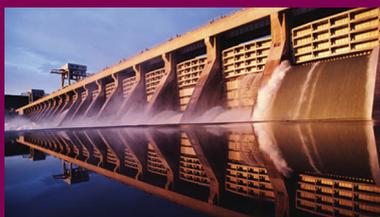


IN-DEPTH REVIEW OF ENERGY EFFICIENCY POLICIES AND PROGRAMMES



Former Yugoslav Republic of **Macedonia**

2007



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**Energy Charter Protocol on Energy Efficiency
and Related Environmental Aspects
PEERA**

In-Depth Review of the Energy Efficiency Policy of the Former Yugoslav Republic of Macedonia

2007

October 2007

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Executive Summary

Background

The Former Yugoslav Republic of Macedonia (hereinafter ‘Macedonia’)¹ has come a long way in its transition from a centrally-planned to a market economy, as reform efforts have been frequently interrupted by political instability. Since 2001, modest economic growth has resumed, structural reforms have been accelerated and macroeconomic stability in the country has steadily increased. Private sector is growing, contributing an important share of 65% in GDP. Fiscal decentralisation has begun to be implemented which has created opportunities for greater local government autonomy and control of local infrastructure investments.

However, growth remains low and unemployment is excessive at around 36%, despite recent measures to improve business climate. Living standards are low and about 21% of the population lives below the absolute poverty line. Investment rate and the flow of FDI are lagging significantly behind faster growing economies in the region.

The primary energy supply of Macedonia is dominated by coal and crude oil, with shares of 49% and 35% respectively. Around 10% of the energy supply is based on renewable energy sources: hydro energy, fire-wood and geothermal energy. The import energy dependence of Macedonia is high, in the range of 46%, and has been increasing during the last years. Major local energy resource is lignite coal.

Final energy use has been steadily increasing in Macedonia since 2001. Industry is the largest energy consuming sector with metallurgy (iron and steel industry) accounting for 59% of the total industrial energy use. The residential sector is the second largest energy consumer, and electricity is the major energy used in the sector, including for space heating.

Energy Policy

Important influence on Macedonian energy policy has the overall country objective of EU accession. After 2004, when the Stabilisation and Association Agreement entered into force, Macedonia gradually moved towards meeting the EU requirements regarding the development of the energy sector. In 2006, Macedonia ratified the Energy Community Treaty.

The strategic priorities of Macedonia in the energy sector and provisions that transpose the *acquis communautaire* are incorporated in the new Energy Law, adopted by the Parliament in 2006. The new Energy Law provided a legal framework for the energy market in Macedonia and straightened the legal basis for the work of the independent energy regulator, which was established in 2003.

The restructuring of the electricity sector started in 2004 by unbundling the former vertically integrated state-owned power company ESM, followed by a process of partial

¹ The State to which this report relates has been admitted to membership of the United Nations under General Assembly Resolution 47/225 as the Former Yugoslav Republic of Macedonia. By the national Constitution, the name of the state is Republic of Macedonia.

privatisation. In the oil sector privatisation is completed and competitive markets exist. The gas sector was also restructured and its privatisation has advanced. Prices for electricity, gas, heat and oil are regulated. There are no direct social subsidies, but cross subsidies exist. The overall electricity price levels are low.

Being a serious problem for the country, energy supply has attracted a specific political attention in Macedonia. There are ambitions for energy self-sufficiency and there are plans for constructing new energy generating facilities. The focus on exploring renewables, specifically by small hydropower generation, is intense. However, Macedonia still lacks a comprehensive long term Energy Strategy and there is an intention of developing such a strategy in the short-term.

Energy Efficiency Policy

An Energy Efficiency Strategy was adopted in 2004, accompanied by implementation plans and technical programme analyses. The programs identified for implementation have the potential to realise cost effective reductions in energy use representing approximately 6% of the country's current energy use.

Macedonia has had no specific Energy Efficiency Law, but provisions for energy efficiency have been included in the Energy Law. The new Energy Law of 2006, clearly targets energy efficiency by including a special chapter, where the current national policy and activities for improvement of energy efficiency are elaborated. The scope and provisions of the Energy Law provide an adequate legal framework for the energy efficiency policy of Macedonia. There are on-going efforts for developing and adopting the secondary legislation and technical regulations, as only the labelling of household appliances is regulated so far.

Very limited budget financial sources are allocated for energy efficiency activities. All significant funding of energy efficiency projects is done predominantly through international cooperation. Some positive signs in general commercial financing over the last three years did not influence energy efficiency financing so far. A number of barriers hamper the investment in energy efficiency both on the financial sector side, and on the customers' side.

To address some of the existing barriers to energy efficiency, the government of Macedonia initiated the Sustainable Energy Project, supported by the Global Environment Facility (GEF) and the World Bank. The Sustainable Energy Project is aimed at introducing two appropriate instruments for financing energy efficiency and small scale renewable initiatives, both based on market principles: ESCOs and loan/guarantee facility. Utilities and local banks are involved in programme implementation.

Major problematic areas in Macedonia, as far as energy efficiency is concerned, are the wide use of electricity for domestic heating and the inefficient energy consumption in buildings. The Government has started addressing these problems, but they have not been given enough priority. The introduction of the building certificate system is planned.

The Energy Law allocates the responsibilities for energy efficiency policy development and implementation in Macedonia to the Ministry of Economy, supported by the Energy Agency. Responsibility within the Ministry is with the Energy Department and its Unit

for Energy Efficiency and Renewable Energy Sources, which have limited human resources. The state Energy Agency was established in December 2005. It is responsible for professional technical support on data management, strategy analysis, policy and project assessment, and implementation coordination. The Energy Agency has an important role for increasing the activities in the area of energy efficiency and renewables, but it has a limited capacity so far.

The Energy Law has involved local authorities in energy efficiency strategic planning and programmes implementation. However, the decentralisation reform has put a heavy burden of new responsibilities on local authorities and the process of building all relevant capacities is progressing slowly.

Renewable Energy Policy

The Government of Macedonia gives priority to the development of renewable energy sources, as the country has promising indigenous resources of renewable energy, including hydropower, geothermal energy, biomass, and wind energy. The legal framework for exploitation of renewable energy sources is the Energy Law. The adoption of a Strategy for Renewable Energy Sources is foreseen for 2008.

Following the provisions of the Energy Law, preferential feed-in tariff for purchase of electricity generated by small hydropower plants and by wind power plants were adopted by the Energy Regulatory Commission in 2007.

The Government considers the construction of small hydro power plants as one of the projects of great importance for the country. An international public competition was held in 2006-2007 for granting water concession for electricity generation from 60 small hydro power plants according to the DBOT model (Design, Build, Operate, Transfer). The international tender for water concessions for another 27 small hydro-power plants for electricity generation was recently announced.

Financing for projects promoting renewable energy is provided by both international cooperation and the state budget. The GEF/World Bank Sustainable Energy Project is greatly focused on developing the market environment for utilisation of renewable energy.

Overall Assessment of Progress

Macedonia is progressing in reforming its energy sector, but the country has to overcome a number of serious problems attached to its development and the growing energy demand: strong dependence on energy import, unfavourable energy mix, poor condition of the power system, high degree of inefficiency in energy production and use. The structure of the economy (sectors composition, high energy intensive and obsolete technologies etc.) trigger increased energy consumption. Because of these strong reasons, serious attention has been given in Macedonia to the need for rationalising energy consumption. Major strategic and legislative framework for energy efficiency has been developed. International and foreign support for developing enabling environment for energy efficiency has been initiated.

However, energy efficiency has not gained enough priority in the Government's implementation performance. A specific structured and resourced action is needed to close the implementation gap and successfully improve the situation, especially in strengthening the institutions; continuing the pricing reform; and focused priority actions to substantially reduce the electricity use for heating, to increase buildings energy efficiency, to support local authorities' capacity building, and to launch targeted information and awareness raising programmes.

The review team has formulated recommendations for improvements in these key areas.

Introduction

The Former Yugoslav Republic of Macedonia has ratified the Energy Charter Treaty (ECT) and the Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) in September 1998. In fulfilling its commitments under PEEREA Macedonia presented two regular reviews of its energy efficiency policies – one in October 2001, and one in May 2006. The current PEEREA In-depth Review is the first for the country.

By ratifying PEEREA, countries commit themselves to establish policies for improving energy efficiency and reducing the negative environmental impacts of the energy cycle (Art.3), and to develop, implement and regularly update energy efficiency programmes (Art.8). Guiding principle of the Protocol is that contracting parties shall cooperate and, as appropriate, assist each other in developing and implementing energy efficiency policies, laws and regulations (Art.3).

The In-depth Review is a peer review, aiming to assess the progress of a country in fulfilling its commitments under PEEREA. Not less it seeks to enhance the level of co-operation among PEEREA Parties and to promote continuous dialogue and transfer of experience and information.

The In-Depth Review of the Energy Efficiency Policy of Macedonia was carried out by a team, comprising officials from four countries – Parties to the Protocol. The review team visited Macedonia in the period September 10-14, 2007 and met with representatives of a number of institutions listed in Annex 1. The review team expresses its high appreciation to the Ministry of Economy of the Republic of Macedonia for the organisation of the mission and special thanks to all participants in the meetings.

The members of the review team were: Mr. Jean-Christophe Fueg from the Swiss Federal Office of Energy (team leader), Ms. Snezhana Todorova from the Bulgarian Energy Efficiency Agency, Mr. George Cassar from the Malta Resources Authority, and Mr. Kresimir Cerovac from the Croatian Ministry of Economy. The team also included Mrs. Valya Peeva from the Energy Charter Secretariat.

The main source of information on the energy efficiency policies and programmes, together with relevant data, were the Regular Reviews, presented by Macedonia to the PEEREA Working Group, and information provided by Macedonian institutions during the country visit. Other sources of information were also used, e.g. relevant publications of the Macedonian government, the European Commission, the International Energy Agency (IEA), the World Bank, the EBRD, etc.

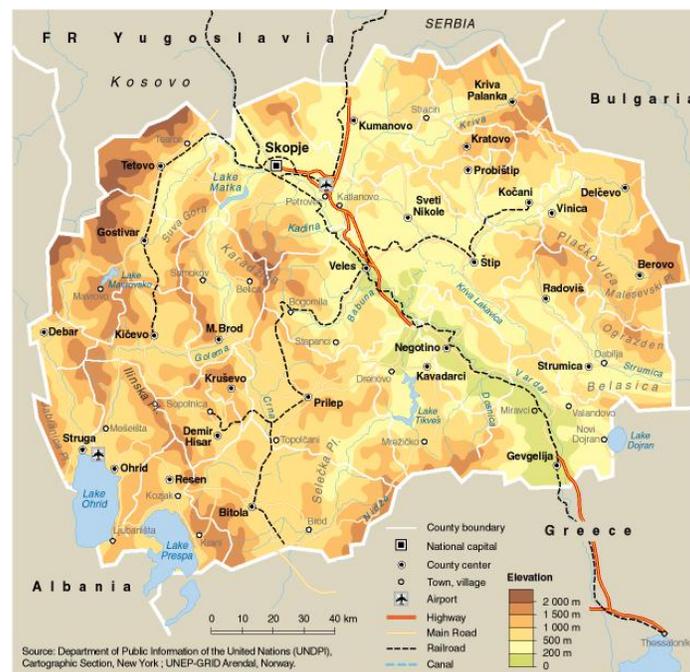
The in-depth review report was discussed by the PEEREA Working Group and, in a consensus with the Macedonian authorities, was submitted for endorsement by the Energy Charter Conference.

General Background

Geographical Profile

The Republic of Macedonia is located in the central part of the Balkan Peninsula and borders Serbia, Bulgaria, Greece and Albania. Macedonia is a mountainous landlocked country, having an area of 25 713 km². The highest point is in the Korab Mountain range to the North-West, at 2 764 m. Forests cover more than one third of the total territory of Macedonia or about one million ha, 90% of which is owned by 30 major forestry companies. Wood is mostly used for domestic heating purposes and the rest is provided to the wood processing industry. Agricultural areas cover 25% of the total country territory, and are characterised with a large diversity of agro-ecological conditions, and a wide spectrum of agricultural production respectively. The country is not rich in natural resources, with the exception of lignite and hydro. About 2% of the land area is covered by water comprising 35 large and small rivers, 3 natural lakes (Ohrid Lake, Prespa Lake and Dojran Lake), and 50 artificial lakes.

Figure 1. Map of the Former Yugoslav Republic of Macedonia



The climate is classified as transitional from continental to Mediterranean. The complex relief is also the cause of substantial microclimate differences. Macedonia is characterised with extreme temperatures, in winter down to -30°C (even in settlements in plain regions) and in summer above 40°C. The average annual air temperature in urbanised areas is between 11 and 14°C. The average temperature need for heating is about 2500 degree-days in most of the settlements. The country is characterised with a lot of sunny days during the year. The average number of hours of sunshine is between 2000 and 2400 hours a year.

The population of Macedonia is 2.023 million people. Nearly 30% of them (over 600000 citizens) are concentrated in the capital Skopje. Other major cities are Bitola, Tetovo, Gostivar, Veles, Kumanovo, Ohrid and Stip.

Political Profile

Republic of Macedonia declared itself independent from the collapsing Yugoslav state after a referendum in 1991. The state political system is parliamentary democracy with a unicameral parliament of 120 seats. Members are elected with a 4-year mandate by popular vote from party lists in six election districts with 20 seats each. The latest parliamentary elections took place on 5 July 2006. The current government was approved by the Parliament in August 2006. The president is elected by general direct ballot and has a term of 5 years, with the right to one re-election.

Inter-ethnic tensions between ethnic Macedonians and ethnic Albanian minority led to political instability in the country in 2001, and influenced greatly the political situation there after. The Ohrid Framework Agreement, signed in August 2001, was the peace deal between the two ethnic groups.²

Following the signature of the Ohrid Framework Agreement, a new basis had been established for local self government, with greater powers given to local authorities. Since 2004, Republic of Macedonia is structured in 84 municipalities and the city of Skopje, the capital of the country, as a separate unit of local self-government. The regional reform is now going ahead with fiscal decentralisation in place since July 2005. Following two years grace period, the municipalities will gain new responsibility to manage their future investment needs with their revenues. In the new legislation, municipalities will be able to borrow directly from international financial institutions (IFIs) and to offer financial guarantees in respect of loans to their municipal utility companies.³

EU Accession

The priority policy objective and strategic interest of Macedonia is full membership in the European Union. The EU signed a Stabilisation and Association Agreement with Macedonia in April 2001, and the country put up an official application for EU membership in March 2004. In December 2005, the Former Yugoslav Republic of Macedonia received the status of an official EU candidate, although no decision was made about the date of opening accession negotiations.

This act gave a major boost to the legal reform efforts in the country. Macedonia is continuing to make progress in implementing the legal reforms necessary for a free market economy.

The first EU accession progress report, presented in November 2006, recognised progress achieved, but noted a slowdown in the pace of reforms in 2006, probably due to the elections in mid 2006. The report outlines specific recommendations of the EU Commission in a number of areas, stressing areas such as police and judicial reforms, the fight against corruption and organised crime, the need to secure

² Transition report update 2007, EBRD, May 2007.

³ Strategy for the Former Yugoslav Republic of Macedonia, Document of the European Bank for Reconstruction and Development, as approved by the Board of Directors at its meeting on 11 July 2006.

depolitisation and capacity in the public sector, and the need to sustain efforts in implementing the Ohrid Framework Agreement.

Economy Profile

Macedonia has come a long way in its transition from a centrally-planned to a market economy, as reform efforts have been frequently interrupted by political instability. Since 2001, modest economic growth has resumed, structural reforms have been accelerated and macroeconomic stability in the country has steadily increased. Economic (GDP) growth is estimated at about 4% in 2006, similar to the economic performance in the previous years. Inflation rate is low at 0.5% and the exchange rate is stable at around 61 denar per Euro (in line with the Central Bank exchange rate policy of a de facto near-peg to the Euro). Private sector is growing, contributing an important share of 65% in GDP. Fiscal decentralisation has begun to be implemented which has created opportunities for greater local government autonomy and control of local infrastructure investments.

However, growth remains low and unemployment is excessive at around 36% during the last years, despite recent measures to improve business climate. Investment rate of about 20% of GDP is lagging significantly behind faster growing economies in the region. The flow of FDI also marks one of the lowest rates among transition countries. Living standards are low and per-capita GDP is at roughly 25% of the EU-25 average in terms of purchasing power. An estimated 21% of the population lives below the absolute poverty line.

Macedonian economy is an open economy, highly integrated into international trade, with a total trade-to-GDP ratio of over 90%. The main export commodities are textiles and steel. Agriculture and industry have been the two most important sectors of the economy, but the services sector has gained prominence in the past few years. Services – primarily in trade, transport, and telecommunications – accounted for 59 percent of GDP in 2005. 29 percent of GDP was generated by industry, dominated by iron and steel, textiles, and the exploitation of natural resources such as metals and minerals. Agriculture accounts for the remaining 12 percent.

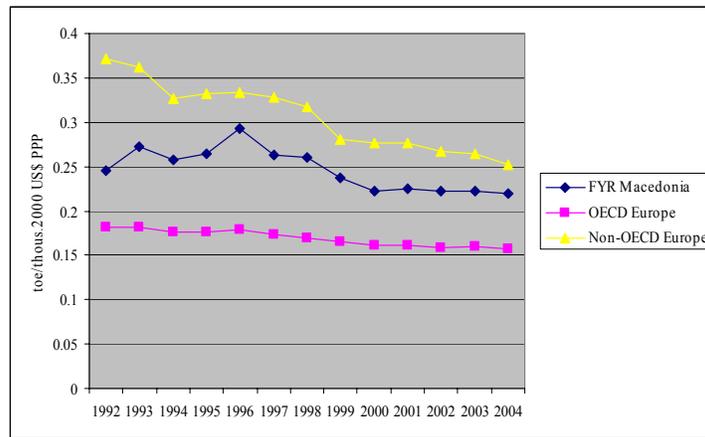
Recently implemented tax reform is expected to stimulate investments and growth. The reform reduced and unified the personal income tax rates and corporate income tax rates at 12 per cent from January 2007. The income tax rate will be further cut to 10 per cent in January 2008. In addition, the reinvested profit tax will be abolished and the government will provide further tax incentives for foreign investors in special economic zones. The Ministry of Economy has prepared a Programme for Stimulating Investments in the Republic of Macedonia 2007-2010, adopted by the Government on June 3rd, 2007. The Programme contains guidelines for reducing the barriers which limit investments and recommendations for harmonisation of regulations with international accepted standards.

