



**CYPRUS INSTITUTE
OF ENERGY**

Energy Efficiency Policies and Measures in Cyprus

ODYSSEE- MURE 2010

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targets**

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Energy Efficiency Policies and Measures in Cyprus in 2012

1 Executive Summary

This report presents the case study of Cyprus for the IEE project “Monitoring of energy efficiency in EU 27, Norway and Croatia (Odyssee-Mure)”. Firstly it provides the economic and energy background to energy efficiency and then presents an assessment of energy efficiency trends in Cyprus in the period 1995-2010. Finally the energy efficiency measures and policies are presented and evaluated. The report is based on indicators produced from the Odyssee database and the measures extracted from the Mure database both available on line.

Cyprus economy has grown by 32% in the period 2000-2010, an annual increase of 2.9% in the GDP. Value added increased in all sectors except agriculture. The most important sector which is services has increased by 40% and this explains the overall economic growth. The value added of industry increased by 12.5% over the same period, and the private consumption of households increased by 38.4%. The fiscal deficit initially deteriorated from 2.3% of GDP in year 2000 to 4.1% of GDP in 2004, became a surplus in years 2007 and 2008, and then deteriorated again strongly and reached 5.3% of GDP in 2010. Cyprus has adopted the euro in 1/1/2008. The euro zone has further stimulated economic growth.

The economy is mainly services driven depending heavily on tourism but also on banking services and companies operating in Cyprus using the beneficial tax and credit system. The accession of Cyprus to the EU had a negative impact on agriculture, due to the cheaper agricultural imports from other EU countries and because of the long term water shortage which the Government has not resolved yet (desalination plants are currently expanded for this purpose) but also due to the common agricultural EU policy.

The expansion of the value added of industry after 2001 is attributed to the construction of buildings (foreign demand). Private consumption has increased by 38.4% which is explained by low unemployment and increase in the disposable income of households. The conclusion is that Cyprus is a services-dominated economy with good macroeconomic indicators which has managed to enter the euro zone by implementing strict policies in public finance.

The Cyprus energy system is small and isolated with no interconnections and no natural gas yet. Since 1995, primary energy consumption has increased by 40% - from 1970 ktoe in 1995 to 2769 ktoe in 2010. During the same period final energy consumption has increased by 35% - from 1409 ktoe to 1909 ktoe in 2010. Oil remains the dominant energy source of final consumers (72%). The shares in the energy balance of 2010 are: transport 56% (15% aviation), 17% households, 12% tertiary, 13% industry, 2% agriculture.

During the period 1995-2010 primary energy intensity has decreased by 0.9%/year. In the same period final energy intensity has also decreased by 0.9%/year. The ratio of final to primary energy intensity has decreased slightly from 72% in 1995 to 71% in 2010. This essentially stable ratio is due to the transformation sector which has a low efficiency of 32%. Renewable energy sources (RES) have started to develop due to the relevant EU directive, and now comprises about 5% of final consumption. The decrease of the energy intensities suggest that improvement in energy efficiency has taken place although structural changes have also played a major role.

During the period 2000-2010 the total energy efficiency index (Odex) has improved by 13% compared with 12% of the EU 27. The reasons for the improvement is the energy efficiency improvement of the industrial sector (mainly from the installations subject to the EU Emissions Trading system – ETS) and also the contribution from the transport sector (56% of final energy consumption) which has improved its efficiency thanks to new clean and fuel efficient vehicles.

The efficiency index of the industrial sector has improved by 29% in the period 2000-2010. The improvement is attributed to the non metallic mineral branch, which is subject to ETS, but also to some other branches which implement energy saving measures. The ETS sector consumes around 70% of industrial energy consumption. The other energy consuming branch is the food/beverage sector.

Between 2000 and 2010 the household sector shows improvement 23% in the global Odex and 11% in the technical Odex. Even though the quality of data in this sector is not very good we can justify the improvement after the year 2004 when Cyprus entered the EU and the measures implemented have started to create energy savings. Prior to accession no significant policies existed. The very important EU directive for the energy performance of buildings has not been implemented fully yet and therefore the large savings potential is still unexploited.

The transport sector shows an improvement of 9% in the Odex in the period 2000-2010. Since in this period passenger traffic using public transport has decreased drastically, the improvement should mainly be attributed to the penetration of new clean and fuel efficient vehicles. Until 2004 diesel fuel prices for transport were subsidised. Therefore the large engine capacity private vehicles were replaced gradually when prices were liberalised. Another factor affecting the efficiency of this sector is energy consumption of aviation (15% of total national final consumption). From the jet fuel consumption per passenger a decrease of 17% has taken place in the same time period. In Cyprus public transport is not well developed. There is no rail infrastructure or water transport. However in 2009 a new Law was enacted for the regulation and develop-

ment of public transport. The entire bus fleet will be gradually replaced and increased with new and environmentally friendly vehicles together with other infrastructure.

Total CO₂ emissions from fuel combustion in Cyprus have increased from 4.77 Mt CO₂ in 1995 to 8.4 Mt CO₂ in 2010. The increase is mainly caused by the low energy efficiency of the electricity generation which is 32% in the time period and is oil based since there is no natural gas. Natural gas will not reach Cyprus before 2015. The total direct CO₂ emissions from all final energy consuming sectors have increased by 18% between 1995 and 2010, from 3.6 Mt CO₂ in 1995 to 4.2 MtCO₂ in 2010, while they had peaked in year 2007 to 4.7 Mt CO₂ and then declined as a result of the economic downturn of years 2008-2010.

Cyprus has significant potential for energy savings in buildings and then in transport. Since the accession in 2004 all European policies in energy efficiency have been transposed and started to be implemented gradually. It is expected that a few more years are required until all the measures synergistically will deliver significant energy savings. In this respect the second National action plan (ESD 2006/32/EC) has been submitted by the Ministry of Commerce and Industry (www.mcit.gov.cy) in 2011 to the Commission with all the measures necessary for achieving a target of 10% in year 2016. The emphasis is two fold firstly to implement fully the EPBD directive, provide incentives to existing buildings for efficiency improvements and then to develop an efficient, environmentally friendly public transport system.

Two more elements have occurred in the recent years which will affect drastically the energy policy in Cyprus. Firstly the major catastrophic accident of the biggest power station in Limassol in July 2011 after the explosion at a near-by naval base. The capacity was 700 MWe (50% of total). This has resulted in severe problems to cover the demand and significant increase of electricity prices.

The second is that Cyprus is exploiting its economic exclusive zone (EEZ) for hydrocarbons and has completed two rounds of authorising rights in the 12 sea blocks of the EEZ. Thus far the results from the research drilling (first round of licensing from one block) have proven significant reserves of natural gas whose recovery is expected to start by 2017. The gas will be transferred to land via a pipeline with the construction also of an LNG terminal.

2 The Background to Energy Efficiency

2.1 Overall economic context

Cyprus is an island in the Eastern Mediterranean with an area of 9250 square kilometres and a population of about 805,000, which became a member of the European Union in 2004 and a Eurozone member in 2008¹. The country has enjoyed sustained economic growth in the last three decades (averaging 5.6% per year in real terms over the last 30 years and 5.3% between 1995 and 2010) mainly due to the development of financial services and tourism. Its per capita Gross Domestic Product exceeded 22,000 Euros in 2011.

Since the global financial crisis, the economy has changed path. Cyprus experienced one year of recession (2009), followed by two years of slow GDP growth. Economic activity was further hit in 2011 by an accident that destroyed half of the total electricity generating capacity of Cyprus. A worsening external environment and tightening financial and fiscal conditions reinforced the adverse effect on economic activity. More stringent bank lending conditions because of the effects of the Greek sovereign debt crisis on the Cypriot banking sector, declining foreign demand for housing, worsening labour market conditions and weakening confidence affected private consumption negatively. Public finances exerted additional pressure as banks needed state support, while at the same time the government had no access to international markets and therefore requested financial aid from EFSF/ESM and IMF in summer 2012. As a result, forecasts of all national and international authorities point to a recession in year 2012, with unclear future prospects.

Figure 2.1 shows GDP and sectoral value added for the period 1995-2010, and Figure 2.2 presents the same results in the form of indices (with 2000 as the base year) thus demonstrating relative changes. Although the industrial sectors experienced an upward trend after 2000 (their real value added increasing by 30% over the 1995-2000 period of stagnation), their contribution to national GDP has been continuously declining. The share of industry (excluding construction) in national GDP dropped from 14% to less

¹ The information provided here refers only to the area controlled by the government of the Republic of Cyprus.

than 10% during this period, while that of construction decreased from 9.7% to 7.6%. Agriculture has also shrunk considerably (from over 4% in 1995 to 2% in 2010). The dominant economic sector – services – has gained further in importance, its real value added increasing by 80% between 1995 and 2010, and its share of total GDP rising from 72% to about 81%. Real estate activities, wholesale and retail trade as well as financial intermediation are the most important subsectors, accounting for almost half the value added of the total tertiary sector.

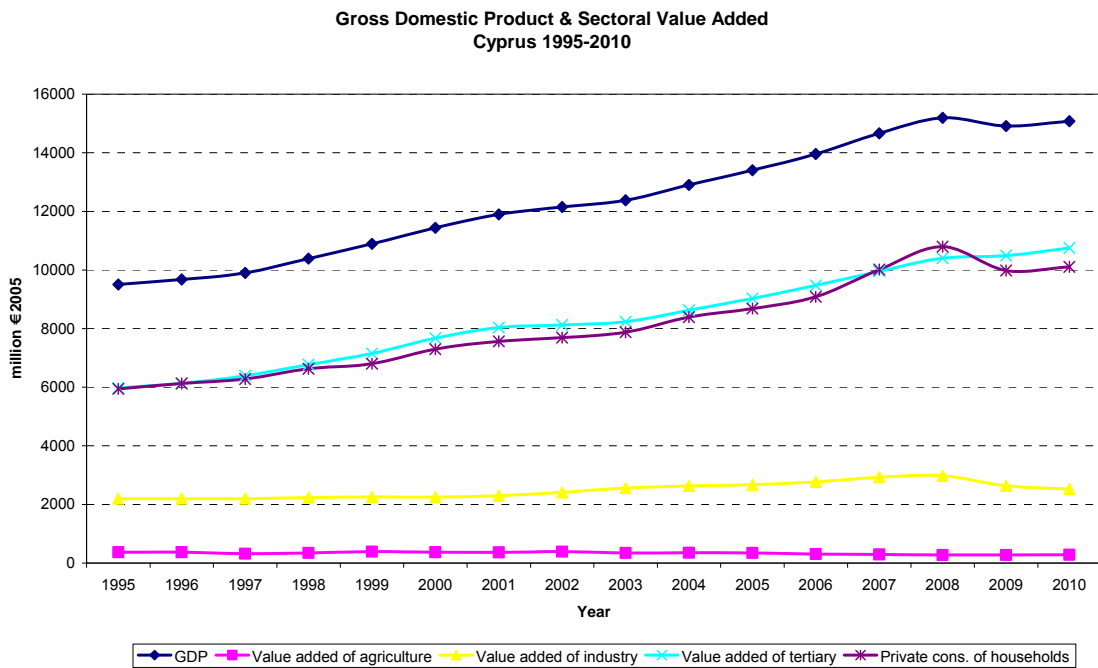


Fig. 2.1 GDP and value added trends in Cyprus, 1995-2010

Energy Efficiency Policies and Measures in Cyprus in 2012

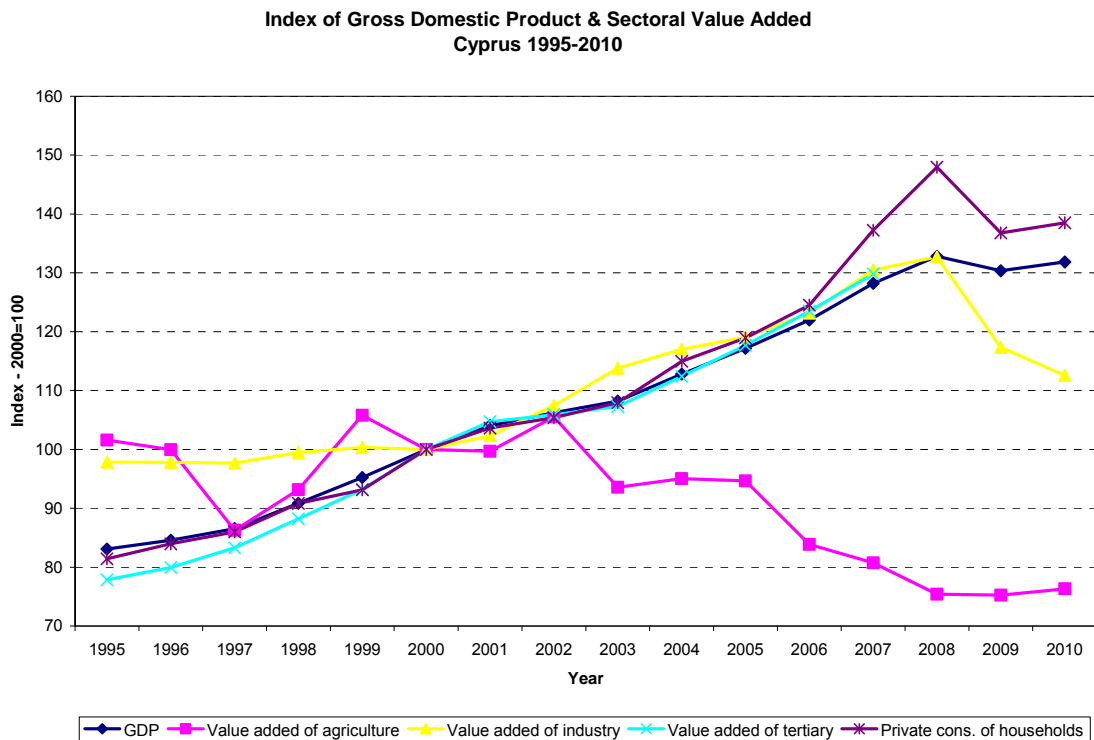


Fig 2.2 Index of GDP and value added by sector in Cyprus, 1995-2010

2.2 Energy consumption trends, by fuel and sector

Cyprus has a small and isolated energy system not interconnected with other energy networks (oil, natural gas or electricity). There are no fossil fuels presently produced on the island. However the exploration, research and exploitation of hydrocarbons in the Exclusive Economic Zone of Cyprus has shown significant reserves of natural gas. The Cyprus Government has already granted after tendering procedures permits for research, exploitation of hydrocarbons in certain blocks of the EEZ and presently has completed successfully a second round of tendering procedure for authorising rights in eleven out of the twelve sea blocks of the EEZ. The interest from many major international oil/natural gas companies is large due to the fact that there are already proven reserves from the drilling data in one of the blocks during the first round. The Government and foreign energy institutes estimate that there may be up to 200 tcf of natural gas recoverable in the Cyprus EEZ.

In July 2011 a major catastrophic accident happened in Mari, Cyprus in the largest and newest (state of the art) electricity power plant. Around 700 MWe, 60% of the total national power generating capacity, was destroyed after the explosion of ammunition containers at a nearby naval base. The national utility company imported large diesel generators and also utilised an old power plant that was being phased out to cover the electricity demand.

The RES share in the energy balance is around 5% and comes from solar thermal energy, wind energy, PV and biomass. Policies are adopted in order to achieve the ambitious 13% RES target by 2020 and to exploit the large solar energy potential. The present installed capacity of wind farms and photovoltaics is 130 MWe and 10 MWe respectively. The target is to have 300 MWe wind turbines and 200 MWe PV by 2020.

Since 1995, primary energy consumption has increased by 40% from 1970 ktoe in 1995 to 2769 ktoe in 2010. For the same period final energy consumption has increased by 35% from 1409 ktoe in 1995 to 1909 ktoe in 2010. This increase is attributed to the major increase of electricity consumption (188 ktoe in 1995 which reached 415 ktoe in 2010) and also to the increase in road transport fuels for private vehicles since public transport is not well developed in Cyprus and there are no trains.

Oil consumption in the same period has increased by 19% from 1.16 Mtoe to 1.38 Mtoe. The electricity production is based on oil, and natural gas is not expected before 2015. RES has increased from 45 ktoe in 1995 to 88 ktoe in 2010. The biggest share of RES comes from solar thermal water heaters. The share of coal is small (1%) and used in the cement industry. The share of oil products in the energy balance has decreased by 9.5% since 1995; oil is still the main energy product for final energy consumption (72%). However the oil share in final consumption has declined due to the continuous increase of electricity consumption. The share of electricity has increased dramatically from 13.4% (188 ktoe) to 22% (415 ktoe) in the period 1995-2010, or an average annual increase of 8%.

From the energy balance it is obvious that transport constitutes the most energy consuming sector - 56% (1.07 Mtoe) in 2010 and 53% (747 ktoe) in 1995. Out of this 56% the shares are: 15% for aviation and 41% for road transport. The transport energy consumption has increased by 43% in the period of examination. It is worth mentioning that Cyprus has the largest share of transport in final consumption compared with EU countries (EU average is around 30%). The reasons for that are: Cyprus is an island far from Europe and not connected with sea ways, public transport is not developed, tourism is well developed.

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Households have consumed 307 ktoe in 2010 against 200 ktoe in 1995; namely a 53% increase. The share of household energy consumption in energy balance has increased from 14.1% in 1995 to 16% in 2010.

The tertiary sector has increased its share from 9.7% in 1995 to 13% in 2010.

The share of industry has decreased from 21.1% in 1995 to 13% in 2010. Energy consumption in 1995 was 297 ktoe and 247 ktoe in 2010. ETS includes 13 installations in industry and energy efficiency measures have been implemented to meet the targets. Also structural changes have been taken place including reduction in recent years of the building construction branch.

