

*In-depth PEEREA Review
of Energy Efficiency Policies and Programmes
of Bulgaria*

**Energy Charter Protocol on Energy Efficiency and
Related Environmental Aspects (PEEREA)**

Energy Charter Secretariat

2002

INTRODUCTION

The Energy Charter Treaty was signed in December 1994 and entered into legal force in April 1998. To date the Treaty has been signed or acceded to by fifty-one states.¹ The Treaty was developed on the basis of the European Energy Charter of 1991. Whereas the latter document was drawn up as a declaration of political intent to promote East-West energy co-operation, the Energy Charter Treaty is a legally-binding multilateral instrument covering investment protection, liberalisation of trade, freedom of transit, dispute settlement and environmental aspects in the energy sector.

The Energy Charter Conference, the governing and decision-making body for the Energy Charter Treaty, meets on a regular basis - normally twice a year - to discuss policy issues affecting East-West energy co-operation, review implementation of the provisions of the Treaty, and consider possible new instruments and projects on energy issues. All states who have signed or acceded to the Treaty are members of the Conference. Regular meetings of the Conference's subsidiary groups on transit, trade, investment and energy efficiency and environment are held in between Conference meetings.

THE ENERGY CHARTER PROTOCOL ON ENERGY EFFICIENCY AND RELATED ENVIRONMENTAL ASPECTS

The Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) is a legally-binding instrument that was signed together with the Energy Charter Treaty in December 1994 by the same 51 states that signed the Treaty itself. It requires its Signatories to formulate energy efficiency strategies and policy aims, to establish appropriate regulatory frameworks, and to develop specific programmes for the promotion of efficient energy usage and the reduction of harmful environmental practices in the energy sector.

Implementation of PEEREA is kept under review and discussion by the Energy Charter Working Group on Energy Efficiency and Related Environmental Aspects. A key feature of the Working Group's activities is the development of a series of in-depth reviews of individual states' energy efficiency policies and programmes. Recommendations to the authorities of the states concerned resulting from these in-depth reviews are presented I ~ to the Energy Charter Conference for discussion and endorsement.

For further information on PEEREA and the in-depth energy efficiency review series, contact Mr Tudor Constantinescu at the Energy Charter Secretariat in Brussels (Tel: +322 775 9854)

¹ Albania, Armenia, Austria, Australia, Azerbaijan, Belarus, Belgium, Bosnia and Hercegovina, Bulgaria, Croatia, Czech Republic, Cyprus, Denmark, Estonia, European Commission, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Mongolia, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, Uzbekistan, United Kingdom.

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Executive summary

Bulgaria is a middle size country situated in South-East Europe with a population of 7.8 million and a surface area of approximately 110 910 km². After more than four decades of communist dictatorship, democratisation started in 1990. During the mid nineties, Bulgaria suffered a severe economic crisis, from which the country is gradually recovering following the introduction of the IMF currency board system in 1997. Accession to the European Union is a priority for the Government.

The Bulgarian energy sector, which is characterised by a high share of solid fuels and nuclear energy and a high import dependence, has been the subject of cautious restructuring, with the objective of establishing a financially viable sector and a competitive energy market.

In the electricity sector, the former monopoly supplier NEK EAD (National Electricity Company) has been split up in seven state-owned independent distribution companies and several independent electricity producers. NEK still owns the transmission network and a major part of the generation plants, including the Kozloduy Nuclear Power Plant and the major thermal and hydro plants. The natural gas sector is dominated by Bulgargaz EAD, although an accounting separation between transmission, storage and distribution activities has been completed. Deliveries are mainly to large industrial consumers and district heating plants, distribution networks for small and residential consumers have still to be developed. District heating companies are state or municipality owned and are in the process of being restructured and modernised.

The Government's strategy for restructuring and subsequent privatisation of the electricity and gas sectors has been laid down in the "National Strategy for Development of Energy and Energy Efficiency until 2010", published in 1998 (the "National Strategy") and the Energy and Energy Efficiency Law (EEEL) of 1999.

The main objectives of Bulgarian energy policy, as formulated in the National Strategy are: (i) security of supply at minimum cost, (ii) to ensure nuclear safety, (iii) to increase energy independence through the application of local energy resources, (iv) rational use of energy and the utilisation of renewable energy sources, (v) energy sector development in conformity with environmental requirements, (vi) the establishment of a competitive domestic energy market and (vii) the integration of the Bulgarian energy system and market into those of the European Union.

The Energy and Energy Efficiency Law of 1999, which at the time of writing this report is subject to amendments, aims at providing conditions for (i) development of an up-to-date competitive energy market, (ii) attraction of investments and privatisation in the energy area, (iii) least cost energy supply, (iv) improvement of energy efficiency, (v) encouragement of the use of renewable energy sources and (vi) integration of the Bulgarian energy system and energy market into the European ones. The EEEL sets the legal framework for the electricity, natural gas and district heating sectors; defines licensing procedures and public service obligations, and provides the legal basis for the establishment and operation of governing bodies for state management and state regulation in the energy sector (see below).

Energy prices have increased gradually since 1993, they are however still below their real costs. A "pricing policy providing for a gradual transition to real prices and self-funding of the industry", taking into consideration social factors, is therefore a priority for the

Government. Prices and tariffs are set by energy enterprises in conformity with mandatory rules adopted by the Council of Ministers and submitted to the State Energy Regulatory Commission (SERC) for approval. Specific problems exist in the district heating sectors, where household prices are still subsidised from the budget. The Government's strategy in this area aims to gradually remove subsidies without losing too many customers, while increasing investors' interest. A programme for target-oriented monetary assistance for space heating costs to low income persons and families has been applied since 1999, providing subsidies from the social care budget.

According to the EEEL, transmission and distribution enterprises are obliged to purchase electricity and heat produced from renewable energy sources and by co-generation plants "in quantities and at preferential prices" determined by a procedure and at conditions set by the Council of Ministers.

While various environmental levies and taxes exist in Bulgaria, which are allocated to environmental funds (see below), import duty exemptions are in place for i.a. renewable energy equipment and components for the production of energy saving lamps.

The industry sector is still the largest final energy user (46%), followed by households (23%), transport (20%), services (3%) and agriculture (3%). The primary energy intensity in 1999 was 1.57 Mtoe/billion 1995 US\$, compared to the final energy intensity of 0.85 Mtoe/billion 1995 US\$ and a per capita consumption of 2.22 toe/capita. While major energy savings are expected in industry, as a result of restructuring and modernisation, energy consumption trends in the residential, service and transport sectors suggest that Government intervention will be needed in order to eliminate inefficiencies.