Energy Overview

Energy Supply

Macedonia's economy is characterised by relatively high level of primary energy consumption per unit of GDP (0.22 toe/thousand 2000 US\$ PPP), which is about 40% higher than the average level in OECD-Europe countries (Fig. 2). This energy intensity is explained by the high share of low quality local coal in the primary energy mix, the extensive electricity use in metal processing industry; the low efficiency in electricity generation, supply and consumption; and the practice of using electricity for heating by residential users.⁴

Figure 2. Primary Energy Intensity (TPES/GDP)



Source: Based on IEA Energy Statistics, Electronic version 2006

The total primary energy consumption in Macedonia in 2005 was 2.7Mtoe, following an ascending trend since 2002 (Fig. 3). In the proposed energy balance of the country for the year 2007,⁵ the total energy consumption is foreseen to increase further with 14.72% (compared to the one in 2006), mainly as a result of restarting certain economic capacities in industry and the intensive energy use in the households.

The primary energy supply of Macedonia is dominated by coal and crude oil, with shares of 49% and 35% respectively. Around 10% of the energy supply is based on renewable energy sources: hydro energy, fire-wood and geothermal energy.

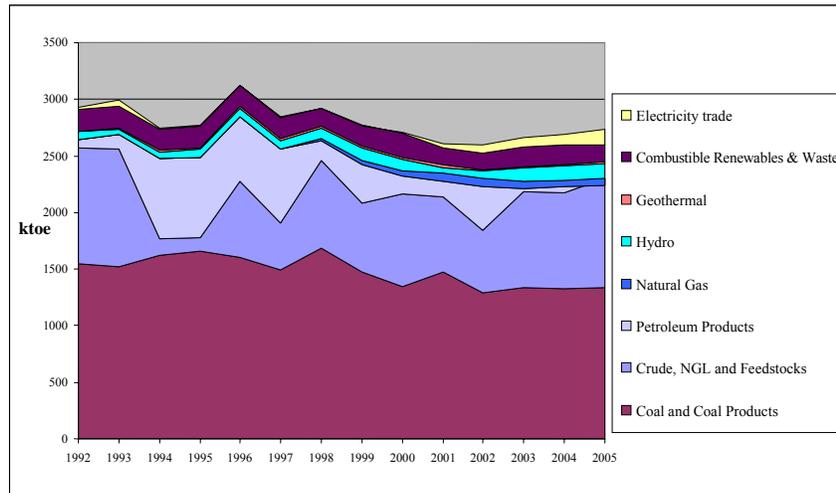
The import energy dependence of Macedonia is high, in the range of 46%, and has been increasing during the last years. All crude oil is supplied by import and is transported from Thessaloniki (Greece) to the refinery in Skopje through an oil pipeline with capacity of 2.5 million tonnes per year. The average annual consumption of oil derivatives is in the range of 0.8 million tonnes. Gas is imported from Russia via pipeline through Ukraine, Moldova,

⁴ ERC, Presentation by Juliana Dimovska in Vermont, 2005.

⁵ Energy Balance of the Republic of Macedonia for the year 2007, Proposal of December 2006, Ministry of Economy.

Romania and Bulgaria. The main transmission gas pipeline is around 98 km long, stretching from the border with Bulgaria to Skopje. Worth noting is also the increasing electricity import: from 1.662 million kWh or 20.45% from the total electricity needs in 2005 to 2.994 million kWh or 33.53% in 2006.

Figure 3. Total Primary Energy Supply by Fuel 1992-2005



Source: Based on IEA Energy Statistics, Electronic version 2007

Major local energy resource in Macedonia is lignite coal with heating value of 6500-8000 kJ/kg, 0.5-1.5% contents of sulphur and 8-25% of ashes. The annual production of lignite is approximately 7.2 million tonnes. The two largest coal mines, providing around 7 million tonnes per year, are supplying coal for electricity production by the thermal power plants. The coal from the smaller mines is used by industrial consumers and households.

Natural gas has a very small share of 2.3% in TPES. The gas pipeline system of Macedonia has a capacity of 800 million m³ per year, which is not fully used (only 15%). Lack of distribution systems on local level does not allow using the available gas capacity. So far, main gas pipeline branches to the cities with length of 26 km, and distribution gas network with length of 31.5 km have been built. Toplifikacija AD-Skopje is the biggest user of natural gas in the country. The municipality of Kumanovo is investing in a gas distribution network to explore its location on the main gas pipeline. In the years to come, construction of three major gas pipeline projects should commence. Two of them, Klecovce-Negotino and the gas ring around Skopje, should be initiated in 2008, while the third one, Skopje-Tetovo-Gostivar-Kicevo-(with a branch to Debar)-Struga-Ohrid, should start a year later. The gas pipeline projects are expected to be funded primarily through concessions.

The geothermal energy has a small share of about 0.4% in the total primary energy supply. Macedonia has a geothermal potential of 173 MW usable for district heating and greenhouses.⁶

⁶ Enerdata, Macedonia Energy Report, 2007.

Hydropower is an important energy source in Macedonia with a share of nearly 5% of TPES. Depending on hydrological conditions in the year, hydropower provides 15 to 18% of the annual electricity production.

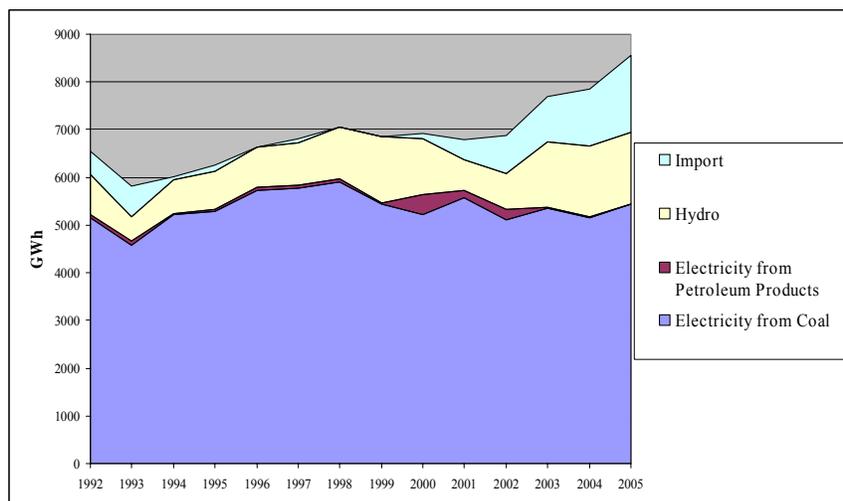
Electricity Generation

The total installed capacity for electricity generation in Macedonia is 1524 MW, with annual production of around 6.7 GWh. Major producers of around 5 GWh annually are the thermal power plants, which have installed capacity of 1010 MW and are highly dependent on lignite coal (Fig. 4). A main lignite mine provides fuel for the Bitola power plant. With an installed capacity of 675 MW and an annual output of 4.6 GWh this plant provides about 70% of Macedonia's electricity supply. Unfortunately, estimates of the main lignite deposit's remaining life range from 6 to 11 years, and any replacement is going to be more expensive to mine.⁷

The Negotino thermal power plant (with a capacity of 210 MW), which uses residual oil, is not in operation regularly because of the high price of the fuel, and therefore of the produced electricity.

The total installed capacity for production of electricity from hydro power is 504 MW from seven big hydro power plants, and 36 MW from 22 small hydro power plants. According to the Energy Balance 2006, the annual production of hydro power is around 1.5 GWh. Large-scale hydropower has been extensively exploited and now faces various financial, environmental and legal hurdles. The scope for additional large scale hydropower is limited.⁸

Figure 4. Electricity Supply



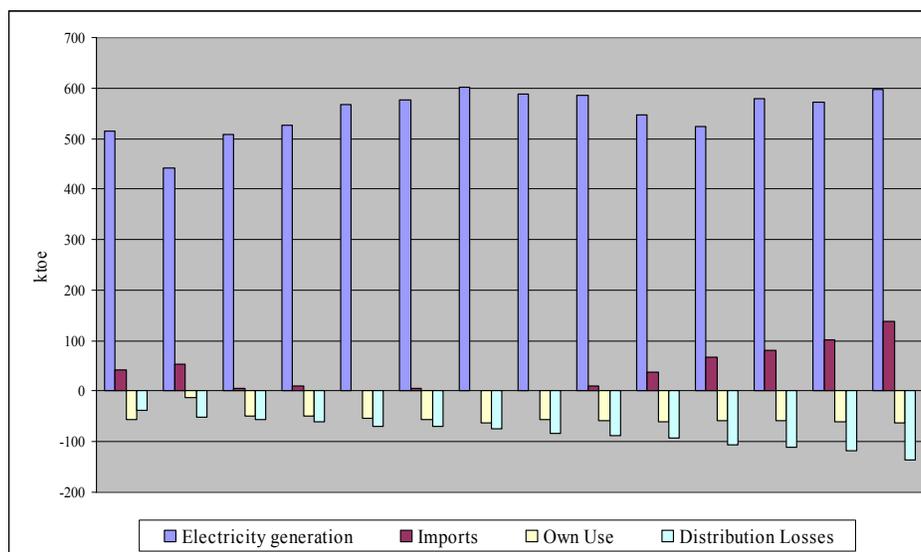
Source: Based on IEA Energy Statistics, Electronic version 2007

⁷ Macedonia, FYR, Sustainable Energy Project, Project Appraisal Document, World Bank, 2006.

⁸ Macedonia, FYR, Sustainable Energy Project, Project Appraisal Document, World Bank, 2006.

System losses of the Macedonian electricity sector are a huge problem. Distribution system losses are estimated to be more than 17% of the power available (Fig.5). Power distribution system faces ageing equipment and stealing of electricity. On top of these, the troubles with payment of electricity bills in residential and public sector, as well as in industry, are still present.⁹

Figure 5. Electricity Supply 1992-2005



Source: Based on IEA Energy Statistics, Electronic version 2007

With the lack of investments in new facilities and new fuel resources, mid-term imbalance of power capacity is expected to occur, as well as country's dependence on power imports. AD ELEM, the major electricity production company, has developed a plan for construction and reconstruction of the generation facilities during the period 2007-2011. The plan includes revitalisation of TPP Bitola and opening of two open pit mines to provide for continuous supply of coal for the plant. The modernisation will increase the installed capacity by 31.8 MW, will improve the degree of utilisation of the aggregates and will keep the specific consumption of coal on the current level. Important elements of the plan are the construction of a new power plant with combined cycle (TE-TO Skopje) with 190 MW electric and 150 MW thermal capacity, the construction of HPP Boskov Most with 66.03 MW capacity, and the development of a cascade HPP at the Crna River.

The electricity transmission system of the country is connected with the systems of Greece and Serbia, but is not connected with the other neighbouring countries Bulgaria and Albania (Fig. 6).

⁹ Natasa Markovska, Sector Analysis Report: Energy, Support to the Preparation of a National Strategy for Sustainable Development in the Republic of Macedonia, 2007.

Figure 6. Macendonia's Electricity Transmission System



District Heating

Currently, five district heating systems are operational in Macedonia with total capacity of 653 MW, powered by heavy oil (more than 75%), natural gas and lignite (Fig. 7).

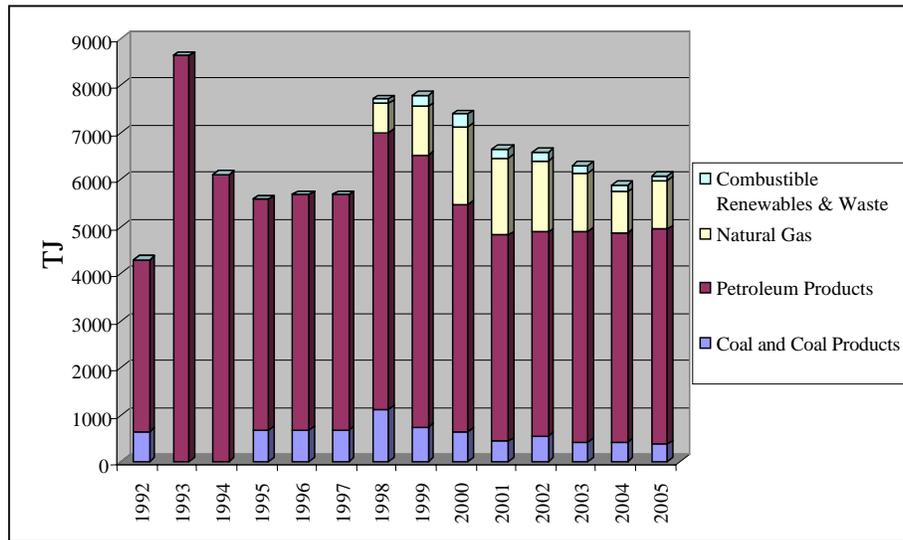
The biggest district heating system with a capacity of 518 MW is serviced by “Toplifikacija” AD – Skopje (a private company). It covers the broader area of the city of Skopje, has 3 heating plants and provides heat and hot water to about 60000 mainly residential (65%) and commercial customers (30%). Two of the DH plants can use both heavy fuel oil and natural gas (heavy fuel is dominating because of its lower price), the third one works only on heavy fuel. This DH system has a high degree of automation. Since 2002 equipment for distant control and monitoring of the parameters of the heating station has been installed. Further plans include improving the efficiency of fuel burning and waste heat utilisation. Also, the 180 km long and very old distribution network leads to substantial heat losses, and renewal of the pipelines insulation and other measures are foreseen.

A smaller system serviced by “Skopje – Sever” AD with 46 MW capacity supplies heating to the Northern part of the city of Skopje. The industrial zone of the city of Skopje is serviced by “Energy Sector – ESM” district heating system with 32 MW capacity.

In addition to the district heating systems in Skopje, there are two small district heating systems – one in the residential area of the city of Bitola (“Toplifikacija-Bitola” DOO

with 26 MW capacity), and one utility in the city of Makedonska Kamenica (PE “Doming” with 12 MW capacity).

Figure 7. District Heat Output



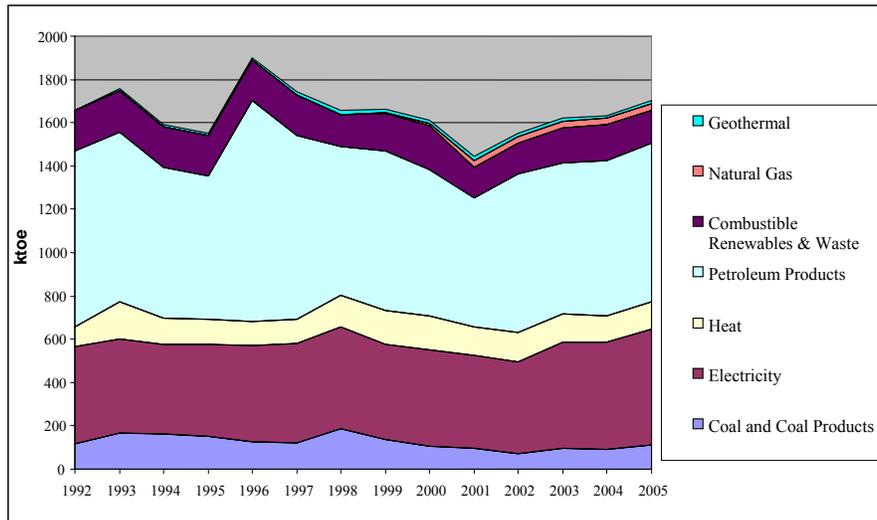
Source: Based on IEA Energy Statistics, Electronic version 2007

Final Energy Consumption

In Macedonia, final energy consumption has been steadily increasing since 2001 (Fig. 8). The total energy needs are expected to grow further mainly as a result of restarting certain economic capacities in industry and the intensive energy use by households. The structure of the economy (sectors composition, high energy intensive and obsolete technologies etc.) trigger increased energy consumption.

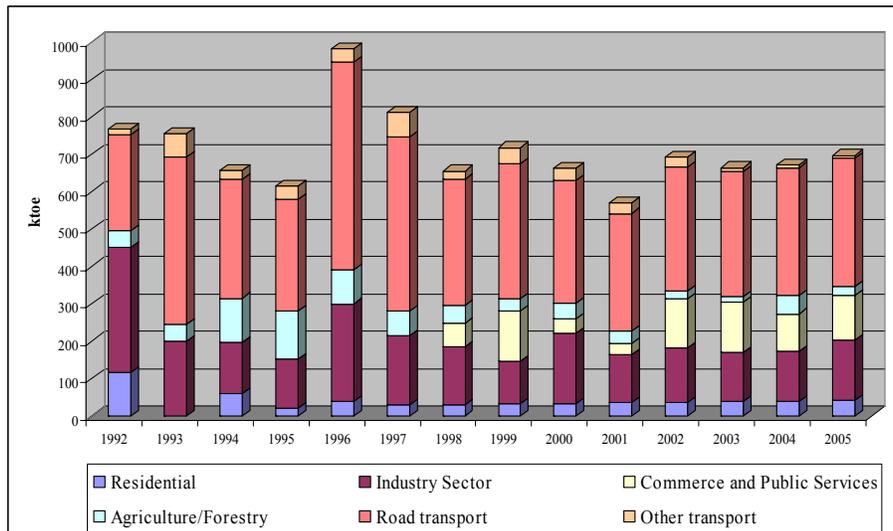
The final energy consumption is dominated by petroleum products (43%) and electricity (32%). Petroleum products are mostly used for road transport, but they are also widely used in the services sector and industry (Fig. 9). Electricity is mostly used by households, but is also the main energy used in industry (Fig. 10). Consumption of electricity is increasing, mainly due to increased use by the iron and steel industry and the households.

