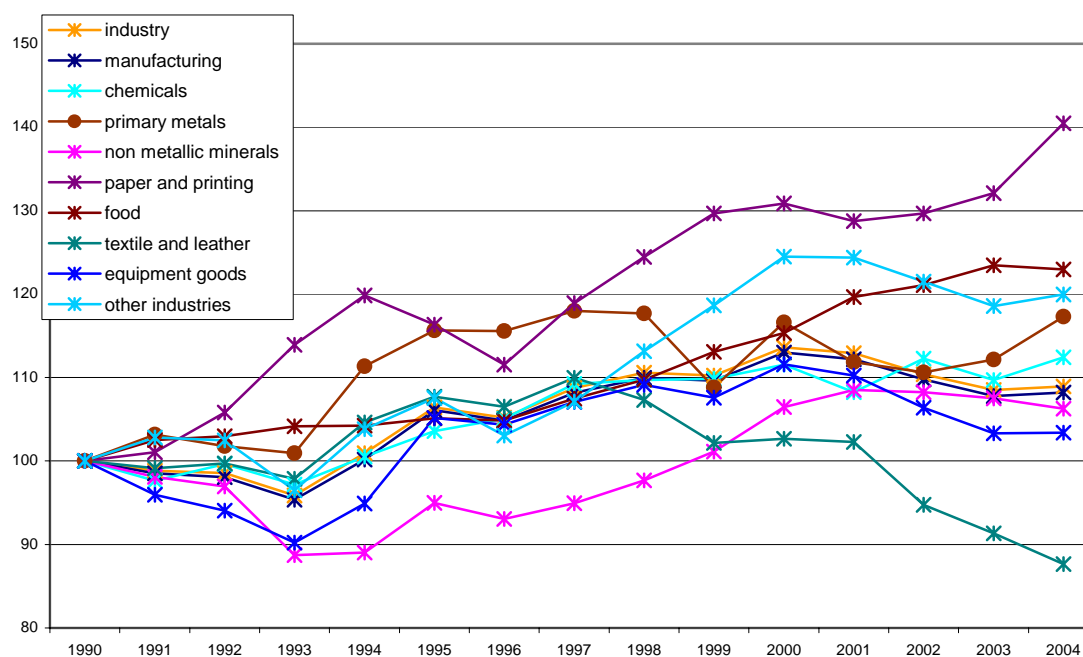


Figure 5.2: Index of industrial production

Energy consumption trend

In the 2004 manufacturing consumed 40.5 Mtoe of energy, +11.9% compared with 1990, and it's 30.6% of total final consumption. The consumption had an increasing trend since 1993 with the exception of 1996 and 2002; in the last years the consumption is practically steady.

In Figure 5.3 the consumption by fuel is reported. The main energy source are gas and oil products. Their share is about 60% all over the period but the consumption of gas is increasing, +31.9% in the period 1990-2004 (in 2004 its share was 42.2%) while oil products are decreasing, -14.6%.

Electricity is also increasing, +24.5% in 2004. The coal drop by 15.9% in the period 1990-2004 but the decrease kept on until 2002 followed by an increasing trend that seems to continue for the next years. This is due to an increase of coal in the consumption of primary metals.

In the period 1990-2004 the industrial branches grew but in different ways. Food grew more, +82.2%, followed by equipment and paper, +65.3% and +55.8% respectively. Only chemicals had a cut in energy consumption, -19.2%, as a consequence of its transformation towards products less energy intensive.

As the result of energy consumption trends, Figure 5.5 shows the shares of the branches in manufacturing consumption.

Figure 5.3: Energy consumption of manufacturing by energy sources

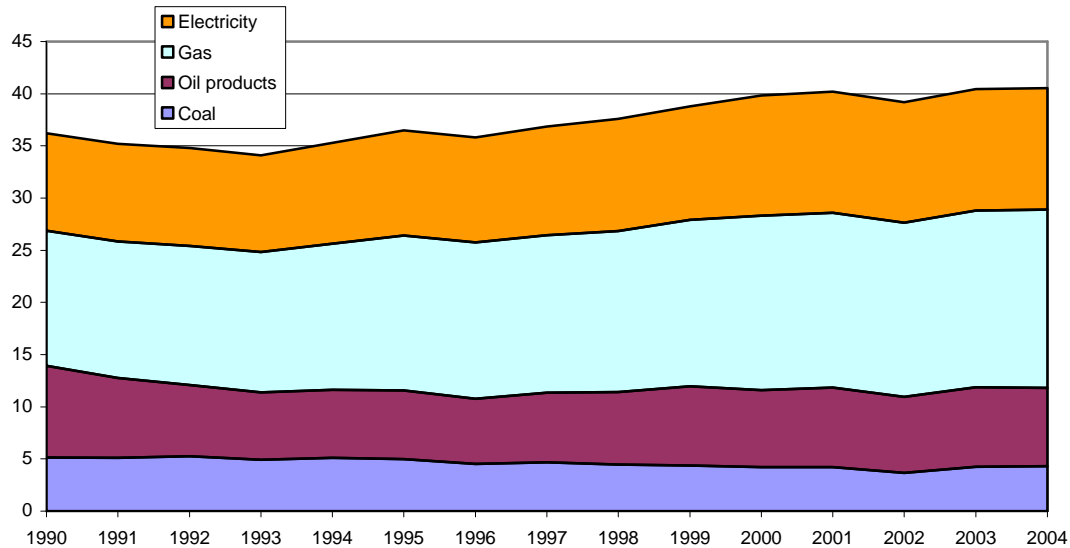


Figure 5.4: Energy consumption of manufacturing by branches (index 1990=100)