Government energy efficiency policies in Bulgaria – as stipulated in the "National Strategy" and in the EEEL – are largely based on regulation, creating the appropriate institutional framework, as well as pricing and tariff setting policy. While many energy efficiency measures proposed in the "National Strategy" and in the EEEL refer to the supply side, some regulatory measures refer to the demand side, in particular standards and indicators in industrial processes, building standards and appliance labels and standards in accordance with EU regulations. Mandatory metering and heat energy accountancy in district heating is under consideration.

In the framework of the SAVE II Programme of the European Commission, a "Study on the Possibility for an Implementation of a Wide Spread Energy Saving Programme in Bulgaria" has been prepared. The study provides a database for energy saving measures, and proposes a National Energy Saving Programme (until 2006) and a short-term National Energy Saving Action Plan (see section 6, box 1). There is certainly a need for such programmes, taking into consideration that most energy efficiency initiatives so far have been realised on a project base or in the framework of specific programmes carried out by different entities and funded by various international and bilateral donors.

Institutional responsibilities for the formulation and implementation of energy and energy efficiency policies are defined in the EEEL of 1999. It is probably a peculiarity of the Bulgarian system, that both energy and energy efficiency policy are (still) not under the responsibility of a specific ministry, but are dealt with by the Council of Ministers, who has delegated certain preparatory and executive tasks to two state agencies and a regulatory Commission: the State Energy and Energy Resources Agency (SEERA), who is responsible

i.a. for energy policy formulation, preparation of sector legislation and indicative planning; the State Energy Efficiency Agency (SEEA), responsible for the “state energy efficiency policy” and the State Energy Regulatory Commission (SERC). Some changes in this institutional structure are currently being discussed.

SEEA assumes a central role in the energy efficiency field, which includes policy formulation and implementation, proposing energy efficiency programmes and legislation and other tasks and competences related to data collection and analysis, training, dissemination, project inception, etc.

In addition to SEEA, the Ministries of Economy, Environment and Water and Regional Development and Public Works are also involved – at various degrees - in energy efficiency issues. Mention should in particular be made to the Centre for Energy Efficiency in Industry, established in co-operation with the Japanese International Co-operation Agency and hosted by the Ministry of Economy.

In addition to the state institutions, various energy and energy efficiency centres have been established on the national, regional and municipal level, e.g. the Sofia Energy Centre, the Centre for Energy Efficiency EnEffect and several regional energy agencies and centres. All these organisations receive public funding, in particular from international and bilateral institutions like EU co-operation programmes, USAID, etc. Funding of energy efficiency projects is still not a common practice in Bulgaria, although there are several initiatives to encourage local banks and energy service companies (ESCOs) to engage in this field.

Environmental policy in Bulgaria is under the responsibility of the Ministry of Environment and Water (MoEW). The Environmental Protection Act defines financial mechanisms to support environmental projects: the National Environmental Fund and the Municipal Environmental Funds, which are financed i.a. from environmental and fuel consumption charges.

The MoEW is also responsible for developing, co-ordinating and implementing Bulgaria’s obligations under the United Nations Framework Convention on Climate Change (UNFCCC) and has published the National Climate Change Action Plan. Many GHG mitigation measures proposed in the Action Plan relate to energy efficiency, both in the energy supply sector and on the demand-side. According to the Kyoto Protocol, signed by Bulgaria as an Annex B country, Bulgaria has the obligation to reduce its GHG emissions by 8% during the period 2008 – 2012, compared to the base year 1988. The Bulgarian Government also supports the joint implementation mechanism under the UNFCCC. A Project Preparation Unit and a Joint Implementation Unit with Bulgarian and Dutch participation have been established, hosted by the SEEA

In the framework of the negotiations between the European Union and Bulgaria following the 1999 “Understanding between the Republic of Bulgaria and the European Commission concerning Kozlodoy NPP”, at least 15% of the funds provided in the framework of the closure of Units 1 and 2 of the Kozlodoy Nuclear Power Plant will be directed to energy efficiency.

In summary, while gradually progressing in increasing energy efficiency and improving environmental protection, Bulgaria has reached a critical phase in these efforts, which is characterised by the need to achieve the steps: (i) from policy formulation to implementation,

(ii) from a focus on supply side efficiency to the demand side, (iii) from isolated energy efficiency projects to coherent programmes, (iv) from diversity of institutions to an effective coordination of this diversity - while safeguarding the importance of energy efficiency within overall energy policy and institutional setting, and (v) from almost exclusive funding from international and bilateral donors to dedicated state budgets and specific financing instruments.

In the opinion of the review team, specific attention should be given to the following key issues: (i) to formulate and implement well-defined programmes and actions to promote energy efficiency, as suggested in the National Energy Saving Programme and Action Plan, (ii) to create the conditions for effective funding of energy efficiency projects – from public and private sources, (iii) to combine legal instruments to promote energy efficiency by complementary financial, institutional and human-behaviour related instruments, (iv) to better define state responsibility to coordinate actors and stakeholders in the energy efficiency field, (v) to fully eliminate the remaining cross-subsidies in the electricity, natural gas and district heating sectors and (vi) to take full advantage of the Joint Implementation Mechanisms and the agreements with the European Union regarding the closure of units of the Kozlodoy NPP, in order to promote energy efficiency and renewable energy.

Based on the findings of the review team, the report provides a series of recommendations to the Government of Bulgaria, which – in addition to general recommendations referring to overall energy efficiency policies, strategies and programmes – relate to areas like: the institutional framework for energy efficiency, energy pricing, energy efficiency funding and fiscal policies, the implementation of specific energy efficiency measures, the promotion of renewable energy and cogeneration, as well as data collection, monitoring and forecasting.

In-depth Review of Energy Efficiency Policies and Programmes of Bulgaria

1. Introduction to the PEEREA Review

In September 2001, a team of representatives from the Working Group of the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects reviewed the energy efficiency policies and programmes of Bulgaria.

The role of the in-depth energy efficiency review undertaken on a peer basis by the Working Group is to enhance the level of co-operation amongst contracting parties (Article 3.1). The in-depth review is also being used to assess progress, promote continuous dialogue and transfer information.

The review team comprised Mr. O. Studenec of Slovak Republic who chaired the review, Mr. E. Calikoglu of Turkey, Mr. T. Hammar of Denmark and Mr. V. Shakhin of Russian Federation. Mr. T. Constantinescu of the Charter Secretariat and Mr. W. Lutz, consultant to the Secretariat, supported the review team.

Organisations visited are included in Annex 4.

The review team wishes to express its thanks to all Bulgarian participants in meetings for the period of the review. Special thanks go to officials of the Ministry of Economy and of the State Energy Efficiency Agency (SEEA), who also undertook all the preparation of the mission, completing the PEEREA questionnaire and providing background papers and other information as requested.

The report is based on material provided by Bulgaria as well as data and analyses from various other sources, including the International Energy Agency, OECD, UNFCCC, NOVEM and other related materials. Statistical data are presented according to the most actual data available.