Figure 8. Total Final Consumption by Fuel 1992-2005



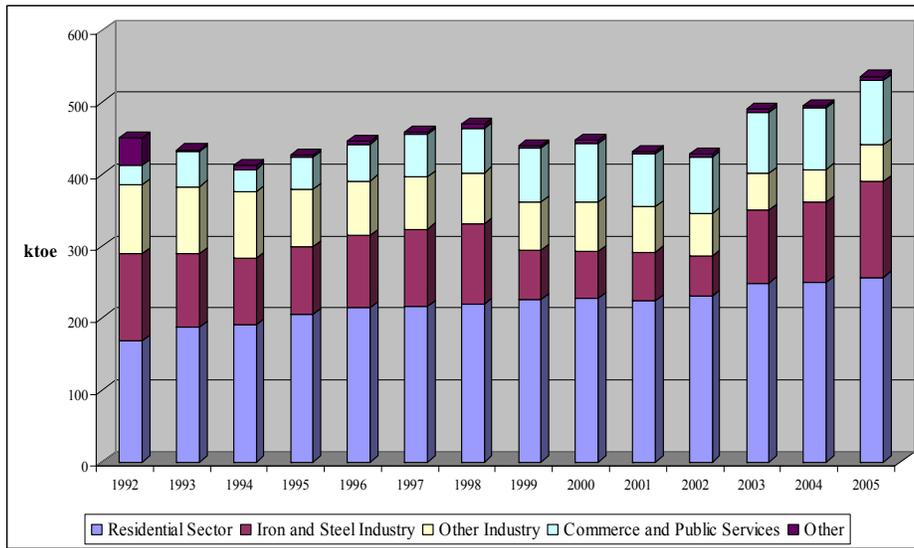
Source: Based on IEA Energy Statistics, Electronic version 2007

Figure 9. Consumption of Petroleum Products by Sector



Source: Based on IEA Energy Statistics, Electronic version 2007

Figure 10. Electricity Consumption by Sector

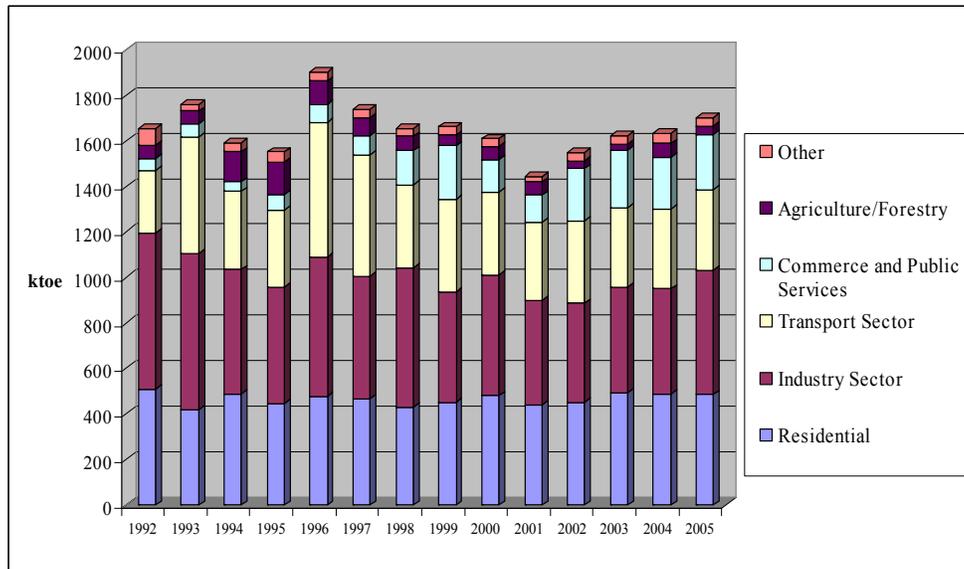


Source: Based on IEA Energy Statistics, Electronic version 2007

Energy End-use Sectors

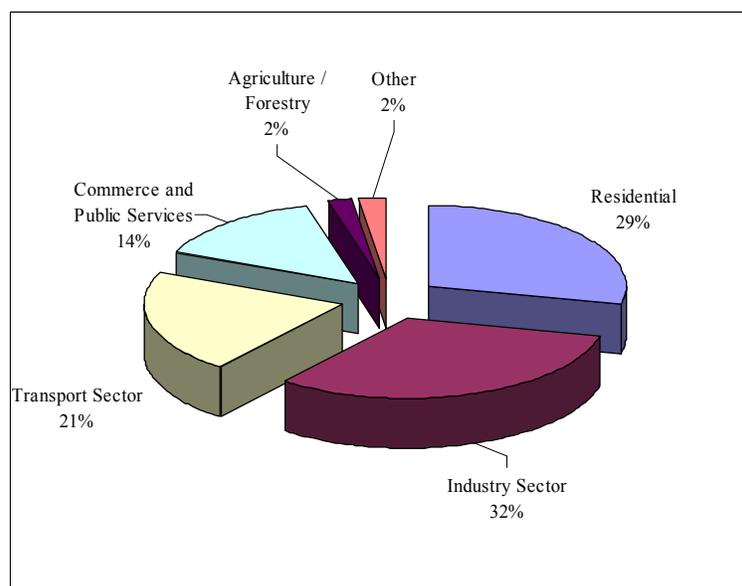
In Macedonia, industry is the largest energy consuming sector with 32% of the total final energy consumption (TFC). Residential sector closely follows with a share of 29% of TFC. Transport energy consumption is about 21% of TFC, and services have a share of 14%. The following Figures 11 and 12 show the energy consumption by sectors.

Figure 11. Final Energy Consumption by End-use Sectors



Source: Based on IEA Energy Statistics, Electronic version 2007

Figure 12. Total Final Consumption by Sector in 2005



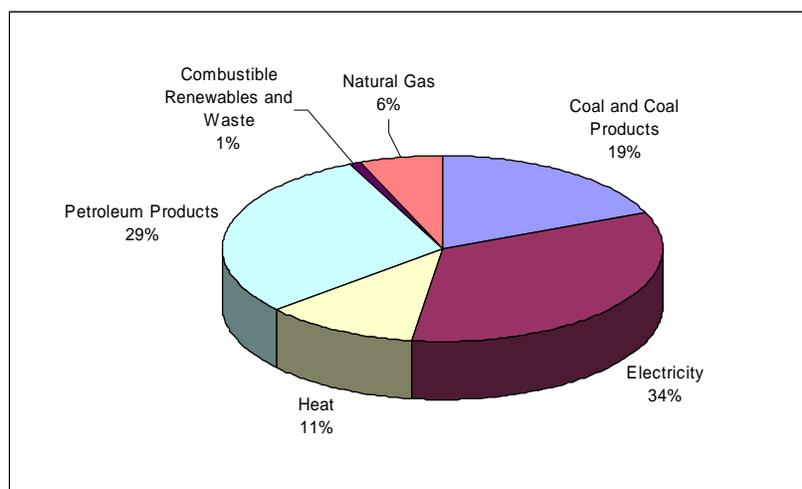
Source: Based on IEA Energy Statistics, Electronic version 2007

Industry

At present, the industry sector accounts for 32% of the total final energy consumption and for 34% of the total electricity consumption in the country. However, this consumption is expected to grow, as Macedonia modernises its plants, increases production, and resumes exporting internationally. Industry is currently working far below its capacity.

A large share of industrial energy use stems from heavy fuel oil, gas oil, and coal that are used to operate boilers that are typically either highly inefficient and/or underutilised. Further, electricity is widely used, electric motors accounting for over 80% of the industrial sector's total electricity use (Fig. 13).

Figure 13. Final Consumption of Industry by Energy Source, 2005

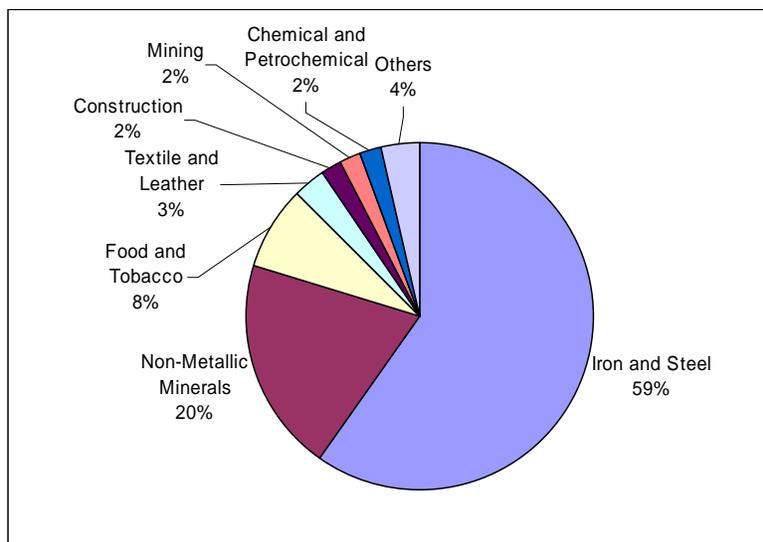


Source: Based on IEA Energy Statistics, Electronic version 2007

The energy intensity index of the Macedonian industrial sector, i.e., the amount of energy consumed in average per unit of production, is approximately five times higher than the indexes of France and the United Kingdom for example. The structure of the sector is largely dominated by traditional industries: textiles, clothing, and steel industry. The number of SMEs is high and increasing (61527 in 2004), but the share of SMEs with new technologies is small. Generally, the technological equipment of the sector is obsolete and the level of technological innovations is low. All these indicate that large energy savings can be achieved.

The main industrial energy consumer in Macedonia is metallurgy (iron and steel industry), accounting for 59% of the total industrial energy consumption (Fig. 14). This includes consumption of a quarter of the total electricity supply in the country. Iron and steel industry is with a high importance for the economy of the country with highest growth rates (Its growth rate in 2005 was 33.4% compared to 2004) and a major exporter. It is envisaged that there will be conditions for further production growth in the period until 2009, because of the restarting of non-active capacities in the sector.

Figure 14. Structure of Energy Consumption in Industry by Subsectors, 2005



Source: Based on IEA Energy Statistics, Electronic version 2007

The high energy intensive industrial companies consume almost one third of the total electricity consumption in the country. The largest consumers are SILMAK (production of ferrosilicon) FE-NI Industry (production of nickel) and MAKSTIL-Duferko (production of iron and steel), which annually consume more electricity than is produced by the all hydro power plants in the country. Electricity supply of these consumers (which are private companies) is problematic in terms of the amounts of electricity they need, the prices of electricity purchased at regional market by MEPSO and price of electricity sold to these companies.¹⁰

MEPSO, the transmission system operator, providing electricity to the direct industrial consumers, took a decision to supply only 45% of the electricity needed by them. The rest 55% they are allowed to buy on the free market (in practice, from imports). This is a serious problem for the companies, as imported electricity is more expensive. A contradiction is seen in the macroeconomic priority given to these sectors and the policy for satisfying their energy needs.

From the viewpoint of its definition in the national strategic documents, the industrial policy of Macedonia is included in the National Strategy for Integration of the Republic of Macedonia into the EU, as well as in other framework documents, strategies or annual programmes for the current economic policy. Enhancement the competitiveness of the Macedonian economy is in the focus. With such goal, also a special “National Restructuring and Conversion Programme for the Steel Industry in the Republic of Macedonia” was adopted. Similar document was prepared for the textile industry as well.

However, industrial strategic documents do not include energy efficiency considerations.

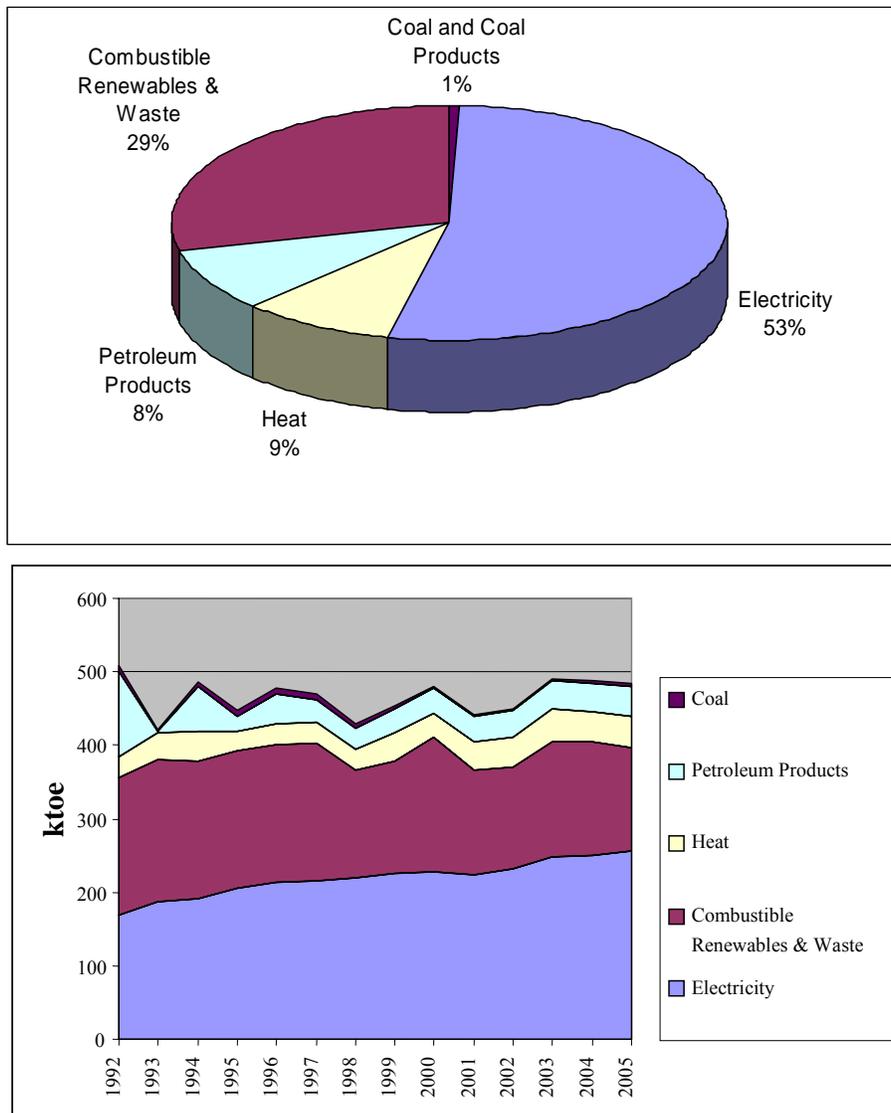
¹⁰ Natasa Markovska, Sector Analysis Report: Energy, Support to the Preparation of a National Strategy for Sustainable Development in the Republic of Macedonia, 2007.

Residential

Macedonia's total population of over two million people resides in approximately 700 000 residential dwellings covering 52 million square meters (m²), primarily in Skopje, which is home to almost one-third of the country's population. Approximately 70% of dwellings are multi-family homes and 30% are single-family homes.

The residential sector is the second largest energy consumer in Macedonia as it accounts for 29% of the Total Final Energy Consumption. Electricity is the major energy used in the sector, and while the overall consumption level does not undergo big fluctuations, the consumption of electricity is increasing every year to reach 53% of households' energy consumption (Fig. 15).

Figure 15. Final Consumption of the Residential Sector by Energy Source, 2005



Source: Based on IEA Energy Statistics, Electronic version 2007

There is no statistical information about the structure of electricity consumption by households. It is commonly known however, that many of the residences in Macedonia are heated with electricity. A presentation of representatives of the Energy Regulatory Commission in 2005 provides some data about the number of households by types of space heating. According to the information, 16.25% of the households use electricity for heating (Table 1).

Table 1. Number of households according to the mode of space heating

Central heating

	Types of space heating						
	Total number of households	Central heating	Individual central heating				
			electricity	coal	wood	liquid fuels	unknown fuels
Republic of Macedonia	564 296 100%	46 451 8.23%	7 446 1.32%	696 0.12%	9 001 1.60%	6 265 1.11%	112 0.02%
Skopje	137 367	44 163	4 599	151	2 099	2 324	25
Bitola	26 387	2 219	334	211	482	714	5
Makedonska Kamenica	2 437	31	2	-	54	2	-

Source: ERC, Presentation “Heating, Affordability / Social Safety Nets” by Branko Brajkovski and Murat Ramadani, Vermont, 2005

Heating by stoves

	Manner of space heating							
	Total number of stove-heated households	Heating by stove						Other types of heating
		electricity	coal	wood	liquid fuels	gas	unknown fuels	
Republic of Macedonia	493 986 87.54%	84 272 14.93%	486 0.09%	406 556 72.05%	2 231 0.40%	163 0.03%	278 0.05%	339 0.06%
Skopje	83 872	35 658	84	47 123	881	74	52	134
Bitola	22 406	7 870	78	14 319	104	17	18	16
Makedonska Kamenica	2 348	27	1	2 316	3	-	1	-

Source: ERC, Presentation “Heating, Affordability / Social Safety Nets” by Branko Brajkovski and Murat Ramadani, Vermont, 2005

A survey on household energy use,¹¹ involving 1412 households all over Macedonia, comes with rough estimation that approximately 50% of the electricity used in

¹¹ Household Survey on Energy Use, Component III of the Efficient Energy Distribution Project, Swiss Agency for Efficient Energy Use S.A.F.E., 2005.

households is for space heating and 25% for water heating. 32% of the space heating in households is done by electricity (mainly in urban areas), 17% by wood and electricity, and 34% by wood only. 90% of households use simple electric water heaters. All households have TVs and refrigerators. 23% have air conditioners, but the efficiency of these devices is generally rather poor.

Since electricity supply capacity is insufficient for all uses and electricity is also imported, reducing electrical usage through conservation or fuel switching is very desirable.

Currently, less than 9% of the households are connected to district heating networks. The district heating company in Skopje provides heat to over 47 000 flats with heating surface of nearly 3 million m². Equipment for second level of temperature regulation (first level is at the heating plant) and heat meters are installed in the heating substations. However, there is no equipment for individual metering and control of heat consumption in collective buildings and the bills are calculated on the basis of square meters of floor area. Expansion of the district heating systems is not foreseen in the short term.

The existing building stock in Macedonia is not energy efficient. In general, the level of thermal insulation of the buildings is poor. Old buildings which, are constructed in traditional methods with thick brick or stonewalls, can offer a rather acceptable comfort level. The main problem is encountered in new constructions of reinforced concrete, where the heat losses are excessive and the comfort level is low. Some completed audits concluded with calculations for payback of building retrofits of 3 to 5 years.

There is an energy efficiency problem not only with the old, but also with the newly constructed buildings. A regulation for thermal insulation of buildings is in force since the '80s, but its actual implementation is limited. Building permits are received without any energy efficiency criteria. There is no enforced energy performance standard. There is no supervision of the energy systems in buildings during their construction.

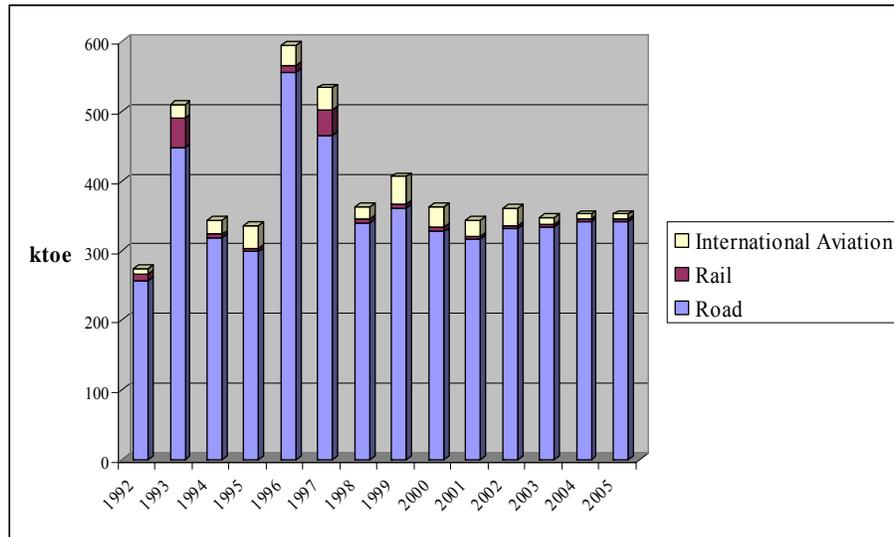
Generally, the considerable potential for improving energy efficiency in buildings, together with the high level of electricity use by households, makes the residential sector a key target for energy efficiency improvement programs.