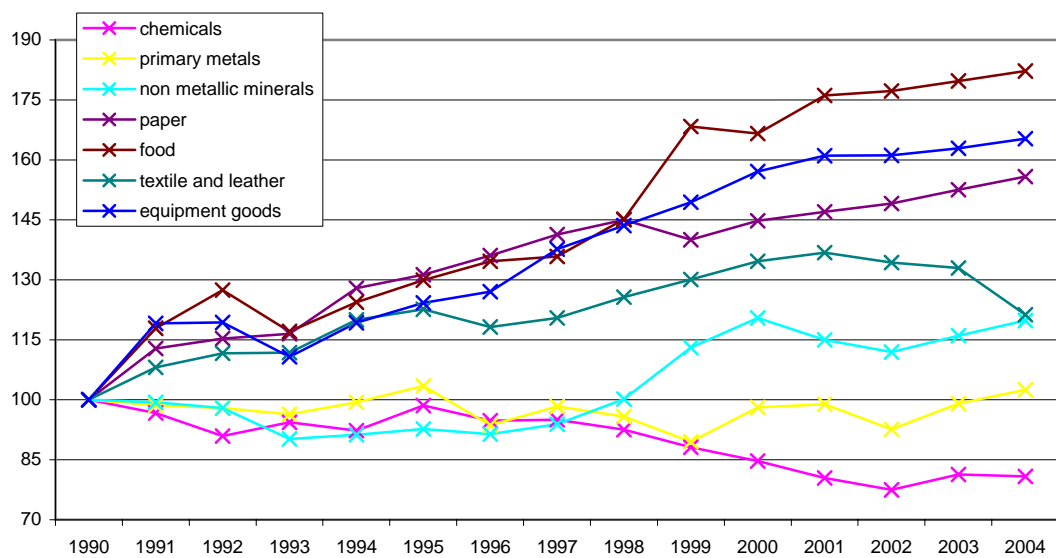
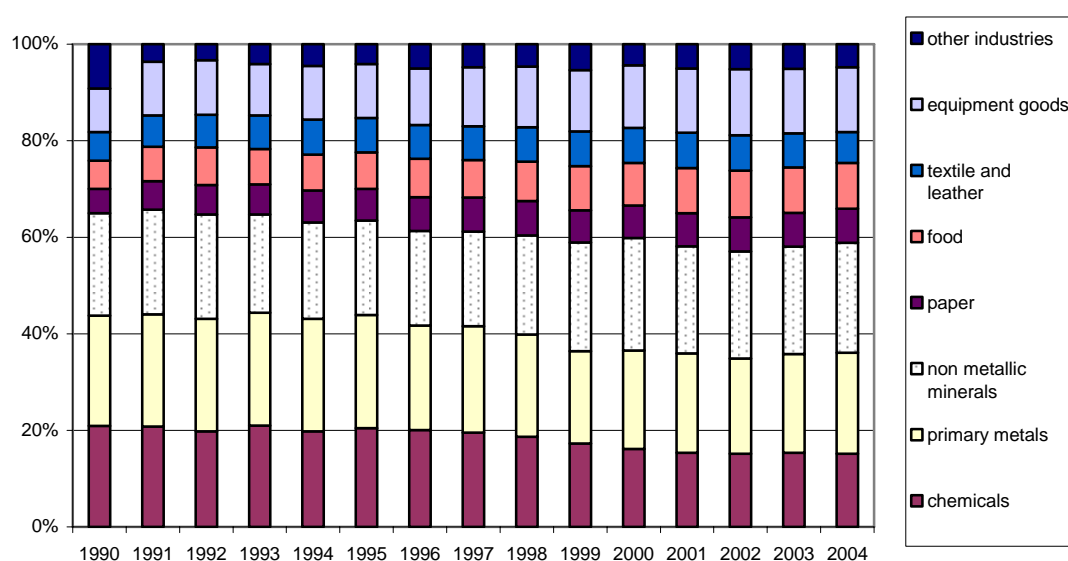


Figure 5.5: Energy consumption of manufacturing by branches (%)

Recent energy efficiency / CO₂-measures

The decree of 16-06-2005 by the Ministry of Productive Activities (now Ministry for Economic Development) has been issued in order to facilitate pre-competitive development programmes, including activities not predominant on industrial research and related to research activities in general, focused on the improvement of energy efficiency and the diffusion of renewable energy resources.

The available sum amounts to 50'000'000 Euro of national resources from F.I.T. (Technology Innovation Funds) with a reservation at least of 30% for the SME (Small and Medium Enterprises), as well as 30'000'000 Euro of additional resources co-financed by F.E.S.R. (European Fund for the Regional Development) resulting from the P.O.N. (Local Industrial Development), with a reservation at least of 70% for the SME.

The pre-competitive development programmes admissible with the tax incentives envisaged by this law and characterised by an investment between 1'500'000 and 5'000'000 Euro, must concern the development of methodologies, systems and products aimed to encourage the improvement of energy efficiency and the diffusion of renewable energy resources coherently with the goals of the EU 6th Framework Programme. In particular the contents of these programmes should concern:

- electric and thermal energy production from renewable sources with low CO₂ emissions, including transportation, transformation, distribution and final use;
- energy savings and energy efficiency, included the ones achievable by using renewable raw materials; Last update: 26 January 2006

- alternative fuels.

The programmes must have a duration not lower than 18 months and not greater than 24 months since the date of presentation of final project to the administrator.

During late 90's, Italian Government issued a series of laws in order to attain the Kyoto Protocol target of abating CO₂ and other pollutants emissions, stemming from energy production in power plants.

Among these, taxation on traditional fossil fuels (above all coal) employed for energy production was betaken as a consistent tool to

- discourage the employment of these fuels for electricity production (as thermoelectric power accounted in 1999 for 78.7% of total domestic electricity production – source GRTN-National Power Grid Manager).
- raise money to be subsequently allotted for the enhancing of energy production from renewable energy sources.

Two are the main laws that implemented the taxation on fossil fuels pollutant emissions, namely:

1. Law n. 448/1998, art. 8, G.U. 29/12/98 n. 302, known in Italy as “carbon tax” or “ecological tax” (Financial Law of year 1999), concerning taxation of CO₂ emissions from fossil fuels employed in large combustion plants;
2. D.P.R. 416/01, G.U. 28/11/01 n. 416, concerning norms for taxation on SO₂ and NO_X emissions from fossil fuels employed in large combustion plants.

The three main targets to be attained by means of the “carbon tax” implementation can be summarized as follows:

- Enhancement of the use of less polluting fuels, i.e. with a low CO₂ emission;
- Promotion of a range of actions to increase energy efficiency in the manufacturing sector;
- Spur the employ of renewable energy sources for the electricity production by power plants.

Energy intensity trends

In the period 1990-2004 energy intensities of industry and manufacturing were practically steady. Observing the trend the energy intensity decreased between 1990-1998 mainly for economic situation, in the last years the slowdown in the economy caused an increase in energy intensity.

Figure 5.7 showed the energy intensities of industrial branches. Only chemicals showed a decreasing energy intensity caused by a cut in consumption, an increase in production and in value added. Equipment, food, textiles and paper showed the biggest increase in energy intensity: +50.1%, +46.4%, +35.5% and +22.5%, respectively. These increases are different: the rise in intensity of paper was caused by a growth of the branch (efficiency increased) while equipment, food and textiles lost efficiency.

Primary metals and non metallic minerals had a fluctuating trend: a decrease in energy intensity was followed by an increase and a new cut.

Figure 5.8 presents the unit consumption of steel, cement and paper and it allows to see that these branches improved energy efficiency.

Figure 5.6: Energy intensity (toe/1000 EC00)

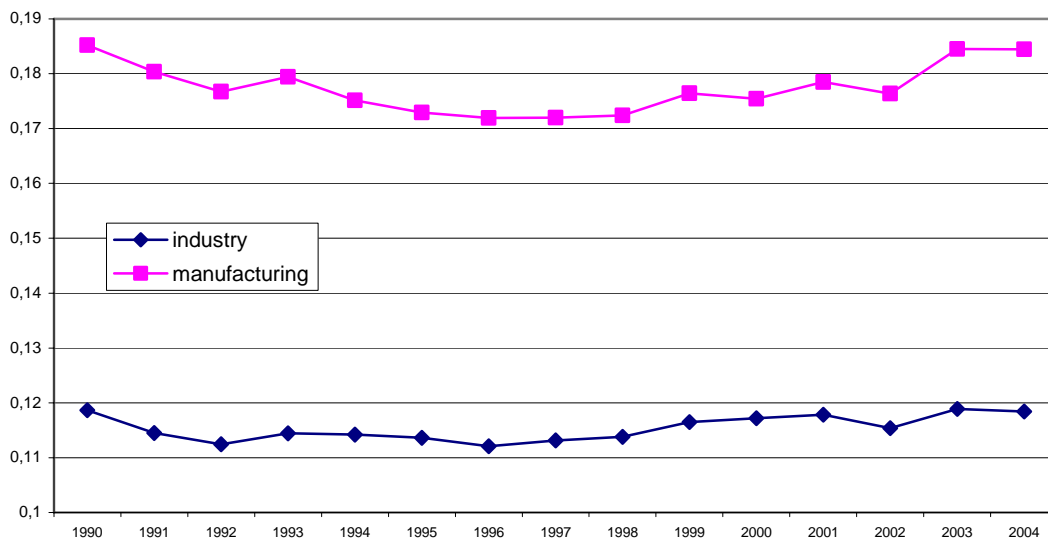


Figure 5.7: Energy intensity by branches (index 1990=100)