2. Overview

Bulgaria is a middle size country in South-East Europe with a population of 7.8 million and a surface of about 110 910 km². Bulgaria is situated in the Balkan Peninsula and comprises both mountain areas (the Balkan and the Rodope mountains) and lowlands (the Danubian plain in the north and lowlands between the Balkan and Rodope mountains). The Danube river forms to a large extent the northern frontier with Romania; other neighbouring countries are Yugoslavia, the Former Yugoslav Republic of Macedonia, Greece and Turkey. In the East, Bulgaria borders the Black Sea, where the important sea port of Varna is located.

The capital of Bulgaria is Sofia, with a population of more than 1 million inhabitants. Other important cities include Plovdiv, Varna, Stara Zagora and Ruse.

Figure 1: Bulgaria



After more than four decades of Communist dictatorship, first steps towards democratisation were undertaken in 1990; in July 1991 a new Constitution was approved. In the following years, the economic crises in the Former Soviet Union (the main foreign trade partner of Bulgaria) and UN sanctions against Yugoslavia resulted in important losses of income for the country. In 1999, exports amounted to an estimated US\$ 3.8 billion, compared to imports of US\$ 5.3 billion. Main import-export partners are Russia, Germany, Italy, Greece and Turkey.

In 1997, the IMF currency board system¹ was introduced which succeeded in stabilising the economy, overcoming the triple digit inflation of 1996 and 1997. Following declines in GDP in both 1996 and 1997, the economy grew an estimated 3.5% in 1998 and 2.5% in 1999. In 1998, the IMF approved a three-year Extended Fund Facility, which provides credits worth approximately US\$ 900 million. In 1999, an unfavourable international environment – primarily caused by the Kosovo conflict – and structural reforms slowed economic growth. The Government’s structural reform programme includes: (i) privatisation and, where appropriate, liquidation of state-owned enterprises, (ii) liberalisation of agricultural policies, (iii) reform of the country’s social insurance programmes and (iv) reforms to strengthen contract enforcement and fight crime and corruption.

In 1999, the GDP was US\$ 11.6 billion using nominal exchange rates and US\$ 38.2 billion using purchasing power parities (US\$ 1995). GDP is estimated to come 50% from services, 29% from industry and 21% from agriculture.

¹ Under the currency board system, the Bulgarian Lev was tied to the German Mark at a fixed exchange rate. The currency board also includes automatic convertibility and backing up of the BGL by foreign exchange reserves hold by the Bulgarian National Bank.

Accession to the European Union is a priority for the Government, this includes the endeavour to adopt the stipulations of the *acquis communautaire* in the energy field. Energy and energy efficiency are also part of the Accession Partnership Project, financed by PHARE.

Figure 2: Total primary energy supply per energy carrier

Source: SEEA, 2001

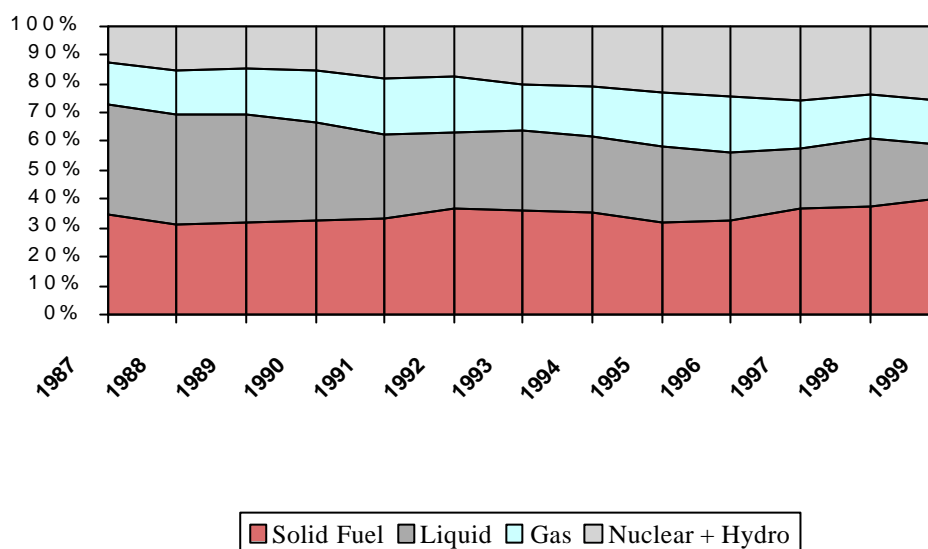
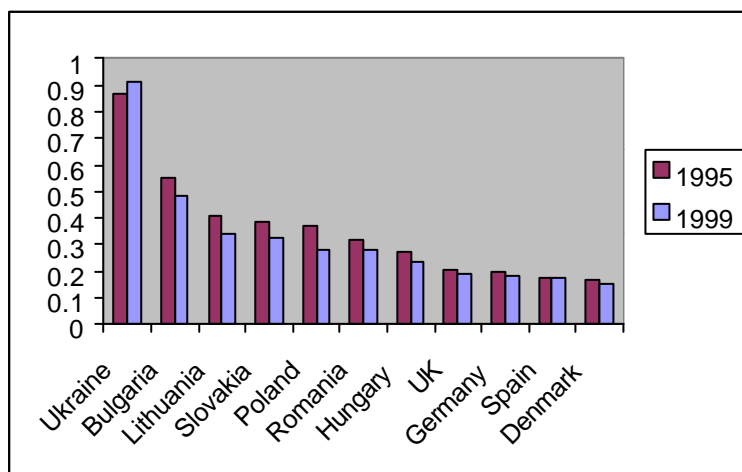


Figure 2 shows the shares of energy carriers in the total primary energy supply of Bulgaria during the period 1987 - 1999. In general, the consumption of solid fuels, nuclear and hydro energy has increased, while the consumption of natural gas has remained more or less constant and the consumption of liquid fuels has been declining.

Bulgaria is a net energy importer: about 60% of the required primary energy resources are imported. The energy intensity of the Bulgarian economy is about double that of countries with developed market economies (see figure 3, based on IEA data).

Figure 3: Energy intensity in selected countries (Mtoe / billion 1995 US\$ PPP)



The energy sector is subject of cautious restructuring, with the objective to establish a financially viable sector and a competitive energy market.

The main features of the energy sector organisation are:

In the electricity sector, the former monopoly supplier NEK EAD (National Electricity Company) has been split up in seven state-owned independent distribution companies and several independent electricity producers. NEK still owns the transmission network and a major part of the generation plants, including the Kozloduy Nuclear Power Plant and the major thermal and hydro power plants. The total installed generation capacities before the start of the licensing were 13 183 MW, of which 6 553 MW thermal power plants (including 2 033 industrial and district heating CHP plants), 3 760 MW nuclear and 2 870 MW hydro power plants. According to the “National Strategy for Development of Energy and Energy Efficiency until 2010” (see section 3), the Government is aiming at the technical rehabilitation of existing and the construction of new generating capacity in order to meet future electricity demand, taking into consideration also the decommissioning of several units of the Kozloduy NPP.