Transport

The energy intensive nature of the transport sector gives ground to high energy consumption and it accounts for 21% of TFC, predominantly petroleum products. However, the level of transport energy consumption in Macedonia was not increasing during the last years and is over 97% dominated by road transport fuel use (Fig. 16).

Road transportation accounts for the largest share of goods and passengers transportation in the country. In 2005, the road network in Macedonia carried 9.4 million passengers and 25 million tons cargo, or 86.5% of the passengers and 88.9% of the goods transported. Railways carried 0.9 million passengers (8.3% of the total number of passengers) and 3.1 million tons of cargo (11.1%). In terms of distance and volume, the road network carried 1086 million pa-km and 5577 million ton-km, while the railway network carried 94 million pa-km and 531 million ton-km.

Figure 16. Energy consumption by transport



Source: Based on IEA Energy Statistics, Electronic version 2007

The overall road network of the country amount to 13 278 km, of which 216 km are highways, 906 km are main national roads, 3806 km are regional roads, and 8566 km are local roads. Only part of the highways is built according to the modern standards, another part is under construction. The overall condition of the main and important regional roads is lower in comparison to European standards, as well as the neighbouring countries network. The remaining regional and the local roads are in poor to medium condition.¹²

The total number of registered vehicles in Macedonia in 2005 was about 278 000, i.e. 136 cars per 1000 inhabitants. This comparatively small number explains the relatively low current density of motorway traffic. It is interesting to note the 20% reduction in the total number of cars between 2002 and 2005, explained mainly by the age of the vehicles. However, there is a huge expansion of traffic in the towns, especially in Skopje, caused by urbanisation and lifestyle trends, and combined with not always adequate public transport.

Private cars represent 90% of the national vehicle fleet. In addition to these, there are a considerable number of non registered cars (estimated at about 40% of total passenger cars in 2006). The average age of the vehicles is high – 15.5 years in 2003, and around half of them are older than 20 years. Respectively, a large number of the cars are obsolete and fuel inefficient.

Railway is underdeveloped in Macedonia. The railway network is about 925 km in single track lines. Its incompleteness and relatively small scale explain the small share of railways in the modal shift of the country. The railway sector is managed by the Macedonian Railways, a fully publicly owned company.

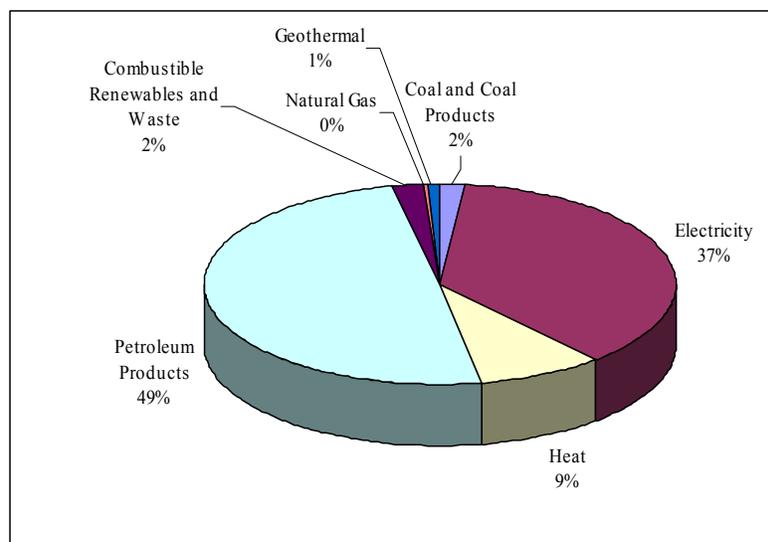
¹² National Road Transport Strategy of the Republic of Macedonia, Ministry of Transport and Communications, 2007.

Much of the core road network is in a process of being rehabilitated or upgraded to provide consistent standards along the main corridors and routes. There is a National Road Transport Strategy of 2007, aiming at expansion and improvement of the road and railway networks. Macedonia also intends to develop a policy of modal shift away from cars (particularly single occupancy car use), driven by environmental, health and safety considerations. Railways transportation is significantly less air polluting and needs less energy per unit of services performed. It can be expected that these measures will lead to higher energy efficiency of the sector.

Services

The commercial sector has been steadily increasing its energy consumption together with its economic growth. In 2005, consumption in this sector has reached some 14% of the Total Final Energy Consumption. Of the total, nearly half is the consumption of petroleum products, and 37% is electricity. (Fig. 17)

Figure 17. Final Consumption of the Services Sector by Energy Source, 2005



Source: Based on IEA Energy Statistics, Electronic version 2007

Public and commercial buildings have similar energy characteristics as the residential ones and high energy efficiency potential. The analyses used for the Energy Efficiency Strategy of the Republic of Macedonia indicate that priority targets for energy efficiency projects at institutional buildings include upgrades in the heating system and building envelope as well as the installation of efficient lighting systems. It is estimated that these measures could be implemented at over half of Macedonia's 1324 primary and secondary schools. In the country's estimated 40 general hospitals, key measures involve improvements in heating and steam systems as well as capturing potential energy savings in the operation of sanitary water systems. Priority targets for commercial projects include lighting systems, space conditioning (heating), and hot water.

One target area is in street lighting, which accounts for over 25% of total electricity costs in many cities. Over 86% of the total street lighting systems are equipped with inefficient lamps.

Two latest trends can influence the approach to improving energy efficiency in public facilities. First, allocation of greater financial responsibilities on municipalities may stimulate initiatives for the introduction of energy efficiency measures to decrease municipal expenditures. Second, privatisation has started in the social sector of the economy and in the public administration. A portion of non-core activities in health, education and administration has been carved out from the state entities and they have been subcontracted to private sector entities.

Energy Policy

Strategic and Legal Basis

The key energy policy objective of Macedonia is to develop an efficient, cost-effective energy sector that will take due account to security of supply, flexibility, safety of the population and protection of the environment. On a more operational level, the objectives include: (i) to increase substantially the hydroelectric power generation capacity, (ii) to proceed with the gasification, (iii) to improve energy interconnection and transmission infrastructure as well as distribution networks, and (iv) to improve the investment climate for construction of new energy capacities, for improvement of the energy efficiency, and for increasing the use of renewable energy sources.¹³

Important influence on Macedonian energy policy has the overall country objective of EU accession. After the signing of the Stabilisation and Association Agreement with EU in 2001, which entered into force in April 2004, Macedonia gradually moved towards meeting the EU requirements regarding the development of the energy sector. The principles for cooperation in the energy sector are:¹⁴

- Formulation and planning of energy policy, modernisation of infrastructure, improvement and diversification of supply and improvement of access to the energy market, including facilitation of transit;
- Promotion of energy saving, energy efficiency, renewable energy and environmental impact of energy production and consumption;
- Restructuring of energy utilities and cooperation between undertakings in this sector.

In the EU Council Decision of 30 January 2006 on the principles, priorities and conditions contained in the European Partnership with the Former Yugoslav Republic of Macedonia, the following priorities are included for the Energy sector:

- Begin to align the legislation on the internal electricity and gas markets, energy efficiency and renewable energy sources with the *acquis* in order to gradually open the energy market to competition.
- Strengthen the independence of the Energy Regulatory Commission.
- Start implementing the Energy Community Treaty.
- Enhance administrative capacity in all energy sectors.¹⁵

Macedonia ratified the Energy Community Treaty on 3 May 2006. The main goal of this Treaty is to provide free energy trade under transparent conditions between the countries from South East Europe and with the EU member states. The Treaty contains the obligations for the SEE states to implement the *acquis communautaire* in the field of energy, competition, environment and renewable energy sources. Beside the reforms in the institutions and regulation of the markets with electricity and natural gas, the Treaty creates obligations for Macedonia in a period of one year to implement the provisions of Directives 2003/54/EC on the general relations within the internal electricity market and

¹³ Republic of Macedonia: National Development Plan 2007 – 2009, Skopje, February 2007.

¹⁴ Association Agreement between Republic of Macedonia and EU, Article 99.

¹⁵ EU Council Decision of 30 January 2006.

2003/55/EC on the general relations within the internal gas market, and to create a framework for opening the market and all customers, except households, to be able to choose their supplier by 2008, and all customers by 2015.

Within a year after the Treaty comes into force, it is necessary to prepare a plan for implementation of the *acquis communautaire* in the field of renewable energy sources and for removal of subsidies and practices which obstruct the competition on the energy market.

The strategic priorities of Macedonia in the energy sector and provisions that transpose the *acquis communautaire* are incorporated in the new Energy Law, which was adopted by the Parliament on 11 May 2006. The new law replaced a law from 1997, which included a series of later amendments. The new Energy Law regulates the energy policy, the organisation and operation of the regulatory authority, construction of new facilities, the organisation and rules for operation of the energy markets (the electricity, natural gas, oil and oil derivatives markets, the thermal and geothermal energy market), licensing, energy efficiency and renewable energy sources, and includes supervision and penalty provisions. Appropriate implementing legislation still needs to be developed.

The new Energy Law prescribed the obligation of the Ministry of Economy to develop and propose for approval an Energy Development Strategy of the Republic of Macedonia for a period of at least twenty years and a five years programme for its implementation. An overall strategy for the development of the energy sector has not been developed yet, although studies, analyses, development plans and other documents related to the energy sector have been completed. The Development Energy Strategy is intended to define the long-term objectives and strategic priorities for development of the energy sector, to propose incentives for investment in renewable energy facilities, incentives for energy efficiency enhancement, and methods for ensuring environmental protection. A public tender for selecting a consultant for developing the Energy Development Strategy of the Republic of Macedonia is underway, with a view to adopt the Strategy in 2008.

Energy Market Structure

The new Energy Law provided a legal framework for the energy market in Macedonia and transposed EU Directives 2003/54/EC on the general relations within the internal electricity market and 2003/55/EC on the general relations within the internal gas market. The Law straightened the legal basis for the work of the independent energy regulator, which was established in 2003.

The restructuring of the electricity sector started in 2004. The former vertically integrated state-owned power company ESM (Electrostopanstvo na Macedonia) was unbundled into 4 major companies: AD ESM (distribution), AD MEPSO (transmission system operator), AD ELEM (generation, including thermal and hydro power plants) and AD TEC Negotino (generation).

A Government Decision adopted in January 2005 initiated the process of privatisation in the power sector. 90% of the AD ESM, the power distribution company established during the unbundling process, was sold to EVN AG, the Austrian power distribution utility, in March 2006. ESM is the single electricity distribution and supply company in

Macedonia, supplying electricity to households, industry and budgetary organisations. ESM also owns and operates 11 small hydro power plants.

The authorities are proceeding with the sale of 100% stake in TEC Negotino. The transmission system operator AD MEPSO is to remain state-owned, while the privatisation of the generation company AD ELEM has been decided and preparations in this area are going on.

In the oil sector privatisation is completed and competitive markets exist. The gas sector was also restructured and its privatisation has advanced. The reforms in the gas sector included:

- Separation of the public services from the commercial activities
- Separation of the ownership of the transport infrastructure from the transport operation and transport system operation of natural gas as a public service
- Formation of an independent company for transport services under regulated conditions
- Granting concessions for gasification, distribution and supply of tariff consumers for a specified territory and determined period for investors

GA-MA JSC is the Macedonian company for transportation of natural gas and managing the natural gas system. It is 50% owned by the government and 50% by MAKPETROL.

MAKPETROL is the former Macedonia's state oil and gas company, since 1998 a totally private joint-stock company. MAKPETROL is the biggest company in Macedonia for distribution and trade with oil products oil derivatives and gas distribution. The company owns 120 petrol stations and 12 storage tanks for oil derivatives. It makes over 60% of the oil derivatives turnover in Macedonia and practically has a monopolistic position on the oil and gas service market.

The OKTA Refinery has been privatised in 1999 and is owned by the Greek firm Hellenic Petroleum. The OKTA Refinery produces most of the petroleum products in Macedonia, including the bulk of the gasoline and diesel, and almost all of the heavy fuel oil.

The District Heating (DH) company Toplifikacija AD successfully completed the process of privatisation in 1999 as a joint stock company and in 2001 appeared on the official market on the Macedonian Stock Exchange. In 2004, DH Toplifikacija AD-Skopje became a share holding company with foreign participation with uncontrolled package of shares. The company is combining production, distribution and supply of heat. In the forthcoming period the DH Company plans to expand its activities to combined heat and power production and distribution of natural gas.

EBRD financing supported privatisation and commercialisation of public utilities, including the newly unbundled electricity distribution and generation companies, and energy projects that fit the regional energy market development such as regional electricity and gas interconnections (EBRD Power Pre-privatisation Share Purchase Project signed in October 2004).

Institutions

The **Ministry of Economy** is the responsible government body for the energy issues in Macedonia. The Ministry has 12 departments; one of them is the Energy Department. Its main functions include:

- conducting the state energy policy through programs, measures and other activities,
- developing laws, sub-laws, and other legal documents on energy,
- initiating and implementing the policy for energy sector restructuring,
- creating and developing approvals and agreements for any energy activity and exploitation.

The Energy Department is also in charge of collecting and providing all data regarding energy production, supply, demand, balance, etc., and compiling them in public documents. An obligation of the Department is to implement energy related European Directives into Macedonian laws.

The Energy Department consists of four Units: Unit for investment projects in the energy area, Unit for the electricity system, Unit for fossil fuels and Unit for energy efficiency and renewable energy sources, with 10 full time employees.

To support the activities of the Ministry in the implementation of the energy policy, the state **Energy Agency** was established in December 2005. It is responsible for professional technical support on data management, strategy analysis, policy and project assessment, and implementation coordination. The formal determination of the Energy Agency is set with the Law on Establishment of an Energy Agency of the Republic of Macedonia, adopted in July 2005 and the Energy Law of 2006. The Management Board of the Agency has been appointed and involves the Ministry of Economy, the Ministry of Finance, and non-governmental representatives, nominated by the Ministry of Economy. The Agency will be independent in its work, and financially accountable to the Ministry of Economy.

The defined role of the Agency is to initiate, coordinate, study and prepare appropriate documents, together with domestic and foreign specialised companies and experts, and to suggest concrete solutions and activities to the Government, through the Ministry of Economy. Specific activities of the Agency will be aimed towards:

- preparation of mid-term and long-term strategies and development plans;
- preparation and coordination of the energy reforms;
- proposal and evaluation of studies and projects on the energy sectors, energy efficiency and renewable energy sources;
- preparation and coordination of the implementation of investment projects;
- regional cooperation and coordination of regional projects, and other activities.

Currently, the Agency has a Director and 4 other employees. The staffing will be gradual: 2007 – 2 more employees, 2008 – 3 employees, 2009 – 3 employees, and 2010 – 4 employees.

The regulation of the energy market is performed by the independent regulatory body, the **Energy Regulatory Commission (ERC)** of the Republic of Macedonia. The Energy Regulatory Commission was established in June 2003 (with amendment of the 1997 Energy Law). The new Energy Law from 2006 provides the legal framework

for the operation of ERC, straightens the provisions concerning appointment and dismissal of the ERC members, financing, reporting and the decision-making process.

By the law, ERC is a regulatory body which is fully independent from the interests of the energy industry and the Governmental bodies. The main competences of the Energy Regulatory Commission are to ensure: safe, secure, continual and quality energy supply to the final consumers; protection of environment and nature; protection of consumers; promotion and protection of a competitive energy market based upon the principles of objectivity, transparency and non-discrimination.

Pursuant to the Energy Law, the Energy Regulatory Commission is authorised to regulate energy activities related to electricity, natural gas, oil and oil derivatives, thermal and geothermal energy. Its major activities include:

- Establishment of tariff systems and prices
- Authorisation procedures (licenses for generation, distribution, supply and eventually other services within the energy industry)
- Development / verification of Grid Codes and Market Codes
- Dispute settlement and customer protection.

The members and the president of the Energy Regulatory Commission are appointed and dismissed by the Parliament of the Republic of Macedonia, upon proposal of the Government. The currently acting five Commissioners were nominated by the Parliament Assembly in July 2003. Each ERC member has a mandate for five years and is limited to maximum two mandates.

ERC adopts decisions with majority of the votes from the total number of members. The execution of specialised and administrative tasks in the Energy Regulatory Commission is carried out in compliance with the Internal Rules for the organisation of the Commission, and is structured in the following manner:

- Departments and divisions established as permanent organisational units to carry out specialised duties: technical-energy department, economics department, legal department and an administrative-technical unit, with a total staff of 13 persons;
- Permanent and temporary inter-departmental working groups specifically formed to carry out tasks in the jurisdiction of the Energy Regulatory Commission that require an interdisciplinary approach. There are permanent working groups for licensing and monitoring of license holders' performance; for prices and tariffs; and for participation in dispute resolution.

The activities of the Regulatory Commission are financed from own sources provided through collection of fees for issued licenses and a fee from the license holders. The fee from license holders are approved by the Parliament as a per cent of the overall revenue of the companies, performing energy activities on the domestic market – this percent cannot exceed 0.1% of the total income of the companies (approved at 0.051% for 2007).

EU Progress Report 2006 recommended that administrative capacity should be significantly strengthened in the energy sector, and particular attention paid to the independence of the Energy Regulatory Commission.

Energy policy on the local level is implemented by **municipal authorities**. The Energy Law assigns them with the responsibilities for the following activities:¹⁶

- Distribution of natural gas, management of the system for distribution of natural gas, and supply of natural gas to the tariff consumers
- Production, distribution and supply of heating energy
- Distribution and supply of geothermal energy.

The Energy Law obliged municipalities and the City of Skopje to adopt 5-years Local Energy Development Programmes which comply with the Energy Development Strategy of the Republic of Macedonia. The Programmes shall ensure the execution of the energy activities of public interest and local importance in the areas mentioned above. Plans for realisation of the Programmes, as well as reports on the implementation of the plans as per the preceding year shall be also developed.¹⁷

The capacity of the local authorities required to realise these responsibilities is still not commonly available. The local authorities are struggling with all new aspects of the decentralisation reform. As a result, the energy programmes required by law are still not developed and implemented.

Energy Pricing Policy

The Energy Regulatory Commission is responsible for the price regulation and adopts methodologies for setting the prices of electricity, gas, geothermal energy, central heating and oil. Coal prices are liberalised. The energy pricing policy is based on the following announced principles:

- Balancing the interests of energy entities and customers
- Protecting consumers against monopolistic prices
- Creating incentives for efficient operation of regulated energy entities
- Creating incentives for the development of a competitive energy market where conditions allow
- Avoidance of cross-subsidisation between individual groups of consumers, and between licensed and non-licensed activities for entities which perform both
- Ensuring non-discriminatory treatment, and
- Applying objective criteria and transparent methods.