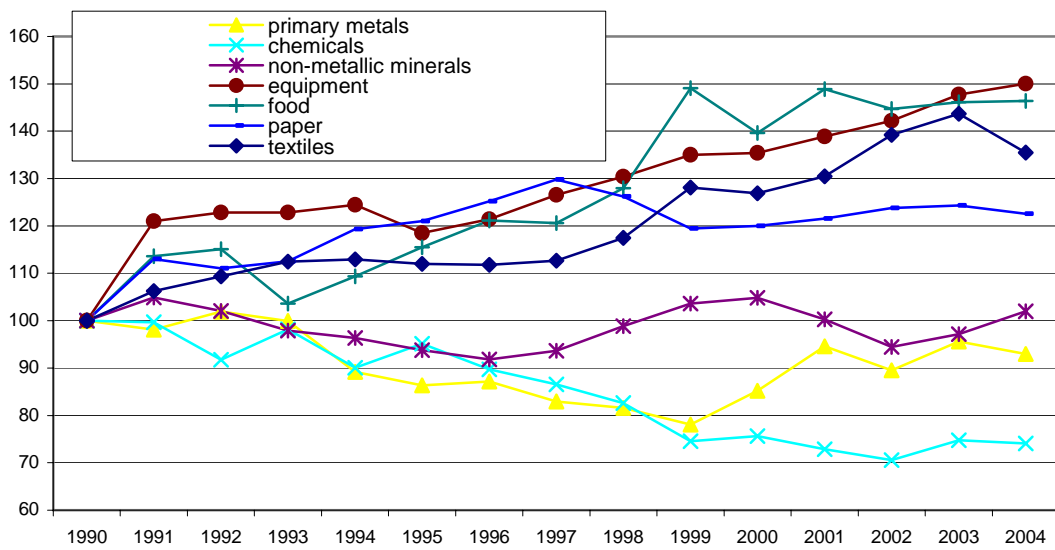
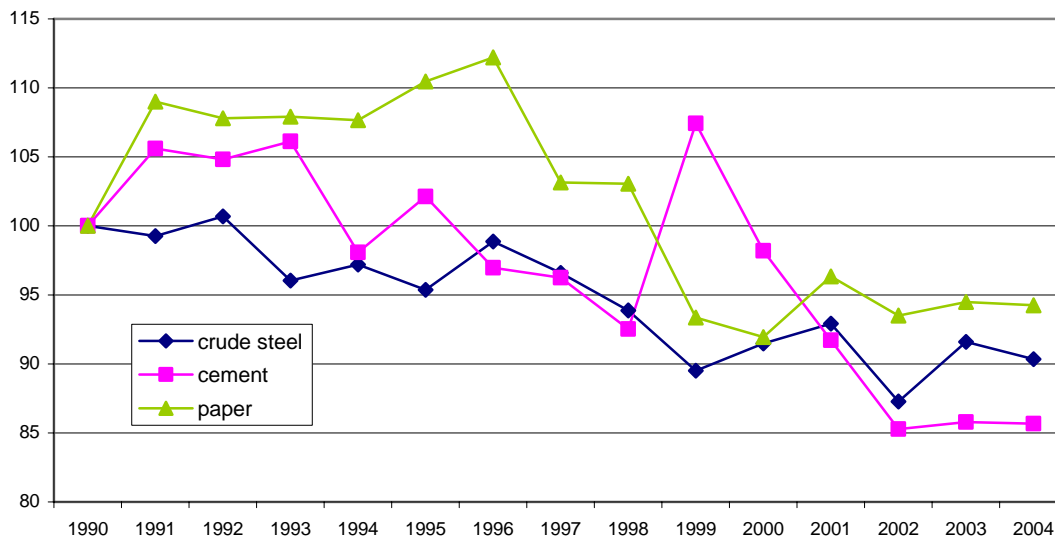


Figure 5.8: Energy unit consumption



Energy efficiency

Manufacturing energy efficiency (Fig. 5.9) didn't show any improvement in the period 1990-2004. This is the result of different performances of the industrial branches.

There was a growth in steel, cement and paper with an increase in energy efficiency (proved by a cut in energy unit consumption). Chemicals showed an improvement in energy efficiency, mainly due to a production less energy intensive. The big losses of energy efficiency in equipment, food and textile caused the bad result of manufacturing.

Figure 5.9: Manufacturing energy efficiency

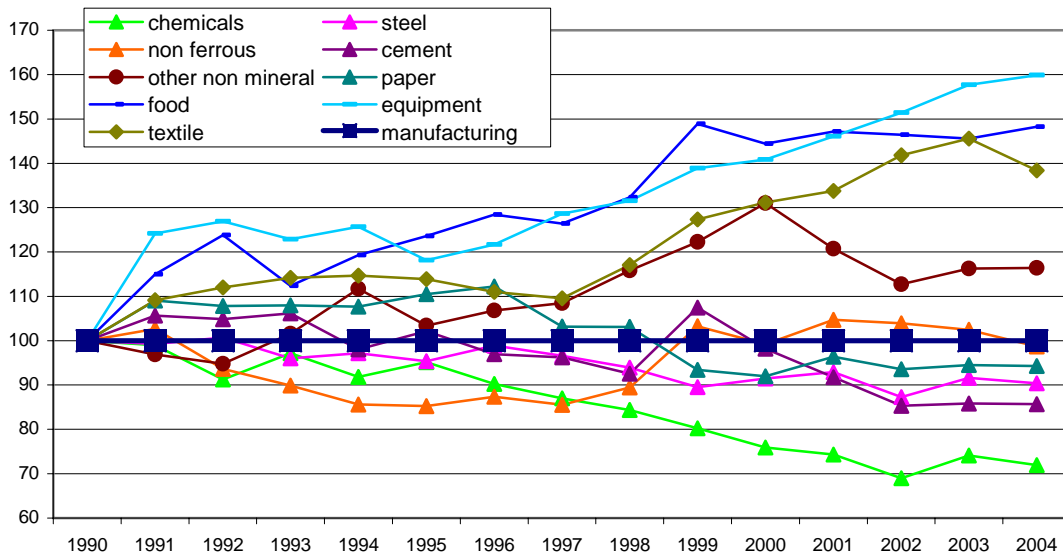
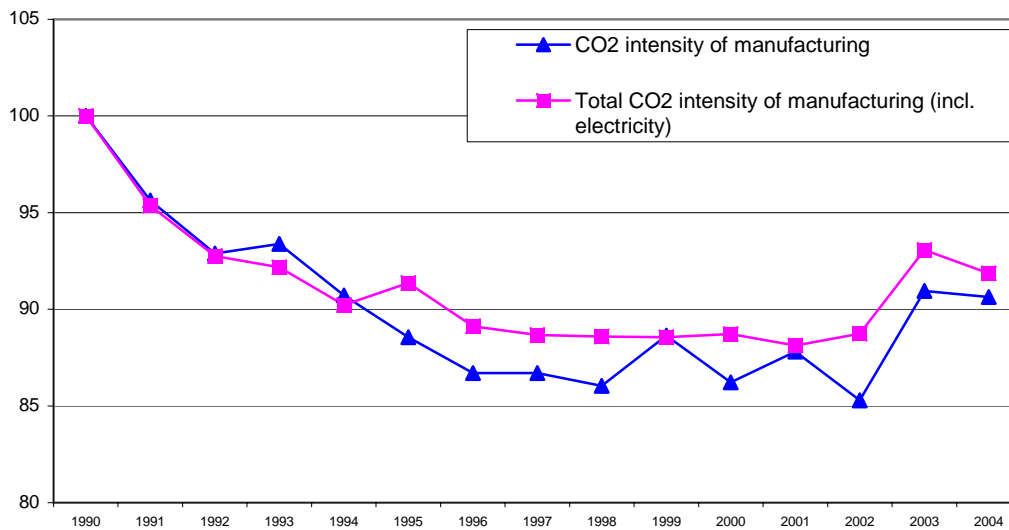