In according to the Energy and Energy Efficiency Law (EEEL) of 1999 (see section 3), the Government aims at a two-stage reform of the electricity sector: in a first stage, originally scheduled from 1998 to 2001, reforms concentrate on the restructuring and desintegration of NEK, including accounting separation, the introduction of transparent tariffs for end users and for transactions among producers, transmission and distribution companies, and to create equal conditions for independent electricity producers. This first stage of reforms foresees also in the privatisation of substantial parts of the assets of NEK, including the establishment of joint ventures and of subsidiaries with 100% NEK participation. In a second stage, scheduled for the period 2001 – 2010, the Government intends to complete the privatisation process and to introduce market mechanisms into the sector, in accordance with EU-Directive 96/92/EC. The Government aims at the introduction of the Single Buyer Model as an interim stage.

The natural gas sector is dominated by Bulgargaz EAD, although accounting separation between transmission, storage and distribution activities has been completed. Bulgargaz also owns the two transit pipelines to Turkey and FYROM respectively (fees for transit are paid on a barter system). Bulgaria receives almost 100% of its natural gas supplies from Russia, Bulgargaz being the sole importer. Deliveries are mainly to large industrial consumers, distribution networks for small and residential consumers have still to be developed. The development of distribution networks is a policy priority of the Government.

Similar to the electricity sector, also reforms in the natural gas sector are scheduled in two stages: a first phase from 1998 to 2001 aiming mainly at the introduction of natural gas in the residential sector and some internal reforms of Bulgargaz and tariff reform and a second phase, scheduled from 2001 to 2010, which will focus on the step by step liberalisation of the sector and privatisation of Bulgargaz. Full liberalisation of the gas market is planned for the period after 2010. According to the EEEL, more than 30 licences for natural gas distribution have been issued. More than two thirds of these licences have been acquired by Overgas Inc., a subsidiary of Russian Gazprom.

Like in many countries in transition, the coal sector is characterised by the closure of uneconomic mines and the restructuring and privatisation of the remaining operations. The Council of Ministers has adopted an “Actualised Plan for the Accelerated Privatisation of the Coal Mining Subsector”.

Also the district heating sector is - like in other Central and Eastern European countries – an area of concern. Problems include consumer dissatisfaction, leading to an increasing number of disconnections; high capital requirements for the rehabilitation of district heating systems and the insulation of homes, and – in the future – an expected increase in market share of natural gas. All district heating companies in Bulgaria are state-owned, except the Sofia district heating company, which is owned by the Sofia municipality.

Accounting separation between the district heat generation and distribution activities has been finalised. The programmes for finance and production stabilisation of district heating companies with gradual reduction of state subsidies are in the process of execution. The “Actualised action plan for restructuring of commercial companies from district heating systems” has the task to stabilise, in the long term, the planned competitive shareholding companies with participation of municipalities, Bulgarian and foreign investors.

The State Agency for Energy and Energy Resources (see below), in coordination with the Ministry of Finance, has developed in June 2000 a “Strategy for the Development of the District Heating for 2000 – 2005” (see sections 5 and 6).

Environmental issues are gaining importance in the Bulgarian energy sector. Many measures proposed in the framework of the National Climate Change Action Plan of the Ministry of Environment and Water refer to energy, both on the supply and demand side. Bulgaria joined the United Nations Framework Convention on Climate Change (UNFCCC) as an Annex I country and has committed itself under the Kyoto Protocol to reduce greenhouse gas emissions by 8% in the time period 2008 – 2012, with 1988 as base year (see section 8).

Bulgaria has ratified the Energy Charter Treaty and the Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) in 1996.

3. Main Energy Policy Highlights

In August 1998, the former Committee of Energy published the “National Strategy for Development of Energy and Energy Efficiency until 2010”, which is the basic energy policy document of the country. The Strategy also served as basis for the Energy and Energy Efficiency Law (EEEL), adopted by Parliament in June 1999.

The main objectives of Bulgarian energy policy, as formulated in the National Strategy are: (i) security of supply at minimum cost, (ii) to ensure nuclear safety, (iii) to increase energy independence through the application of local energy resources, (iv) rational use of energy and the utilisation of renewable energy sources, (v) energy sector development in conformity with environmental requirements and (vi) the establishment of a competitive domestic energy market as well as (vii) the integration of the Bulgarian energy system and market into the European Union ones.

The following actions are stipulated in the Strategy to achieve the above mentioned targets:

- Further improvement of normative legislation, harmonised with EU legislation in accordance with the requirements of the Internal Energy Market;
- Finalisation of the structural, market oriented reform of all sub-sectors of the energy sector; further encouragement of competitiveness and privatisation in the sector;
- Improvement of the market policy with regard to energy carriers, in order to guarantee the protection of national, social and consumer interests and “balanced economic regulation” of energy companies acting as a natural monopoly;
- Development of research and technological modernisation in the energy sector;
- Diversification of fuel supplies and optimal use of local energy resources;
- Investigation and implementation of the potential of energy consumption reduction in the industrial, commercial and residential sectors;
- Implementation of environmental legislation in the energy sector;
- Involvement of foreign investments.

The Strategy deals basically with the short and medium term development requirements and paths of the energy supply, in particular in the electricity, coal mining, district heating and natural gas sectors. Separate chapters are dedicated to energy efficiency; environmental policy; structural reform and privatisation of the energy sector; price and tariff setting policy, and EU accession policy and its effect on the Strategy.

The main directions of the Strategy may be summarised as follows:

- A balanced development of electricity generation capacities, including rehabilitation and modernisation of thermal and nuclear facilities, closure of obsolete or unsecure plants, construction of new coal, hydro, nuclear, and natural gas based capacities;
- Development and modernisation of profitable coal mining in combination with thermal power generation;
- Rehabilitation and restructuring of district heating systems;
- Promotion of natural gas in the residential sector and improvement of individual heating systems;
- Promotion of energy efficiency, based on regulatory measures and price and tariff policy;
- Recultivation of lands used by open pits mines, flue gas desulphurisation and clean combustion technologies in power stations;
- Application of the Energy and Energy Efficiency Law (subsequently approved by Parliament in June 1999), in order to prepare for structural reform in line with EU requirements and the privatisation process.

Based on the National Strategy for Development of Energy and Energy Efficiency until 2010, the Energy and Energy Efficiency Law was enacted in 1999. According to Art. 2(2), the Law pretends to provide conditions for (i) development of an up-to-date competitive energy market, (ii) attraction of investments and privatisation in the energy area, (iii) least cost energy supply, (iv) improvement of energy efficiency, (v) encouragement of the use of renewable energy sources and (vi) integration of the Bulgarian energy system and energy market into the European ones.