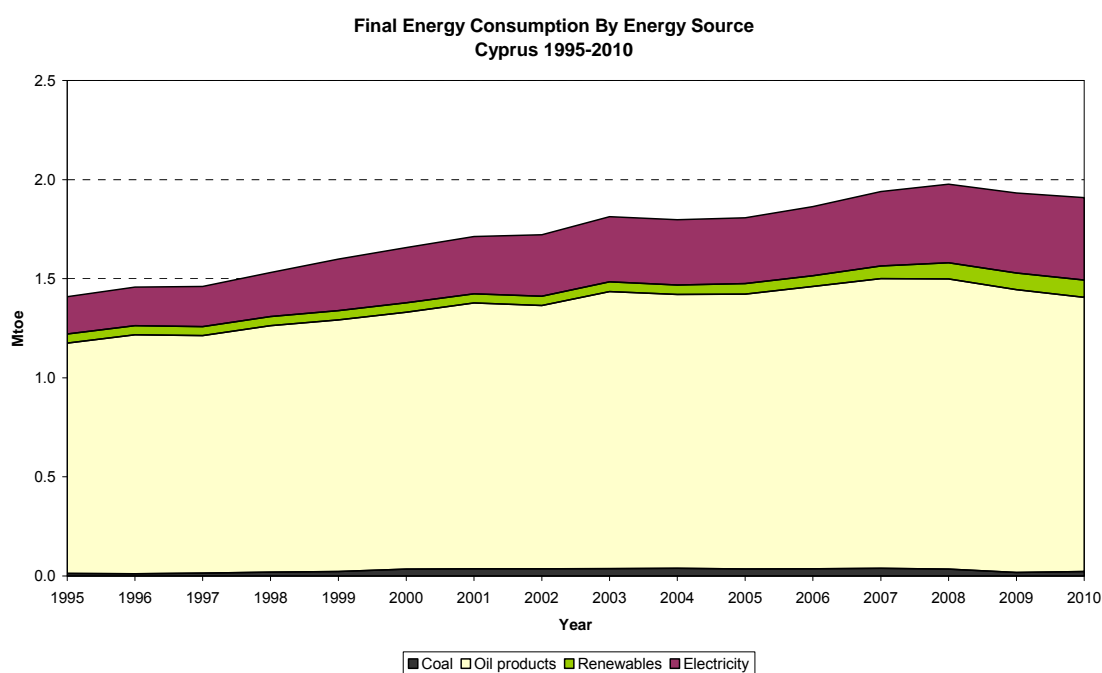


Fig. 2.3 Final energy consumption by energy source, 1995-2010

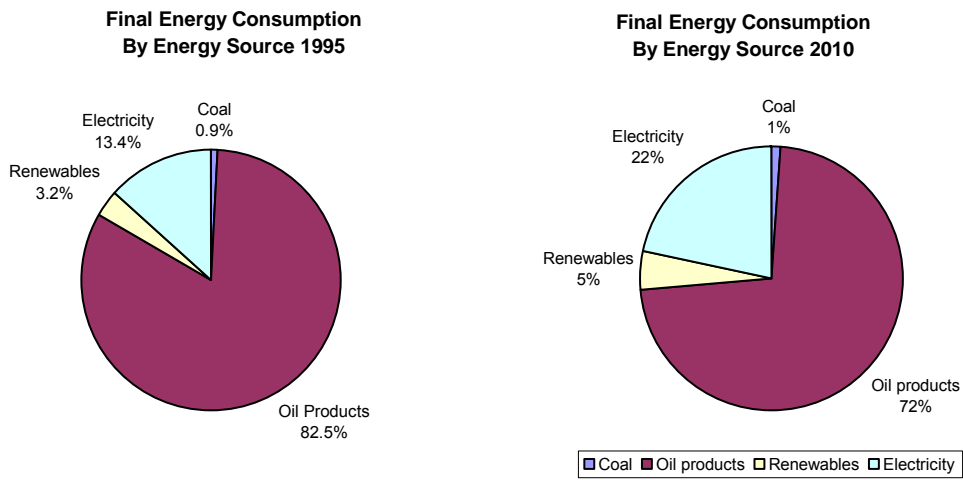


Fig. 2.4 Shares of final energy consumption by energy source, 1995 & 2010

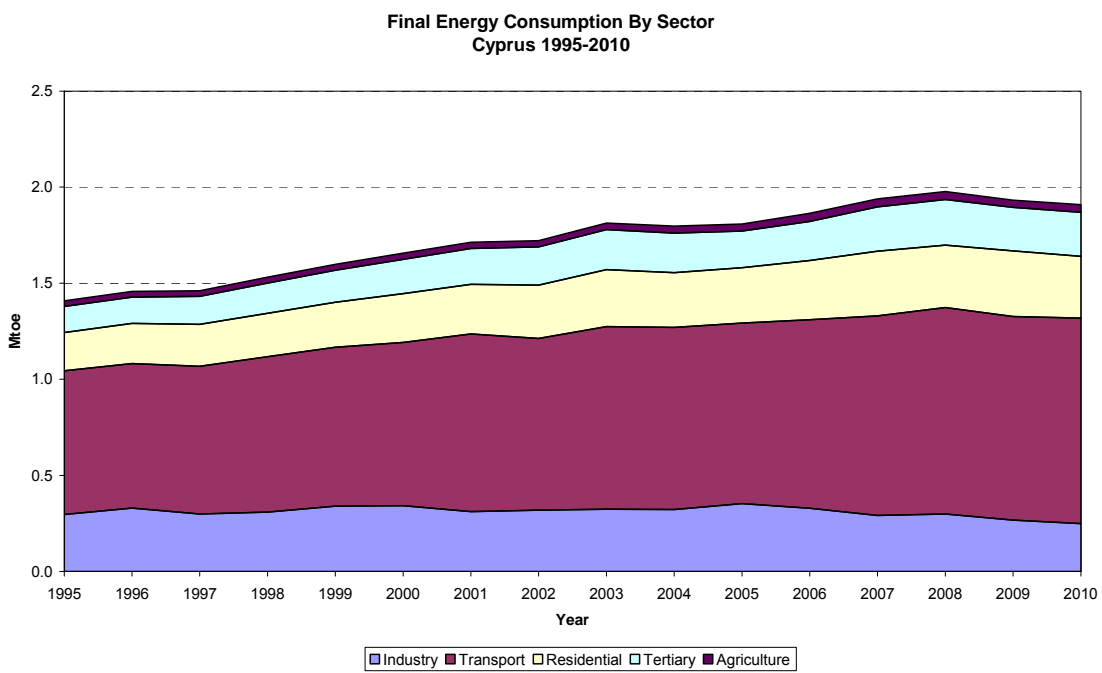


Fig. 2.5 Final energy consumption by sector, 1995-2010

Energy Efficiency Policies and Measures in Cyprus in 2012

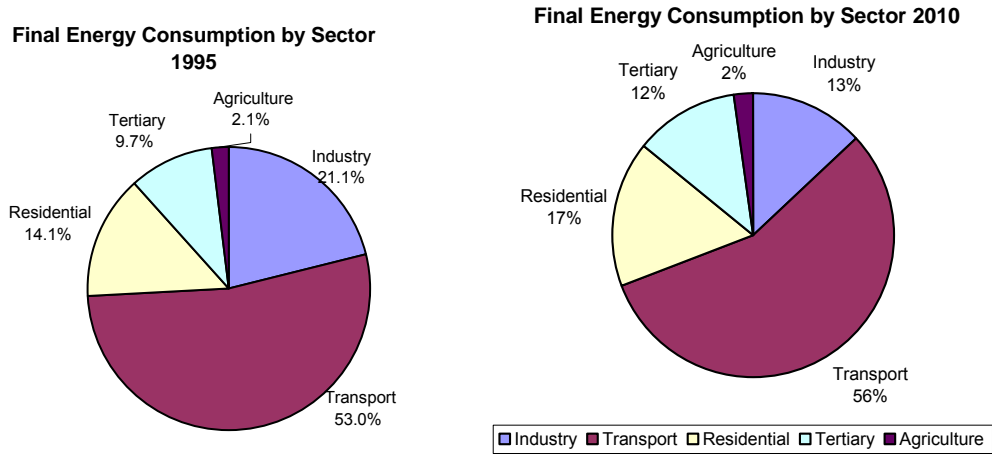


Fig. 2.6 Shares of final energy consumption by sector, 1995 & 2010

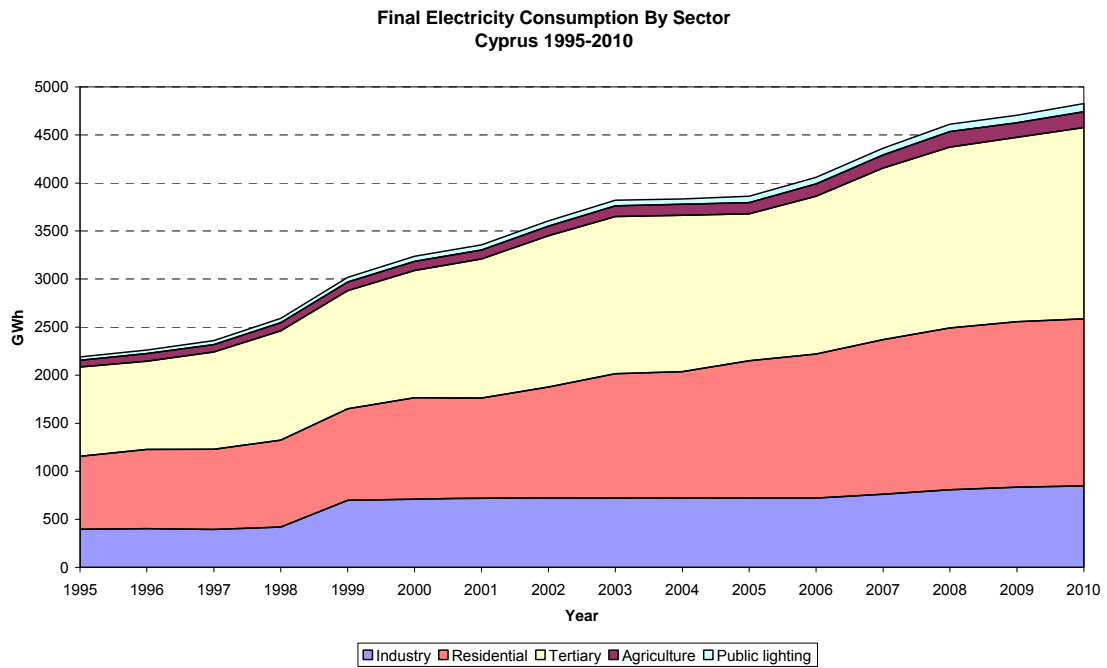


Fig. 2.7 Electricity consumption trends by sector, 1995-2010

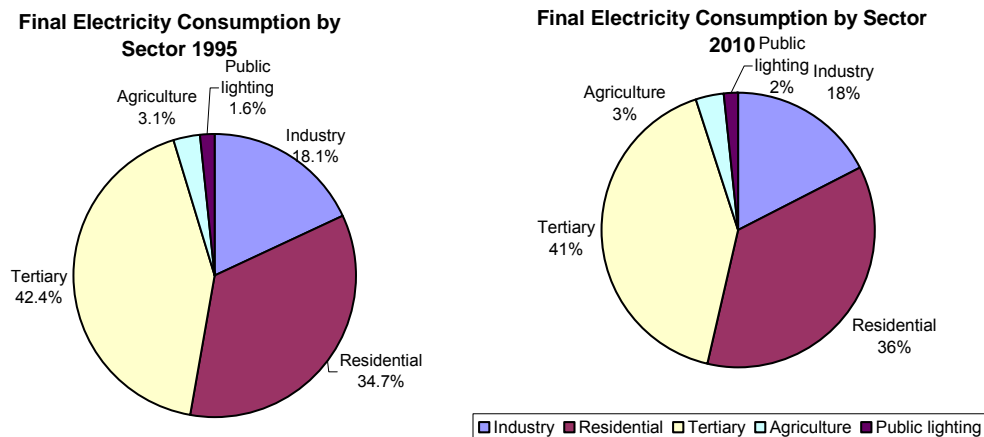


Fig. 2.8 Shares of electricity consumption by sector, 1995 & 2010

2.3 The policy background to energy efficiency

Cyprus energy policy is harmonised with the European Union and has the three main objectives: security of energy supply, competitiveness, protection of the environment. Main changes in the last two years with regard to institutions, energy efficiency, greenhouse gas emissions and renewables policies are:

1) The Republic of Cyprus, announced in February 2012 an invitation to apply for hydrocarbon exploration authorizations (licences) and subsequent hydrocarbon exploitation licences. The licenses will be granted on the basis of competitive bids, to companies or consortia of companies to carry out exploration on Blocks within the exploration area.

The invitation and application procedure of the 2nd Licensing Round as well as the hydrocarbon exploration and exploitation activities in the Republic of Cyprus are governed by the following applicable legislation:

- The Hydrocarbons (Prospection, Exploration and Exploitation) Law of 2007.
- The Hydrocarbons (Prospection, Exploration and Exploitation) Regulations 2007 and 2009.

The exploration area to be offered for licensing is part of the Exclusive Economic Zone (EEZ) of the Republic of Cyprus. The area consists of twelve (12) exploration Blocks. More than twenty international companies or consortia have participated in the second

round of licensing for hydrocarbon exploration and exploitation. By the end of year 2012 the licenses for the rights will be granted.

The first round of licensing has been completed with granting one license to an American company for one sea block. The company has conducted in 2011 a research drilling and has discovered significant reserves of high quality natural gas. The quantity from this one block is estimated to be at least 7 tcf (enough to cover Cyprus' needs for 200 years).

2) One of the major national strategies for Cyprus during the last ten years is to introduce natural gas in the energy system. The power generation is heavy fuel oil based and thus is characterized by low thermal efficiency. Subsequently this has affected CO₂ emissions of power plants so that the national utility company had to purchase additional CO₂ allowances because of non-compliance with the emissions allocated to its installations through the EU ETS. The delay in the introduction of natural gas is attributed to the political disagreements between the Government and political parties, the lack of local expertise in this extremely complicated field, the problematic legal framework for regulating natural gas market, and the recent discovery of natural gas in the economic exclusive zone of Cyprus. The main issue and point of conflict/debate has been the technology with which natural gas will be imported in Cyprus namely: via a sea pipeline, LNG terminal on shore, LNG terminal off-shore, or as Compressed Natural Gas (CNG).

The latest developments in the Government policy indicate that the most likely method is to import natural gas by 2015 from Israel via a sea pipeline and in the medium term to build a LNG terminal in Cyprus for exports.

The absence of natural gas has also affected the liberalization of the electricity market since the high cost of petroleum products has resulted in monopoly in power generation and no private investors have shown any interest to build new power plants. Presently electricity prices to consumers are among the highest in the EU.

3) A major accident in the biggest power generation station of Cyprus happened in July 2011. Total generating capacity before the event was 1300 MWe (three stations). An explosion at a nearby naval base resulted in the destruction of the 700 MWe power plant. In order to address power shortages the utility company has put into operation an old phased out station and also has imported diesel generators. In the meantime the

works to rebuild the destroyed station have made good progress. This station was state-of-the-art, consisted mainly of combined cycle gas turbine units and was designed particularly for the use of natural gas. Electricity prices since the accident have increased considerably (reaching 25 Eurocents/kWh) imposing a burden to households, industry and the commercial sectors which are struggling to survive the economic crisis.

4) As regards greenhouse gas emissions, 13 installations are subject to the EU Emissions Trading system (ETS) – 3 power plants, 2 cement plants (which were merged to one new plant in 2011) and 8 plants producing bricks and tiles. Substantial energy saving measures have been taken in these installations to improve the energy efficiency and reduce their CO₂ emissions. For non-ETS sectors, according to the EU energy and climate policy package that was adopted in 2009, Cyprus has to reduce its GHG emissions by 5% in the year 2020 compared to 2005. National legislation is under discussion in order to implement emission reductions that can lead to compliance with this target.

5) Cyprus in compliance with the RES directive 2009/28/EC has adopted a national action plan for the promotion of renewable energies submitted in June 2010 to the European Commission. The national target for Cyprus is 13% RES in gross national consumption of year 2020. Thus far 130 MWe of wind farms, 10 MWe PV, 10 MWe biogas/electricity plants are operating. The biofuel target of 10% is not feasible for Cyprus with local production and the policy adopted is to import biofuels blended in the road transport fuels.

Due to its very high solar potential, Cyprus gives emphasis to the development of other solar technologies such as solar thermal power plants, and a station of 50 MWe is planned by the national utility company. The percentage of RES in the energy balance of 2010 was about 5%.

6) Transport is the most energy consuming sector in the energy balance (56%). The government has a strategy to develop a new, modern, environmentally friendly public transport system which can alleviate atmospheric pollution and traffic congestion in cities. In 2011 a Law was passed for public transport and among others it regulates the market of public transport with only six regional companies to operate and obligations

on the bus companies including the purchase of new, clean and fuel efficient busses. Thus far 300 busses out of the 1200 needed have been replaced. In order for the national transport strategy to be implemented fully, significant capital investment is needed, and it appears that the long lasting economic crisis has delayed the full implementation of this program.

7) The highest impact in energy savings lies with the implementation of the EPBD. Until 2010 minimum energy efficiency requirements are applied for all buildings and energy performance certificates are issued for new buildings. However the competent authorities cannot enforce the directive with regard to the renovation of old buildings, issuing of certificates during buy-sell and rental transactions. Also the mandatory issue of certificates for public buildings is not applied yet. The obligation of the directive to inspect boilers and air conditioning systems has not been implemented yet fully and a limited number of inspections have been carried out as of the time of this writing.

3 Overall Assessment of Energy Efficiency Trends

3.1 Overall trends in energy intensity

There are two macro indicators which are often used to describe the overall energy efficiency of an economy: the primary energy intensity and the final energy intensity, i.e. the ratio of the primary or final energy consumption to Gross Domestic Product. Primary energy intensity describes the energy productivity of the whole economy. Final energy intensity expresses the energy productivity of final consumers only and excludes losses in transformation and supply. Non-energy uses are also excluded from final consumption. Primary energy consumption in Cyprus increased from 1.97 Mtoe in 1995 to 2.67 Mtoe in 2010, a 35.5% increase, while final energy consumption increased from 1.41 Mtoe in 1995 to 1.91 Mtoe in 2010, a 35.4% increase.

Primary energy intensity fell by about 15% between 1995 and 2010. In the same period final energy intensity has decreased by 15% as well. The declining trend in both intensities in the 1995-2010 period implies energy efficiency improvements but there are also other factors affecting the decrease like structural changes of the economy.

The relative variation of the primary and final energy intensity is explained by the ratio of final to primary intensity. In Cyprus, this ratio has changed from 71.5% in 1995 to a maximum of 74.3% in 2004 and then dropped to 71.5% in 2010. The transformation sector in Cyprus includes the electricity production sector which has 32% efficiency and is oil based (steam turbines, diesel generators, gas turbines).

Energy intensity values are influenced by the climate as more heating and cooling is required in colder winters or hotter summers. In order to filter energy intensity indicators from the influence of climatic variations the energy intensity is calculated with climatic corrections (in terms of degree days). Thus the final energy intensity with climatic corrections represents the theoretical value of the final energy intensity for a normal winter and summer.

Figure 3.1 illustrates the evolution of primary and final energy intensity and their ratio in the period 1995-2010, while Figure 3.2 shows the corresponding trends with climatic corrections. Both intensities have been dropping until 2007, whereas the economic downturn of the period 2008-2010 seems to have stopped this intensity improvement. Whether this stop is temporary or reflects a stagnation of structural or efficiency improvements remains to be seen in the future.