The methodologies for setting the prices for electricity, gas, central heating and geothermal energy are based on incentive based methods and the oil prices are set on the basis of cost plus method. No subsidies are considered in all tariff methodologies. However, there are many cross-subsidies, mainly between commercial and household customers, in the electricity tariffs. There are no social or other subsidies directed to the consumers. An environmental fee is incorporated in the price of gasoline.

A major step in the process of market regulation and a gradual liberalisation was the adoption of a new methodology for price setting of electricity by the Energy Regulatory

¹⁶ Energy Law 2006, Article 15.

¹⁷ Energy Law 2006, Article 13.

Commission. Since January 2005, the prices for generation, transmission and distribution of electricity are regulated following the method and conditions adopted by the Regulatory Commission with the specific Rulebook on the Method and Conditions for Regulating Electricity Prices. The Rulebook determines the method for establishment, approval and control of the regulated prices:

- For generation of electricity for tariff consumers: revenue cap method (defining the revenue that the company will be allowed to earn annually through collection of charges for the regulated activities carried out)
- For transmission of electricity: revenue cap method
- For distribution of electricity: hybrid method (revenue cap and price cap method. The price cap method establishes a price adjusted to cost fluctuations, ensuring sufficient revenue to cover justified expenses.

The Rulebook has also provisions on the method and procedure for applying for approval and control of the electricity price. The companies for electricity generation, transmission and distribution apply to the ERC for approval of the price and the revenue. The following table illustrates the process of changing the prices for different electricity services during 2006 and 2007.

Table 2. Price Changes for electricity generation, transmission and distribution

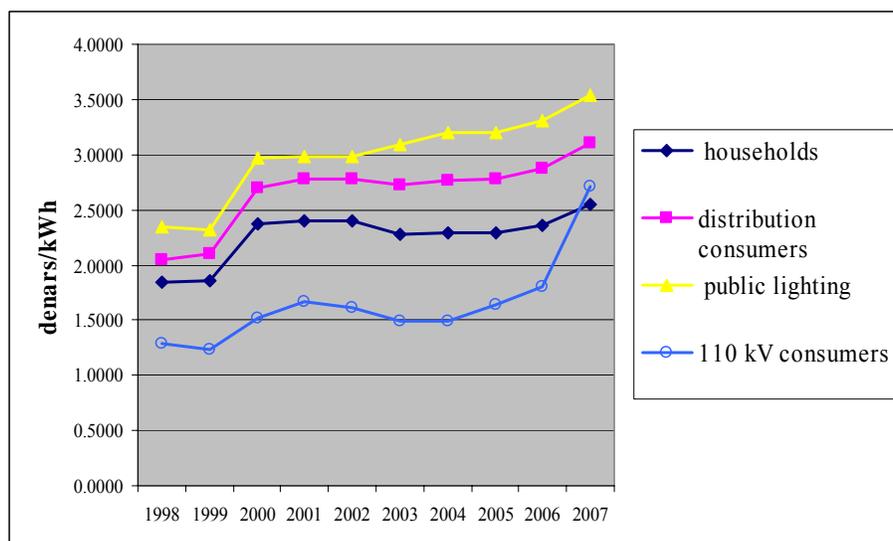
Energy price for	Energy Regulatory Commission of the Republic of Macedonia brought decision on:							
	31.01.2006		18.08.2006 (in force from 01.09.2006)			27.02.2007 (in force from 01.03.2007)		
	MKD	€cents/ kWh	MKD	€cents/ kWh	Increase of tariff rates in compliance with the tariff system	MKD	€cents/ kWh	Increase of tariff rates in compliance with the tariff system
Generation	1.3000	2.1207	No request for change			No request for change		
Transmission service	0.1039	0.1695	No request for change			No request for change		
Average wholesale supply	1.6063	2.6204	1.8180	2.9657	10.53%	No request for change		
Distribution service	0.9052	1.4767	No request for change			0.9313	1.51192	
Average retail supply	2.7101	4.4210	2.9577	4.8249	9.14%	3.0311	4.9447	2.48%

Source: Energy Regulatory Commission

The electricity prices for final consumers have increased accordingly, but still the levels are low (see Annex 3). For example, the average price for households is 2.54 denars/kWh (4.16 Eurocents/kWh). Night tariff is 1.34 den/kWh, i.e. 2 times lower than the day tariff. The price for direct consumers, which has increased substantially in 2006, reached 4.43 Eurocents/kWh.

Compared with 1998-1999 the current consumer electricity prices are more than 50% higher (Fig. 18). Still, their low level is not an incentive for more efficient consumption.

Figure 18. Consumer Electricity Prices



Source: Based on data provided by the Energy Regulatory Commission

Prices for transport, distribution and supply with natural gas are regulated by applying the methodology based on incentive price regulation by the price cap method. The Rulebook on the method and conditions for regulating prices for transport, distribution and supply with natural gas has been published in 2005, followed by the Tariff system for transport of natural gas and the Tariff system for selling natural gas to tariff customers. The total charge that tariff customers directly connected to the natural gas transportation system pay consists of two components: the selling price for natural gas and the price for the service transport and operation of the natural gas transportation system. The applied methodology enables covering all costs and ensures a level of regulated return of capital.

The Rulebook on the method and conditions for regulating the prices for heating, adopted and published in February 2006, provides incentive based regulation for the heating price setting by applying the revenue cap method. This method determines regulated maximum revenue that the companies are allowed to earn annually through collection of charges for their regulated activities. It enables covering all costs and ensures a level of regulated return of capital.

There is a specific Rulebook on the method and conditions for regulating prices for generation, distribution and supply of geothermal energy.

In February 2007, the Rulebook on the method and procedure for establishing and approving the use of feed-in tariffs for purchase of electricity produced from small hydropower plants was published by the Energy Regulatory Commission. The feed-in tariffs apply to the quantity of electricity produced and delivered by newly constructed run-of-river small hydropower plants, which have qualified as privileged producers (Table 3). The privileged producer is obliged to use the feed-in tariffs approved for him for 20 years. The electricity market operator is obliged to purchase the total quantity of electricity delivered by the privileged producer under the approved feed-in tariffs.

Table 3. Feed-in tariffs for the sale of electricity produced by small hydropower plants

Delivered quantity (block)	Monthly quantities of delivered electricity (kWh)	Annual quantities of delivered electricity (kWh)	Privileged tariff (€cents/kWh)
I	1 – 85.000	1 – 1 020 000	12.0
II	85 001 – 170 000	1 020 000 – 2 040 000	8.0
III	170 001 – 350 000	2 040 001 – 4 200 000	6.0
IV	350 001 – 700 000	4 200 001 – 8 400 000	5.0
V	Above 700 000	Above 8 400 001	4.5

(The average price for the production of 1 000 000 kWh per month will be 58 800/1 000 000 = 5.88€cent/kWh))

A Rulebook on the method and procedure for determination and approving the use of feed-in tariff for purchase of electricity generated by wind power plants was adopted by the Energy Regulatory Commission in May 2007. This Rulebook regulates the method of establishing feed-in tariff for electricity generated by wind power plants which have obtained the position of privileged generator, as well as the procedure for approving the use of a feed-in tariff. The feed-in tariff for the sale of electricity produced and delivered from wind power plants is 8.9 €cents/kWh and does not include VAT.

ERC has also drafted a Rulebook on the method and procedure for determination and approving the use of feed-in tariff for purchase of electricity produced by power facilities using biomass as fuel.

Currently, there is no safety net in place for low-income customers. This is likely to become a problem as tariffs increase to cover investment costs, and as payments discipline is better enforced. The EBRD is providing support to the Ministry of Economy of Macedonia for developing a social study on vulnerable energy customers with a view of establishing a power sector social safety net.

Energy Efficiency Policy

Energy Efficiency Strategy

Serious attention has been given in Macedonia to the need for rationalising energy consumption. Fuel diversification and reducing dependence on imported resources are strong reasons for promoting energy savings.

A Programme on Energy Conservation, Substitution and Rational Use of all types of energy through 2000 has been early adopted in 1988, consistent with the Energy Law at that time. This Programme received funding in the Macedonia's budget in 1989, 1990 and to a diminished extent in 1991. The programme was able to implement close to 200 energy efficient interventions, all in industrial facilities, and achieve estimated savings of close to 5% of the energy consumed in the industrial sector at that time. The Programme paid for the interventions. Subsequent funding was unavailable, as the attention was focused at the political and structural economic reforms.¹⁸

The 1997 National Development Strategy included the principle of achieving economic development with as small consumption of energy as possible. It stipulated the need to:

- “De-stimulate” high energy consumption
- Stimulate economic activities with low specific energy consumption per GNP
- Produce useful forms of energy with a minimum consumption of primary energy.

The 1998 Programme for saving, substitution and rational use of all energy types up to the year 2000 started the establishment of a new framework of the energy efficiency policy in Macedonia. The programme was directed to industry and centralised heat supply. Selected projects were co-financed by credits under favourable conditions. The funds for co-financing were provided from the state budget. Within this Programme, more than a 100 energy efficiency and renewable energy projects have been realised.

As a legal obligation stemming from the Energy Law adopted in 1997, and to provide for continuation of energy efficiency activities, in 1999 the Government adopted a new Programme on Efficient Energy Use in the Republic of Macedonia until 2020. This Programme included measures for increasing the energy efficiency, among which: preparation of a national strategy on energy efficiency until 2020; legal and other incentive measures; establishment of a fund for financial support; investment projects development and implementation; preparation of regulations, standards and other acts; informational and educational activities; publications and brochures; international activities.

As an early activity of the 1999 Programme, the Ministry of Economy initiated the development of the Energy Efficiency Strategy until 2020. The Strategy was financially supported by USAID and developed by the American company Nexant Inc., in cooperation with national experts. In October 2004, the Government adopted the Energy Efficiency Strategy.

The Strategy is accompanied with Implementation plans and technical programme analyses. Programs identified for implementation have the potential to realise cost

¹⁸ Energy Efficiency Strategy, 2003.

effective reductions in energy use representing approximately 6% of the country's current energy use, as well as helping postpone future investments in new supply capacity. Three different implementation scenarios, reflecting three different anticipated rates of adoption of energy efficiency practices and technologies are considered: high, medium and low penetration levels (See Annex 4).

The Strategy puts emphasis on the importance of developing a proper institutional framework for the energy efficiency policy development and implementation. Respectively, an important package of institutional and capacity building activities was proposed:

- Establishment of an Energy Efficiency Agency
- Introducing certificates for energy auditors
- Building energy codes for new constructions
- Equipment energy standards and labels
- Energy Efficiency Fund

The series of technical programs proposed by the Strategy have been identified based on their potential benefits under the three implementation scenarios mentioned. The initiatives all lie on the demand-side rather than on supply with particular emphasis on electrical energy use as this is currently the most perturbing end-use issue. The programme initiatives are:

- Residential building programme
- Commercial building programme
- Institutional building programme
- Industrial programme
- Street lighting programme

In the residential sector, the following measures are suggested: consumption based billing, extension of district heating systems, insulation of windows, reflection shields for radiators, and thermostatic valves. Where possible, the shift from electricity to natural gas for heating should be achieved, or otherwise insulation of the building shell implemented.

In industry, the proposed measures target at substitution of electric engines and drives, avoiding the conversion of electricity to heat, saving measures at lighting systems, air compressors, thermal insulation and improved capacity factor.

In the commercial and institutional sector, the improvement of buildings, heating systems and lighting and efficient use of air conditioners are mentioned. In the area of street lighting, the substitution of existing lamps by HPS lamps savings of 10-40%, by introduction of controls (turning off the light when it is not used) 25-50 % are expected. The return of investment in street lighting is estimated with 1 year or less, whereas in the other sectors it is estimated at between 2 and 5 years.

Legal Framework

Macedonia has had no specific Energy Efficiency Law, but provisions for energy efficiency have been included in the Energy Law.

The 1997 Energy Law (first approved in 1997 and last amended in 2005) stipulated that the strategy for energy development in the Republic should consider the possibilities for an efficient energy use. It emphasised the importance of incorporating energy efficiency into construction standards for buildings, fuel switch to natural gas as an ecological fuel, and the need to identify the potential for efficient energy use. According to Article 17a of the Energy Law, a Long-term Programme on Efficient Energy Utilisation was to be approved by the government. This programme should identify the possibilities for a more efficient energy utilisation and should define the basic policies for energy efficiency promotion. One of the main issues for this programme was the preparation of a National Energy Efficiency Strategy for the period to 2020 (described in the previous section).

The 1997 Energy Law also contained provisions for the establishment of an Energy Efficiency Fund. The resources for the fund's operation were to be provided by domestic and foreign borrowing, grants and donations from local and foreign entities and from the state budget. The administration/technical works related to the needs for fund operation had to be performed by the commercial bank.

The new Energy Law, adopted in May 2006, clearly targets energy efficiency by including a special chapter, where the current national policy and activities for improvement of energy efficiency are elaborated. The Law contains provisions about the development of a Strategy for improvement of energy efficiency for a period of ten years and a 5-years Programme for the implementation of the Strategy. The Energy Law obliges municipalities and the City of Skopje to elaborate and implement five-years Local Energy Efficiency Programmes and action plans for their implementation. The Law includes provisions for energy efficiency in the construction of new and reconstruction of existing facilities, including energy audits and buildings certificates. It also calls for applying technical specifications and standards for efficient use of fossil fuels on new motor vehicles, facilities for generation of electricity, heat and other energy intensive industrial capacities that are sold and/or imported on the territory of the Republic of Macedonia. The Law also puts requirements for the energy efficiency of new household appliances and the introduction of energy labelling.

The secondary legislation needed to assure the implementation of the Law as far as the activities in the energy efficiency field are concerned includes:

- The Rulebook for energy efficiency labelling of household appliances, which was adopted in July 2007. It transposes the respective EU legislation in this area (Directives 95/12/EC, 95/13/EC, 96/57/EC, 96/60/EC, 97/17/EC, 92/42/EC, 98/11/EC, 94/2/EC, 92/75/EEC, 2002/31/EC and 2002/40/EC) and closely defines the energy efficiency criteria which have to be met by household appliances. The Rulebook will be applied from 1 January 2010, after securing the institutions needed for the implementation of the prescribed activities.
- Rulebook for energy efficiency of new buildings and reconstruction of existing ones. By this rulebook the EU Directive 2002/91/EC on energy performance of buildings will be implemented and the energy efficiency criteria that have to be met

by buildings will be closely defined. The deadline for adopting this rulebook is January 2008. The government of Macedonia has asked support from the Austrian Development Agency for the development of the document, capacity building for its implementation and a pilot project.

- Technical specifications and standards for efficient exploitation of fossil fuels. These have to closely define the energy efficiency criteria which have to be met by motor vehicles, thermal plants and energy intensive industries, and the control on their implementation. The technical specifications are not developed so far.

It might be interesting to note, that the analyses of the Energy Efficiency Strategy conclude that there are sufficient legal commitments of the national government to promote energy efficiency programmes. In other words, an adequate legal framework exists to enable the immediate creation of the institutions necessary to design and manage national energy efficiency programs. What has been lacking is sufficient government commitment to apply understandably scarce resources for the realisation of the potential contributions that a concerted energy efficiency initiative could have.

EBRD makes a similar general observation, that the “quality” of Macedonia’s laws is quite good when compared with other countries, or when tested against international benchmarks. However, there remains a significant “implementation gap” between the “quality” of such laws, and their implementation. This implementation gap can have the dual effect of undermining the utility of the specific laws in issue and diminishing the confidence that both Macedonian and foreign investors and traders have in the legal system as a whole. However, it appears that FYR Macedonia is taking important steps to make improvements.¹⁹

The 2006 EU progress report also makes a statement in this sense: “Some progress can be reported in the field of energy efficiency and renewable energy for which the new Energy Law requires the adoption of a 10-year strategy. Implementing legislation on energy efficiency and renewable energy remains to be adopted.”²⁰

Financing of Energy Efficiency Activities

From 2000 until recently there have been no budget financial sources allocated for energy efficiency activities. Although the creation of an Energy Efficiency Fund was envisaged by the 1997 Energy Law, such fund has not been established. Commercial financing for energy efficiency was also not available.

Energy efficiency projects during this period were financed through international cooperation, e.g.:

- By the Netherlands, through the PSO Programme (3 million EUR)
- By Austria, through the Austrian Development Agency, for projects for efficient use of geothermal energy, and use of solar thermal energy (1.12 mil. EUR)
- By Switzerland, through SECO, for realisation the Energy Efficient Distribution Project (1.21 mil. CHF)

¹⁹ Strategy for the Former Yugoslav Republic of Macedonia, Document of the European Bank for Reconstruction and Development, as approved by the Board of Directors at its meeting on 11 July 2006.

²⁰ EU progress report 2006.

- By USAID, which provided support for preparation of the Energy Efficiency Strategy of the Republic of Macedonia until 2020
- By EBRD, through the support provided for the power sector reform and through support for some industrial energy efficiency projects.

A research in early 2005 defined the main obstacles to expanded local investment in energy efficiency and renewable energy, as based on:²¹

- Limited access to affordable, medium-term, financing
- Capital constraints at the end-user and municipality level
- Lack of experience of the local financial institutions in evaluating and financing energy efficiency and renewable energy projects
- Limited development of a local energy services industry, limited local available assistance for energy efficiency and renewable energy project identification, installation, engineering, financing and monitoring.
- Low awareness of the economic benefits of energy efficiency and renewable energy
- Low energy prices.

Despite some developments, all these barriers are valid today. Although prices, particularly fuel prices, have been rising, they are still not on a level to promote energy efficiency. There were some positive signs in general commercial financing over the last three years, which can influence energy efficiency financing. A moderate credit growth was noted in 2006. Lending interest rates were slowly and gradually decreased to reach 11.3% in mid-2006. The share of long-term credits slowly increased, and credits to households were registered. However, the cost of financing and difficulties in assessing credit risks of potential borrowers remain high.²²

To address some of these barriers, the government of Macedonia initiated the Sustainable Energy Project, supported by the Global Environment Facility (GEF) and the World Bank. The project financing involves USD5.85 mil. GEF grant, USD2.8 mil. from the government of the Republic of Macedonia, USD18.7 mil. from Macedonian financial intermediaries, and USD6.8 mil. from other local sources. The project explores two interlinked mechanisms for financing energy efficiency and renewable energy projects: a utility based ESCO and a Sustainable Energy Financing Facility. The project is presented in detail in the next section.

Starting in 2006, some budget financing was provided by the government for the Energy Agency establishment, and also for co-financing energy efficiency awareness-raising campaigns.

Some environmental financing is also available for energy efficiency projects. The Fund for the Environment, created in 1998, has experience with energy efficiency projects, mainly fuel-switching and replacements in industrial boilers. Lately, there is a national policy towards exploring the potential of the Clean Development Mechanism (CDM) for projects financing.