In its main lines, the Law provides the legal basis for:

- The establishment and operation of governing bodies for state management and state regulation in the energy sector: the State Energy and Energy Resources Agency (SEERA) and the State Energy Regulatory Commission (SERC);
- The specific attributes and tasks of these agencies, including energy policy preparation and implementation, energy forecasting and planning (SEERA); issuing permits and licences, define the general terms of contracts for the sale of electricity, heat and natural gas; propose mandatory rules of price and tariff setting; approval of prices and tariffs proposed by energy enterprises, etc. (SERC), (see section 7);
- Licences for generation, transmission and distribution of electricity, heat and natural gas;
- Public service obligations of energy enterprises;
- Electricity generation, transmission and distribution, including the rights of independent power producers; the duties of the transmission enterprise; defined areas for electricity distribution and duties of distribution enterprises; rules for transactions between generators, the transmission enterprise and distributors, and rules for electricity supply to consumers;
- Heat generation and distribution, including rules for the operation of district heating networks and commercial relations between heat producers, “supply agents”, distributors and consumers;
- Natural gas import and export; transmission, transit, storage, and distribution;
- The agency responsible for energy efficiency (SEEA) and the instruments foreseen to implement energy efficiency (elaborated in more detail in section 6);
- Administrative penal and other provisions.

Some stipulations of the EEEL are of particular relevance for energy efficiency and renewable energies:

- Transmission and distribution enterprises shall purchase electricity and heat produced from renewable energy sources and by cogeneration plants in quantities and at preferential prices (to be determined by the Council of Ministers) (Art. 22(2) and 100)²;
- In the process of electric load scheduling, the transmission network operator shall give priority to power plants utilising renewable energy sources or waste, and to cogeneration plants (Art. 85(2)).

Energy enterprises are obliged by the law to implement “energy savings options” (Art. 9(1)) and are allowed to incorporate in their tariffs “economically justified costs” for the “achievement of energy efficiency” (Art. 16(3)), although within the framework of the enterprises’ operations (supply side) only.

In order to comply with EU legislation, amendments to the EEEL are under preparation. These amendments mainly relate to restructuring of the energy sector, market liberalisation, more autonomy of the regulatory body and the promotion of local, renewable and environmentally friendly energy resources.

4. Energy pricing and taxation

Under central planning, energy prices in Bulgaria were set artificially at levels significantly below their real costs. As a result, there was little incentive to use energy efficiently. A

² It appears however, that the level at which these preferential prices are fixed at present is not sufficient to make electricity generation from renewables and cogeneration attractive.

process of increase of energy prices was started in 1993 under the pressure of the decreased possibilities of the budget to subsidise them.

Part of the plans for restructuring of the energy sector, as formulated in the National Strategy for Development of Energy and Energy Efficiency until 2010 and the Energy and Energy Efficiency Law of 1999, is a “pricing policy providing for a gradual transition to real prices and self-funding of the industry”, taking into consideration social factors. Price and tariff regulation is among the central tasks of the State Energy Regulatory Commission (SERC).

Part of the strategy in the electricity industry is the determination of separate internal calculation prices of the generation, transmission and distribution prices of NEK; separate accounting of the activities of heat production and heat distribution of heating companies, and the development of regulations of forming differentiated natural gas prices.

In accordance with the Energy and Energy Efficiency Law (Art. 16), the SERC shall be guided by i.a. the following principles: to take into consideration economically justified cost (specified in detail in the Law) and the prohibition of cross-subsidisation of consumers and producers. Prices shall be set by energy enterprises in conformity with the mandatory rules adopted by the Council of Ministers and submitted to the Commission for approval.

At present, electricity tariffs cover the operational costs of the National Electric Company, however are below the long-term marginal costs.

A potentially interesting provision of the Energy and Energy Efficiency Law is that the transmission and distribution enterprises are obliged to purchase electricity and heat produced from renewable energy sources and by cogeneration plants “in quantities and at preferential prices” determined by a procedure and at conditions to be determined by the Council of Ministers (see section 3).

The prices of liquid fuels and natural gas have shown continuous growth over the past years.

A steep increase of the liquid fuel prices was observed in 1994 when VAT was introduced and in 1995 when excise duties went up from 35% to 70% respectively 110% for gasoline (depending of the grade) and from 25% to 30% for diesel fuel. Since 1996 the excise duty for unleaded gasoline is set to be 10 points lower compared to the ordinary gasoline. There is an additional 19% tax for liquid fuels.

Natural gas prices are formed based on the cost of the import and delivery of the fuel to the final consumers through the high, medium and low pressure pipeline network. The domestic trade prices are limited. They depend on the demand volume and on the average international prices for the previous one month period, as well as on the average exchange rate for the same period. The duties (5%), taxes (22%) and trade surplus charge (up to 11%) are added to form the end user price. The prices are calculated by the supplier Bulgargaz EAD and approved by the regulatory agency. The low pressure natural gas distributors can add a surplus charge of maximum 4%. Differentiated prices for industrial and residential consumers are planned for the future taking into consideration the gas consumption mode, consumed volumes, etc.

Heat from district heating companies is delivered to industrial plants at marginal prices based on the individual costs of each generation plant. For households, fixed heat prices are applied, which are still subsidised from the budget. As of 1 January 2000, the fixed price for

households has been increased by 12% to BGL 36.41 / MWh. In October 2001, the heat price increased again by 10%. The Governments strategy is to increase heat prices in steps in order to gradually remove subsidies without losing too many district heat customers. Phasing out subsidies is supposed to stabilise the district heating sector and to increase investors' interest.³

In 1999 during the autumn-winter heating season the Government implemented a programme for target-oriented monetary assistance for space heating costs to low income persons and families. The target oriented assistance was extended in 1999 to 12% of the population and 19.4% of the households. According to data of the National Statistics Institute and the Ministry of Labour and Social Policy the households that could qualify as a target group were 630 000 on average. The Council of Ministers Decision 25 of 27 November 2000 adopted amendments and additions to the Social Care Law Regulations, granting around 30% more aid than the previous year, including support for modernisation of heat accounting system of buildings.