Figure 5.10: CO₂ emission intensity



CO₂ emissions and energy efficiency

Figure 5.10 shows the CO₂ emission intensity in manufacturing excluded and included CO₂ emissions from electricity. In the period 1990-2004 the intensities decreased 9.4% and 8.1%, respectively. The cut was mainly due to a fuel substitution from oil and coal to natural gas.

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

On 19th February 2007, the Italian Government presented the “National Plan for Energy Efficiency”. The available funds will be 1 billion of euro for supply and 1-1.5 billions of euro for demand.

The actions in energy demand are:

- Biobuildings: new level of thermic isolation (from 2010 cut of thermic consumption about 20-25% in new buildings), hot water obtained from solar energy, solar protection in new buildings to reduce the use of air-conditioner
- Energy efficiency in industry: reduce energy consumption through the use of electrical three-phase engines in low tension at high efficiency with power between 5kW and 90kW.
- reduction of tax for LPG; increasing share of biodiesel in fuels and reduction of tax for biodiesel and bioethanol.
- Incentives for photovoltaic.
- Increase the obligation to energy savings through the white certificates.
- Incentives for the CHP plants with high performance: priority of distribution, exemption from obligation to introduce electricity from renewables in the net, exchange of electricity.

The actions in energy supply are about the first industrial innovation project on energy efficiency for an industry that consumes less energy and produces new products to increase the competitiveness, to save energy and to development the renewables. These results can be achieved through

- Investments in renewables: small CHP plants at biomass, wind industry to produce aerogenerators, technologies to produce, store and use hydrogen.
- Investments in industrial brunches for new products with low environment impact and with energy saving: bricks with high thermic isolation, electrical engines with high efficiency, trigeneration plants with high efficiency for the production of electricity, heat and frigorie.
- Investments in manufacturing processes to cut energy intensity: inverter engines, reuse of heat in productive processes. This activity can be done also by ESCO.

Annex 1

Selected Graphs on Energy Efficiency Trends

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Figure A1.1: Final energy consumption by energy sources (Mtoe)

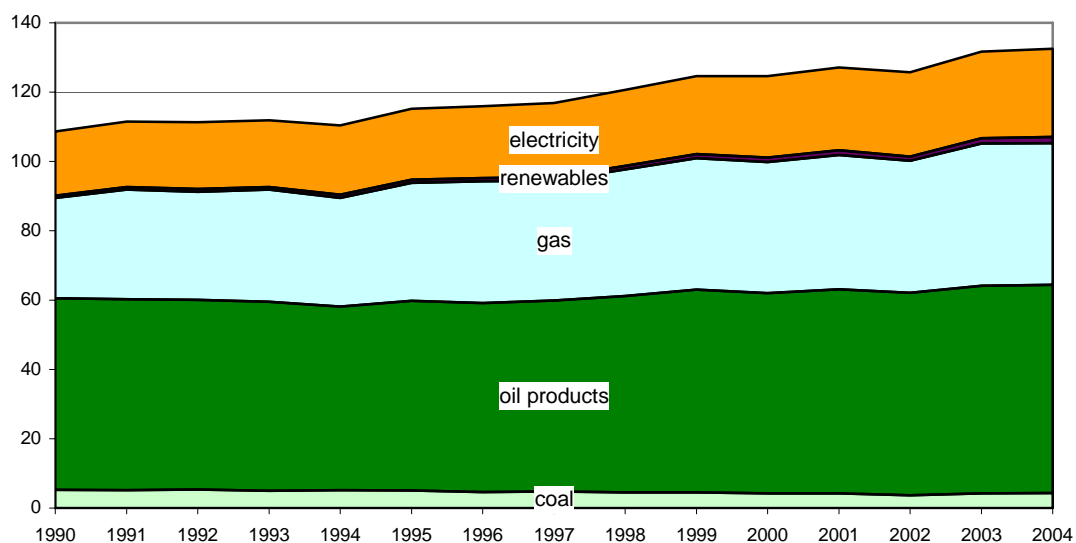


Figure A1.2: Final energy consumption by sectors (Mtoe)

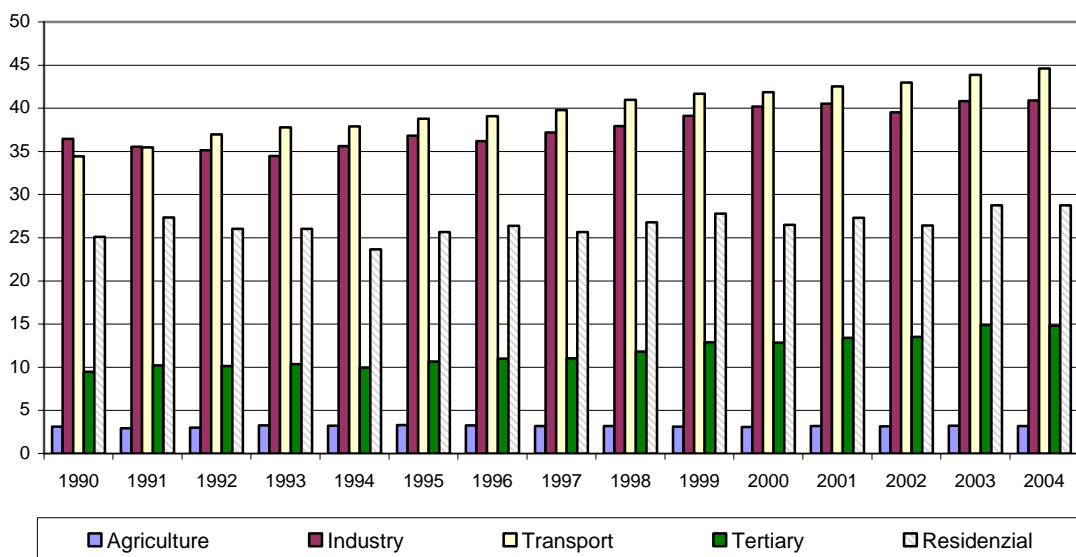


Figure A1.3: Primary and final energy intensities with climatic corrections (toe/1000 EC00)