²¹ Macedonia, Former Yugoslav Republic of, Sustainable Energy Project, Project Appraisal Document, November 27, 2006.

²² Document of the WB, March 2007.

Energy Efficiency Projects

World Bank Projects

Sustainable Energy Project

A Sustainable Energy Project in Macedonia has been approved by the Global Environment Facility (GEF) in December 2006. Under this project a grant of USD 5.5 million will be received, through the World Bank as an implementation agency. The project started implementation in March 2007 and will be completed in September 2010. The development objective of the project is to develop a sustainable market for energy efficiency and renewable energy by supporting the development of an enabling framework, institutional capacity, and necessary financing mechanisms. The project has three components:

Component 1 – “Market Framework” covers the following areas:

- Capacity Building, Strategic/Legislative/Institutional – This sub-component is comprising *technical assistance* focused on supporting the Government in designing and implementing policy and secondary legislation on the inclusion of renewable energy in the electricity sector. The sub-component will also include support to the Macedonian Electric Power System Operator (MEPSO), the Energy Regulatory Agency and government departments with regard to streamlining of permitting processes. The technical assistance will also comprise legal and technical support and advice to the institutions and government entities involved in creating the regulatory framework for the sector.
- Capacity Building, Technical/Advisory – This sub-component is focused on *project development and project investment support*. Project development support will focus on development of a sustainable pipeline of potential projects that can be financed by the financing facility in Component 3.
- Monitoring, Information Dissemination and Administration of the project

Component 2 – “Support to Utility-based ESCO” will support the development and start-up of a utility-based Energy Service Company (ESCO), under the umbrella of the Macedonian Electric Power System Operator (MEPSO). The ESCO will help to stimulate the market for energy services by providing turnkey and performance-based contracting for energy efficiency and by demonstrating the financial performance of such projects using third-party financing for publicly-owned buildings. Early focus will be on energy upgrades of school buildings.

Financial support to the ESCO from GEF will be US\$0.5 million which will be used to finance business development (free walk-through energy audits, pre-financing of investment-grade audits) and provide co-financing to energy efficiency investment following a revolving fund principle during the first one-two years. After this period, it is expected that the SEFF will be fully operational so that the ESCO can cover its financing needs from commercial banks that by that time will have learned to accept the ESCO business concept.

Component 3 will be a Sustainable Energy Financing Facility (SEFF) consisting of a loan guarantee facility and a loan facility (a revolving fund), on a co-financing basis

with commercial institutions and the Macedonian Bank for Development Promotion (MBDP). The MBDP will co-finance the SEFF with an amount not less than \$2.5 million. The SEFF is expected to leverage private sector financing and also to build capacities in commercial banks for financing energy efficiency projects on a commercially sustainable basis.

This financing component will provide a guarantee facility for energy efficiency loans and a credit facility for energy efficiency and renewable energy, co-financed with the MBDP and commercial banks.

The guarantee facility will focus exclusively on energy efficiency projects. It will provide partial (50-70%) credit guarantees to qualified energy efficiency projects that borrow from commercial banks. The partial guarantee is a risk-sharing mechanism that will provide commercial banks with partial coverage of risk exposure against loans made for energy efficiency projects.

The guarantee programme targets energy efficiency in all sectors. The primary definition of eligible energy efficiency transactions is investments in projects and equipment aimed at improving efficiency of energy use in buildings. Specific eligible investments include: improvement of the building envelope; improvements to building mechanical heating ventilation and air conditioning (HVAC); improvements to interior and exterior building lighting; and street lighting.

Loans from the loan facility would be applied to both energy efficiency and renewable energy projects. Energy efficiency loans would be focused on the industrial and municipal markets, where most of the projects show relatively good payback periods.

The GEF funds will be allocated as shown in Table 4.

Table 4. Allocation of GEF funds within the Sustainable Energy Financing Facility Component

Use and Origin of funds	Energy Efficiency	Renewable Energy	Total
Guarantee Facility (GEF)	\$1.2	-	\$1.2
Loan facility (GEF)	\$0.5	\$2.0	\$2.5
Total	\$1.7	\$2.0	\$3.7

The direct impact of the whole project is expected to be the implementation of 10 MW of renewable energy capacity among small hydro, biomass and geothermal, with 1,130 GWh of life-cycle generation, and 730 GWh of electric energy saved through energy efficiency investments.

The preparation and start up phase of the ESCO has already begun, with the emphasis on preparing all legal documentation required, followed by initial (short-range) business planning, and initial energy audits. The purpose of the energy audits at an early stage is two-fold: both to give the ESCO personnel experience with the engineering process and some initial training, and also to prepare actual projects for investment. The first audits include street lighting and 3 schools in a small town.

The Macedonian Bank for Development Promotion has also started the preparations for project implementation.

Power System Improvement Project

Important improvement of the existing hydropower plants were achieved by the Power System Improvement Project, financed by the World Bank, which closed in June 2005. The objectives of this project were:

- to increase the efficiency and capacity of FYR of Macedonia's hydropower plants through the rehabilitation of its six largest plants (which represent about 90% of its hydropower capacity);
- to increase system operating efficiency through completion of a modern energy management system;
- to begin the reduction in losses in distribution; and
- to facilitate the reintegration of FYR of Macedonia into UCTE.

According to the reports, the project has achieved all of its objectives and the primary objective of increasing efficiency and capacity in the main hydropower plants has been overachieved with the actual results of rehabilitation exceeding the original targets.²³

EBRD projects

Distribution Grid Efficiency Investment Project

EBRD is starting a new project in Macedonia in 2007: Distribution Grid Efficiency Investment Project. Under the project, EUR 100m will be provided for an investment programme to upgrade the electricity distribution network in Macedonia (a EUR 50 million corporate loan to ESM, in parallel with an equivalent financing from the IFC). The investment programme will be focused on four main areas:

- Upgrade of grid lines and connections
- Upgrade of substations and transformers
- Roll out of metering
- Upgrade to systems and administration.

The loan will support the ongoing turnaround in operating efficiency of the recently privatised distribution company ESM, demonstrating the benefits of private participation in the electricity sector and playing a key role in the ongoing sector liberalisation and restructuring.

Energy Efficiency Improvements in Mittal Steel Skopje

EBRD also provided a €25 million loan in 2005 to Mittal Steel Skopje, owner of two steel rolling mills in Macedonia, for energy efficiency improvements, for working capital and to help further promote regional integration of the steel industry. The energy efficiency component of the project included rehabilitation of the pusher furnaces, and switching from oil firing to natural gas in the hot-rolling mill. The activity was preceded by an energy audit on the facilities in November 2004.

²³ Macedonia, Former Yugoslav Republic of, Sustainable Energy Project, Project Appraisal Document, World Bank, November 27, 2006.

Other projects and activities

Efficient Energy Distribution Project (Switzerland)

The Swiss State Secretariat of Economic Affairs SECO supported the project “Improvement of Basic Infrastructures in Macedonia – Efficient Energy Distribution Programme” in 2003-2006. The Efficient Energy Distribution Programme consists of two projects complemented by a substantial assistance programme. Both are necessary improvements of the energy infrastructure of Macedonia.

The “Replacement of Condenser Batteries in the Distribution System” and the “Numeric Measuring System for Active, Reactive Energy and Power” focus mainly on the pollution problem and aim at decreasing the loss of energy in both commercial and technical respect. In addition to these “hardware” components, a substantial assistance programme on technical, institutional and policy level in the fields of POPs abatement and of energy efficiency improvement were implemented.

Under the Efficient Energy Distribution Programme, a Survey on Energy Use by Households was completed in 2005, including 1412 households all over Macedonia. The survey covered space heating, domestic hot water, refrigerators & freezers, and awareness. Main outcomes of the household survey were conclusions about electricity use, but also recommendations for efficiency improvements. Also, an information campaign was organised to raise the public awareness of energy efficiency labelling of household appliances, in support of introducing them in national legislation. The project was implemented by the Swiss Agency for Efficient Energy Use S.A.F.E., Zurich and DAAD Competence Center, a research unit of the Faculty of Electrical Engineering and Information Technologies, Skopje. The project was supported by SECO.

It was organised by the DAAD Competence Centre of the Faculty of Electrical Engineering and Information Technologies.

Awareness raising

To increase the awareness regarding efficient energy use, the Government of Macedonia took a decision in 2007 and assigned the Ministry of Economy to carry out a national awareness raising campaign. Financing for the campaign was assured from the Ministry of Economy and the electricity companies, and a tender was publicly announced for a consultancy company to organise the campaign. The tender failed as there was only one company applying, and a new tender is planned.

The Ministry of Economy considers a campaign for the introduction of some simple energy efficiency measures like cleaning the chimneys and cleaning the freezers.

The Norwegian Government provided support through ENSI International for training in energy auditing and business planning. It also aimed at creating an understanding and a demand for auditing services.

Organisation of Energy Efficiency Activities

Governmental Bodies

The Ministry of Economy is responsible for the design and formulation of the overall energy policy, including energy efficiency. Responsibility within the Ministry is with the Energy Department and its Unit for energy efficiency and renewable energy sources. Considering that the Department has 10 full-time employees for its four units, the resources devoted to energy efficiency are very limited.

Other Ministries are also involved in energy efficiency issues. Many of the activities of the Ministry of the Environment and Physical Planning relate to energy efficiency. They are presented in a following chapter.

The Ministry of Transport and Communications is responsible for the national policy in road, railway and air transport, but also for spatial and urban planning and construction. The activities of this ministry do not incorporate directly energy efficiency considerations, but are of a nature to often result in reduced energy consumption.

The Energy Agency of the Republic of Macedonia, as by the Energy Law of 2006, will have an important role for increasing the activities in the area of energy efficiency and renewables. In compliance with the Law, the Energy Agency will have the following jurisdiction relating to energy efficiency and renewable energy sources:

- develop initiatives, propose and coordinate studies and projects for energy efficiency and RES;
- cooperate with the Ministry of Economy for implementation of the Action Plan for realisation of the Energy Efficiency Strategy;
- issue guarantee for origin for electricity produced from RES;
- propose and incorporate measures for environment protection in the energy projects, etc.

The Energy Agency will act as the overall implementing agency for the GEF Sustainable Energy project and will coordinate activities among the World Bank and other project participants. The Energy Agency will also manage the Market Framework Component, comprising capacity building activities. The Agency will establish a special Sustainable Energy Unit (SEU) with special assignment to the GEF project. The SEU will consist of five persons of which one will be the head of unit who will also have the title of Project Manager for the GEF project.

Local Authorities

Together with their responsibilities for developing and implementing energy policy on the local level, municipalities are obliged by the Energy Law to have local energy efficiency policy. Local Energy Efficiency Programmes for a period of at least 5 years, which must be in accordance with the national Energy Efficiency Strategy, should be adopted by the Municipal Council or the Council of the City of Skopje. A plan for implementation of the Programme should also be approved and monitored.²⁴

²⁴ Energy Law 2006, Article 128.

These specific responsibilities of the local authorities require specific capacity, which is still not commonly available. The decentralisation reform has put a number of new responsibilities to local authorities and the process of building all relevant capacities is progressing slowly. As a result, the programmes required by law are not developed and implemented.

Utilities

The DH Company Toplifikacija Skopje implements energy efficiency measures to improve its cost-efficiency within its annual available funds. In 2003 the company made a big investment for the installation of a system for remote monitoring and control of heat consumption on the substations level. Measuring of heat energy provided is done, and individual measurement in newly constructed apartment buildings is applied. A project for heating control in public and commercial buildings is underway to stop heating during holidays. Another project – for energy efficiency improvement in greenhouses was recently approved. Toplifikacija Skopje is an active participant in the process of establishment the ESCO under the Sustainable Energy Project.

The ESCO is initially a joint venture of MEPSO and Toplifikacija Skopje. Each company has agreed to contribute personnel and other resources to the start up. The ESCO will be managed by a Management Board comprised of representatives from MEPSO and Toplifikacija, plus the Managing Director. In the long-term, the ESCO should establish itself as a provider of energy services to various market segments, and should offer various contractual mechanisms as well as financing.

Other Institutions

The Research Centre for Energy, Informatics and Materials of the Macedonian Academy of Sciences and Arts (ICEIM-MANU) was established in 1994 with a mission of initiating and coordinating national research programs and performing high-level research in selected fields, both applied and basic. Since then, the whole scientific activity has been realised through over forty research projects, out of which twenty nine international – funded from EC, UN Agencies, USAID and some European governments. Specifically, the applied research of the Centre has been devoted to energy strategies, energy efficiency and renewable energy sources, as well as the environmental impacts of various energy technologies, including greenhouse gases emissions and climate change. The results contributed to some strategic documents, adopted by the government, which shape the national policy in energy and the environment sectors.

The Macedonian Centre for Energy Efficiency (MACEF) has a mission to increase the energy efficiency and environmental protection at national level by implementing measures and capacity building in cooperation with governmental institutions, local self-government, engineers, donor organisation and ecologists. MACEF has initiated the creation of a Municipal Energy Efficiency Network, in which six municipalities are participating so far. The activities for the network include training and information dissemination. MACEF has also developed an environment and energy efficiency programme for kids in cooperation with the Ministry of Education (for primary schools) and the Ministry for Social Policy (for kindergartens). A pilot project in Skopje with kindergartens was implemented.

MBDP is a state-owned development bank that falls directly under the Ministry of Finance. Energy efficiency and renewables are new areas for the bank's activities, connected with its role for the implementation of the Sustainable Energy Project. The MBDP will act as implementing agency for the investment component of the project, as it will act as the manager of the guarantee and credit facilities. As a development oriented organisation that serves as an intermediary between international donors and financial institutions, the MBDP holds a unique position in the marketplace that can be leveraged to catalyse local investment in energy efficiency and renewable energy projects.

The Macedonian Energy Association (MEA) under the Macedonia Chamber of Commerce was founded in May 2005 and its members are 33 companies – producers, energy systems operators, and the biggest energy consumers.

Renewable Energy Policy

Renewable Energy Potential and Supply

Macedonia has promising indigenous resources of renewable energy. These include hydropower, geothermal energy, biomass and wind energy.

Hydro

Depending on hydrological conditions in the year, 15 to 18% of the annual electricity production in Macedonia comes from hydro power plants. There are six big hydro power plants and 22 small ones, with total net capacity of 540 MW. Macedonia has a significant potential for construction of small hydro-power plants (with installed capacity of less than 5 MW in size) located at roughly 400 sites throughout the country, which were already identified and which may meet over 10% of the country's current electricity needs. Furthermore, the National Power Utility identified 44 potential sites with a total capacity of 174 MW and annual possible energy production of 645 GWh. For these sites, studies of some level of detail are available.

Geothermal

The geothermal energy accounts for 2.4% in the heat production sector. There are possibilities for increasing the exploitation of existing and new geothermal sources. Macedonia is quite rich in geothermal sources suitable for different uses except for the production of electricity. The biggest part of geothermal occurrences in Macedonia is connected with the Vardar tectonic unit. There are 7 main geothermal fields in Macedonia with 18 localities with thermal waters, and there are more than 50 springs and wells where thermal water appears. The biggest amount of thermal waters can be found up to the altitude of 400 m above the sea level. Only the Kozuv Mountain springs and Baniste wells have altitude of 600 m above the sea level. Temperatures of the flows vary in the range from 24-27°C to 70-78°C. Total mean temperature is 59.77°C.

About 15 geothermal projects have been developed in Macedonia during the 70s and 80s. Some of them are still in operation but others are abandoned or work below the designed capacities. Four of them are very important and have an important influence to the development and application of geothermal energy in the country. These are the Kocani geothermal project, the Smokvica and Istibanja agricultural geothermal projects, and the integrated project in Bansko.

Solar

The solar energy is being used at a symbolic level for domestic water heating. But the geographical position and climate in Macedonia offer a very good perspective to intensify the use of solar collectors. The annual average for daily solar radiation varies between 3.4 kWh/m² in the Northern part of the country (Skopje) and 4.2 kWh/m² in the South Western part (Bitola). The total annual solar radiation varies from a minimum of 1250 kWh/m² in Northern part to a maximum of 1530 kWh/m² in the South Western part which leads to an average annual solar radiation of 1385

kWh/m². The climate characteristics – high intensity of solar radiation and its sunshine duration, temperature and air humidity, provide favourable conditions for the successful development of solar energy. The continental climate with hot and dry summers makes Macedonia a country with higher potential for the utilisation of solar energy than the average European countries.²⁵

Biomass

According to the energy balance for the year 2005, biomass contributes by 5.6 % to the primary energy supply. The total area under forests in Macedonia is 955,300 ha, that is 37% of the territory of the country. The estimate of the annual woodcutting mass is about 1.3 million m³, and the share of firewood is 80-85% of it.

Biomass, in the form of wood and charcoal is almost exclusively used in the domestic sector. Industrial or other uses are very small and represent less than 1% of the total biomass final energy consumption. In addition, there is relatively high potential in the country for utilising biogas from animal manure for energy generation purposes, as well as growing crops for production of biofuel.

Wind

The decision for including the wind energy as part of ELEM's portfolio was made in June 2004. A Preliminary Atlas of the Winds in Republic of Macedonia was developed. 15 possible locations with sufficient energy potential for construction of wind power plants with foreseen installed capacity 25 MW to 33 MW were identified. On the basis of the Atlas, a Monitoring Programme of the Wind Potential in the Republic of Macedonia is in implementation with a grant from the Norwegian Government. The programme will be performed in several phases. In the first phase, four locations are included where measuring stations with 30-50 m height are installed, and those are: Bogoslovec (Sveti Nikole), Sasavarlija (Stip), Ravanec (Bogdanci) and Flora (Kozuf). The measurement and data collection for the wind parameters started to be performed in June 2006.

Renewable Energy Policy

The Government of the Republic of Macedonia gives priority to the development of renewable energy sources. The legal framework for exploitation of renewable energy sources is the Energy Law, which has a separate part for energy efficiency and renewable energy. The chapter stipulates the responsibilities of the Government of the Republic of Macedonia for adoption of a Strategy for Renewable Energy Sources for the period of 10 years.

The Strategy shall define the objectives for utilisation of the renewable energy sources and the manners of achieving such objectives, especially: the potential of the renewable energy sources, the feasibility potential of the renewable energy sources, the arranged

²⁵ Natasa Markovska, D.Sc., Sector Analysis Report: Energy, Support to the Preparation of a National Strategy for Sustainable Development in the Republic of Macedonia, 2007.

scope and dynamics for introduction of electricity consumption from renewable energy sources in the electricity balance, definition of transitional measures for support of the renewable energy sources utilisation through preferential tariffs for privileged electricity producers and other support measures.

In 2006-2007 a Basic Study on Renewable Energy Sources in the Republic of Macedonia is being developed, which will serve as a basis for the development of the national Strategy. The Strategy for Renewable Energy Sources will be adopted in 2008.