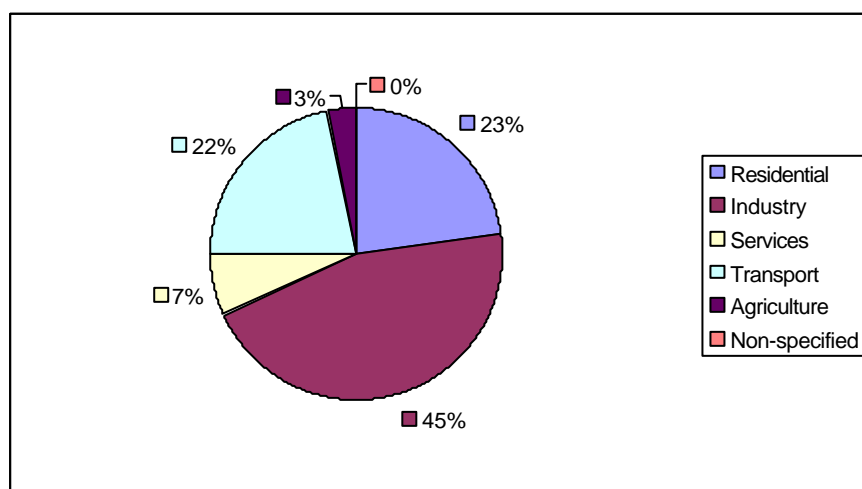
In Bulgaria, various environmental levies and taxes exist, e.g. levies on the pollution of the environment, both within admissible limits and – as a penalty – for pollution above admissible limits, which are allocated to the Municipal and National Environmental Funds (see section 8). There are also levies on the import of hazardous substances, including substances demaging the ozone layer. On the other side, renewable energy equipment and materials and elements for the production of energy saving lamps are exempted from import duties (see section 8).

5. End-use sectors

Figure 4 shows the sectoral structure of the final energy consumption in Bulgaria. The total final energy intensity in 1999 was 0.254 toe/1000US\$, compared to 0.293 toe/1000US\$ in 1998 and 0.297 toe/1000US\$ in 1997 (using PPPs).

Figure 4: Sectoral Structure of Final Energy Consumption in Bulgaria, 1999

Source: IEA, 2001

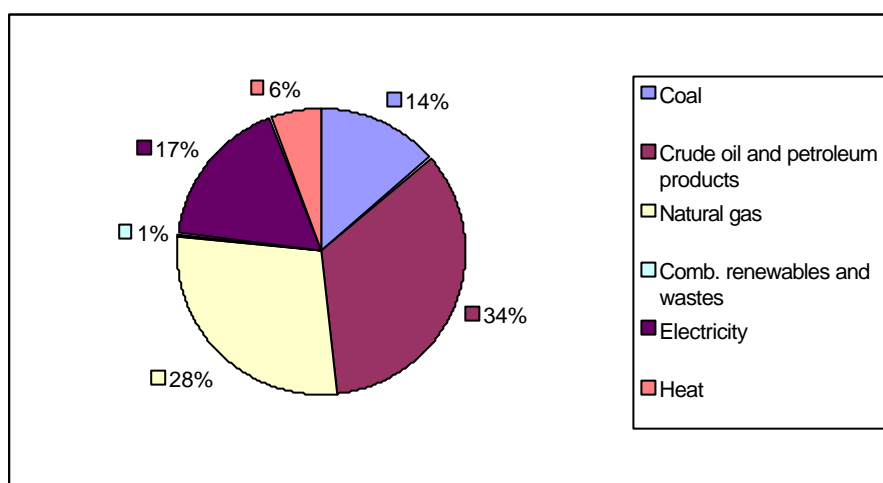


³ As of October 2001, 6 out of in total 22 district heating companies in Bulgaria operate without subsidies.

Industry

Figure 5 shows the structure of industrial final energy consumption by energy source in 1999. Total final consumption of industry in 1999 was 4.299 Mtoe, compared to 5.447 Mtoe in 1998.

Figure 5: Structure of Industrial Final Energy Consumption, 1999
Source: IEA, 2001



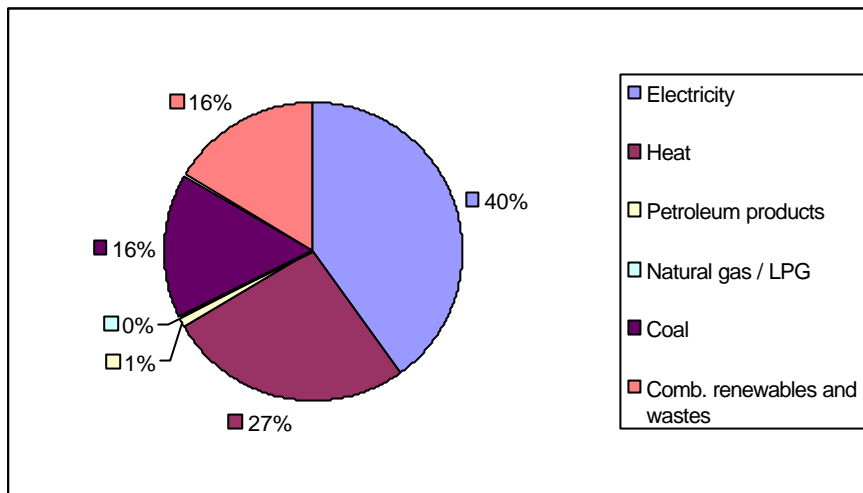
Main energy consuming industrial branches are chemical and petrochemical industry (44.4%), followed by iron & steel (16.6%), non-metallic minerals (11.8%), food & tobacco (7.6%), non-ferrous metals (4.0%) and pulp & paper (2.3%). Other manufacturing industries account for 9.5% of final energy consumption, while mining and construction account for 2.6% and 1.9% respectively.

As a result of the ongoing restructuring and technological modernisation of the Bulgarian industry, major energy savings are expected by the Government. In addition to these autonomous changes and improvements, regulatory measures, like mandatory audits and energy efficiency standards for industrial processes and products have to be applied in accordance with the Energy and Energy Efficiency Law of 1999 (see section 6).

Residential

Figure 6 shows the structure of final energy consumption in the residential sector in 1999. Total final energy consumption of the residential sector in 1999 was 2.177 Mtoe, compared to 2.364 Mtoe in 1998.

Figure 6: Structure of Final Energy Consumption in the Residential Sector, 1999
Source: IEA, 2001



A major part of the final residential energy consumption is for thermal purposes. According to the climatic conditions of the country, heating plays an important role in this sector. Major heat sources are district heating (in urban areas) and individual heating (mainly in rural areas). About 570 000 homes with 1 650 000 occupants (18% of the population) are supplied by district heating. Individual heating is predominantly based on solid fuels, like coal and wood; in general there is still little penetration of natural gas in the residential sector.

Both district heating and individual heating systems are in general inefficient. While district heating systems are addressed by priority measures defined under the National Strategy for Development of Energy and Energy Efficiency until 2010, no specific programmes or measures are in place to improve individual heating systems, in particular there are no minimum efficiency standards for heating devices, like hot water boilers, ovens, etc. According to the National Strategy for Development of Energy and Energy Efficiency until 2010, standards for “burning processes” are under consideration.

