



**Mediterranean and National Strategies for Sustainable
Development
Priority Field of Action 2: Energy and Climate Change**

**Energy Efficiency and Renewable Energy
Cyprus - National study's summary**

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Energy Efficiency and Renewable Energy in Cyprus

1. Challenges and energy sustainability

The total electricity production in Cyprus was 4,348 GWh during 2005 against 4,176 GWh in 2004. This corresponds to an increase of 4.1% compared to the previous year, covering the total energy demand of the residential, urban, industrial and rural areas under the effective control of the Government of the Republic of Cyprus. The Gross Production for 1990 was 1,974 GWh, of which 1,445 GWh was the actual consumption.

The demand for electricity in Cyprus continues to rise. The Cyprus Energy Regulatory Authority (CERA) and the Transmission System Operator (TSO), which are both regulators, have provided data for historic demand and made estimates of future demand up to 2015. Their projections are based on an analysis of maximum demand on an hourly basis and at different times of the year. A strong correlation between actual electricity demand and gross domestic product (GDP) was identified for the period 1995 to 2005, despite the fact that GDP was not taken into account in the CERA/TSO analysis. This was then projected based on Ministry of Finance GDP projections to 2009, and beyond to 2015 assuming the same rate of increase in GDP. Gross demand is expected to increase from 4,910 MWh in 2007 to 7,004 MWh in 2015, an average increase of 5.2% per annum.

National targets for the contribution of energy efficiency measures are set for all Member States in the Energy End-Use Efficiency and Energy Services Directive (Directive 2006/32/EC of 27th April 2006). Cyprus has set the indicative targets of 5% contribution of RUE to electricity demand up to 2010. It is assumed that for the period until 2015 the same increase will be achieved.

The potential contributions of Renewable Energy Sources (RES) have already been defined by the Cyprus Energy Service. These figures are consistent with the report that Cyprus has submitted to the EC on the implementation of the Directive on the Promotion of Electricity from Renewable Energy Sources (2001/77/EC) up to 2010, indicates a target of 6% for the contribution of RES to electricity demand in 2010. It is assumed that for the period until 2015 the same increase will be achieved.

Cyprus being an island, does not import or export energy.

Cyprus ratified the UNFCCC as a *non-Annex I* party on 15th October 1997, and on the same basis, subsequently ratified the Kyoto Protocol on 16th July 1999. It follows that Cyprus has no emissions limitation commitments under the KP. Indeed, out of 25 EU Member States, only Cyprus and Malta have no commitments. Although Cyprus does not have any individual reduction limitation commitments, as a Member State of the European Union, Cyprus is now bound by the obligations set out in European Union legislation.

The Greenhouse Gas Emissions for 2004 were 10281 kt CO₂ eq, of which 7613 kt CO₂ eq were from the sector of energy, in comparison to the total of 6011 kt CO₂ eq and 4453 kt CO₂ eq from the energy sector in 1990. Emissions caused by the sector of Energy for 2004 accounted for 74% of total GHG emissions, corresponding to an increase of 71% in comparison to 1990 levels, and 3.4% in comparison to 2003.

2. Indicators

The following energy contribution to the country's energy balance is expected by year 2010, provided that all £42 million are offered in the form of grants and/or subsidies. Increase of the share of energy from renewable sources from 4% in 1995 to 9% of total energy consumed in 2010. Increase of electricity generated from renewable energies, from the presently zero level, to 6% by

2010; 4.6% based on wind energy projects (small and large), 0.1% by utilisation of solar energy (photovoltaics); 1.2% utilisation of energy originating from biomass and 0.1% from Hydroelectric energy.

Regarding wind potential (on-shore), in Cyprus there are some areas with mean wind velocity of 5-6 m/s and few areas with 6,5-7m/sec. The estimated maximum exploitable potential is 150-250MW. Utilisation of wind energy in Cyprus is affected by anticyclones moving from west to east, from the Siberian anticyclone during the winter and from the low pressure crated in the area of India and expanded until the area of Cyprus during the summer; sea breezes generated in coastal areas as a result of the different heat capacities of sea and land, which give rise to different rates of heating and cooling; and mountain valley winds created when cool mountain air warms up in the morning and begins to rise while cool air from the valley moves to replace it. During the night the flow reverses. The prospect of installing wind turbines in the Southern coast of Cyprus (near shore applications) is currently been investigated. Initial studies showed that due to the high depth of the sea at relatively short distance from the shore, more that 30m depth at a distance of 300 m from the shore, the cost of the installation of the wind turbines is expected to be very high, to the extend that the wind potential which exists at those areas will not be enough to compensate the investment.

Concerning solar energy potential, the Meteorological service of Cyprus has classified the Island in 14 zones from a climatic point of view. However, from the considerations, affecting the use of solar energy, the classification may be broadened to 3 zones – coastal, central plains and mountains. The collection of sunshine duration data at a number of meteorological stations started in 1959. Statistical analysis shows that all parts of Cyprus enjoy a sunny climate. The mean daily sunshine, i.e. the time interval from sunrise to sunset, for Cyprus varies from 9.8 hours in December to 14.5 hours in June.