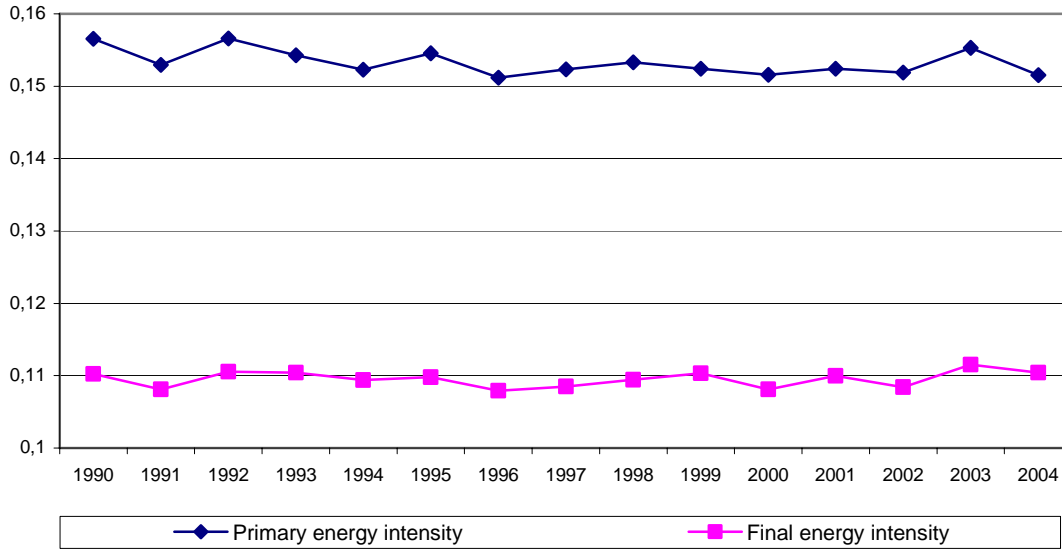


Figure A1.4: Energy consumption of transport sector by transport modes (Mtoe)

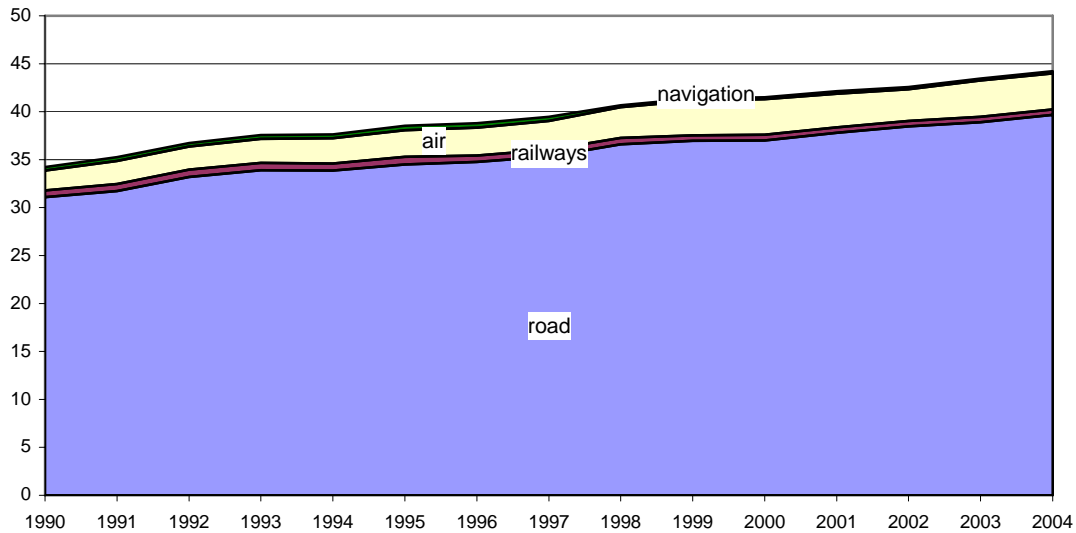


Figure A1.5: Unit consumption of transport modes (index 1990=100)

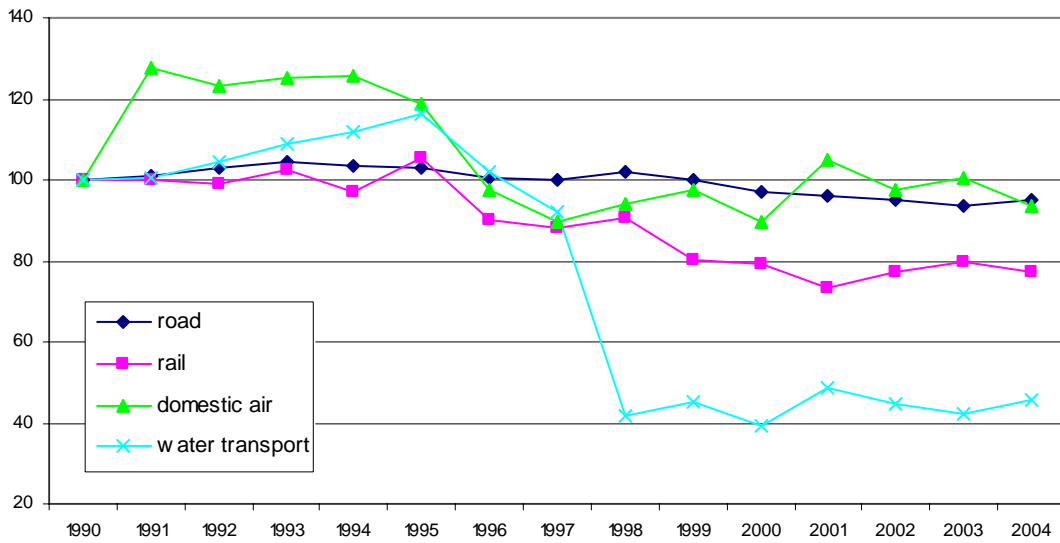


Figure A1.6: Energy consumption of households by energy sources (Mtoe)

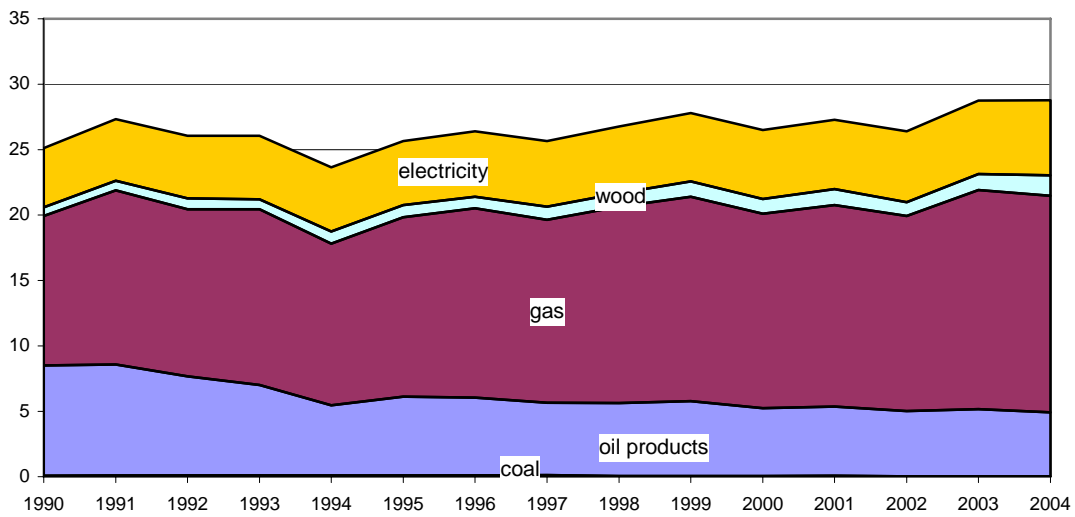


Figure A1.7: Energy consumption of households by end-users (%)