Energy Efficiency Policies and Measures in Cyprus in 2012

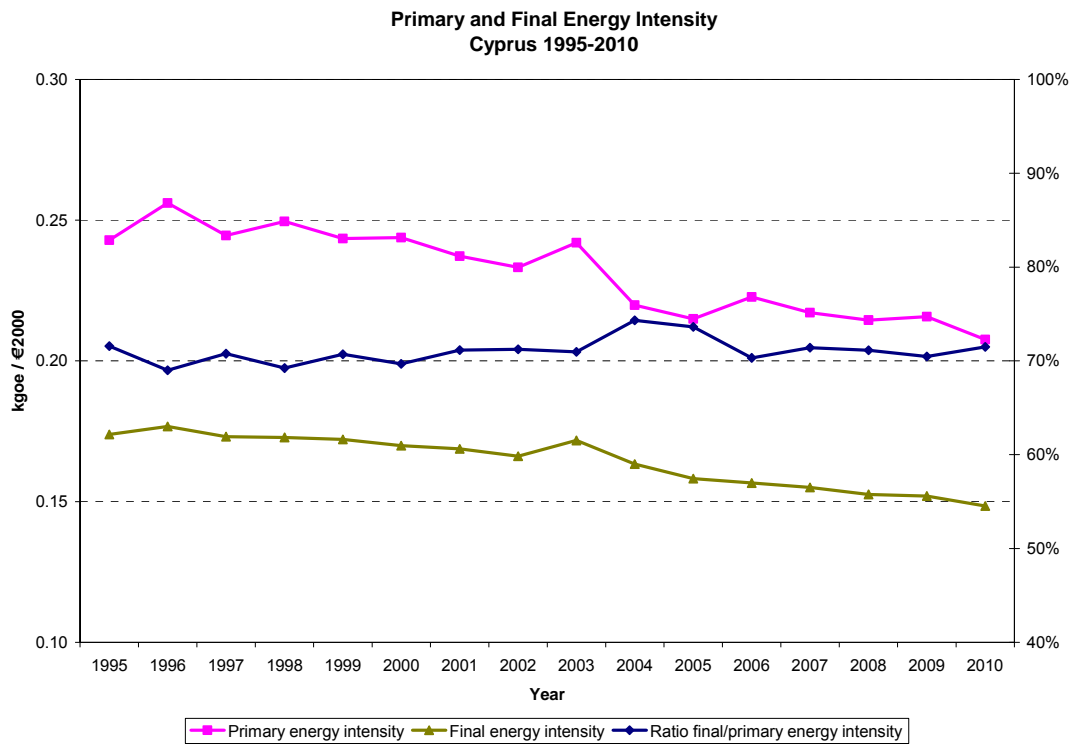


Fig 3.1 Primary and final energy intensity and their ratio, 1995-2010

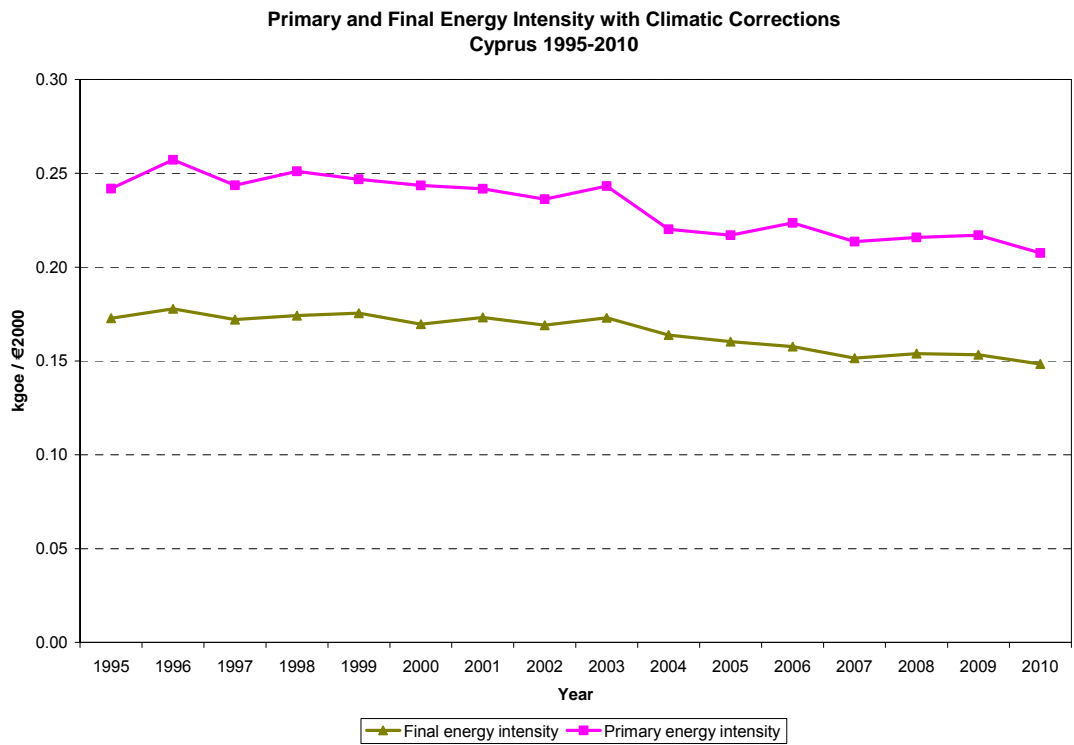


Fig 3.2 Primary and final energy intensity with climatic corrections, 1995-2010

3.2 Industry

The energy consumption of industry was 297 ktoe in 1995 and 249 ktoe in 2010 – a decrease of 16%. The share of industry in final energy consumption was 21.1% in 1995 and dropped to 13% in 2010. The consumption has a declining trend since 2005. In Figures 3.3 and 3.4 the energy consumption by sector and fuel are presented, while figure 3.5 shows the percentage shares of energy products. The main energy source is oil products and then electricity. There is also some limited consumption of coal by the cement industry. The share of oil products fell to 59% in 2010 from 83% in 1995. The electricity share has risen sharply to 29% in 2010 compared to 12% in 1995.

Electricity has increased by 114% in the period 1995-2010 substituting the consumption of oil products used before. The share of the non metallic minerals branch in the final energy consumption of industry was 63% in 2010. This is the only branch in Cyprus (apart from power plants) that is subject to the ETS scheme.

The non metallic minerals branch is the most energy consuming in industry and includes ten industries (cement and brick plants). These installations have implemented measures for the reduction of greenhouse gas emissions. Energy efficiency measures and deployment of renewable energy are reflected in the various indicators and unit energy consumption of this sector. The figure xx shows the decrease in the unit consumption of cement in the period as a result of new technological measures adopted in this industry.

The value added of industry has increased by 15% from 1995 to 2010. The shares of the various branches in the period 1995-2010 indicate structural changes. The value added of manufacturing has decreased by 7%. The decrease has been more intense in the last three years due to the economic crises. Within manufacturing the most important branches (in terms of value added) are the food and drinks branch (36%) and the non metallic minerals (14%). The non metallic mineral branch has increased by 28% in the period but has shown a drastic decrease in the last three years due to the slowing building construction industry as a result of the economic crisis and the reduction of the real estate market. The food branch has increased its value added by only 3% in the period but since 2005 has decreased gradually by 16% in comparison with the 2010. The construction branch accounted for 41% of the value added of industry in 2010 compared to 38% in 1995. It has increased by 25% in the period 1995-2010 but for the last three years there is a decrease. The reason as explained before is the economic crisis that has severely affected the market of real estate (reduction of building permits and decline in the purchases of houses by foreigners).

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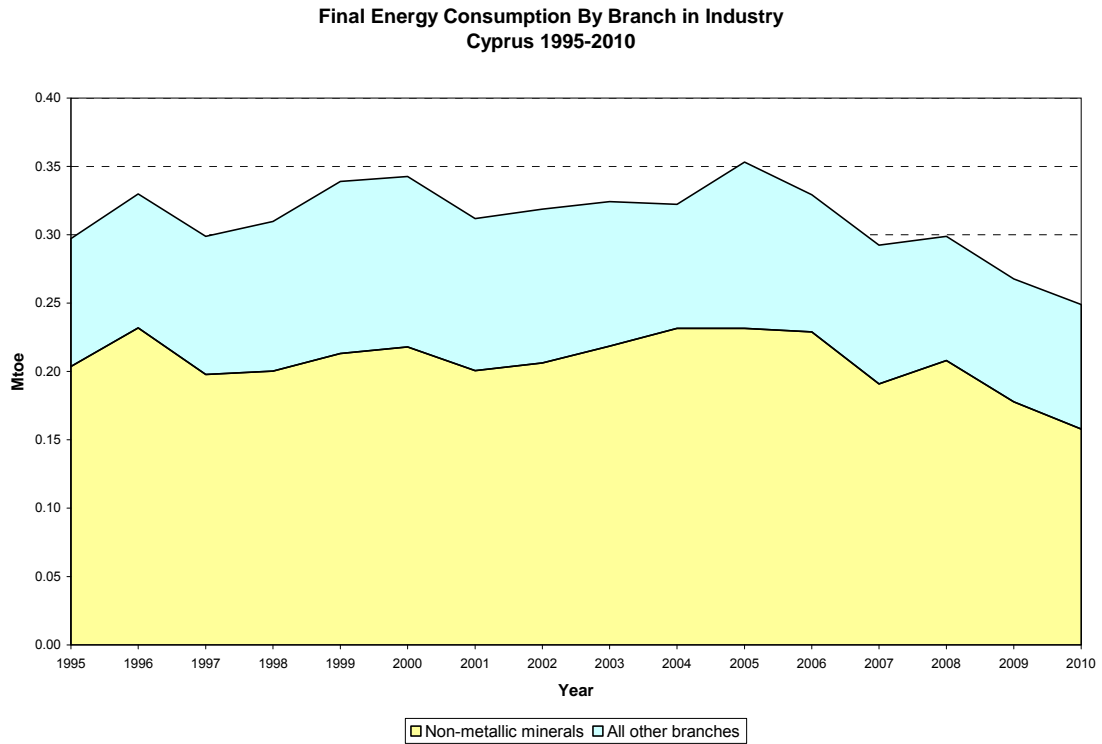


Fig. 3.3 Final energy consumption of industry and of the most energy intensive sector (non-metallic minerals)

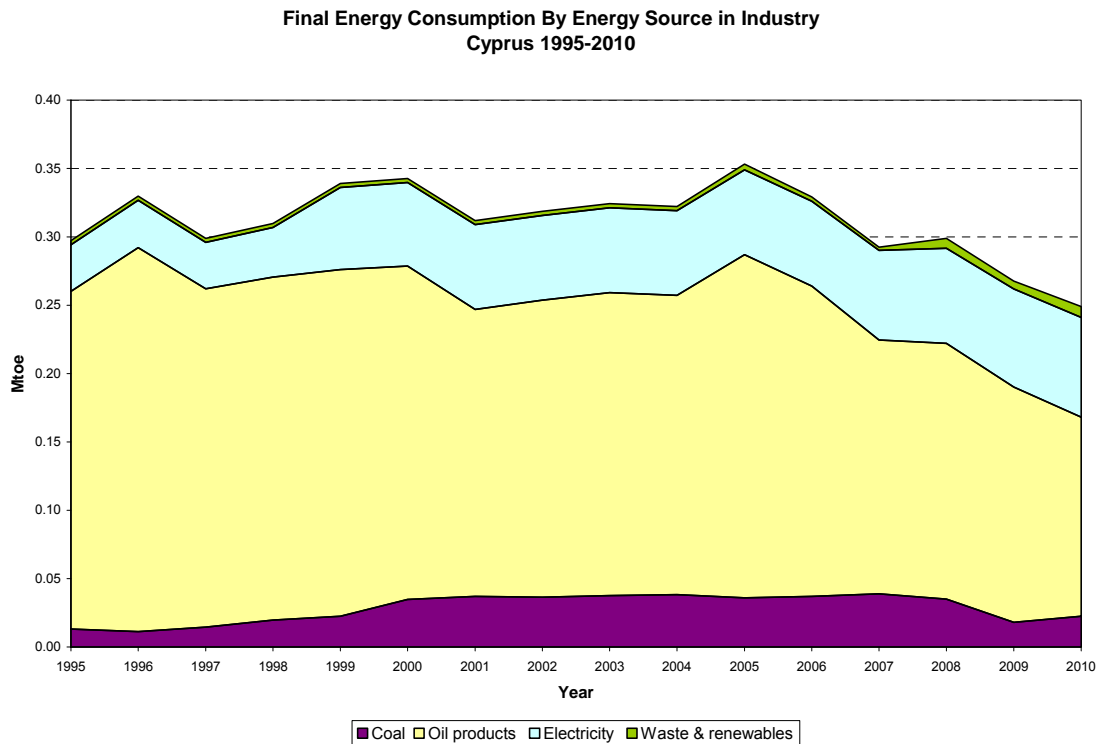


Fig. 3.4 Energy consumption of industry by energy source

Energy Efficiency Policies and Measures in Cyprus in 2012

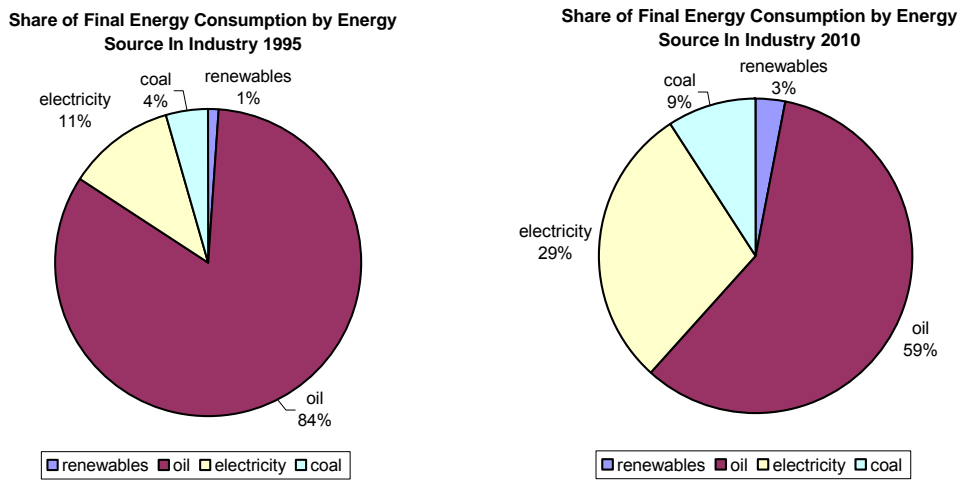


Fig. 3.5 Shares of final energy consumption by energy source in industry, 1995 & 2010

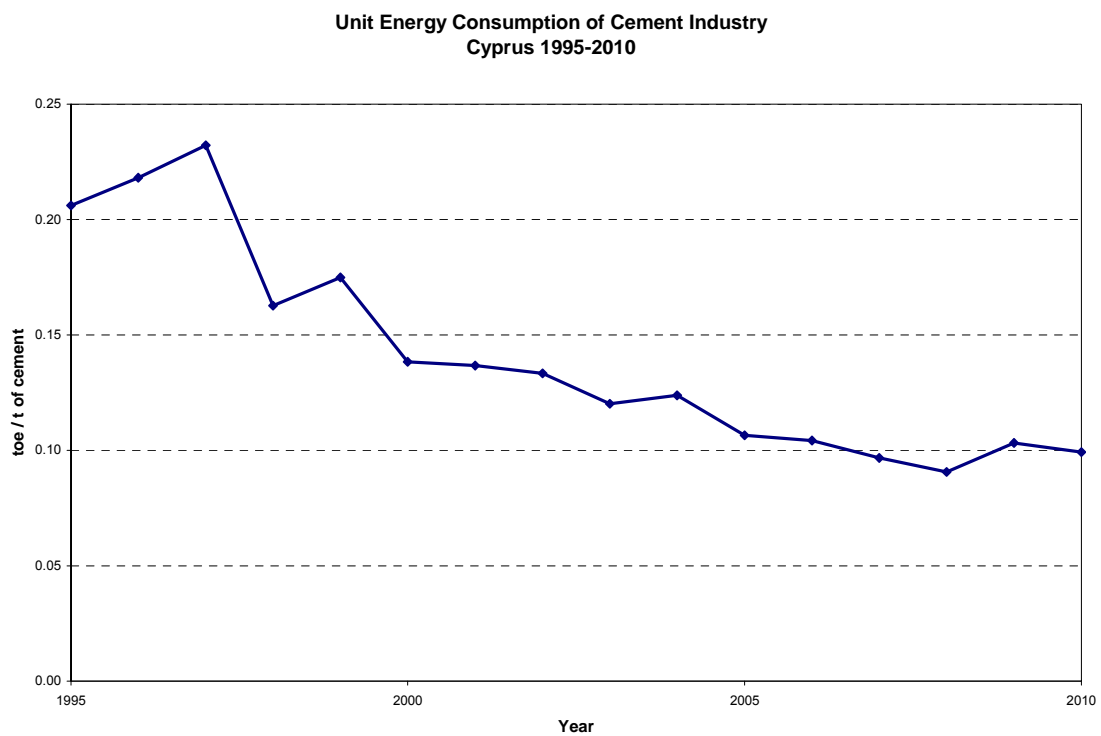


Fig. 3.6 Unit consumption trends of cement

Energy Efficiency Policies and Measures in Cyprus in 2012

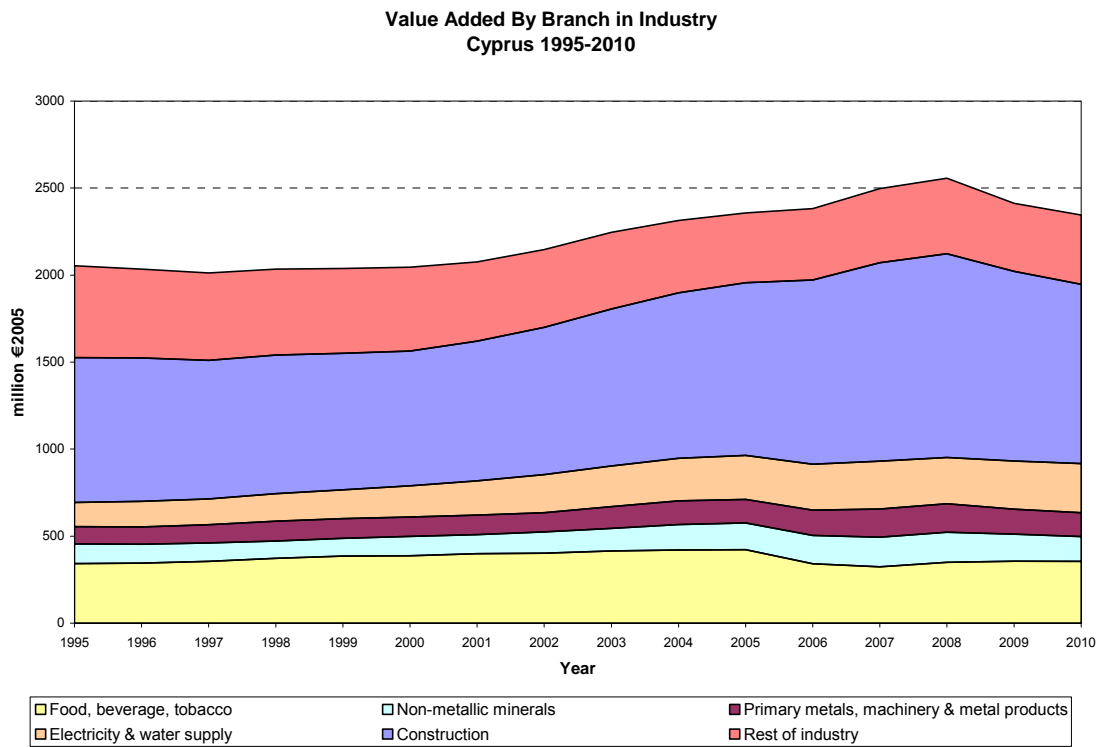


Fig. 3.7 Value added by branch in industry, 1995-2010

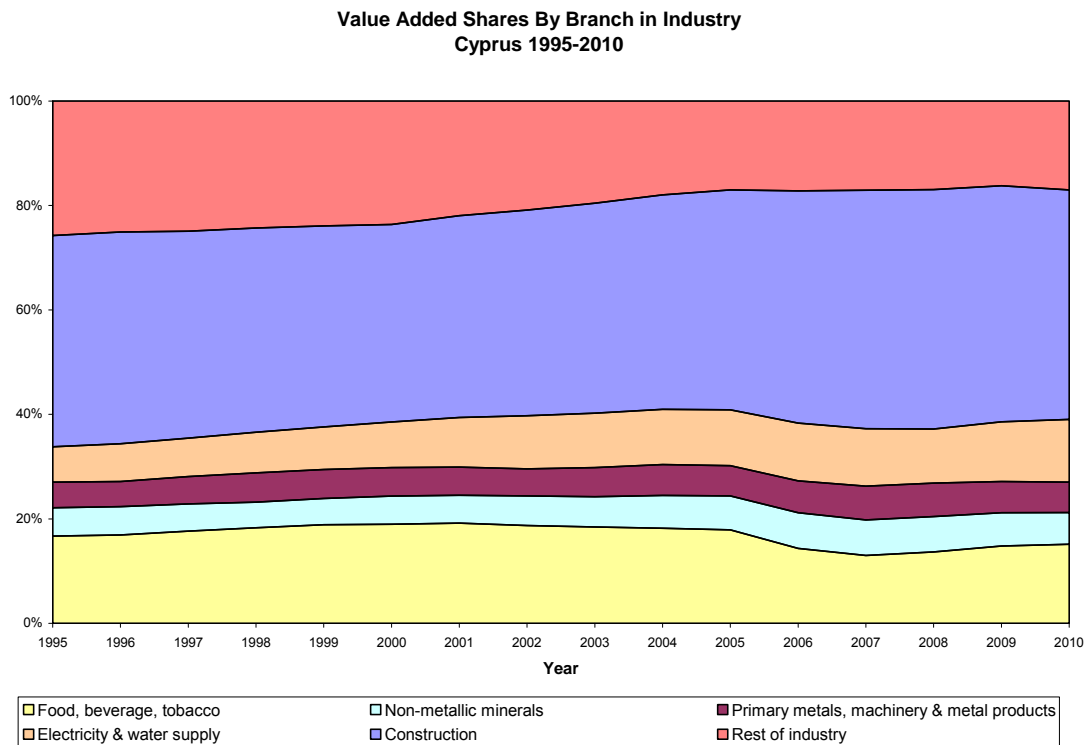


Fig. 3.8 Share of value added by branch in industry, 1995-2010

3.3 Households

Final energy consumption has increased from 199 ktoe in 1995 to 322 ktoe in 2010. The share in the energy balance has increased from 14.1% to 17% in the period. The energy source mix has changed in favour of electricity consumption whereas the oil consumption has decreased. The share of RES (17%) has remained the same and is mainly attributed to solar thermal water heaters. Electricity consumption has increased dramatically from 65 ktoe to 150 ktoe during this period (a 130% increase). The reasons are the installation of air conditioners and the increasing number of home electric appliances.