Problems in the district heating sector are technical, financial and institutional. Priority areas for action identified by the Government include:

- To rehabilitate district heat generation and distribution systems;
- To improve energy management;
- To install control and monitoring systems;
- To install measuring and control equipment for final consumers;
- To raise the degree of combined heat and power (CHP) generation in the district heating sector (at the moment only 9 of in total 22 district heating companies in Bulgaria have CHP);
- To implement heat energy accountancy;
- To phase out subsidies for residential consumers;
- To introduce a dual tariff with capacity and energy charge;
- To solve legal problems with regard to the recuperation of profits by the public owners of district heating companies (see section 6).

Concerning the building envelope, Regulation No. 1 of July 28, 1992 defines the requirements concerning heat insulation efficiency in buildings, specifically the heat resistance of walls. At the moment new energy efficiency standards in conformity with the German standard DIN 4108 are under preparation.

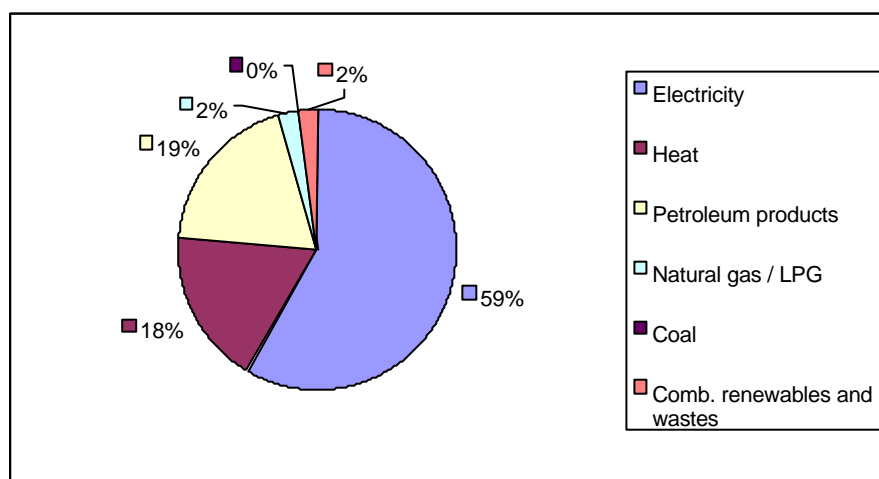
A problem experienced so far is that both existing buildings and the major part of buildings under construction do not meet the heat insulation standards.

Services

Figure 7 shows the structure of final energy consumption in the services sector in 1999. Total final energy consumption of the services sector in 1999 was 0.648 Mtoe, compared to 0.183 Mtoe in 1998.

Figure 7: Structure of Final Energy Consumption in the Services Sector, 1999

Source: IEA, 2001



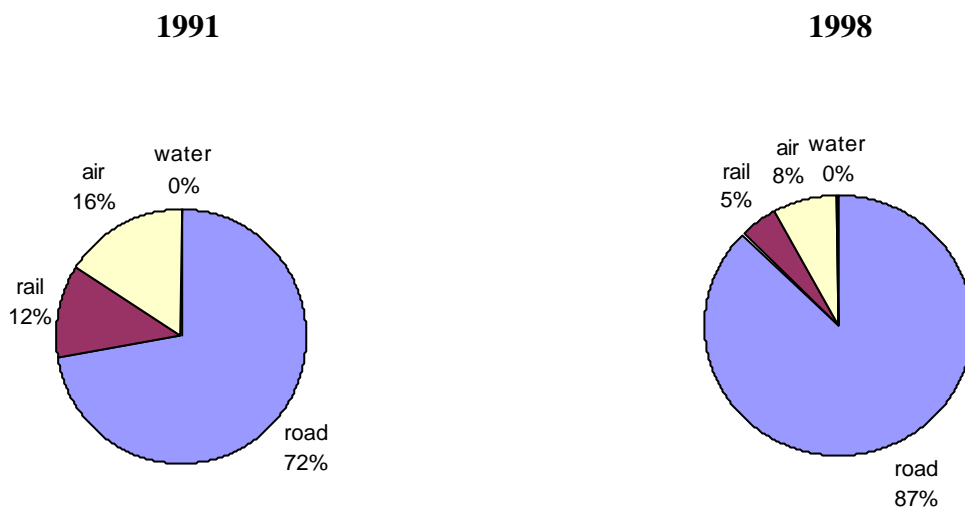
It is expected that the tendency for the creation of energy service companies and the application of innovative financing mechanisms like third party financing in the services sector will continue.

Transport

Figure 8 shows the changes in energy consumption in types of transport between 1991 and 1998, which reveals an increase in road transport from 72% to 87% in this period.

Figure 8: Transport energy consumption by mode, 1991 and 1998

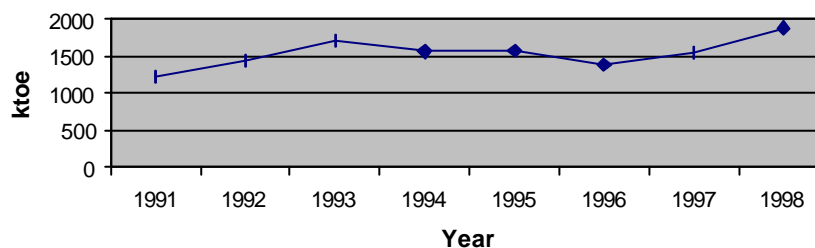
Source: ADEME, SEEA, ENERDATA, 2000



As Figure 9 shows, energy consumption in the transport sector is raising.

Figure 9: Energy consumption in transport, 1991 - 1998

Source: ADEME, SEEA, ENERDATA, 2000



Improvements of energy efficiency in the transport sector are supposed to be achieved as a result of replacement of transport stock, improved traffic and transport services and an improved road network; however there is no comprehensive strategy in place.

6. Energy efficiency policies and programmes

Energy efficiency policies of the Bulgarian Government are defined in the “National Strategy for Development of Energy and Energy Efficiency until 2010” of August 1998 and the subsequent Energy and Energy Efficiency Law of June 1999. Both documents include specific chapters on energy efficiency and on district heating. In general, the stipulations of the EEEL are the concretisation of the policy guidelines given in the National Strategy.

The approach to energy efficiency is described in the National Strategy as follows: *“The main means of implementing the national energy efficiency strategy are to elaborate an appropriate regulation and institution base as well as to improve the pricing and tariff setting policy in conformity with the principles of the market economy.”*

A substantial part of the energy efficiency measures proposed in the National Strategy refer to the supply side, mainly relating to the rehabilitation and modernisation of generation plants and district heating systems. Energy efficiency measures on the demand side focus on regulation and standards.