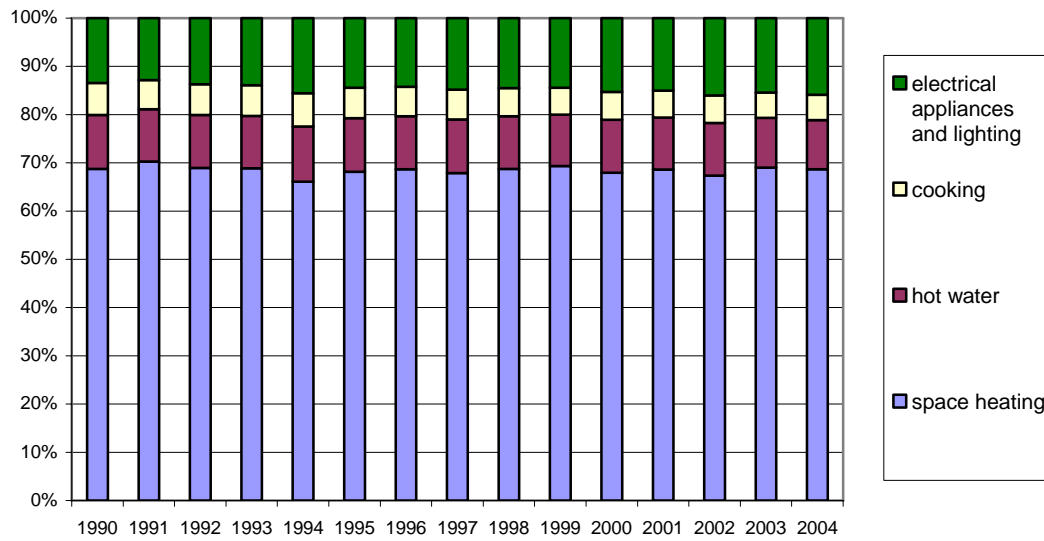


Figure A1.8: Energy consumption of households for space heating by energy sources (Mtoe)

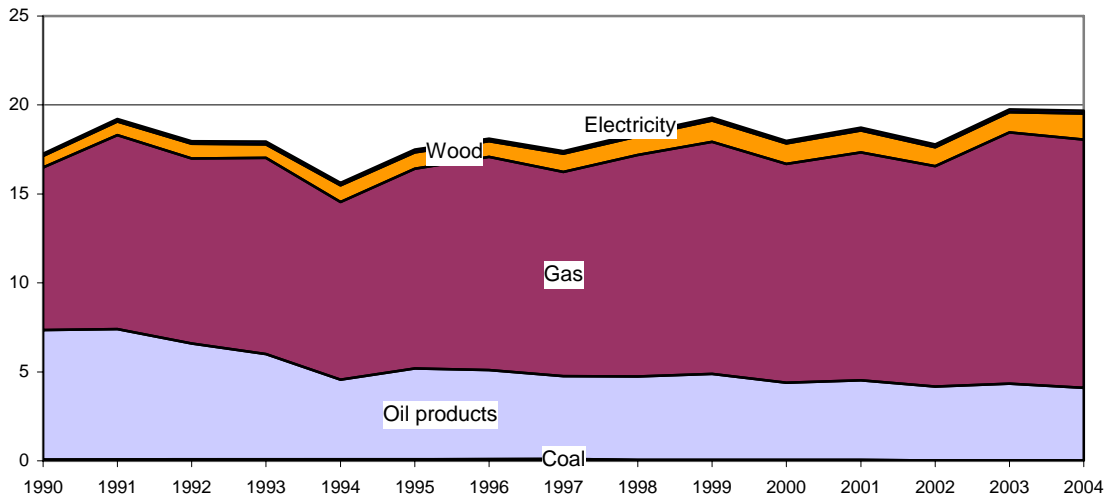


Figure A1.9 : Unit consumption per dwelling

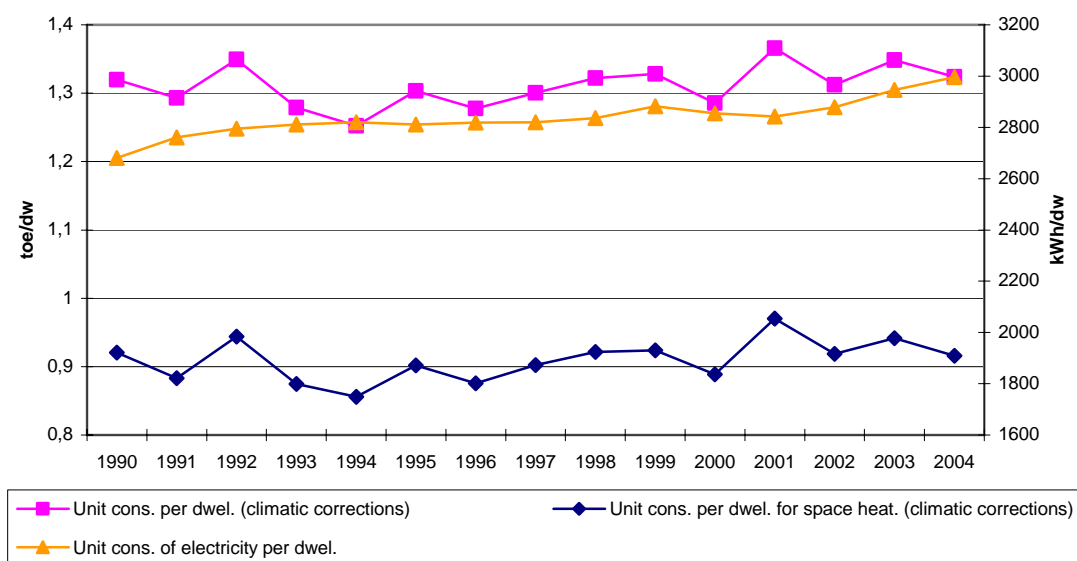


Figure A1.10: Energy consumption of tertiary sector by energy sources (Mtoe)