Space heating energy consumption has increased from 79 ktoe in 1995 to 88 ktoe in 2010. However the use of electric heat pumps (in the heating mode) is not included in this figure.

The implementation of the EPBD has started in 2008 with the setting of minimum energy efficiency requirements for new buildings (building shell) and the first energy certificates were issued in 2009. The energy performance indicator of the reference residential building is 180 kWh/m²/year (heating, cooling, hot water, lighting). This result is derived from the official national calculation methodology tool and is designated as the asset rating (based on standardised conditions and typical occupancy).

The unit consumption of dwellings has changed slightly from 0.96 toe/dw to 0.97 toe/dw in the period 1995-2010. The unit consumption of heating has changed from 0.4 toe/dw in 1995 to 0.3 toe/dw in 2010. The unit consumption for water heating has remained stable 0.21 toe/dw, which is explained by the fact that solar energy covers 70% of the needs (91% of dwellings have a solar system).

Electricity consumption per dwelling has increased from 3749 kWh/dw to 5239 kWh/dw in this period, while electricity consumption for lighting and appliances has increased from 2298 kWh/dw to 3330 kWh/dw.

Energy Efficiency Policies and Measures in Cyprus in 2012

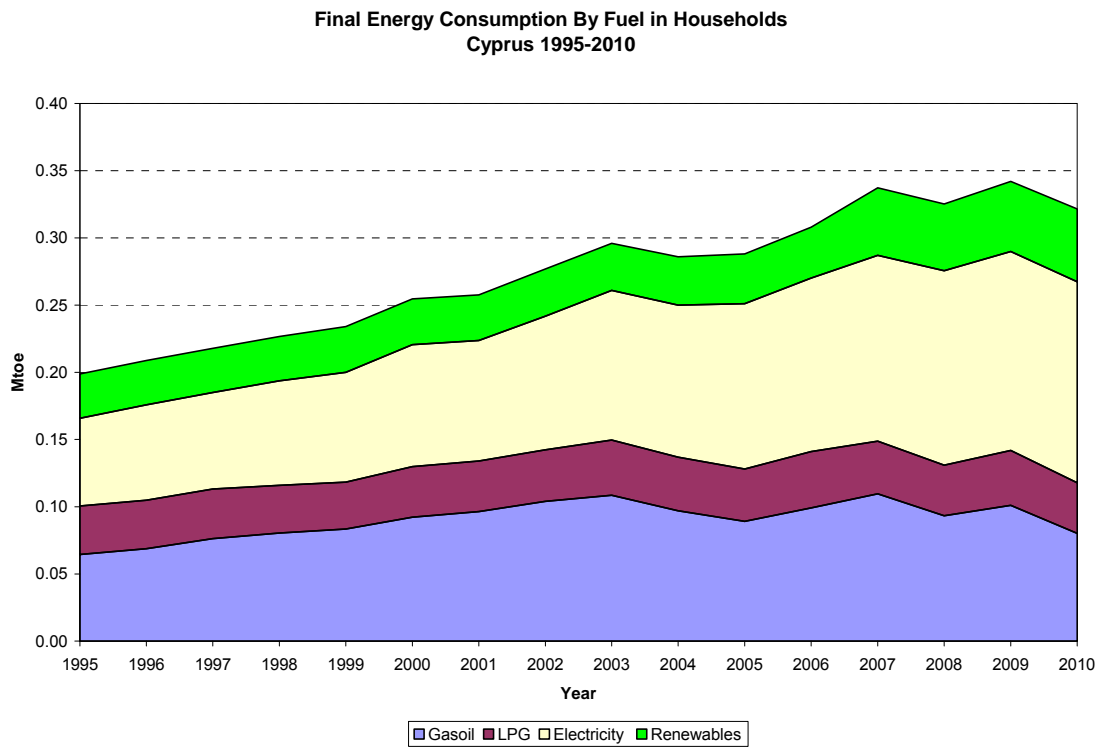


Fig. 3.9 Final energy consumption by energy source in households, 1995-2010

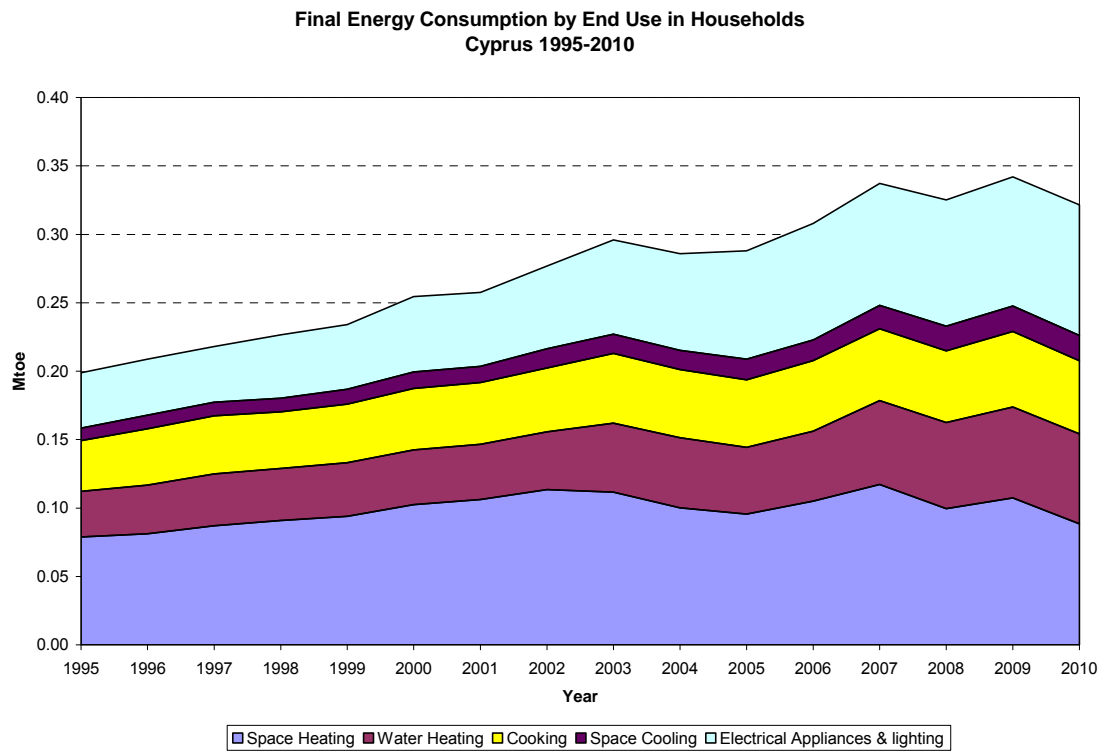


Fig. 3.10 Final energy consumption by end use in households, 1995-2010

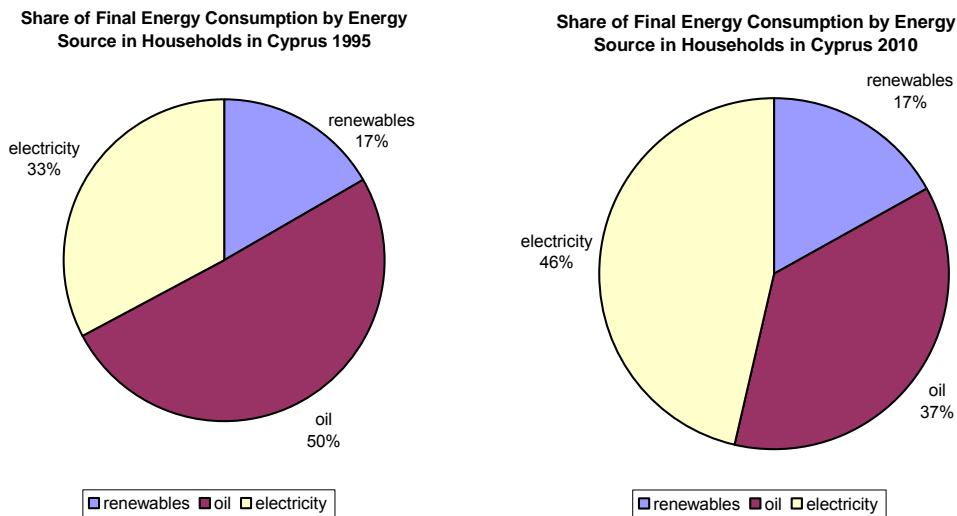


Fig. 3.11 Shares of final energy consumption by energy source in households, 1995 & 2010

3.4 Services

The economy of Cyprus depends heavily on services. The value added for the services sector has increased by 80% in the period 1995-2010. The contribution of the services sector to national GDP reached 71% in 2010. The most important branches are hotels & restaurants, with an increase of 8% in the period, and public administration, with an increase of 49% which is attributed to the uncontrolled expansion of the government sector and the employment of thousands of civil servants the last five years – although this branch has a relatively low share in energy consumption. The education branch has experienced a significant increase of 63% in this period, which can be explained by the significant expansion of private universities.

The energy intensity of the tertiary sector has decreased from 0.023 kgoe/€2005 to 0.021 kgoe/€2005 over the period 1995-2010. The electricity intensity has increased from 162 kwh/€2005 to 193 kwh/€2005 in the same period. Total electricity consumption has increased by 114%, which is explained in the high use of air-conditioning and the construction of thousands of new touristic buildings. The share of electricity consumption in the energy balance of tertiary sector has increased from 61% to 78%. The consumption of electricity per employee was 5245 kwh/emp in 1995 and reached 7455 kwh/emp in 2010.

Energy Efficiency Policies and Measures in Cyprus in 2012

In the hotels & restaurants branch electricity intensity has increased from 393 kwh/€2005 to 560 kwh/€2005 in the period 1999-2010.

Overall, unit energy consumption of the tertiary sector has increased from 0.742 toe/employee to 0.823 toe/employee.

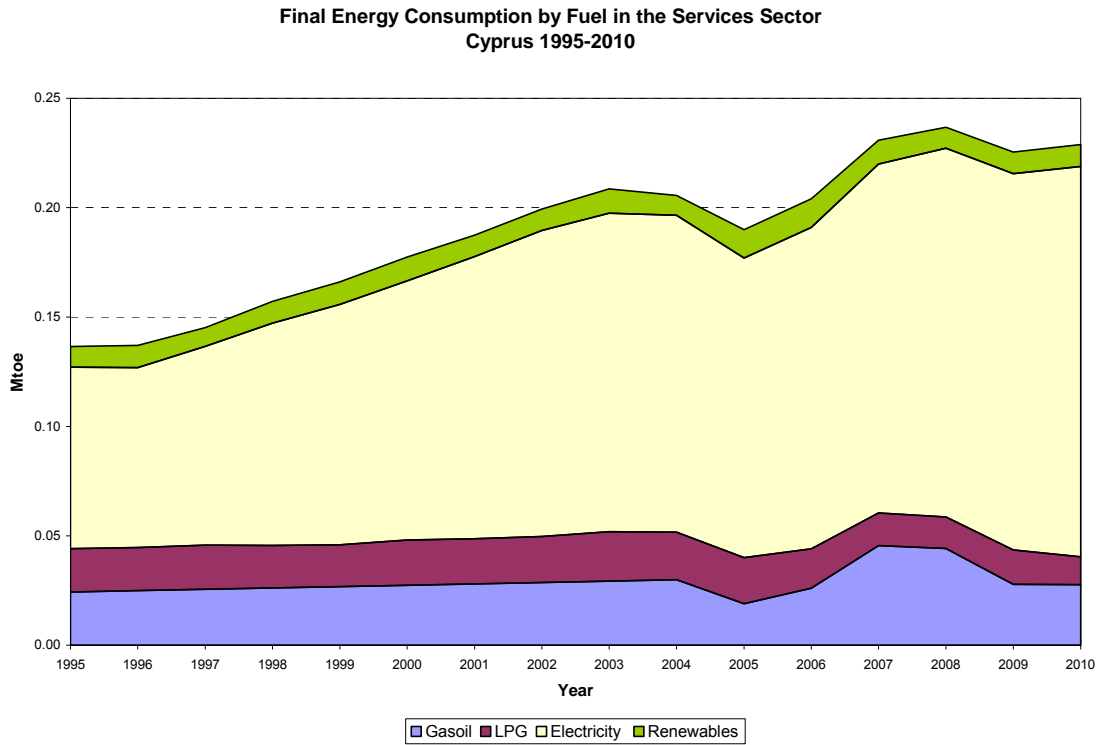


Fig. 3.12 Final energy consumption in the services sector by energy source, 1995-2010

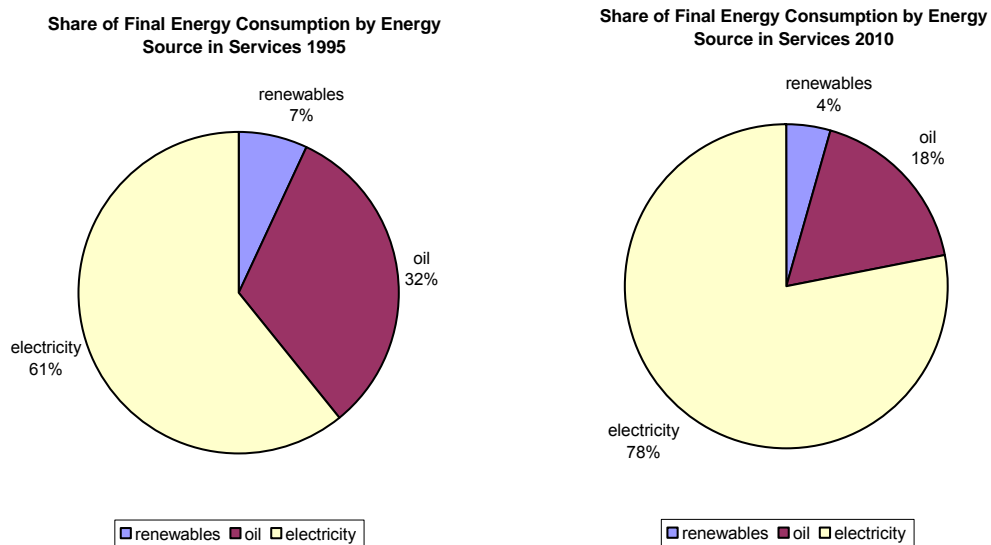


Fig. 3.13 Shares of final energy consumption by energy source in the services sector, 1995 & 2010

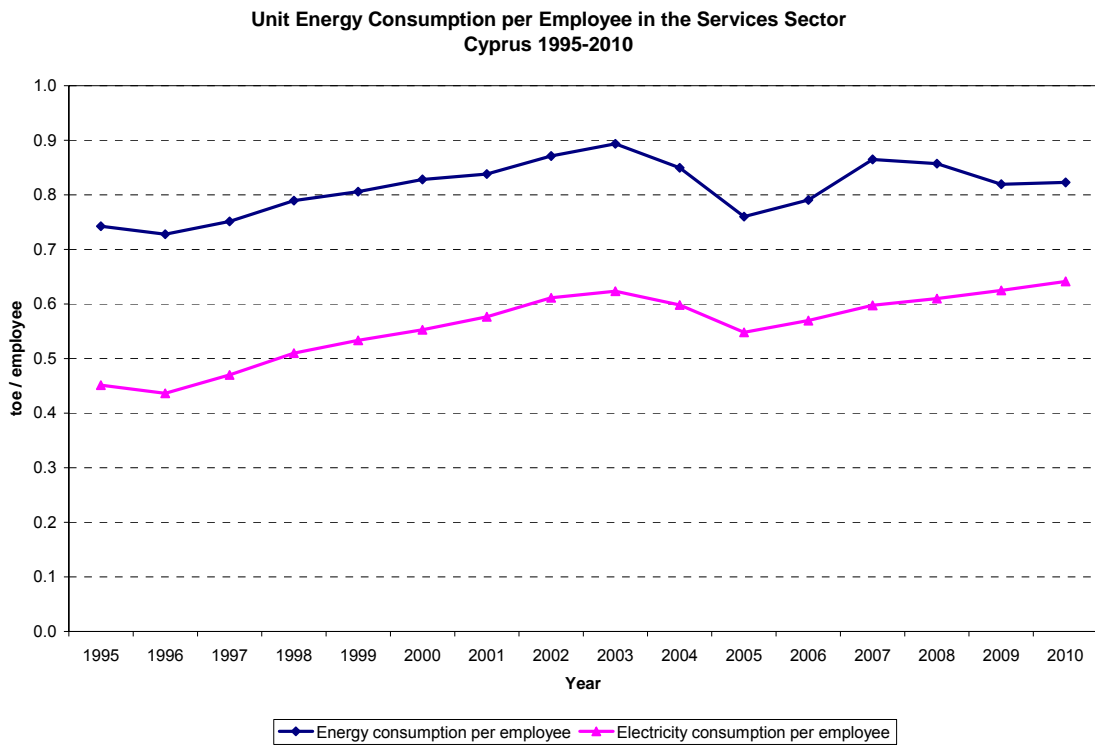


Fig. 3.14 Unit consumption trends in the services sector

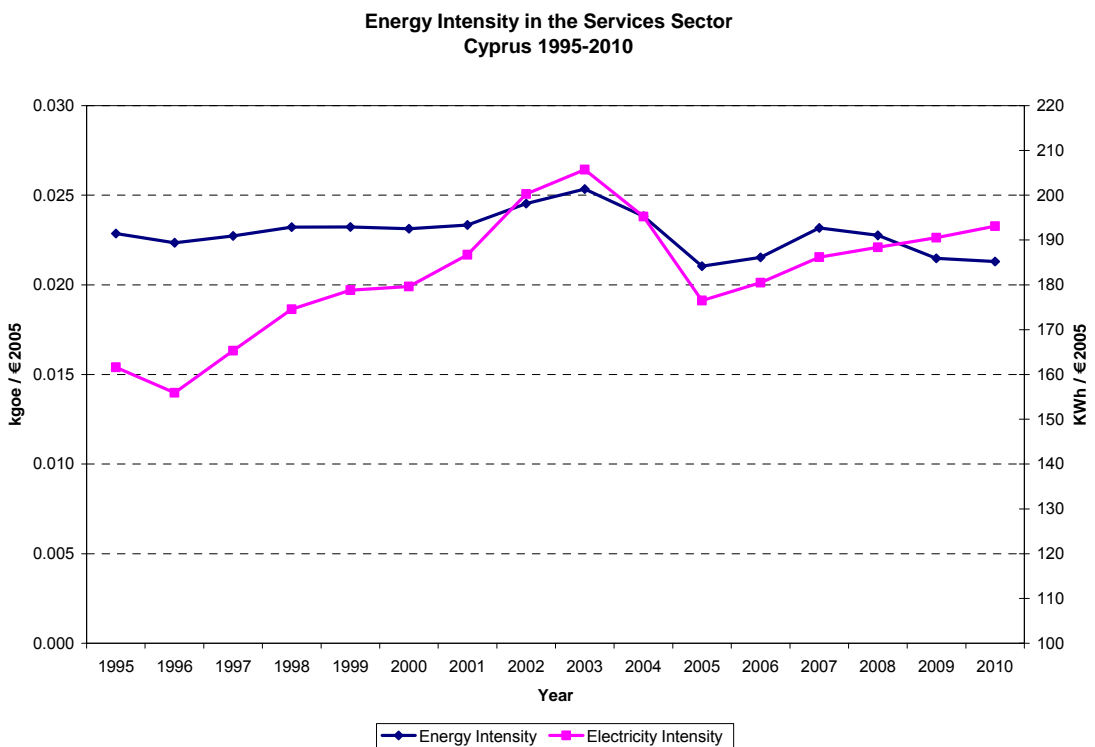


Fig 3.15 Final energy and electricity intensity in the services sector, 1995-2010

3.5 Transport

This sector is the most energy consuming in the energy balance, with a 56% share in 2010 whereas in 1995 it was 53%. As a percentage is the largest in the EU. The aviation part is 15% and the road transport part is 41%. Cyprus being an isolated island has no sea interconnections with EU, no rail infrastructure and also the public bus system is not well developed and has low use by citizens. More negative effects for energy consumption is the fact that due to the political situation with Turkey the Cyprus Airways flights can not use the Turkish FIR and thus jet fuel consumption increases further. There are also some effects of 'fuel tourism' as cars are crossing the green line between the areas controlled by the Republic of Cyprus and refuel with cheaper fuel from the occupied areas in the north of the island.