The theoretical potential is always estimated from data for the cultivated areas for each crop and the residue yield. Then the available potential can be evaluated with the assumption that only a portion of the theoretical potential is available for energy exploitation since there are other uses for most agricultural residues. Current biomass exploitation refers to a significant amount of agricultural residues in connection to the traditional wood stoves and the prospects of the development of energy crops, even though, further analysis and on site investigation may identify possible difficulties on harvesting of agricultural by-products for bioelectricity production.

Biomass resources in Cyprus include a wide range of biomass residues, agricultural and forest, municipal solid waste, sewage water sludge and a considerable potential of energy crops, which include traditional herbaceous corps, or short rotation woody crops. A large energy potential exists from energy crops that can be grown on deforested or otherwise degraded lands. The potential for small hydro plants is very limited, especially with the water shortages over the last years. The suitable sites are estimated as being adequate for a maximum of about 1MW installed capacity.

3. Currently established policies in terms of RE and URE

The first formulation of Renewable Energy and Energy Conservation Action Plan was completed in 1985 and revised in 1998. This included the first energy support Scheme for the sectors of manufacturing industry, hotels and agriculture. In year 2000, the Applied Energy Centre and the Cyprus Institute of Energy were established. Moreover, the Electricity Authority of Cyprus (EAC) agreed to purchase electricity generated from RES; the independent authority of Transmission System Operator (TSO) was set; procedures have been specified for licensing and interconnection of wind and photovoltaic installations to the national grid; an Action Plan (2002-2010) for RES was formulated; the legislative framework for the promotion of RES and conservation of energy (2003) was established; Cyprus Energy Regulatory Authority (CERA) (2004) was instituted; New support schemes have been initiated (2004); and New Enhanced Support Schemes for RES and RUE (2006) were created.

To enforce the provisions of Directive 2001/77/EC of the European Parliament, Cyprus has introduced relevant legislation for the implementation and monitoring of the announced energy policy.

A new law [33(I) 2003], provides for the creation of a Special Fund whose proceeds will come from a levy of £0.13 per kWh (approximately 0.74 euro cent) on all electricity consumption, donations and government grants. The Fund finances programmes for the promotion of renewable energy sources and energy conservation which are approved by the Council of Ministers. It is managed by a Committee headed by the Permanent Secretary of the Ministry of Commerce, Industry and Tourism. Its implementation is monitored by the Energy Service of the Ministry of Commerce, Industry and Tourism. The Energy Service operates its own Applied Energy Centre (AEC), which in close collaboration with the Cyprus Institute of Energy (CIE), serves as the focal point for all efforts in the field of energy conservation and renewable energy sources.

Grants and/or subsidies are provided for investments by companies, households and public sector bodies in energy conservation and in renewable energy systems such as wind, solar thermal, photovoltaic, small hydro, biomass and desalination.

4. Difficulties, possible solutions, needed reforms

As it can be validated by researches performed by EUROSTAT, Cyprus is one of the first countries in the EU that the public recognises Climate Changes, and their associated problems. However, very small percentage recognises that large investments have to be made in the energy sector, and priorities have to be set by the stakeholders. Nevertheless, the feedback from the energy saving/renewable energy schemes are very promising, since more and more people apply for the available funding.

For help the strengthening of country's sustainable development policies diversification of the energy supply sources is the primary concern. This corresponds to construction of a receiving / regasification terminal for Liquefied Natural Gas (LNG), which would make possible the importation of natural gas. The overall environmental situation in Cyprus is characterized by deficiencies in environmental infrastructure, particularly in the area of urban waste water treatment, solid and hazardous waste management. Moreover, a continuous degradation of the natural environment particularly in the coastal areas was observed, due mainly to tourist development, whereas in the area of the energy intensity of the economy and the green house gases emissions, the relevant indicators for Cyprus are at relatively higher levels as compared to the EU average. This is to be explained by the technology used in the generation of electricity (use of heavy fuel oil); the operation of energy intensive industries such as cement production; and the absence of public transport systems such as railways, simultaneously with the fact that the bus system is not well developed.

Energy consumption is steadily increasing, whereas the transport sector accounts for a significant percentage of the total energy consumption.

5. Success story

In terms of Renewable Energy Sources (RES), 4% of the country's energy originates from solar energy, and is mainly used for the heating of water. 1% of the energy supply comes from solids, and is used for industry. With respect to the solar energy use, the EU Study "Sun in Action" ranks Cyprus first with approximately 1m² of installed solar collector per capita. Today, about 690,000 m² of solar collectors are installed in Cyprus. Approximately 90% of privately owned houses, 80% of apartments and 50% of hotels are equipped with solar water heating systems.