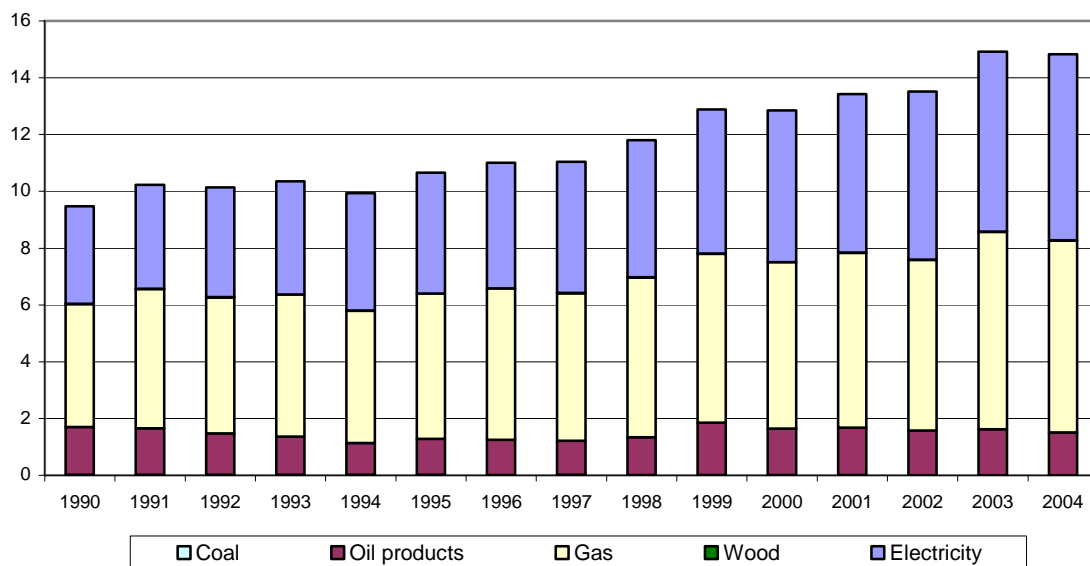
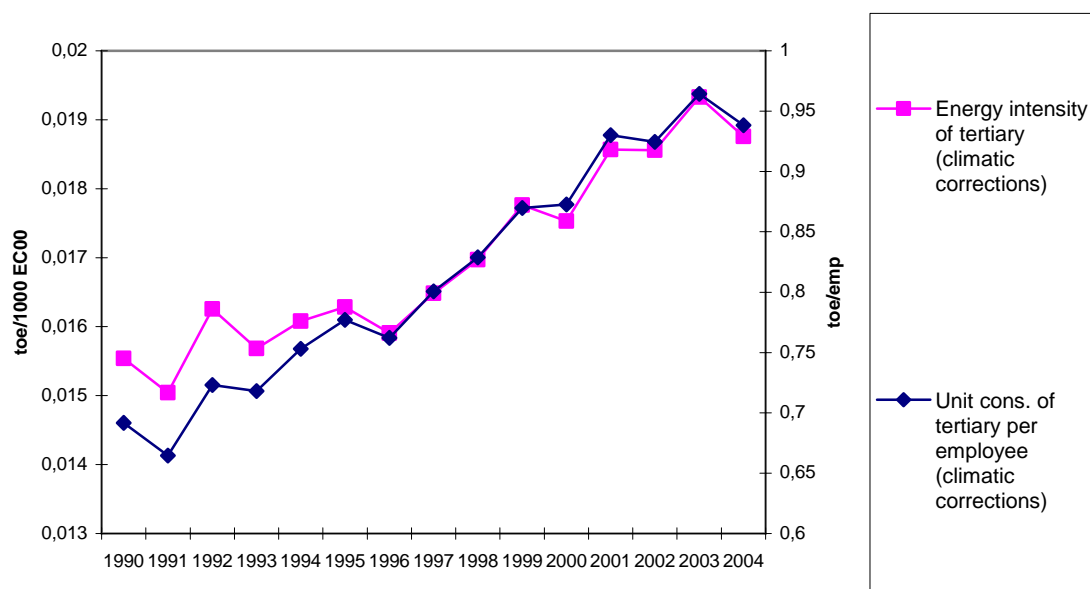


Figure A1.11: Energy intensity and unit consumption per employee in tertiary sector



Annex 2

Energy Efficiency Measure Summary by Country

Energy Efficiency Policies and Measures in Italy 2006

Household

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
ITA2	Energy Labelling for Washing and Drying Machines	Ongoing	Legislative/Informative	Appliances	general public, manufacturers	1998		Low
ITA3	Labelling of Building Components and Heating Equipment	Ongoing	Information/Education	Hot Water, Heating	manufacturers, retailers	1998		Unknown
ITA4	Energy Labelling for Refrigerators and Freezers	Ongoing	Legislative/Informative	Appliances	general public, manufacturers	1999		Low
ITA5	Additional Explanations for Project, Installation, Working and Maintenance of Thermal Plants in Buildings (update of D.P.R. 412/93)	Ongoing	Legislative/Normative	Heating	general public	2000		Low
ITA6	Financial Package for High-Efficiency Equipment Installation	Completed	Financial	Appliances, Hot Water, Heating	landlords, owner-occupiers, tenants	1991	1997	Low
ITA7	Limit to the Internal Temperature of Buildings	Ongoing	Legislative/Normative	Heating	owner-occupiers, building professions	1993		Low
ITA8	Information Campaign for Energy Saving	Completed	Information/Education	Appliances, Hot Water, Heating	general public	1991	1996	Low

Energy Efficiency Policies and Measures in Italy 2006

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
ITA9	Information and Education Activity by ENEA	Completed	Information/Education	Appliances, Hot Water, Heating	general public	1991	2001	Low
ITA10	Energy Auditing of Buildings	Proposed (medium/long-term)	Legislative/Informative	Hot Water, Heating		2006		Unknown
ITA12	Limit to the Heating Period of Buildings	Ongoing	Legislative/Normative	Heating	building professions, owner-occupiers	1993		Low
ITA13	Energy Labelling for Dishwashers	Ongoing	Legislative/Informative	Appliances	general public, manufacturers	1999		Low
ITA14	Fiscal Incentives for Energy Saving in the Household Sector	Ongoing	Fiscal	Appliances, Hot Water, Heating	landlords, owner-occupiers	1992		Low
ITA15	Efficiency Standards and Labelling for New Boilers	Ongoing	Legislative/Normative	Hot Water, Heating	general public, manufacturers	1997		Low
ITA16	Design Norms for the Building and Thermal Equipment, Building Shell, and Thermal Plants Regulation and Metering	Ongoing	Legislative/Normative	Heating	building professions, owner-occupiers, tenants	1993		Medium

Energy Efficiency Policies and Measures in Italy 2006

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Audience	Starting Year	Ending Year	Semi-quantitative Impact
ITA19	Energy Labelling for Air Conditioners and Electric-Fired Ovens	Ongoing	Legislative/Informative	Appliances	general public	2003		Low
ITA22	Implementation of EU Directive 2002/91/CE on energy efficiency in buildings	Ongoing	Legislative/Normative, Legislative/Informative, Information/Education			2005		Low
ITA23	New labelling of refrigerators and freezers	Ongoing	Legislative/Informative			1999		Low

Transport

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Groups	Starting Year	Ending Year	Semi-quantitative Impact
ITA1	Urban Traffic Plans [P.U.T. - Piani Urbani del Traffico]	Ongoing	Infrastructure	Passengers, Goods	Local Authorities	1997		Low
ITA2	Financial Incentives for Conversion of Non-Catalysed Vehicles	Ongoing	Financial	Passengers	Existing vehicles, General Public, Local Authorities, Manufacturers	2000		Low

Energy Efficiency Policies and Measures in Italy 2006

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Groups	Starting Year	Ending Year	Semi-quantitative Impact
ITA3	Voluntary Agreement between FIAT and Environment Ministry	Ongoing	Co-operative Measures	Passengers, Goods	Collective passengers, General Public, Individual passengers, Industry/commerce, Infrastructure Companies, Researchers, Transport companies	1997	2005	Medium
ITA4	Programmes for the Sustainable Mobility Enhancement	Ongoing	Infrastructure	Passengers, Goods	Collective passengers, Employers, Fleets Owners, General Public, Individual passengers, Local Authorities	2001		Low
ITA5	Agreement Protocol between ENEA and Federtrasporti	Completed	Infrastructure	Passengers, Goods	Fleets Owners, Transport companies	1999	2001	Low
ITA6	Compulsory Inspection for Motor Vehicles	Ongoing	Legislative/Informative	Passengers, Goods	Existing vehicles, General Public, Individual passengers, New vehicles	1995		Low
ITA7	Financial Grants for Mobility Managers' Programmes	Ongoing		Passengers	Local Authorities	2001		Unknown
ITA8	Sustainable Mobility in Urban Areas and Mobility Management	Ongoing	Infrastructure	Passengers, Goods	Collective passengers, Employers, Existing vehicles, Fleets Owners, General Public, Individual passengers, Local Authorities, Manufacturers, Transport companies	1998		Low