Transport energy consumption has increased by 43% in the 1995-2010 period due to the dramatic increase of private vehicles. The number of vehicles in 1995 was 374 000 and reached 627 000 in 2010. Gasoline vehicles rose from 203 000 in 1995 to 416 000 in 2010. Diesel cars were 17 000 in 1995 and reached 46 000 in 2010. Diesel light duty vehicles were 78 000 in 1995 and 100 000 in 2010. It is obvious that private cars have doubled in the time period and this basically explains the increase in transport fuel consumption. Aviation fuel use has not changed significantly in the period as shown in the diagrams and is affected to some extent by the evolution in tourist flows.

The shares of fuels in the energy balance of transport are 38% gasoline, 34 % diesel, 27% jet fuel and 1% biofuels. The share of biofuels is expected to increase in the next few years due to compliance with the EU renewables directive. The target is for 10% renewable fuels, which should be realised either by using renewable electricity or (primarily) by blending biofuels in the imported diesel and gasoline for road transport. The share of gasoline in 1995 was 26% and this rise is attributed to the dramatic increase of private cars and also to bigger, more luxurious non efficient cars imported as second hand vehicles from Japan and the UK. The steering wheel of vehicles in Cyprus is on the right side of the vehicle and all imported vehicles come from countries with the same system. Another factor which plays a role in the transport energy consumption - and particularly in aviation fuel use – is the fact that Cyprus is a popular touristic destination with 2.2 million tourists visiting the country every year (compared with a permanent population of Cyprus of about 840 000). Also the number of Cypriot residents travelling abroad for tourism is around 1.3 million every year.

Specific fuel consumption for different types of vehicles has changed as follows:

Private cars from 9.14 lt/100km in 1995 to 9.25 lt/100 km in 2010

Gasoline cars from 9.3 lt/100 km in 1995 to 9.4 lt/100 km in 2010

Diesel cars from 8.6 lt/100 km in the 1995, to 8.8 lt/100 km in 2005 and to 8.6 lt/100 km in 2010.

Diesel light duty vehicles from 10.6 lt/100 km in 1995 to 9.9 lt/100 km in 2010.

Heavy duty vehicles from 28.4 lt/100 km in 1995 to 24.9 lt/100 km in 2010.

For light duty vehicles and heavy duty vehicles the specific energy consumption has declined due to more fuel efficient diesel engines.

For the aviation sector the unit consumption has declined from 0.06 toe/passenger to 0.04 toe/passenger in the period 1995-2010. The reasons are more energy efficient aircraft and better management of the flight programs.

Fuel consumption shares by mode of transport were 64% road and 36% air in 1995, and 73% road and 27% air in 2010.

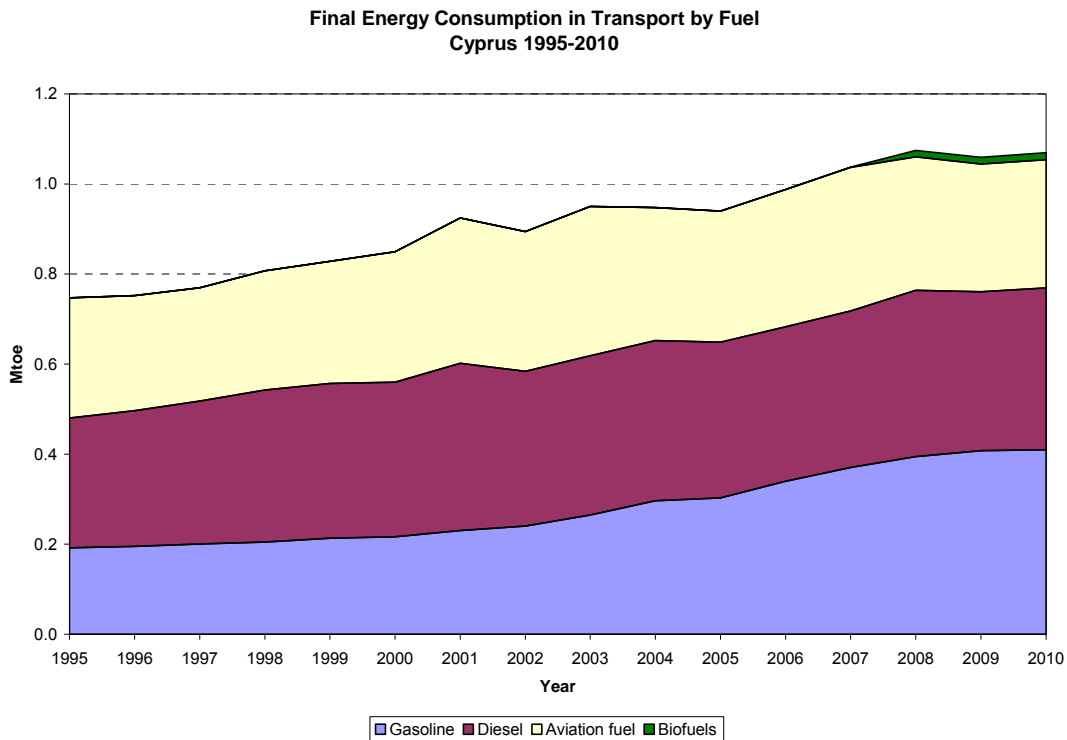


Fig. 3.16 Final energy consumption by energy source in transport, 1995-2010

Energy Efficiency Policies and Measures in Cyprus in 2012

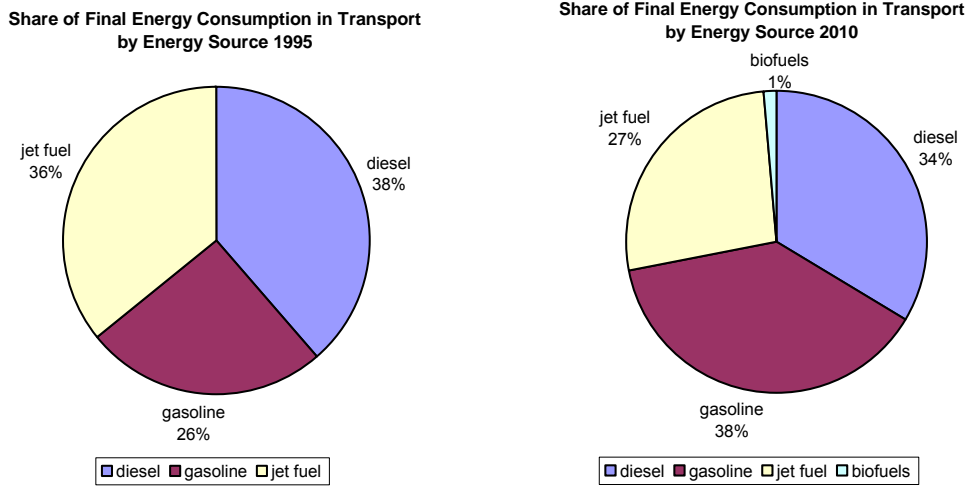


Fig 3.17 Shares of final energy consumption by energy source in transport, 1995 & 2010

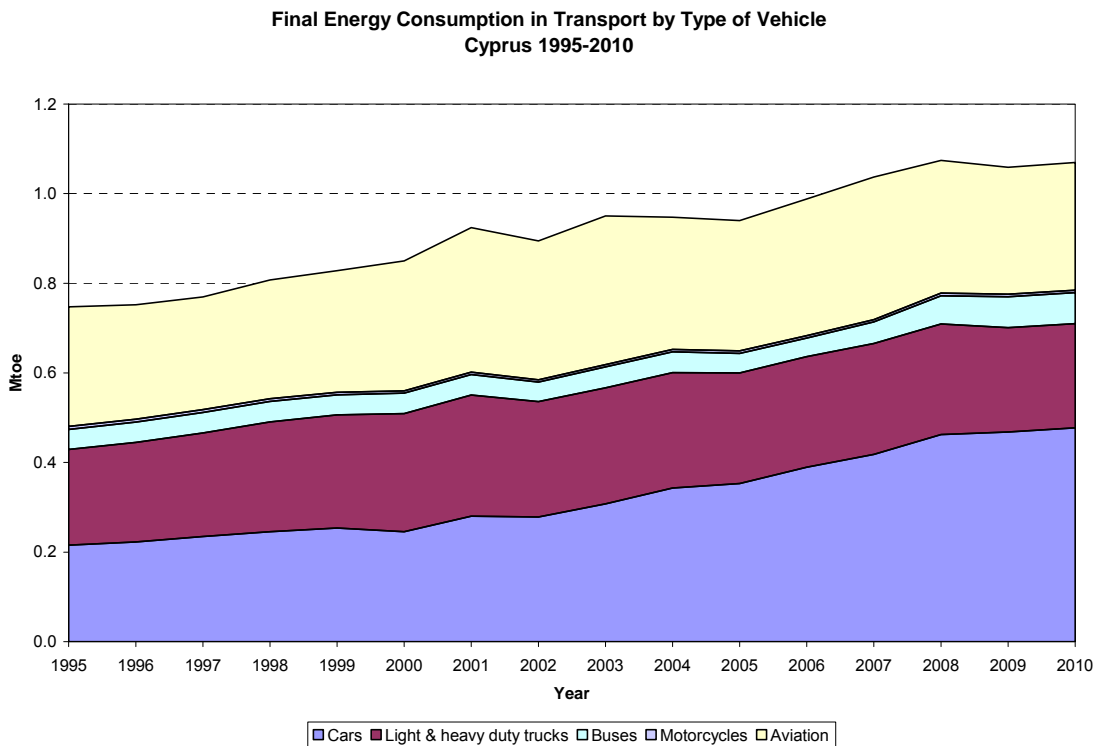


Fig. 3.18 Final energy consumption trends by type of vehicle, 1995-2010

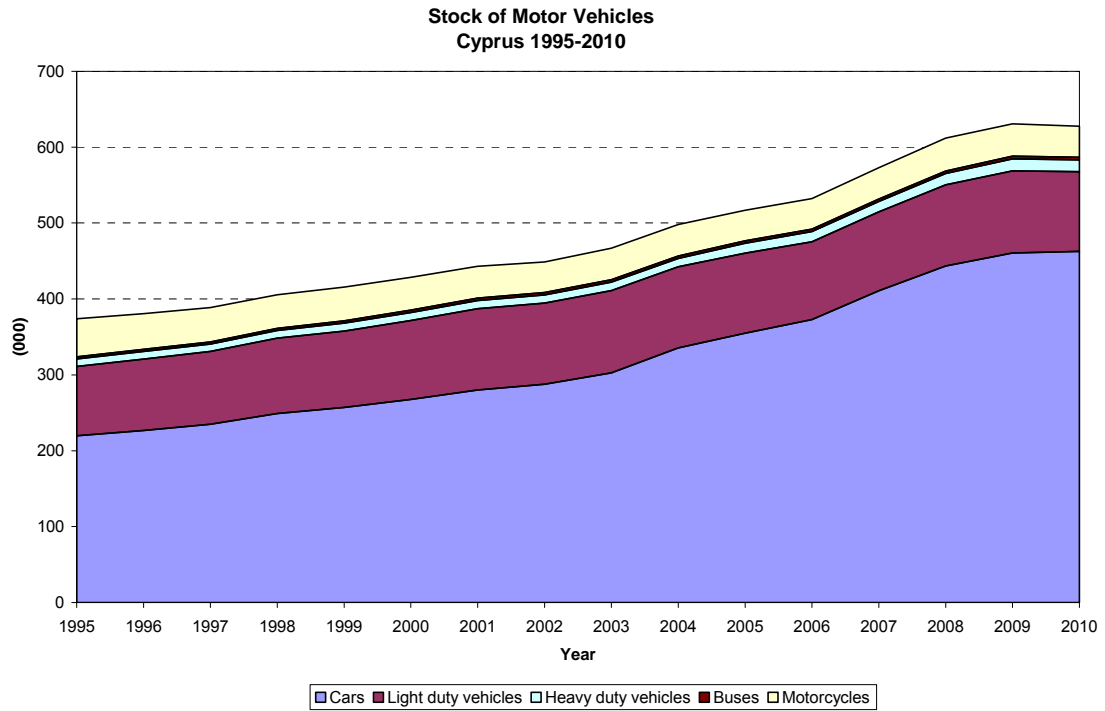


Fig. 3.19 Trends in the stock of motor vehicles

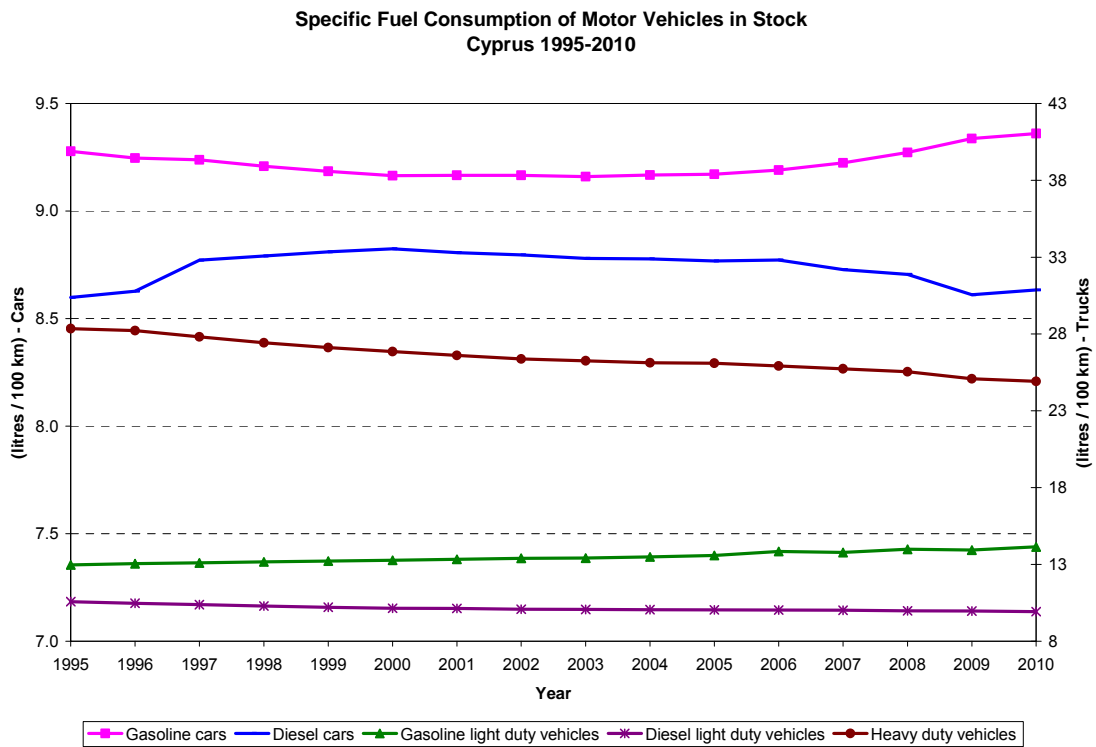


Fig. 3.20 Specific fuel consumption of motor vehicles in stock

3.6 Assessment of energy efficiency/savings through ODEX: total and by sector

In order to evaluate real energy efficiency trends, an aggregated energy efficiency indicator (ODEX) was developed in the Odyssee database. Its calculation is based on a detailed analysis of ~30 branches, sub-sectors, end uses (7 modes in transport, 9 end uses for households, 11 branches in industry) using unit consumption figures (kwh/m², kwh/appliance, litres/100km, toe/ton of product etc). The different branches / end-uses are weighted according to their share in final energy consumption. ODEX is calculated as a 3-year moving average to normalise for factors like climate and structural changes not related to energy efficiency. Also the indicator includes the progress in energy efficiency technology. For the base year 2000 the ODEX is set to a value of 100.

ODEX is calculated for three final consumption sectors (transport, households, manufacturing) and for the economy as a whole. It summarises the energy efficiency improvement per sector. An index of 85 means a 15% improvement of the energy efficiency compared with the year 2000.

Figure 3.21 illustrates the evolution of this index by sector and for the whole economy of Cyprus. During the period 2000-2010 the total energy efficiency index (Odex) has improved by 13%, or 1.2%/year, compared to 11.6% of the EU-27. The reasons for the improvement is the energy efficiency improvement of the industrial sector mainly from the ETS installations and also the contribution from the transport sector (55% of energy consumption) which has improved its efficiency from the new clean and fuel efficient vehicles. However we have to consider to some extent statistical errors due to the lack of complete and accurate data for some energy products and end uses, particularly in the household sector. Another aspect to keep in mind is that prior to 2004 the diesel fuel consumed was not accounted for separately according to its end use (i.e. was not classified to heating and transport diesel fuel).

The efficiency index of the industrial sector has improved by 29% during the period 2000-2010. The improvement is mainly attributed to the development of the non metallic mineral branch (cement, bricks) which are subject to the ETS, and to some extent to developments in other industrial branches which implement energy saving measures and conduct industrial energy audits. Typical efficiency technologies applied are waste heat recovery, auto production of power to avoid high electricity seasonal tariffs, and the use of waste for energy. The share of the non metallic mineral sector is 50% in en-

ergy consumption of industry. The decrease of the Odex index in this branch was 40% between 2000 and 2010.

During the same period the household sector has shown an improvement of 23% in its total Odex. Even though the quality of data in this sector is not very good we can justify the improvement after the year 2004 when Cyprus entered the EU and the measures implemented have started to cause energy savings. Prior to EU accession no significant policies existed. Actually the high impact measures such as the Buildings Directive has been implemented partly since 1/1/2008. The technical Odex has remained flat during 2000-2006 and has only showed signs of improvement from 2007 onwards. The technical Odex has improved by 11% in the period 2000-2010.

The transport sector shows an improvement of 9% in the Odex in the period 2000-2010. This was due to a moderate decline of 5% in the road index and a stronger improvement of the efficiency index of 19% in air transport. Since in this period passenger traffic using public transport has decreased drastically, the improvement should be mainly explained by the penetration of clean and fuel efficient vehicles. Until 2004 diesel fuel prices for transport were subsidised by gasoline. Therefore, large engine capacity private vehicles were replaced gradually when prices were liberalised. Another factor affecting the efficiency of this sector is energy consumption of aviation (16% of final consumption). Jet fuel consumption per passenger has declined by 19% in the same time period, thanks to more efficient aircraft and better flight management.