The Energy Agency of the Republic of Macedonia shall support the Ministry of Economy in the elaboration of the Programme for the implementation of the Strategy for Renewable Energy Sources and development of the Rulebook on the exploitation of renewable energy sources.

Under the Energy Law (Article 140), the Energy Agency of the Republic of Macedonia shall issue and maintain a national registry of guarantees of origin for electricity produced from renewable energy resources and from high-efficiency cogeneration facilities in the Republic of Macedonia and guarantees of origin associated with imports of electricity issued by other authorised national bodies.

The local policy for renewable energy sources exploitation comprises geothermal energy, biomass, biogas, landfill gas and solar energy. The local policy is established within a 5-years local programme for renewable energy resources which has to be in accordance with the Strategy for Renewable Energy Sources. Upon the proposal of the Mayor, the Programme shall be adopted by the Municipal council or the Council of the City of Skopje. The Mayor shall prepare a plan for realisation of the Programme, as well as annual reports on the implementation of the plan and shall file it to the Municipal Council for approval. The plan and the report shall be submitted to the Ministry.²⁶

The Energy Law also stipulates the establishment of preferential tariffs for electricity sold by preferential producers. A Decision for determining privileged tariffs for the sale and purchase of electricity generated and delivered from the small hydropower plants, which acquired the right of privileged producer, was passed by the Regulatory Commission for Energy on 9th February 2007. A feed-in tariff for purchase of electricity generated by wind power plants was adopted by the Energy Regulatory Commission in May 2007 (see section Energy Pricing Policy).

RE projects

Small Hydro Power Plants

The Government considers the construction of small hydro power plants as one of the projects of great importance for the country. Under the project Small Power Plants in Macedonia, 60 locations have been put to international public competition for collecting bids for granting water concession for electricity generation from 60 small hydro power plants (with installed power up to 5 MW) according to the DBOT model (Design, Build, Operate, Transfer) on the Vardar, Strumica and Crni Drim river basins. 41 of them have been allocated in the first package of the project. The remaining 19 location are included in the second package at the end of July 2007.

²⁶ Energy Law 2006, Article 137.

The Ministry of Economy has published a preliminary information notice for international public call for water concessions for another 27 small hydro-power plants for electricity generation to be announced in September 2007. The water concession would be provided for electricity generation according to the DBOT model. Successful bidders will be required to transfer of ownership of all facilities of the small hydro-power plants and the land of their location after the expiration of the concession period to the Government of the Republic of Macedonia.

The Ministry of Economy recently announced an international public competition for expression of interest for participation in a prequalification procedure for construction of HPP “Boshkov most” – a concession project for building, operating, and transfer of HPP “Boshkov Most”. The deadline was 3 September 2007.

Austrian Development Cooperation in Macedonia

Since its beginnings in 1998, the Austrian Development Cooperation in Macedonia has been focused on water and energy. The goal of the ADC was to improve the provision of services for basic infrastructure needs of the population. In the field of energy, the Austrian Cooperation emphasised the Macedonian potential for renewable energies and supported the use of geothermal energy for warming up of green houses for growing vegetables. The focus of the programme has always been on investment measures, but included institutional strengthening of the communal sector in the partner municipalities as well. In the period from 1998 to 2003 the Austrian Cooperation made available a total of 7.7 million Euros for specific bilateral projects in Macedonia.

Within the programme, a project for the geothermal-system “GEOTERMA” in Kocani, located in North-eastern part of Macedonia was supported. The system has a production of a cumulative quantity of more than 20 million m³ thermal water for greenhouses, district heating, etc. Phase 1 of the project aimed at improving the technical and environmental situation and at optimising the system. With the completion of a new exploitation well and re-injection well the elasticity of the reservoir exploitation has been improved. Based on the comprehensive technical studies on the efficiency of the geothermal system, the main objective of the Phase 2 is to establish an optimising concept with scenarios for the rehabilitation of the present system and it’s improving for sustainable use of the geothermal resources. The optimising concept will also consider the efficiency aspect: energy output vs. energy demand of the system.

In the field of solar energy the Austrian Development Cooperation supports Macedonia in the development of a national product line for solar-powered facilities for warm water. The overall objective of the Solar Water Heaters project is comprehensive training of the key groups for production, installation and implementing of solar thermal systems in order to significantly increase the use of solar thermal energy in Macedonia. The main focus of the project is on small solar water heating systems for single-family houses but also on systems for the social sector. Furthermore it is the objective of the project to significantly improve the solar thermal systems produced already in Macedonia and the installation of 10 demonstration systems with improved technology. In order to ensure a high quality of the installed systems, also the implementation of a national labelling scheme for solar thermal collectors and systems and the foundation of a “Macedonian Solar Test Centre” are foreseen.

Macedonian Government has decided to invest 150 000 Euro from the state budget to build upon this project and to support the first 500 households who install solar heaters with 30% of the investment needed. The Energy Efficiency and Renewable Energy unit within the Ministry of the Economy is implementing the support programme.

Further possible areas of cooperation, depending on the increase of ADC funds for Macedonia, are biomass, wind energy and small hydro power stations.²⁷

Makpetrol's Biodiesel Plant

The oil and gas retailer Makpetrol has opened in August 2007 the first biodiesel plant in Macedonia. The plant has an annual capacity of 30 000 tonnes, following an investment of 8 million Euro. Privately-held Makpetrol had financed the project from its own funds. The biodiesel plant will meet European standards EN 14214, and Makpetrol aims to sell its production both at home and abroad. The company expects that its biodiesel will be cheaper than conventional diesel fuel. It will use non-refined rapeseed oil imported from the European Union.

Sustainable Energy Project

The GEF/WB Sustainable Energy Project, which is under implementation, is greatly focused on developing the market environment for utilisation of renewable energy. Because of the integrated character of the project components, directed to both energy efficiency and renewable energy, it was presented under “Energy Efficiency Projects”.

²⁷ Austrian Development Cooperation with Country Programme 2005-2007, Austrian Development Agency, November 2004.

Environmental Policy Related to Energy

The Framework Law on Environment was adopted in 2005. It was built upon the experience from the development and the implementation of the first National Environmental Action Plan (NEAP) of 1996 and particularly it aims to respond to challenges of EU approximation.

This Second National Environmental Action Plan (NEAP 2) provides the overall guidance and directions for Macedonia in the field of environment over the period 2006-2011. Apart from setting the priorities and objectives within the various sectors, the NEAP identifies specific measures and actions that must be implemented in order to attain these objectives.

Since 2002, Macedonia started the process of harmonisation of the environmental legislation with the EU and new laws on Environment, Nature, Air Quality and Waste Management have been adopted. Draft Law on Waters has been prepared during this process, but its adoption was delayed. The EU approximation imposes substantial requirements on Macedonia not only in terms of investment but also in terms of capacity enhancement, institutional restructuring and enforcement. In recognition of this, the Government has commenced the elaboration of a comprehensive environmental strategy for the EU approximation. This strategy is expected to be ready in 2007. The Government has also been working to prepare the Strategy for Sustainable Development of the Republic of Macedonia, which is expected in late 2008.

Macedonia ratified the UN Framework Convention on Climate Change (UNFCCC) in 1997 as a non-Annex I Party to the Convention, and ratified the Kyoto Protocol in July 2004. Climate change issues are incorporated in the Law on Environment, including details on preparation of inventories of GHG emissions and removals by sinks, as well as action plan on measures and activities to abate increase of GHG emissions.

The Ministry of Environment and Physical Planning (MoEPP) is the designated National Focal Point to the UNFCCC, the key governmental body responsible for policy making with regard to the provisions of the UNFCCC. In January 2000, the Climate Change Project Office was set up within the Ministry. Furthermore, a National Climate Change Committee was established as an advisory body for policy-making related to climate change issues. The Ministry of Environment and Physical Planning was also nominated as the country's Designated National Authority (DNA) for CDM.

The First National Communication on Climate Change was submitted to the UNFCCC Secretariat in March 2003. This document comprises the Action Plan with recommended measures for GHG mitigation and adaptation to the impact of climate change in the most vulnerable sectors. In 2005, preparation of Macedonia's Second National Communication on Climate Change was initiated with financial support from UNDP/GEF.

Preparation of the Second National Communication started in March 2005 and is expected to be finalised in early 2008. Two phases are completed: National GHG inventory report and Vulnerability assessment and adaptation, as well as Climate change scenarios for Macedonia. Recently, a National Strategy for Clean Development Mechanism for the first commitment period of the Kyoto Protocol 2008 – 2012, was published.

The Goal of National CDM Strategy is to facilitate transfer of investment and technologies through CDM for implementation of projects that reduce GHG emissions and contribute to Macedonia's national sustainable development priorities.

Macedonia's economy is characterised by relatively high level of GHG emissions per unit of GDP. The energy sector contributes about 70% of the total country's GHG emissions or approximately 10 MtCO₂eq/year. This is mainly due to the use of the domestic lignite coal for electricity production and high use of imported liquid fuels. However, this also represents a relatively high abatement potential as any project measures replacing grid-based electricity in Macedonia are likely to lead to high emission reductions and therefore would be more attractive from CDM. It is expected that in the Macedonian power system, electricity production from thermal plants will continue to be dominant, which makes projects that promote efficiency of energy use and renewable energy highly attractive from CDM perspective. In particular, it is estimated that combined margin (CM) emission factor for Macedonian electricity grid accounts for 0.915 tCO₂/MWh.

Table 5. Priority areas and projects for CDM in Macedonia's energy sector²⁸

Priority Areas	Potential CDM projects
Rehabilitation of large power plants	Rehabilitation of the Bitola plant (three 225 MW coal-fired units)
Fuel Switching to Natural Gas	Toplifikacija 340 MW natural gas powered cogeneration project (approximately 785,000 tCO ₂ eq/year)
CHP for District Heating	Rehabilitation of district heating system in Skopje and Negotino
Industrial Efficiency Improvements	Okta oil refinery waste heat/gas collection and utilisation projects
Hydro Power	Rehabilitation of seven large hydropower plants
Geothermal Energy	Kocani geothermal central heating system project

²⁸ National Strategy for Clean Development Mechanism for the first commitment period of the Kyoto Protocol 2008 – 2012, UNDP, Skopje, 2007.

Assessment of Progress

Energy and Energy Efficiency Policy

Macedonia is progressing in reforming its energy sector, but the country has to overcome a number of serious problems attached to its development and the growing energy demand: strong dependence on energy import, unfavourable energy mix, poor condition of the power system, high degree of inefficiency in energy production and use. The structure of the economy, the obsolete industrial technologies, and the inefficient buildings trigger high energy intensity.

Being a serious problem for the country, energy development has attracted a specific political attention in Macedonia. Energy supply is a priority for the government. There are ambitions for energy self-sufficiency and there are plans for constructing new energy generating facilities. The focus on exploring renewables, specifically by small hydropower generation, is intense.

However, these intentions and plans are not based on clearly studied long-term overall trends of economic and energy demand growth and strategic planning. General energy scenarios are missing. Macedonia still lacks a comprehensive long term Energy Strategy and the declared intention of developing such a strategy in the short-term is a positive and needed step. It will help the government to identify the priority objectives on a more reliable background and to concentrate the available resources for their achievement.

It is of substantial importance that the new energy strategy takes into account in its analyses and scenarios the existing considerable potential for energy efficiency in the country. There is an indication that this potential and the benefits that could be gained are not enough recognised on decision-making level.

Furthermore, both the new energy strategy and the requirement of the Energy Law of 2006 for developing a 10-year energy efficiency strategy should not undermine the importance of the already adopted Energy Efficiency Strategy and the many positive elements it contains. The Energy Efficiency Strategy is an insightful document, accompanied with implementation plans and technical programme analyses. The programs identified for implementation have the potential to realise cost effective reductions in energy use representing approximately 6% of the country's current energy use. Any up-dates if needed should not delay the process of implementing the programmes, which are quite well focused.

Energy efficiency and renewable energy policies in Macedonia are integrated: they are treated in one and the same chapter of the Energy Law, one and the same governmental bodies are responsible for both policies (the Ministry of Economy, the Energy Department in the Ministry of Economy, the EE and RES sector within the energy department, the Energy Agency). While there are important benefits of integrating these policies,²⁹ which are much more valid in a small country like Macedonia, there should be a balance between the commitments to energy efficiency

²⁹ More on this issue in *Integration of Energy Efficiency and Renewable Energy Policies*, Energy Charter Secretariat, 2005.

and renewable energy, based on a number of criteria, but cost-efficiency for energy saved/produced being a key one.

The scope and provisions of the Energy Law provide quite an adequate legal framework for the energy efficiency policy of Macedonia. The efforts for developing and adopting the secondary legislation and technical regulations need to be intensified, as only the labelling of household appliances was regulated so far.

Institutions

The Energy Law allocates the responsibilities for energy efficiency policy development and implementation in the Republic of Macedonia to the Ministry of Economy, supported by the Energy Agency. With its wide range of responsibilities, and small team for dealing with all energy issues, the Ministry of Economy needs increased capacity to control the implementation of the compulsory energy efficiency measures in different areas (buildings, appliances, industry, motor vehicles, municipalities, etc.). The cooperation with other governmental bodies, with responsibilities in these same areas, is crucially important.

The establishment of an Energy Agency is definitely a positive and needed act to strengthen the institutional capacity for energy efficiency in the country. However, the process of constructing the Agency seems to take a long time, and the number of employees will be gradually increasing until 2010 to reach 17.

The limited institutional capacity once again underlines the necessity to select priority areas, where to focus the attention and efforts. For example, managing the introduction of a building certificates system, and issuing and registering guarantees of origin for renewable electricity, are activities of a character to block the limited capacity of the Agency.

Macedonian government has made a strong step in the right direction by involving local authorities in energy efficiency strategic planning and programmes implementation by law. However, the decentralisation reform has put a heavy burden of new responsibilities on local authorities and the process of building all relevant capacities is progressing slowly. While specific capacity for energy efficiency is missing, the awareness of local authorities on energy efficiency is also not enough. As a result, the local energy efficiency programmes required by law are not developed and few activities are going on.

This situation entails explicit efforts to be done for awareness raising and capacity building for municipalities. Such activities are not particularly identified in the existing strategy and governmentally supported projects. Existing initiatives and networking activities of non-governmental actors on the local level could be supported and further developed. Another possibility is to include energy efficiency capacity building in existing and planned national and donor programmes for supporting the decentralisation process and local authorities.

Energy Market and Pricing

Macedonia has recently started the restructuring and privatisation of the energy sector. In the oil sector privatisation is completed and competitive market exists. The former vertically integrated state-owned power company ESM was unbundled into 4 major companies for generation, transmission and distribution, and the distribution is already privatised. The Energy Regulatory Commission is playing an important role in regulating the energy market.

However, the current structure and the applied single buyer principle in Macedonia do not provide for real competition on the internal electricity market. The electricity prices are relatively low and do not provide strong incentives for energy efficiency. There are cross-subsidies, which is not a sustainable approach. A positive move is the latest steep rise of the tariff for direct customers.

A rise in energy prices is unavoidable, as tariffs need to be adjusted to reflect the true cost of service. Introducing a market price of energy will improve the operational condition of domestic energy producers and also will provide significant motivation for energy saving on the consumers side. However, a pricing reform should be promoted well in advance, and should be combined with a social safety net and incentives for the electricity companies to provide energy services to the customers.

Financing Energy Efficiency

Very limited budget financial sources are allocated for energy efficiency activities. All significant funding of energy efficiency projects is done predominantly through international cooperation. Some positive signs in general commercial financing over the last three years did not influence energy efficiency financing so far. A number of barriers hamper the investment in energy efficiency both on the financial sector side, and on the customers' side. To address some of these barriers, the government of Macedonia initiated the Sustainable Energy Project, supported by the Global Environment Facility (GEF) and the World Bank.

The Sustainable Energy Project is aimed at introducing two very appropriate instruments for financing energy efficiency and small scale renewable initiatives, both based on market principles: ESCOs and loan/guarantee facility. They have good potential to promote energy efficiency, which should be explored. However, the lack of awareness and capacity within all participants in the process should be quickly overcome by specific measures, in order to make these instruments work.

Macedonia has developed the required institutional set-up for financing projects through the Clean Development Mechanism of the Kyoto Protocol. A national pipeline of eligible energy projects is created and there is further interest in some energy companies.

Specific Energy Efficiency Programmes and Measures

Two major problematic areas in Macedonia, as far as energy efficiency is concerned, are the wide use of electricity for domestic heating and the inefficient energy consumption in buildings. The Government has started addressing these problems, but they have not been given enough priority. A specific structured and resourced action is needed to successfully improve the situation. It should be based on an all-encompassing assessment of heating alternatives, combined with thermal retrofit of buildings. In the process, the potential for expansion and improvements of the existing heating systems should be explored, the prospects for gasification further developed, but also some new ideas like heat pumps and heating by renewables can be evaluated and utilised.

For buildings, the implementation of the existing regulations for thermal insulation of new constructions is not strictly controlled. Supervision of the buildings energy systems during construction is limited. Responsibilities for construction control of buildings are divided between the Ministry of Transport and Communication and the municipalities. The Ministry of Economy is responsible for the energy efficiency of buildings. Currently, the introduction of the building certificate system is planned and a draft Rulebook for it is to be developed. All these put strong requirements for coordination among responsible institutions and strengthening the existing building norms, permit and inspection procedures.

Recommendations

General Recommendations

- The Government should base its energy policy on solid quantified energy scenarios. These energy scenarios should take into account general economic development scenarios, particularly as regards industrial development.
- Given the limited financial resources of the country, the new energy strategy should identify a few priority actions, which have the highest impact for achieving the objectives.
- The new energy strategy should acknowledge the achievable energy efficiency potential and include it in its analyses of supply and demand scenarios. The role of energy efficiency in achieving the overall objective of energy security should be taken into account.
- The Government should ensure that strategy, policies and programmes have continuity, are amendable and scalable. The many positive elements of the 2004 Energy Efficiency Strategy should persist under the new energy strategy.

Energy Efficiency Policies, Legislation and Programmes

- The Government should prioritise its energy efficiency efforts in a limited number of activities where biggest results can be achieved. Action Plans with clear deadlines and quantitative goals for these priority areas should be adopted.
- The Government should undertake efforts to bridge the gap between the energy efficiency policy development and its implementation, and streamline adoption of secondary legislation and technical regulation.

Institutional Framework

- The Government should strengthen the mandate and capacity of the Ministry of Economy as a designated governmental body who is responsible for energy efficiency. The Government should ensure systematic cooperation between the Ministry of Economy and all other governmental bodies in matters relating to energy efficiency.
- The establishment of the Energy Agency is a positive step. However, its mandate as an energy policy implementation body needs to be refined. The government should also ensure that the Energy Agency is provided with adequate and sufficient resources to implement national policies in good coordination with the other actors in this area.