Energy Efficiency Policies and Measures in Italy 2006

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Groups	Starting Year	Ending Year	Semi-quantitative Impact
ITA9	Development of Cycle Mobility	Ongoing	Information/Education/Training	Passengers	Local Authorities	1998		Low
ITA10	Car-Restricted Areas Planning in Major Towns [Z.T.L. - Zone a Traffico Limitato]	Ongoing	Infrastructure	Passengers	Individual passengers	1993		Low
ITA11	The Blue Label in Rome	Ongoing	Legislative/Normative	Passengers, Goods	Individual passengers, Transport companies	1994		Low
ITA12	Use of Bio-Diesel for Public and State-Owned Vehicle Fleets	Proposed (advanced)	Co-operative Measures	Passengers, Goods	Existing vehicles, Fleets Owners, Industry/commerce, Local Authorities, Transport companies			Medium
ITA13	Financial Packages for Old Vehicles Replacement	Completed	Financial	Passengers	General Public, Individual passengers, Manufacturers	1997	2005	Low
ITA14	Financial Contributions for the Purchase of Vehicles with a Low Environmental Impact	Ongoing	Financial	Passengers, Goods	Existing vehicles, Fleets Owners, Local Authorities, New vehicles	2003		Low
ITA15	Voluntary Agreement Ministry of Environment/FIAT/Unione Petrolifera for the promotion of Methane Goods Vehicles and Distributors	Ongoing	Co-operative Measures	Goods	Industry/commerce, New vehicles, Researchers	2003		Medium

Energy Efficiency Policies and Measures in Italy 2006

Measure Code	Measure Title	Status	Measure Type	Subsector	Target Groups	Starting Year	Ending Year	Semi-quantitative Impact
ITA16	Agreement Protocol between Environment Ministry and Federtrasporti	Ongoing	Infrastructure	Passengers	Collective passengers, Employers, Existing vehicles, General Public, Local Authorities, Transport companies	1999		Low
ITA17	Roadway Parking Rate in Urban Areas	Ongoing	Infrastructure	Passengers	Collective passengers, General Public, Individual passengers	1993		Low
ITA18	Improved Mobility in the Smaller Italian Islands (MINIMI Project) [Mobilità Innovativa Nelle Isole Minori Italiane]	Ongoing	Infrastructure	Passengers	Employers, Local Authorities	2001	2003	Low
ITA19	Implementation of EU Directive on use of biofuels	Ongoing	Fiscal			2005		Low

Energy Efficiency Policies and Measures in Italy 2006

Industry

Measure Code	Measure Title	Status	Measure Type	Target Groups	Starting Year	Ending Year	Semi-quantitative Impact
ITA1	Definition of Energy Prices (Pricing Scheme CIP 6/92)	Ongoing		Energy Managers / Account, Energy Suppliers, Large Enterprises, SMEs	1997		Unknown
ITA2	Energy Manager's Appointment for R.U.E. in Industry	Ongoing	Legislative/Informative	Building Profess., Employees, Energy Managers / Account, Large Enterprises, Prof. Associations, SMEs	1991		Low
ITA3	Taxation on CO ₂ , SO ₂ and NOX Emissions by Combustion Power Plants [Carbon Tax]	Ongoing	Cross-cutting with sector-specific characteristics	Energy Suppliers, Large Enterprises, SMEs	1999	2005	Unknown
ITA4	Evaluation Criteria for Financial Grants Distribution Concerning Energy Saving	Ongoing	Financial	Energy Managers / Account, Energy Suppliers, Large Enterprises, SMEs	1991		Low
ITA6	Technical Norm for Energy Re-Utilization in Combustion Cycles	Ongoing		Energy Suppliers, Large Enterprises, SMEs	1991		Unknown
ITA7	Voluntary Agreements between the Ministries for Industry & Environment, Italian Industry Associations and Major Firms	Proposed (advanced)	Co-operative Measures	Large Enterprises, SMEs, Trade Associations			Low

Energy Efficiency Policies and Measures in Italy 2006

Measure Code	Measure Title	Status	Measure Type	Target Groups	Starting Year	Ending Year	Semi-quantitative Impact
ITA8	Financial Package for the Establishment in Municipal Gas Utilities of Low Grade Heat Production Equipment	Ongoing	Financial	Energy Suppliers	2001	2002	Low
ITA10	Norms for the Design, Installation, Management and Maintenance of Thermal Equipment for Offices	Ongoing		Energy Managers / Account	1991		Unknown
ITA12	Financing for energy efficiency and diffusion of renewables	Ongoing	Financial		2005		Low

Tertiary

Measure Code	Measure Title	Status	Measure Type	Target Groups	Starting Year	Ending Year	Semi-quantitative Impact
ITA1	First Financial Package for CHP Plants and District Heating Equipment Installation	Ongoing	Co-operative Measures	Local Authorities	1999	2004	High
ITA2	Unification of Appraisal Criteria and Tools for the Distribution of Financial Grants.	Ongoing	Co-operative Measures	Energy Managers / Account, Large Enterprises, SMEs	1991		Low

Energy Efficiency Policies and Measures in Italy 2006

Measure Code	Measure Title	Status	Measure Type	Target Groups	Starting Year	Ending Year	Semi-quantitative Impact
ITA3	Norms for Installation, Management and Maintenance of Thermal Equipment in Offices.	Ongoing	Legislative/Normative	Energy Managers / Account	1991		High
ITA4	Design Norms for Thermal Plant Regulation and Metering	Ongoing	Cross-cutting with sector-specific characteristics	Building Profess.	1993		Low
ITA5	Installation of PV Roofs connected to the Power Grid [Programma Nazionale dei 10.000 Tetti Fotovoltaici]	Ongoing	Financial	Local Authorities, Public Estates	2001	2006	Low
ITA6	Labelling of Building Components and Heating Equipment	Ongoing	Legislative/Informative Information/Education/Training	Local Authorities	1991		Medium
ITA7	Installation of Solar Thermal Equipment in Central and Southern Italy Municipalities [Comune Solarizzato]	Completed	Financial	Local Authorities	2001	2005	Low
ITA8	Limit to the Internal Temperature of Buildings	Ongoing	Legislative/Normative	Building Profess.	1993		Low
ITA9	Design Norms for Thermal Equipment	Ongoing	Legislative/Normative	Building Profess.	1993		High
ITA10	Design Norms for Building Shell	Ongoing	Legislative/Normative	Building Profess.	1993		High
ITA11	Design Norms for the System	Ongoing	Legislative/Normative	Building Profess.	1993		High

Energy Efficiency Policies and Measures in Italy 2006

Cross-cutting

Measure Code	Measure Title	Status	Measure Type	Starting Year	Ending Year	Semi-quantitative Impact
ITA1	Incentives for energy production using PV conversion from solar energy	Ongoing	Fiscal	2005		Low
ITA2	New decrees on energy efficiency	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes Co-operative Measures Market-based Instruments	2004		High
ITA3	New Quantitative Targets for the Enhancement of Efficiency in Energy Residential Uses	Ongoing	Market-based Instruments	2001		Low
ITA4	Green Certificates for Energy Production	Ongoing	Market-based Instruments	2000		Low
ITA5	Definition of Energy Prices (CIP 6/92 Pricing Scheme)	Ongoing	Co-operative Measures	1992		Low
ITA6	Energy Efficiency Targets for Electricity and Natural Gas Supply Utilities	Ongoing	Legislative/Normative Market-based Instruments	2001	2006	High