Energy savings attained since 1996 are presented in Figure 3.22. They have reached 0.23 Mtoe in year 2010, or about 12% of that year's total final energy consumption. As explained above, most of these savings came from improvements in manufacturing and transport.

Energy Efficiency Policies and Measures in Cyprus in 2012

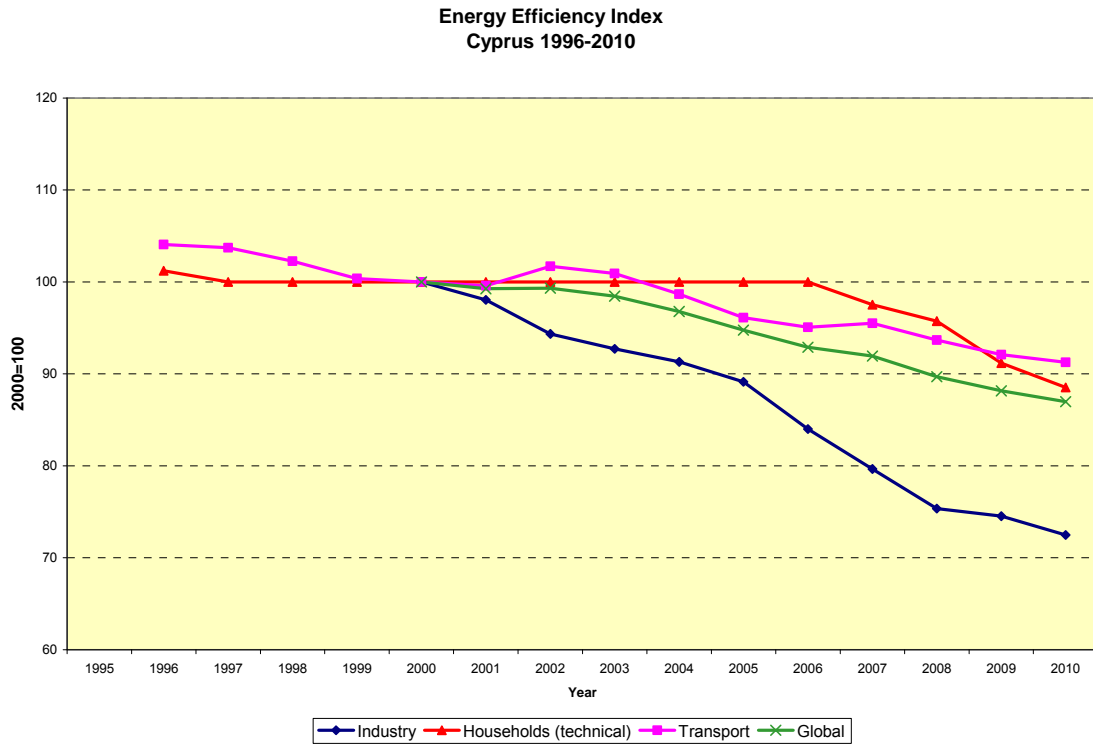


Fig. 3.21 Energy efficiency index of Cyprus, 1996-2010

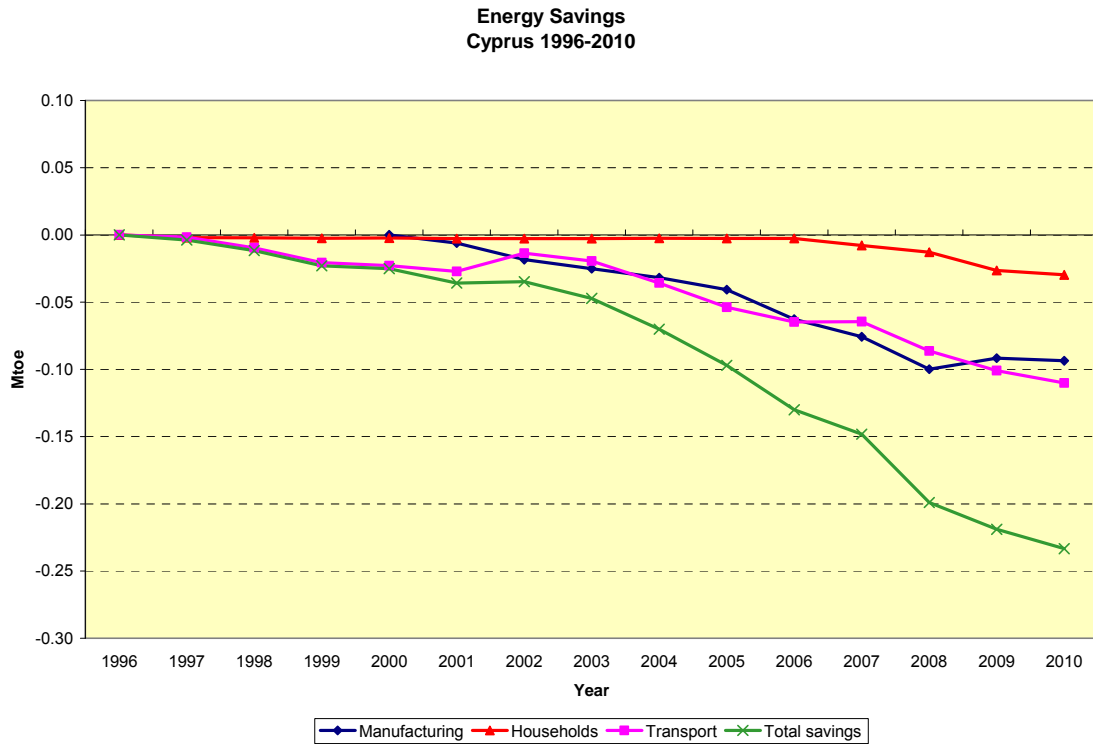


Fig. 3.22 Energy savings by sector in Cyprus, 1996-2010

3.7 CO₂ emissions trends

Total CO₂ emissions from fossil fuel combustion in Cyprus amounted to 4.8 Mt in 1995 and rose to around 8.4 Mt in 2010. A major part of these emissions comes from oil-fired power plants. As regards final energy consumption, direct CO₂ emissions lied at around 3.6 Mt in 1995 and grew to 4.2 Mt in 2010 – an 18% increase. Until 2007, i.e. before the occurrence of the economic and financial crisis that affected the Cypriot economy considerably, emissions had grown up to 4.7 Mt, or by 32% compared to 1995.

As in final energy consumption, the transport sector is the major contributor in CO₂ emissions as well. In fact its emissions share is even higher than its energy share since transportation is entirely oil-powered, in contrast to other sectors whose energy needs are partly satisfied by electricity which has zero direct CO₂ emissions. As a result, transport accounted for 74% of all direct CO₂ emissions from final energy use in 2010, in contrast to 61% in year 1995. The emissions contribution of households (12-14%) and agriculture (6%) has remained almost stable since 1995. The corresponding share of industry has dropped substantially, from 15% in 1995 to only 6% in 2010. This is due to two factors:

- the decrease in the contribution of industrial sectors to national GDP (which led industry to contribute only by 13% to final energy use as opposed to 21% in 1995)
- the electrification of industry: as shown in the previous sections, coal and oil accounted for 88% of final industrial energy use in 1995 and only for 68% in 2010. Participation of ten installations (two cement plants and eight brick and tile producing plants) in the EU Emissions Trading System has also contributed to this development.

The tertiary sector, although the dominant sector in the economy of Cyprus, was responsible for only 2% of direct CO₂ emissions from final energy consumption in year 2010, down from 4% in 1995. This is because the service sector has low energy intensity and the share of electricity and renewables accounted for 82% of its final energy use.

With the exception of transport, which continued its increasing emission trends with only a short break in 2009, CO₂ emissions of all other sectors have been declining after 2007 as a result of the economic slowdown and the resulting drop in final energy consumption. Decarbonisation of the energy mix has proceeded very slowly: some small

Energy Efficiency Policies and Measures in Cyprus in 2012

steps in this direction have been the slow increase in the use of solar thermal energy in households and the tertiary sector, some adoption of biomass in industry, and the blending of biofuels in automotive diesel oil in the transport sector as a result of national obligations mandated by the EU Renewables Directive (2009/28/EC).

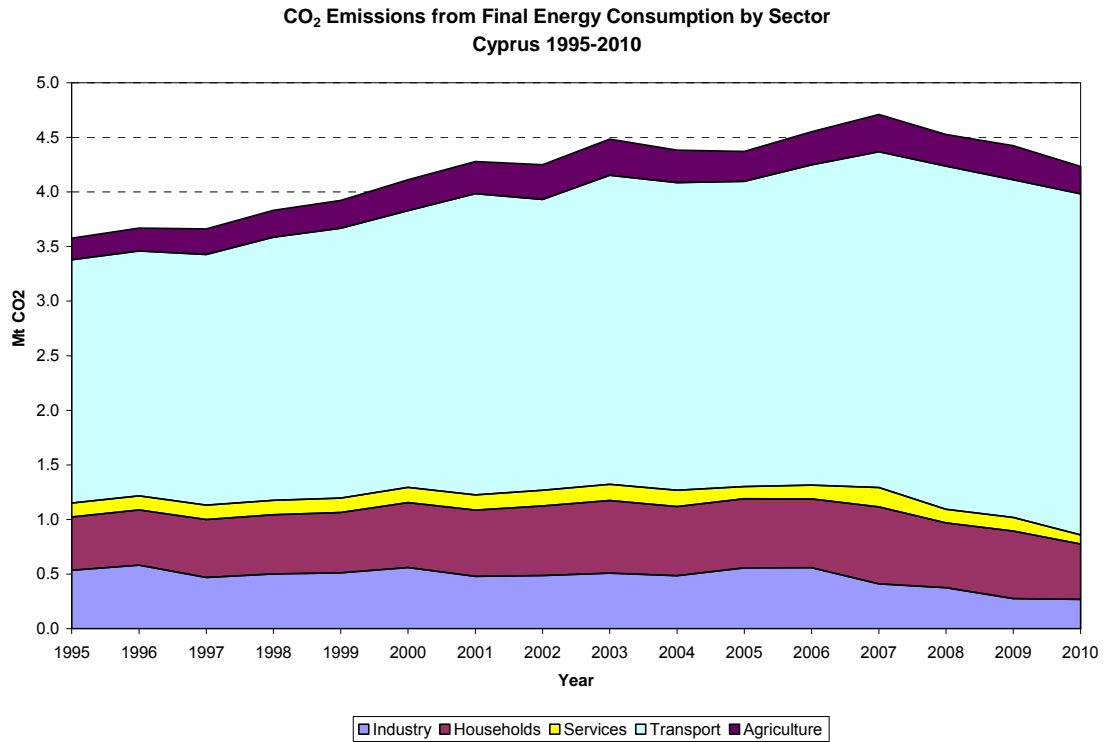


Fig. 3.23 CO₂ emission trends by sector, 1995-2010

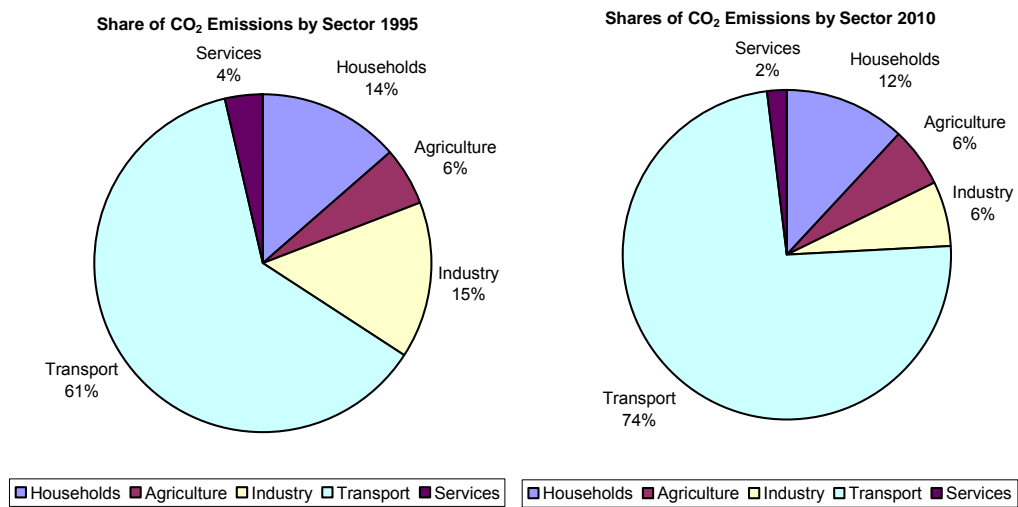


Fig. 3.24 Shares of CO₂ emissions by sector in years 1995 and 2010

4 Energy Efficiency Measures

4.1 Recent energy efficiency measures

Residential Sector

Regulations for the energy performance of buildings have been adopted in compliance with the EPBD directive 2002/91/EC. Minimum energy efficiency requirements for new buildings have been set. The Cyprus reference residential building includes all the minimum technical characteristics such as the building shell thermal code, energy efficiency of HVAC equipments, mandatory installation of solar thermal system for hot water, provisions for the installation of a photovoltaic system. A national calculation method named SBEMCY based on a reference building has been developed and is applied to prove and get a building permit that a new building passes the minimum requirements (B class building) and also for the issuance of the energy performance certificate.

New legislative regulations for the mandatory inspection of boilers and air conditioning systems have been enacted but until the end of 2009 they had not been implemented. Due to the hot climate conditions, the use of split air conditioning units is standard in Cyprus and therefore air conditioning constitutes a significant part of electricity consumption and maximum power demand during peak seasons.

A financial support scheme has been in operation for households providing for free 5 CFL lamps with the payment of the utility bill. Around 1.5 million lamps have been distributed to final consumers.

A financial support scheme has been in place providing grants for existing dwellings in energy efficiency improvements including thermal insulation, double glazing, solar thermal water heaters and geothermal heat pumps.

Transport Sector

A national action plan for public transport upgrading has been adopted by the government. It includes new legislation with requirements for all public transport operators (bus companies). Among others it foresees a radical improvement of the existing infrastructure such as 1000 new environmentally friendly buses replacing the old polluting ones, new bus routes, modern stations, bus lanes etc. Up to 2009 the action plan had

been partially implemented but more time and significant investment is required mainly for the purchasing of new modern buses.

A financial support scheme has been in place for purchasing of electric and hybrid as well as cars with emissions less than 120 g/km.

Taxation of new vehicles is partly based on CO₂ emissions and small clean vehicles receive low tax coefficients.

A support scheme providing grants for the scrapping of old cars was implemented during some years of this period.

Industrial Sector

An explicit national action plan for the reduction of GHG emissions has not been implemented up to now.

Energy intensive installations are subject to the EU Emissions Trading Scheme. The scheme covers 13 installations; three of them are power plants and the other ten installations belong to the non-metallic minerals branch (cement and brick plants).

Legislation for the promotion of combined heat and power has been adopted in conformity with the relevant EU directive. An action plan to exploit the 200 MWe potential mainly from industry and to a lesser extent in the commercial building sector has been in place. A financial support scheme is in place providing grants for the investment and also a feed in tariff system.

A governmental support scheme for energy efficiency investments in industry has also been implemented, including grants of 30% of the investment cost in energy saving technologies.

Tertiary Sector

Regulations for the energy performance of buildings in compliance with the EPBD directive 2002/91/EC have been adopted. Minimum energy efficiency requirements for new buildings have been set. The Cyprus reference building includes all the minimum technical characteristics such as the building shell thermal code, energy efficiency of HVAC equipments. A national calculation method named SBEMCY based on a reference building has been developed and is applied to prove and get a building permit

that a new building passes the minimum requirements (B class building) and also for the issuance of the energy performance certificate.

New legislative regulations for the mandatory inspection of boilers_and air conditioning systems have been enacted but until the end of 2009 they had not been implemented. Due to the hot climate conditions, the use of split air conditioning units is standard in Cyprus and therefore air conditioning constitutes a significant part of electricity consumption and maximum power demand during peak seasons.

A financial support scheme has been adopted providing grants for existing commercial buildings in energy efficiency improvements including thermal insulation, double glazing, solar thermal water heaters, geothermal heat pumps, motors, heat recovery etc.

A national action plan for green public procurement is in place, setting efficiency criteria for public purchasing of equipment, vehicles and appliances.

An action plan for energy savings in public buildings has also been adopted, with provisions for designating an employee to act as energy manager for every public building. Awareness campaigns are scheduled for the personnel to save energy and encourage energy conservation behaviour.

Cross-cutting measures

Financial incentives from the governmental special fund for energy efficiency and RES investments. Capital grants and feed in tariffs for CHP, PV, wind, thermal-electric, geothermal technologies. Priority access to the grid for RES and obligation of the national utility company to buy the electricity fed into the grid on special tariffs.

Information/awareness campaigns for energy efficiency and RES. Training workshops (tailor-made for professional engineers and architects) in energy efficiency technologies and renewables.

4.2 Patterns and dynamics of energy efficiency measures

In this section the use of spider graphs illustrates the patterns for each separate sector of the energy policies and measures in Cyprus.

Spider diagrams are a graphical representation of the distribution of energy efficiency policies. They provide an overview of the type of measures a country has implemented. Spider diagrams are constructed by assigning each energy policy and measure in each sector to one of the following categories:

- Financial
- Fiscal
- Information-Education
- Legislative-Normative
- Legislative-Informative
- Infrastructure
- Social Planning/ Organisational
- Cooperative Measures
- Cross-cutting Measures with Sector Specifics

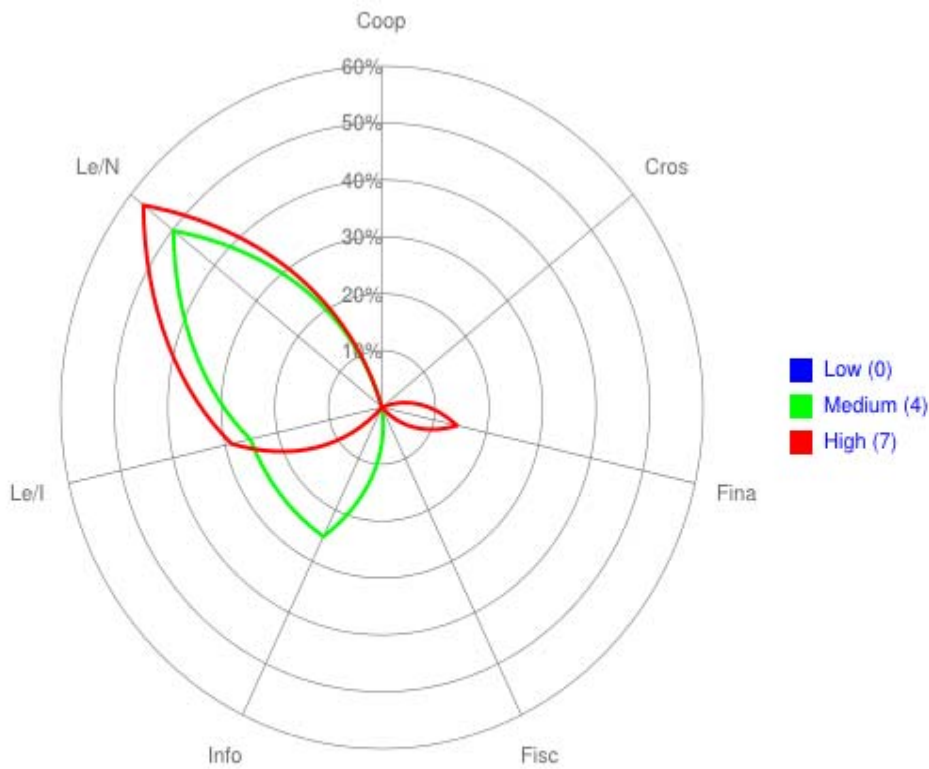
The wider spread the policies in a sector the more equally spread the measures on the different axes.