Energy Pricing

- The Government should send a clear message that current energy prices are not sustainable so as to allow the consumers to prepare for future adjustments.
- The energy prices should be cost-reflective.

- Pricing structures should eliminate cross-subsidies and should integrate formulae that promote energy efficiency and take care of vulnerable customers.
- Energy utilities should receive incentives and operate under conditions so as to develop and implement demand-side management (DSM) programmes.

Financing Energy Efficiency

- The inception of energy service companies (ESCOs) in Macedonia is a positive first step. The Government should follow the development and take further steps as required.
- The Government should further explore the opportunities for financing energy efficiency projects through the Clean Development Mechanism (CDM) under the Kyoto Protocol, including through programmatic and unilateral CDM projects.

Specific Energy Efficiency Programmes and Measures

Electricity Use for Heating

- Electricity use for heating is one, if not the highest, priority in the field of energy efficiency. The Government should consider launching a highly publicised Action Plan to alleviate this problem. The Plan should include: thermal retrofit of buildings, with public sector playing an exemplary role; assessment of heating alternatives; developing incentives for switching to alternative heat sources.
- The Government should consider appropriate ways to support low-income and vulnerable groups of the population to switch from electricity to other types of heating and to implement retrofit measures.

Buildings Energy Efficiency

- Energy performance of buildings is another priority area for the Government's energy efficiency efforts.
- Coordination between different governmental bodies (central and local), responsible for different aspects and levels of construction regulations and buildings management, should be improved.
- The building codes, approval and inspection procedures need to be reviewed, revised, and strengthened.
- Government bodies should provide a leading example by building and retrofitting according to high standards.

Local Authorities

- In the wake of ongoing decentralisation, it is essential that the Government assures that municipalities are enabled to take on energy responsibilities, particularly those related to energy efficiency.
- The devolution of financial prerogatives to local authorities (particularly as concerns payment of energy bills) should become an opportunity to raise their energy efficiency awareness.

- The Government should ensure training of local energy managers (building on existing network initiatives). The Government should investigate if energy training for local managers could not be included as a component in national and donor programmes for supporting the decentralisation process and local authorities.

Other Programmes

- The Government should see that the existing DH systems, with the necessary efficiency improvements, are maintained. Incentives for switching to more sustainable fuels should be considered.
- The Government should secure that policy makers in the area of transport at national and local level incorporate energy efficiency considerations in their plans.

Information and Awareness

- The Government should launch targeted public awareness raising programmes that can play an important role in the implementation of energy efficiency activities, particularly as elements of those in the priority areas mentioned.
- The Government should make sure that energy efficiency training is properly accredited and should see that trained energy experts can practice in governmental programmes.

Renewables and CHP

- The Ministry should make an evaluation of the programme for solar water heaters, and if it is successful, to assure its continuation, and transfer further implementation to the Energy Agency.
- The Government should pay increased attention to biomass, combustible renewable waste and methane recovery as renewable energy sources.

Annexes

Annex 1. Organisations Contacted by the Review Team

Ministry of Economy of the Republic of Macedonia

Energy Agency of the Republic of Macedonia

Energy Regulatory Commission of the Republic of Macedonia

Ministry of Finance

Ministry of Environment and Physical Planning

Ministry of transport and Communication

Macedonian Energy Association – Economic Chamber of Macedonia

ICEIM-MANU – The Research Centre for Energy, Informatics and Materials of the Macedonian Academy of Sciences and Arts

Macedonian Centre for Energy Efficiency MACEF

Faculty of Mechanical Engineering – Skopje

Macedonian Bank for Development Promotion (MBDP)

ESCO Company

AD MEPSO – Macedonian transmission system operator

AD ELEM

AD ESM-EVN

Toplifikacija AD – Skopje (District Heating Company)

Makpetrol AD – Skopje

AD GA-MA

OKTA AD – Skopje

Dervage Private Company

Annex 2. General economic and energy data

Table 6. Energy Balance

Indicators	<i>ktoe</i>							
	1992	1995	2000	2001	2002	2003	2004	2005
Total Primary Energy Production	1742	1810	1532	1572	1510	1568	1536	1461
Net imports	1188	961	1178	1037	1085	1094	1160	1277
Total Primary Energy Supply (TPES)	2930	2771	2710	2608	2595	2662	2696	2738
Total Final Consumption (TFC)	1656	1552	1610	1442	1549	1620	1632	1701

Source: IEA Energy Statistics, Electronic Version 2007

Table 7. Total Primary Energy Supply Structure

Products	<i>ktoe</i>							
	1992	1995	2000	2001	2002	2003	2004	2005
Coal and Coal Products	1546	1654	1344	1478	1291	1339	1330	1332
Crude, NGL and Feedstocks	1021	121	820	655	548	845	848	967
Petroleum Products	79	715	153	140	389	27	47	-57
Natural Gas	0	0	54	72	74	66	58	64
Hydro	73	69	101	54	65	118	127	128
Geothermal	0	15	16	23	13	13	12	12
Combustible Renewables & Waste	187	187	212	149	147	171	171	154
Electricity trade	24	10	10	37	68	82	101	138
Solar/Wind/Other	-	-	-	-	-	-	-	-
Total Primary Energy Supply	2930	2771	2710	2608	2595	2662	2696	2738

Source: IEA Energy Statistics, Electronic Version 2007

Table 8. Total Final Energy Consumption

Energy products	<i>ktoe</i>							
	1992	1995	2000	2001	2002	2003	2004	2005
Electricity	451	427	448	432	428	490	496	536
Heat	91	112	153	132	136	128	122	127
Petroleum products	811	662	679	594	731	697	715	733
Natural Gas	0	0	7	26	32	30	32	33
Coal	116	151	104	95	69	97	90	109
Combustible Renewables & Waste	187	187	204	143	141	165	166	151
Geothermal	0	13	15	21	12	12	11	11
Total Final Consumption	1656	1552	1610	1442	1549	1620	1632	1701

Source: IEA Energy Statistics, Electronic Version 2007

Table 9. Basic Energy Related Indicators

Indicators	1992	1995	2000	2001	2002	2003	2004
Population (million)	1.934	1.963	2.010	2.016	2.022	2.026	2.030
GDP (billion 2000 US\$)	3.449	3.100	3.587	3.425	3.454	3.551	3.653
GDP (billion 2000 US\$ PPP)	11.93	10.484	12.177	11.616	11.668	11.984	12.336
Primary Energy Intensity (TPES/GDP) (toe per thousand 2000 US\$)	0.85	0.894	0.755	0.762	0.751	0.75	0.738
Primary Energy Intensity ^{PPP} (TPES/GDP PPP) (toe per thousand 2000 US\$ PPP)	0.246	0.264	0.223	0.225	0.222	0.222	0.219
TPES/Population (toe per capita)	1.515	1.412	1.348	1.294	1.284	1.314	1.328
Electricity Consumption/GDP (kWh per 2000 US\$)	1.711	1.79	1.643	1.67	1.634	1.798	1.77
Electricity Consumption/Population (kWh per capita)	3050.67	2826.29	2931.34	2837.80	2791.79	3151.04	3184.24
Energy-related CO ₂ Emissions (Mt)	8.82	8.81	8.47	8.58	8.2	8.23	n.a.

Source: IEA Energy Statistics, Electronic Version 2006

Table 10. Electricity generation

Products	1992	1995	2000	2001	2002	2003	2004	2005
Coal and Coal Products	5158	5293	5209	5568	5119	5341	5160	5435
Petroleum Products	59	38	431	167	214	22	23	15
Hydro	848	801	1170	626	757	1374	1482	1492
Import	488	116	116	430	791	954	1175	1605
Total electricity generation	6065	6132	6811	6361	6090	6737	6665	6942

Source: IEA Energy Statistics, Electronic Version 2007

Table 11. Heat production

Products	1992	1995	2000	2001	2002	2003	2004	2005
Coal and Coal Products	649	669	635	433	532	415	413	364
Petroleum Products	3644	4911	4833	4385	4347	4494	4452	4583
Natural Gas	0	0	1663	1636	1520	1219	877	1035
Combustible Renewables and Waste	0	0	260	190	188	169	132	100
Total heat production	4293	5580	7391	6644	6587	6297	5874	6082

Source: IEA Energy Statistics, Electronic Version 2007

Annex 3. Selected end-use data tables

Table 12. Total Final Energy Consumption by Sector

Sectors	1992	1995	2000	2001	2002	2003	2004	2005
Residential	508	447	481	441	450	492	488	485
Industry Sector	686	511	531	457	437	467	462	547
Commercial and Public Services	53	69	143	119	231	253	226	352
Transport Sector	274	336	363	345	360	347	352	244
Agriculture/Forestry	61	142	56	57	33	28	61	37
Other/non-energy use	73	46	35	24	38	34	43	36
Total Final Consumption	1656	1552	1610	1442	1549	1620	1632	1701

Source: IEA Energy Statistics, Electronic Version 2007

Table 13. Final Energy Consumption of the Residential Sector

Energy products	1992	1995	2000	2001	2002	2003	2004	2005
Electricity	168	205	228	224	231	249	250	257
Heat	30	28	33	38	40	44	40	43
Oil products	116	20	34	35	36	39	40	41
Natural Gas	-	-	-	-	-	-	-	-
Coal and Coal Products	7	8	4	3	3	3	3	3
Combustible Renewables & Waste	187	187	182	142	140	156	155	140
Total Residential Sector	508	447	481	441	450	492	488	485

Source: IEA Energy Statistics, Electronic Version 2007

Table 14. Final Energy Consumption of the Services Sector

Energy products	1992	1995	2000	2001	2002	2003	2004	2005
Electricity	27	44	81	73	78	85	85	90
Heat	19	17	18	15	17	21	22	21
Oil products	0	0	41	29	131	134	100	121
Natural Gas	0	0	0	0	0	0	0	1
Coal and Coal Products	6	6	1	1	3	4	9	4
Combustible Renewables & Waste	0	0	0	0	0	7	8	5
Geothermal	0	2	3	0	1	2	2	2
Total Services Sector	53	69	143	119	231	253	226	244

Source: IEA Energy Statistics, Electronic Version 2007

Table 15. Final Energy Consumption of the Industry Sector

Energy products	1992	1995	2000	2001	2002	2003	2004	2005
Electricity	218	174	134	131	115	152	157	184
Heat	30	67	102	79	79	62	61	63
Oil products	335	133	186	129	147	131	133	161
Natural Gas	0	0	7	26	32	30	32	33
Coal and Coal Products	104	137	99	91	63	90	78	102
Combustible Renewables & Waste	0	0	2	1	1	1	2	5
Total Industry Sector	686	511	531	457	437	467	462	547

Source: IEA Energy Statistics, Electronic Version 2007

Table 16. Energy Consumption of the Industry Sector by Subsectors

Subsectors	1992	1995	2000	2001	2002	2003	2004	2005
Iron and Steel	295	187	168	160	141	237	249	327
Chemical and Petrochemical	47	55	8	11	12	11	10	10
Non-Metallic Minerals	30	26	109	115	120	104	102	110
Non-Ferrous Metals	63	96	88	69	64	17	1	2
Food and Tobacco	31	36	82	43	44	45	41	42
Mining and Quarrying	28	7	7	7	6	5	2	11
Construction	36	8	4	5	8	7	17	11
Textile and Leather	13	46	29	22	20	18	18	17
Non-specified/Other	143	50	37	25	21	23	21	18
Total Industry Sector	686	511	531	457	437	467	462	547

Source: IEA Energy Statistics, Electronic Version 2007

Annex 4. Electricity Prices for Final Consumers

		(den/kWh)*										
Consumers Categories		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007**	
1	110 kV	1.2912	1.2384	1.5162	1.6696	1.6089	1.4955	1.4980	1.6426	1.7991	2.7089	
2	35 kV	1.9987	2.0815	2.4475	2.6724	2.7076	2.8390	2.9394	2.7751	2.7046	2.7525	
3	10 (20) kV	2.2215	2.2586	2.7965	2.8242	2.7917	2.8213	2.8908	2.8715	3.0100	3.3108	
4	0.4 kV***:											
4.1	Households	1.8414	1.8641	2.3725	2.4019	2.4002	2.2838	2.2854	2.2887	2.3650	2.5430	
4.2	Other:											
	I tariff degree	2.5034	2.4683	3.0528	3.1025	3.0676	3.0804	3.2843	3.2865	3.4000	3.6418	
	II tariff degree	3.5724	3.5731	3.4494	4.7251	4.7135	4.8706	5.0431	5.0430	5.2100	5.6057	
4.3	Public lighting	2.3440	2.3153	2.9629	2.9896	2.9896	3.0937	3.2000	3.2000	3.3100	3.5339	
5	Distribution consumers**** average	2.0458	2.0954	2.6934	2.7792	2.7755	2.7265	2.7693	2.7773	2.8722	3.1035	
6	Whole system average	1.8537	1.9241	2.4813	2.5241	2.5391	2.4075	2.4253	2.4363	2.5606	2.9999	

Source: Energy Regulatory Commission of the Republic of Macedonia

* Exchange rate: 1 Euro = 61.1962 DEN (15.10.2007, National Bank of the Republic of Macedonia)

** 2007 prices are for the period January - July

*** There are four categories of consumers on 0.4 kV voltage level

**** Distribution consumers: 35, 10 (20), 0.4 kV

Annex 4. Energy Savings Potential by Sector

(From the Energy Efficiency Strategy of the Republic of Macedonia)

The energy programs suggested by the Strategy are estimated under high, medium, and low penetration levels. The actual penetration levels will reflect factors including energy pricing and billing practices (e.g., higher energy prices and increased use of consumption-based billing should produce higher penetration rates); marketing of the programs; and other energy policy and programme administration considerations including public education and training of specialists. The following table indicates the estimated percentages of energy use that can be saved per average participant and the total percentage saving for each sector under each penetration level.

Sector	Average Per-Participant Savings (%)	High Penetration Scenario	Medium Penetration Scenario	Low Penetration Scenario
Residential				
Penetration Rate %	---	25	20	15
Achievable Savings %	15	3.75	3.0	2.25
Commercial				
Penetration Rate %	---	40	30	20
Achievable Savings %	10	4.0	3.0	2.0
Institutional				
Penetration Rate %	---	50	40	30
Achievable Savings (%)	20	10.0	8.0	6.0
Street Lighting				
Penetration Rate %	---	40	30	20
Achievable Savings (%)	25	10.0	7.5	5.0
Industrial				
Penetration Rate (%)	---	40	30	20
Achievable Savings (%)	10	4.0	3.0	2.0

The following table shows the savings per sector relative to Macedonia's total energy use under the three penetration scenarios.

Programme	Sector Consumption MWh	Sector Consumption %	Average Per-Participant Savings (%)³⁰		Low Scenario %	Medium Scenario %	High Scenario %
Overall	6 439 000	100		% TOTAL	2.0	2.805	3.61
Residential	2 652 868	41.2	15%	% total	0.93	1.24	1.55
				Penetration Rate	15%	20%	25%
Commercial	643 900	10	10%	% total	0.20	0.3	0.4
				Penetration Rate	20%	30%	40%
Institutional	283 316	4.4	20%	% total	0.26	0.35	0.44
				Penetration Rate	30%	40%	50%
Industry/ Agriculture	1 738 530	27	10%	% total	0.54	0.81	1.08
				Penetration Rate	20%	30%	40%
Street Lighting	90 146	1.4	25%	% total	0.07	0.105	0.14
				Penetration Rate	20%	30%	40%

³⁰ The estimated electrical savings percentage column represents the savings potential for each sector. These values must be multiplied by the respective penetration rate to obtain the overall impact for each sector. For instance, the residential sector with a medium penetration rate of 20% would be expected to have an overall savings of 3% of the electrical energy consumed in the sector (15% times 20%) which when related to the overall electrical demand represents 1.24% of the overall electrical energy demand.

Annex 5. Information Sources

- Document of the World Bank, Report No. 38840-MK, International Bank for Reconstruction and Development and International Finance Corporation Country Partnership Strategy for the Former Yugoslav Republic of Macedonia for the Period FY07-FY10, March 2, 2007, <http://www.worldbank.org>
- Energy Efficiency Strategy of the Republic of Macedonia, prepared with USAID funding by Nexant, Inc., ICEIM-MANU, Consumers Organisation of Macedonia, Timel Project Engineering, December 2003
- Energy Law, 11 May 2006
- Energy Profile Macedonia, Austrian Energy Agency, enerCEE, www.energyagency.at/enercee/mk
- Household Survey on Energy Use, Component III of the Efficient Energy Distribution Project, Presentation by Jurg Nipkow, Swiss Agency for Efficient Energy Use S.A.F.E., Zurich, 2005
- In-depth Report on the Investment Climate and Market Structure in the Energy Sector of the Republic of Macedonia, Energy Charter Secretariat, 2006
- Macedonia's First National Communication under the United Nations Framework Convention on Climate Change, Ministry of Environment and Physical Planning, Skopje, 2003
- Macedonia, Former Yugoslav Republic of, Sustainable Energy Project, Project Appraisal Document, November 27, 2006
- Macedonian Transmission System Operator (MEPSO) Report, Skopje, December 2006
- Monograph "40 Years Toplifikacija AD-Skopje"
- Natasa Markovska, D.Sc., Sector Analysis Report: Energy, Support to the Preparation of a National Strategy for Sustainable Development in the Republic of Macedonia, A Sida-funded project in cooperation with the Ministry of Environment and Physical Planning, the Republic of Macedonia, 2007
- National Programme for Adoption of the *Acquis Communautaire*, Republic of Macedonia, Government of the Republic of Macedonia, Skopje, April 2007
- National Strategy for Clean Development Mechanism for the first commitment period of the Kyoto Protocol 2008 – 2012, UNDP, Skopje, 2007
- National Road Transport Strategy of the Republic of Macedonia, Ministry of Transport and Communications, 2007
- Pre-accession Economic Programme 2007-2009, Republic of Macedonia, Skopje, November 2006
- Regional Urban Heating Policy Assessment, Part I, Alliance to Save Energy/Municipal Network for Energy Efficiency, July 2007
- Republic of Macedonia: National Development Plan 2007 – 2009, Skopje, February 2007
- Strategy for the Former Yugoslav Republic of Macedonia, Document of the European Bank for Reconstruction and Development, As approved by the Board of Directors at its meeting on 11 July 2006, <http://www.ebrd.org/country/index.htm>
- State Statistical Office website, <http://www.stat.gov.mk>
- The Former Yugoslav Republic of Macedonia 2006 Progress Report, Commission of the European Communities, SEC (2006)1387, Brussels, 08.11.2006, <http://www.delmkd.ec.europa.eu/en/bilateral-relations/SEC%202006%201387%20PROGRESS%20REPORT.pdf>
- Transition report update 2007, EBRD, May 2007, <http://www.ebrd.com/pubs/econo/tru07.pdf>