Cyprus has joined the EU in 2004 and has transposed and implemented the European energy efficiency policy. Prior to accession, essentially no national energy efficiency policies existed. Therefore the spider graphs are based on the period after 2004.

Residential Sector

This sector's most effective measures are the implementation of the EPBD directive which did not exist before and also the financial support schemes for existing housing in applying energy saving technologies. The measures are a mixture of legislative normative, informative and financial ones.

Energy efficiency patterns residential sector: development of measure by type over quantitative impact (CY)

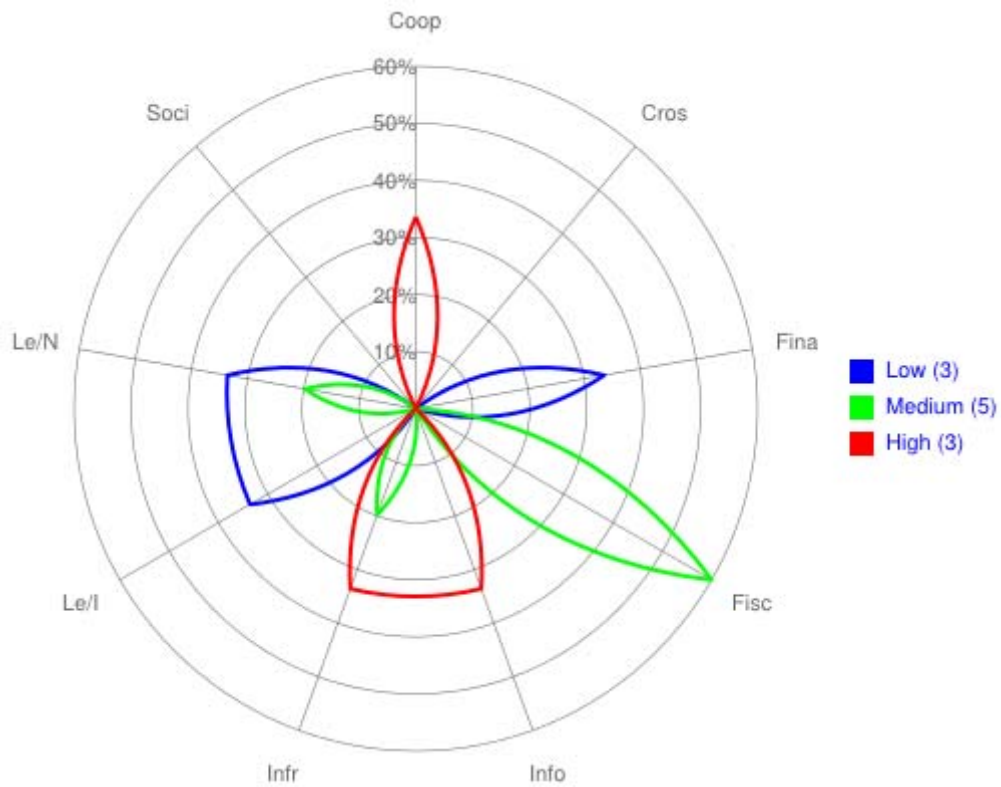


Coop: Co-operative Measures
 Cros: Cross-cutting with sector-specific characteristics
 Fina: Financial
 Fisc: Fiscal/Tariffs
 Info: Information/Education
 Le/I: Legislative/Informative
 Le/N: Legislative/Normative

Transport Sector

This is the most energy consuming sector, with a 56% share in final energy consumption (41% road, 15% aviation). Air transport fuel use, which is the largest as a percentage in the EU, is not covered by any specific measures. Cyprus being an island is isolated and there is no sea connection with the rest of the EU. It is worth mentioning that airplanes of the national airline (Cyprus Airways) have to divert when routing from entering Turkey's air space due to the political situation, thus wasting at least 5% additional fuel. The most significant transport-related policy is the national action plan for upgrading the public transport system, which had not been implemented fully until 2010. Other measures are grants for purchasing electric, hybrid, low emissions cars and vehicle taxation based partially on CO₂. The measure mix covers almost all types, with fiscal measures being the largest part of them.

Energy efficiency patterns transport sector: development of measure by type over quantitative impact (CY)

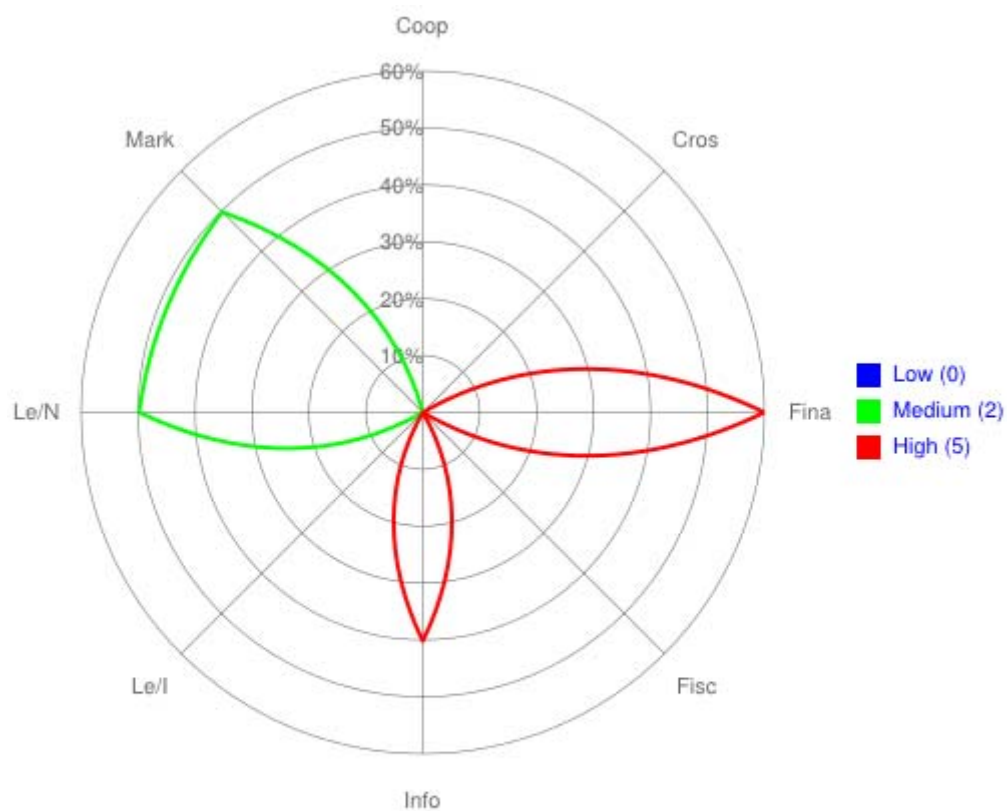


Cros: Cross-cutting with sector-specific characteristics
 Fina: Financial
 Fisc: Fiscal
 Info: Information/Education/Training
 Infr: Infrastructure
 Le/I: Legislative/Informative
 Le/N: Legislative/Normative
 Soci: Social Planning/Organisational

Industrial Sector

In the industrial sector we notice that the dominant measures are market -based (50% ETS, national action plan for GHG reductions), financial (60%), legislative normative (50%) and informative (40%).

Energy efficiency patterns industry sector: development of measure by type over quantitative impact (CY)

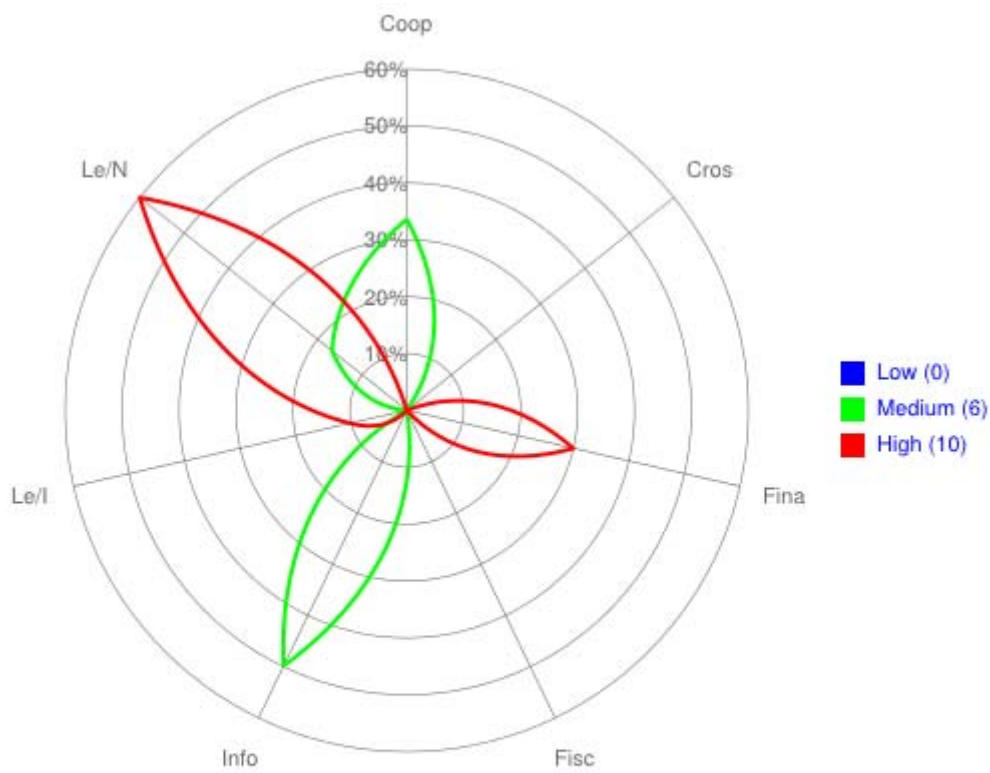


- Coop: Co-operative Measures
- Cros: Cross-cutting with sector-specific characteristics
- Fina: Financial
- Fisc: Fiscal/Tariffs
- Info: Information/Education/Training
- Le/I: Legislative/Informative
- Le/N: Legislative/Normative
- Mark: New Market-based Instruments

Tertiary Sector

For the tertiary sector the most important measures are legislative normative (60%), informative (40%) and financial, cooperative measures (30%). As mentioned earlier the most effective measure is the implementation of EPBD.

Energy efficiency patterns tertiary sector : development of measure by type over quantitative impact (CY)

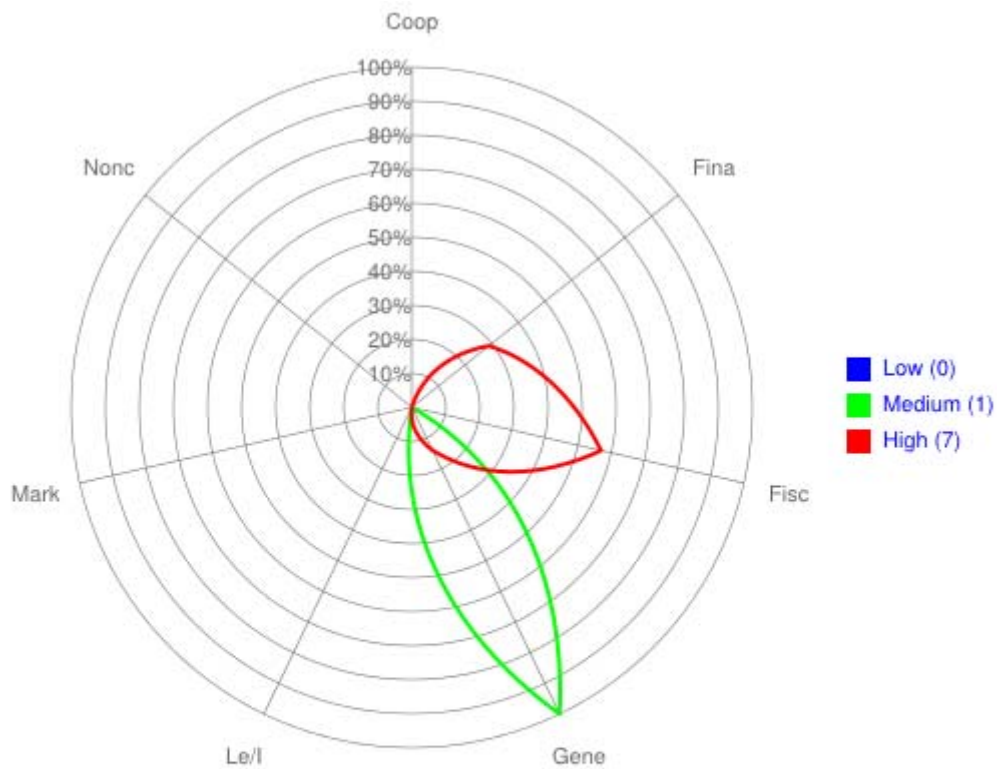


- Coop: Co-operative Measures
- Cros: Cross-cutting with sector-specific characteristics
- Fina: Financial
- Fisc: Fiscal/Tariffs
- Info: Information/Education/Training
- Le/I: Legislative/Informative
- Le/N: Legislative/Normative

Cross-cutting measures

In the graph below the most important measures are the general energy efficiency climate change programs (100%) and fiscal measures with 55%.

Energy efficiency patterns general cross cutting sector : development of measure by type over quantitative impact (CY)



- Coop: Co-operative Measures
- Fina: Financial Measures
- Fisc: Fiscal Measures/Tariffs
- Gene: General Energy Efficiency / Climate Change / Renewable Programmes
- Le/I: Legislative/Normative Measures
- Mark: Market-based Instruments
- Nonc: Non-classified Measure Types

4.3 Innovative energy efficiency measures

The parliament of Cyprus has passed a law for the taxation of vehicles taking into account their CO₂ emission levels. This will promote the purchase of clean and efficient vehicles. Special tax coefficients based on CO₂ emissions are applied when purchasing a new car, registering it and also on the annual fees paid. A 30% discount is given for emissions less than 120g/km up to an increase of 20% in tax for emissions above 250g/km.

A second relevant measure associated with car fuel efficiency as well as atmospheric pollution is the governmental program for scrapping old vehicles. The scheme has proven very popular among citizens and very successful in the respect that the budget allocated was spent quickly and thousands of polluting and non efficient cars have been phased out.

Feed in tariffs for RES

The Government operates since 2004 a financial support scheme for installation of renewable energy sources in conformity the EU directives and targets set. For Cyprus the mandatory target is 13% renewables by 2020 in gross national energy consumption – compared to a 3% share in 2005. For this ambitious target to be achieved it is necessary to proceed with significant investments and implement strong, effective policies and streamlined procedures for licensing authorisations. The main reasons that until 2009 RES had not developed satisfactorily is the bureaucratic procedures (2-3 years to get licences) and the limited land to install large scale RES (wind, PV).

Since the solar potential of Cyprus is one of the highest in the EU, the installation of solar energy technologies (solar thermal, PV, concentrated solar power) is a priority and the main way to comply with the overall RES targets.

The target for PV installations as set by the national action plan for RES is 196MWe by the year 2020. The present capacity installed is 12 MWe. In order for this to be achieved a financial support scheme is in operation since 2004. The main elements of the very popular governmental support scheme for PV are as follows:

Energy Efficiency Policies and Measures in Cyprus in 2012

1) It has feed in tariffs which are guaranteed when electricity is sold to the national grid. The tariffs presently are 0.28 €/kWh for households PV up to 7 KWe, 0.25 €/kWh for PV installed on buildings or in agricultural land plots up to 20 KWe, 0.25 €/kWh for PV installations on agricultural land up to 150 KWe. For larger systems of the order of 1.5-10 MWe a bidding procedure is followed. The main criterion is the lowest feed in tariff offered from bidders.

2) Autonomous (not grid connected) PV systems up to 7 KWe receive a 55% grant for the investment up to 33,000 Euros. Systems up to 20 KWe receive 40% of the investment cost up to 24,000 Euros. These systems are used for water pumping or isolated buildings.

3) The electricity produced is by Law fed into the national grid and purchased by the national utility company at subsidised prices.

4) The cost for the grid connection of the PV system is shared between the producer (50%) and the utility company (50%).

5) Authorisation procedures and permits from the energy regulators are issued easily and quickly for PV plants.

Furthermore, it should be noted that Cyprus is the first country in the world in solar thermal heaters per capital. The building energy performance regulations include mandatory installation of a solar thermal system for hot water in dwellings and also provisions for the installation of a PV system.

4.4 Energy efficiency measure evaluations

4.4.1 Semi-quantitative impact estimates of energy efficiency measures

Annex 1 includes a summary of the energy efficiency measures according to the MURE database. Each sector of end use is tabulated separately. The last column shows the semi-quantitative impact estimates of energy efficiency measures.

Under the scope of the energy services directive all the measures included in the national energy efficiency action plan will be calculated in terms of energy savings according to the methodologies (top down, bottom up). These measures will be counted towards achieving the target.

From the methodologies prepared by the Commission so far some calculations have been carried out for the energy savings caused from specific energy efficiency measures such as CFL lamps, thermal insulation, double glazing of existing buildings, solar thermal heaters, and thermal building code for new buildings.

In parallel using the criteria in the MURE database the impact of measures can be characterised. From the tables we can select three measures which have the most impact, namely:

- 1) The energy performance of buildings regulations, minimum efficiency requirements for new/renovated buildings. The specified thermal transmittance (U-values) for new buildings are 0.85 for walls, 0.75 for roofs, 3.8 for glazing, U mean=1.3 for houses, U=1.8 for commercial buildings. Considering that no building codes or thermal standards were applied prior to 2007 the new requirements will deliver according to calculations a minimum of 30% energy savings comparing to the existing building stock (specific energy consumption in kWh/m²/year).
- 2) The financial incentives provided for energy efficiency investments in buildings and industry. Most technologies are covered by these incentives. Particularly for existing houses the scheme provides grants of up to 2000 Euros for the thermal insulation of walls, roofs, double glazing. Thermal insulation has a high energy conservation impact. Considering that a roof without insulation has a thermal value of U=3 and after the insulation this drops to U=0.5, overall energy savings of 30% are estimated.

- 3) National action plan for the development of public transport. Radical changes and significant investments in developing high quality, effective and environmentally friendly mobility covering all regions of the island. This is a package of high impact measures such as the purchase of 1000 new efficient buses. The target set by Government is to increase the usage of public transport from 2% in 2008 to 10% in 2015.

4.4.2 Lessons from Quantitative Energy Efficiency Measure Evaluations

Evaluation of building regulation

The implementation of the EPBD in Cyprus will have high impact with regard to energy savings as prior to the directive there were no building energy regulations. The minimum requirements started to apply in 2008 in new buildings. The methodology used to calculate the energy savings for the NEEAP is the bottom up as adopted by the European Commission.

The minimum energy requirements for new buildings have been set for the reference building. They include maximum values for thermal transmittance of the building shell (U-values), mandatory installation of solar water heater, minimum efficiencies of heating and cooling equipment.

The results are:

- 1) new dwellings EPBD implementation, 15,400 toe in 2010 and 124,000 toe in 2016
- 2) new tertiary buildings EPBD implementation, 2,000 toe in 2010 and 17,600 toe in 2016

The percentage of energy savings from the EPBD implementation between a new building and the existing stock is more than 30%.

Evaluation of financial support schemes for energy savings

Cyprus operates since 2004 a financial support scheme for the installation of energy efficiency and RES technologies. It provides grants and feed in tariffs subsidies, it covers buildings, industry, transport and the fund is approximately 24 million Euros annually.

Particularly for the existing household sector it covers thermal insulation of walls, roofs and the installation of double glazing. According to the NEEAP2 the energy savings in 2010 were 9,952 toe.

For the tertiary sector (existing buildings) the energy efficiency grants scheme produced energy savings of 5,896 toe in 2010. Typical technologies used were efficient lighting, motors, heat recovery, and thermal insulation.

Also the scheme covers provision of free CFL lamps to household consumers and businesses. Around two million will be distributed through the utility company with the payment of the monthly bill. The energy savings from this measure are estimated to be around 15,700 toe in 2016 and 13,800 toe in 2010.

Another measure for which energy savings have been calculated is the scheme for scrapping old cars (grant of the order of 1300-1700 Euros per car). It was applied from 2008 to 2010. Around 4,000 old cars were removed and substituted by new efficient vehicles. In 2010 the energy saving was calculated at 2,825 toe.

The calculations of the energy savings have been carried out using the European Commission's bottom up methodology of the ESD directive.

5 National Developments under the EU Energy Efficiency Directive and the 20% Energy Efficiency Target of the EU

Cyprus has submitted in June 2007 the first National Energy Efficiency Action Plan in compliance with the ESD directive 2006/32/EC. The target adopted is 10% (185,000 toe) in 2016 (higher than the 9% indicative of the directive) and the intermediate target is 3% (60,000 toe) for 2010. In July 2011 the Second National Energy Efficiency Action Plan (NEEAP2) was submitted by the Ministry of Commerce and Industry to the Commission according to the directive and following the relevant template (www.mcit.gov.cy).

According to NEEAP2 Cyprus meets the intermediate target set of 3% (60,000 toe) and is estimated to reach savings of 3.57% (65,729 toe) in 2010. With regard to the final target for the year 2016 the measures already taken will create energy savings of 190,700 toe which is 10.35% and exceeds the adopted target.

The impact of measures in terms of energy savings implemented in the period 2004-2010 is firstly from the household sector, then the tertiary and lastly transport and industry.

- 1) household energy savings in 2016 162,000 toe
- 2) tertiary energy savings in 2016 23,600 toe
- 3) industry energy savings in 2016 1,141 toe
- 4) transport energy savings in 2016 3,900 toe

The potential for energy savings in the building and transport sector is significant. This is due to the fact that the EPBD implementation started in 2008 and set requirements in buildings for the first time. The public transport system is not well developed and the use of buses has decreased drastically during the last 10 years. In 2008 the final energy consumption of transport was around 53% of the total (36% road transport, 17% air transport).

Therefore the NEEAP2 includes new strong policies and measures to exploit the huge potential in these two sectors buildings and transport.

In the building sector the most important policy is the implementation of the energy performance of buildings directive. Since 1/1/2008 Cyprus applies minimum energy efficiency requirements for new buildings which constitute part of the building authori-

sation procedure. It has to be noted that this is the first building energy code applied. In addition the other main provisions for the mandatory maintenance and inspection of heating and air conditioning systems have not been implemented yet. An innovative new measure adopted is the mandatory installation of a solar thermal heater in new dwellings.

In the transport sector the NEEAP2 put particular emphasis but the most important is the recent developments where the government has decided and implements a new long term strategy for public transport. In this respect a Law has been enacted in July 2009 which sets criteria and other contractual terms, aspects for establishing a new public transport system with buses. According to the new legislation 6 new consortium companies will be created from the hundreds operating until recently. The bus service will cover all the regions of the island with new environmental buses and cheap fares.

According to the new contracts signed by end of 2009 there are terms and conditions for the purchasing of 1200 new modern, environmental buses whereas today there are 1030 old ones. Cyprus has the lowest indicator of usage of public transport means (1.7%, i.e. full dependency on private vehicles). Until 2011 around 300 new buses have been purchased.

In general the main objective is a radically new bus system and associated infrastructure which will be effective and assure the fast, safe, comfortable, environmental friendly and affordable mobility for the general population.

However until 2011 no significant progress for the implementation of the action plan for a new public transport system had been made. Significant investments are required in terms of infrastructure and organisation.

Annex 1

Energy Efficiency Measure Summary for Cyprus

Energy Efficiency Policies and Measures in Cyprus in 2012

9/10/2012

MURE II Industry 4 Measures Found

Code	Title	Status	Type	Starting Year	Semi-quantitative Impact	NEEAP Measure	EU-related Measure	Quantitative evaluation	Description
CY3	EU-related: Amended EU Emission Trading Scheme (Directive 2009/29/EC) - Governmental grants/subsidies scheme for the promotion and development of RES, energy saving technologies and the creation of a special fund for financing or subsidising ...	Ongoing	Financial, Information/Education/Training	2003	High	Yes	YES	No	YES
CY5	Information , awareness Campaigns for Energy Efficiency, Renewable sources	Ongoing	Information/Education/Training	2006	High	Yes	No	No	YES
CY2	EU-related: Combined Heat Power (Cogeneration) (Directive 2004/8/EC) - Combined Heat and Power Policy	Ongoing	Legislative/Normative	2007	Medium	Yes	YES	No	YES
CY4	EU-related: Amended EU Emission Trading Scheme (Directive 2009/29/EC) - Emission Trading Scheme (2008-2012)	Ongoing	New Market-based Instruments	2008	Medium	No	YES	No	YES

9/10/2012

MURE II Household 6 Measures Found

Code	Title	Status	Type	Starting Year	Semi-quantitative Impact	NEEAP Measure	EU-related Measure	Quantitative Evaluation	Description
CY3	EU-related: Energy Performance of Buildings EPBD Recast (Directive 2010/31/EU) - Governmental financial support schemes for investments in RES/RUE/EE	Ongoing	Legislative/Normative	2003	High	Yes	YES	No	YES
CY9	EU-related: Energy Performance of Buildings EPBD Recast (Directive 2010/31/EU) - Information, awareness campaigns, workshops , seminars for energy savings	Ongoing	Information/Education, Legislative/Normative	2004	Medium	Yes	YES	No	YES
CY1	EU-related: Energy Performance of Buildings (Directive 2002/91/EC) - Law for the energy performance of buildings	Ongoing	Legislative/Informative, Legislative/Normative	2007	High	Yes	YES	No	YES
CY6	Scheme for subsidising CFL lamps	Ongoing	Financial	2007	High	Yes	No	No	YES
CY4	EU-related: Recast Ecodesign Directive for Energy-related Products (Directive 2009/125/EC) - Efficiency requirements for energy using products	Ongoing	Legislative/Normative	2011	Medium	Yes	YES	No	YES
CY2	EU-related: Revised Directive for Labelling of Energy-related Products (Directive 2010/30/EU) - Energy labelling and relevant information of household appliances	Ongoing	Legislative/Informative	2012	Medium	Yes	YES	No	YES

Energy Efficiency Policies and Measures in Cyprus in 2012

9/10/2012

MURE II Tertiary 5 Measures Found

Code	Title	Status	Type	Starting Year	Semi-quantitative Impact	NEEAP Measure	EU-related Measure	Quantitative Evaluation	Description
CY1	Governmental financial support schemes for investments in RES/RUE/EE	Ongoing	Financial	2004	High	Yes	No	No	YES
CY2	EU-related: Energy Performance of Buildings (Directive 2002/91/EC) - Energy performance buildings Regulations	Ongoing	Legislative/Informative, Legislative/Normative	2007	High	Yes	YES	No	YES
CY7	Action plan for green public procurement	Completed	Co-operative Measures	2007	Medium	Yes	No	No	YES
CY8	EU-related: Energy Performance of Buildings EPBD Recast (Directive 2010/31/EU) - Information, awareness, training for energy efficiency and RES technologies in buildings	Ongoing	Information/Education/Training	2010	Medium	Yes	YES	No	YES
CY3	EU-related: Recast Ecodesign Directive for Energy-related Products (Directive 2009/125/EC) - Eco design requirements for energy related products	Ongoing	Legislative/Normative	2011	Medium	No	YES	No	YES

MURE II Transport 10 Measures Found

Code	Title	Status	Type	Starting Year	Semi-quantitative Impact	NEEAP Measure	EU-related Measure	Quantitative Evaluation	Description
CY8	EU-related: CO2 Standards for Light Duty Vehicles - Mandatory technical inspection of motor vehicles (MOT)	Ongoing	Legislative/Normative	1995	Medium	No	Yes	No	YES
CY12	EU-related: Passenger Car Labelling on fuel economy rating (Directive 1999/94/EC) - Energy and CO2 labelling for cars	Ongoing	Legislative/Informative	2003	Low	No	YES	No	YES
CY1	Grants for purchasing hybrid, dual propulsion vehicles, electric cars	Completed	Financial	2005	Low	Yes	No	No	YES
CY5	EU-related: Fiscal Measures to Promote Car Fuel Efficiency - Vehicle taxation including CO2 criteria	Ongoing	Fiscal	2007	Medium	Yes	YES	No	YES
CY14	Registration fee and annual vehicle tax reduction for clean vehicles.	Ongoing	Fiscal	2007	Medium	Yes	No	No	YES
CY16	EU-related: Promotion of Biofuels or other Renewable Fuels for Transport (Directive 2003/30/EC) - Introduction of biofuels in transport	Ongoing	Legislative/Normative	2007	Low	No	YES	No	No
CY13	Fiscal incentives for old cars scrapping	Completed		2008	High	Yes	No	No	YES
CY15	Express Bus transportation to airports	Ongoing	Infrastructure	2008	Medium	Yes	No	No	YES
CY17	National Strategy for the development / upgrading of public transport	Ongoing	Co-operative Measures , Information/Education/Training, Infrastructure	2010	High	Yes	No	No	YES
CY18	EU-related: Promotion of clean and energy-efficient road transport vehicles (Directive 2009/33/EC) - Law for the public purchasing of clean and efficient vehicles	Ongoing	Unknown	2011	Unknown	No	Yes	No	YES

Energy Efficiency Policies and Measures in Cyprus in 2012

MURE II General cross-cutting 4 Measures Found

Code	Title	Status	Type	Starting Year	Semi-quantitative Impact	NEEAP Measure	EU-related Measure	Quantitative Evaluation	Description
CY1	Governmental grants, subsidies scheme for the promotion of RES, RUE, energy saving investments (Enterprises with economic activity)	Ongoing	Financial Measures, Fiscal Measures/Tariffs	2003	High	No	No	No	YES
CY2	Governmental grants/subsidies scheme for the promotion and encouragement of RES, energy saving and the creation of a special fund for financing or subsidising of these investments (natural persons and enterprises without economic activity)	Ongoing	Financial Measures, Fiscal Measures/Tariffs	2003	High	No	No	No	YES
CY4	Information, awareness policies for energy savings	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes	2004	Medium	No	No	No	YES
CY5	EU-related: Energy End-use Efficiency and Energy Services ESD (Directive 2006/32/EC) - NATIONAL EMISSIONS TRADING SCHEME	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes	2008	High	Yes	YES	No	YES

Annex 2

Country Profile



Energy Efficiency Profile: Cyprus

October 2012

Energy Efficiency Trends

Overview

Over the period 2000-2010, the energy efficiency index for the whole economy (ODEX) decreased by 13% compared to 12% for the EU. Most of this energy efficiency improvement came from industry, particularly from installations subject to the Emissions Trading Scheme (ETS) (cement and brick industry). Energy efficiency slightly improved in the building sector in recent years with the EPBD implementation and due to financial support schemes for the existing building stock. The transport sector, which is the largest final energy consumer (~56% of final energy consumption), contributed less to energy efficiency improvements.

Industry

The efficiency in the industrial sector has improved by 29%. In the non metallic minerals branch, which consumes approximately 50% of final energy consumption in industry and falls under the scope of the EU ETS, the energy efficiency index has decreased by 40%. This is mainly reflecting the efficiency improvement in the cement industry, which has undergone major renovation in order to save energy and reduce its emissions. The industry has developed new efficient processes, CHP technology, waste heat recovery and also use of wastes for energy and biomass. Also there has been systematic training of industry managers and engineers in energy management, good practices. Cyprus does not have any steel, glass or paper industry. The food branch, second most energy consuming industrial sector and not subject to ETS, has shown deterioration in energy efficiency.

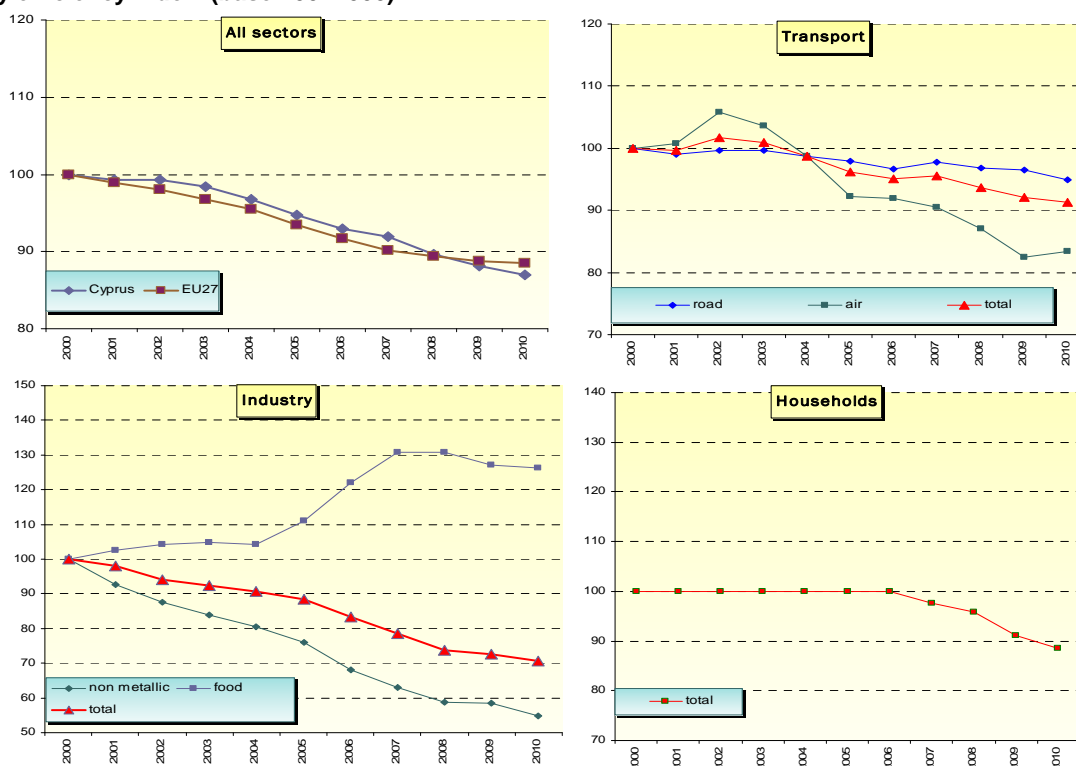
Households

Between 2000 and 2010 the global energy efficiency index has improved by 23%. The technical Odex has improved by 11%, mainly after 2007. This is due to the fact that Cyprus has entered the EU in 2004 and implemented policies and measures in energy efficiency after the accession which have started to deliver energy savings after 2008. Prior to EU accession there was no energy efficiency legislation such as mandatory building codes. The slight improvement is mainly attributed to efficient electrical appliances, free CFL lamps and use of solar water heaters (85% of households). Significant energy savings in the household sector are expected in the coming years due to the impact of the EPBD (minimum energy efficiency requirements in building shell and heating/cooling equipment) which started to be implemented in 2008. Stricter efficiency requirements will be imposed in 2013 for new buildings in view of the road map for nearly zero energy buildings set by the EPBD recast.

Transport

This sector shows a 9% improvement in the period 2000-2010. This development is mainly caused by efficiency improvements for cars, as a consequence of the penetration of new, cleaner, more efficient cars. This is partly linked to the change of the legislation in fuel taxation in 2000: diesel is now almost priced at the same level as gasoline, resulting in the phasing out of inefficient vehicles and a shift towards smaller and more efficient cars. In addition, some effective measures have been applied in the last few years, such as grants for scrapping old vehicles, vehicle taxation based on CO₂ emissions. Public transport (bus) is not well developed and has decreased drastically over the last 10 years, which affects the ODEX. Aviation has a high share (~15% of final energy consumption). The index for aviation has improved by 17%, due to efficient fleet and better management.

Energy efficiency index (base 100=2000)*



* All indicators measured as a three-year moving average.

Source ODYSSEE

For more information : <http://www.odyssee-indicators.org/>

Energy Efficiency Policy measures

Institutions and programmes

The Ministry of Commerce, Industry and Tourism is responsible for the adoption and implementation of energy efficiency policy including RES, energy efficiency. **The Cyprus Institute of Energy** (NGO) was founded in 2000 to assist the Government in the promotion and implementation of policies and measures in RES and energy efficiency. One of the main tasks of the Institute is the operation of the Governmental financial support schemes for investments in RES/energy efficiency and providing technical support to the Government with the negotiation, transposition and implementation of EU energy policies. It also provides technical assistance and advice to public authorities for RES/energy efficiency policies and assists in the market facilitation via the development of local sustainable energy markets.

Industry

The main financial instrument used is the governmental financial support schemes for the promotion of RES/energy efficiency. The fund is created by imposing a levy of 0.5 cents/kWh for all categories of electricity consumers (€23 million/year). Sectors covered are: households, industry, tertiary, transport. The financial incentives are provided in the form of grants and subsidies for energy efficiency investments (30% - 50% aid depending on the technology) and feed-in tariffs for CHP/RES electricity sold to the national grid. The basic criterion used for the evaluation of any energy savings investment proposal is to achieve a 10% primary energy savings after the investment.

Households, Services

Governmental financial support schemes for financing energy saving investments are used extensively in this sector. Since 2004 there have been thousands of applications and grants provided. For the household sector, subsidies apply to thermal insulation, solar thermal heaters, geothermal heat pumps, and PV. For the tertiary sector, all technologies are eligible provided they satisfy a 10% primary energy savings. Since the operation of the program more than 50,000 applications for investments have been received and the majority of them have been approved.

Cyprus has enacted a primary legislation for the energy performance of buildings (in compliance with directive 2002/91/EC). Secondary legislation for setting minimum efficiency requirements, thermal building codes are enforced since 1/1/2008. Prior to accession to the EU, Cyprus did not have any mandatory building codes on energy efficiency. Therefore after the full implementation of the EPBD the impact in terms of energy savings is expected to be high.

Electricity consumption in Cyprus has increased by 70% in the last 10 years attributed to air conditioning. The government has decided to promote and subsidise CFL lamps (5 lamps per household for free). The scheme has a budget for the purchase of 2 million lamps over five years. Thus around 1 million lamps have been distributed to consumers via the utility company.

Transport

The main type of action used is to provide grants for the purchase of hybrid, electric, or FFV vehicles and the reduction of other registration fees. A second instrument used is the new national law for the taxation of vehicles which includes provisions integrating engine capacity and CO₂ emissions criterion providing reduced taxation for smaller, clean and efficient cars. In 2006 a scrappage scheme for old cars has been implemented. The first phase includes grants to remove 15,000 vehicles.

The Ministry of Communications and Works has submitted an action plan for public transport which includes the radical upgrade of the public bus system. Among other measures 6 new companies will be created, one for each region and one among main cities. More than 1000 new efficient buses will be purchased and new routes are applied. Also a new bus service has started to connect cities with airports.

Selected Energy Efficiency Measures

Sectors	Title of Measure	Since
Households, tertiary	Law for the energy performance of buildings, minimum efficiency requirements	2008
households	Governmental financial support schemes for energy efficiency / res Thermal insulation, double glazing, solar water heaters, PV, Geo-HP	2004
Households, tertiary	Subsidised CFL lamps	2007
Tertiary	Governmental financial support schemes for energy efficiency /RES	2007
Industry	Governmental financial support schemes for energy efficiency / RES	2004
Industry	Training and education for energy management and energy audits	2006
Transport	Grants for hybrid, electric cars,FFV	2006
Transport	Law for the taxation of vehicles including CO ₂ emissions criteria	2007
Transport	Grants for scrapping of old cars	2006
Transport	National strategy for upgrading the public transport system	2008

Source : MURE www.mure2.com



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