According to the EEEL (Chapter 13, Section II), standards and labelling are foreseen in the following areas:

- Mandatory energy consumption/efficiency indicators in production processes, including the obligation of producers to provide information on the energy intensity of their products;
- Mandatory labelling of energy consuming “locally produced or imported products and goods, as well as buildings”, including certification of compliance with energy efficiency standards.

Another central measure stipulated by the Law (Chapter 13, Section III) are mandatory “expert energy efficiency evaluations and audits” in order to secure compliance of buildings, industrial, agricultural, transport and other facilities with “indicators set by energy efficiency regulations and standards”. These audits are mandatory for new and existing facilities, as well as reconstruction, modernisation or extension of site, which exceed definite limits of annual consumption of fuels and electricity. The execution of experts’ evaluations and audits is subject to a permit to be granted by SEEA. Chapter 13 of the EEEL also provides rules for energy efficiency services and for the supervision by SEEA of the compliance of consumers with energy efficiency requirements and of expert services as defined by the law.

Concerning district heating, the National Strategy for Development of Energy and Energy Efficiency until 2010 emphasises the Government’s expectation that district heating systems “will retain an important position in the country’s energy sector”. According to studies carried out (see section 5), district heating is expected to retain its position and competitiveness subject to meeting the following conditions:

- Refurbishment of the existing thermal energy sources by means of increasing the share of cogeneration;
- Rehabilitation and refurbishment of heat transmission networks and user stations in order to reduce transmission losses;
- Installation of equipment and meters for individual control and metering of heat consumption;
- Implementation of structural and pricing reform in the district heating sector;
- Redirection of state subsidies from district heating companies to poor consumers;
- Adoption of a new regulatory framework;
- Introduction of high efficiency boilers and fuel switching (increasing the share of gas and biomass).

Chapter 11 of the EEEL defines the rules for heat generation, transmission and distribution; the rights and duties of the district heating network operator and the commercial relations between heat producers, distributors and consumers. The Law also introduces the possibility for consumers to appoint a so-called “heat supply agent”, who is a legal person representing the consumers vis-à-vis the heat distributor; as well as rules for metering of heat supplies and consumption.

At the time of writing this report (autumn 2001), secondary legislation required to implement the stipulations of the Law is under preparation. Also a revision of the EEEL is under discussion. Proposals put forward include strengthening of the rights of the Chairman of the State Energy Efficiency Agency (SEEA), the establishment of an Energy Efficiency and Renewable Energy Fund, improving normative legislation for energy efficiency companies, modifications to the State Budget and Local Taxes and Fees Acts in order to facilitate “budget entities” to profit from the savings achieved by energy services and to reduce the tax weight for legal persons and citizens that have realized long-term energy efficiency measures.

In the framework of the SAVE II Programme of the European Commission, a “Study on the Possibility for an Implementation of a Wide Spread Energy Saving Programme in Bulgaria” has been carried out by the State Energy Efficiency Agency (SEEA), in cooperation with E.V.A. from Austria and I.C.E. from France. This study, which has been completed in 2001, consists of three documents:

- The National Energy Saving Study and Database of Bulgaria, which provides an overview of potentially interesting energy saving measures in Bulgaria, including technological and economic data;
- The National Energy Saving Programme of Bulgaria, which includes the most promising energy saving options for all sectors, grouped into programmes, with a time frame until 2006;
- The National Energy Saving Action Plan, focussing on priority areas and concrete projects, appropriate for implementation during the next two to three years.

The National Energy Saving Programme and the National Energy Saving Action Plan are described in more detail in Box 1.

Box 1: National Energy Saving Programme and National Energy Saving Action Plan

The *National Energy Saving Programme* proposes energy conservation targets by sector; provides an overview on instruments for the promotion of energy efficiency (as far as normative/regulative instruments are concerned, consistent with EU legislation), and proposes energy efficiency strategies per sector, including:

- Promotion of natural gas in the residential sector;
- Improvement of thermal characteristics of buildings and energy efficiency of heating devices;
- Building stock rehabilitation including short and long-term pay-back period measures;
- Development of legislation for energy conservation in the building sector and creation of financial and fiscal incentives for households to implement the measures;
- Stabilisation of the market for district heating, including measures for the rehabilitation of district heating systems, proposals for amendments to the EEEL with regard to heat supply contracts and the restructuring of district heating companies, in accordance with the Government's strategy for development of the district heating sector for the period 2000 to 2005;
- Proposal of policy, financial, institutional-organisational, information and training measures, including amendments to policy documents, the Energy and Energy Efficiency Law, enforcement of energy efficiency secondary legislation; financial and fiscal measures; improvement of interactions between state and sector organisations, NGOs, etc., voluntary agreements, etc;
- Energy efficiency measures in agriculture.

The *National Energy Saving Action Plan* is based on the National Energy Saving Programme and proposes short term energy efficiency targets and measures, focussing on:

- Energy efficiency in existing and new building stock (in particular thermal insulation and the improvement of heating systems);
- Rehabilitation of district heating systems and restructuring of district heating companies;
- Policy, financial, and institutional-organisational measures aiming at more effective implementation of energy efficiency in industry;
- Energy efficiency measures in agriculture.

For most areas, the Action Plan includes proposals for both technical measures (with short-term and long-term pay-back period) and legislative measures. Some of the proposals for legislative measures are briefly presented:

- Development of legislation for thermal energy conservation in buildings, including both standards and financial incentives for households. A specific issue mentioned is the need for improvement of state control and management in order to effectively enforce the standards.
- Revision of the Energy and Energy Efficiency Law in order to allow heat supply contracts with housing owner associations, instead of individual customers; transparent heat tariffs; electricity purchase tariffs from cogeneration plants which take into consideration their social and economic benefits; avoidance of cross-subsidising of natural gas tariffs to the benefit of small consumers; allocation of subsidies to the social-poor instead of district heating companies.

- Improvement of the regulatory framework for residential gas supply and to develop and adopt a price setting policy and natural gas tariffs for end users.

The Action Plan presents more than 80 energy efficiency measures in agriculture, building sector, district heating, industry and transport, involving total investments of 5.78 billion BGL and leading to energy savings of 1.716 Mtoe/year equivalent to 17% of total final energy consumption and savings of 1.1 billion BGL/year.

- Most of the measures proposed are low-cost measures and measures with a pay-back period up to 3 years, taking into consideration the current difficult economic situation in Bulgaria, which makes it difficult for industrial enterprises, households and public institutions like municipalities to make major investments. In addition, legal problems concerning the recuperation of profits (so called “budget organisations” are not allowed to use the savings for other purposes after repayment of the investment – see section 7) impede municipalities to attract investors under third party financing schemes.

Measures proposed under the Action Plan with pay-back periods up to 3 years involve total investments of 880 million BGL, leading to energy savings of 782 Mtoe/year equivalent to 7.6% of total final energy consumption and savings of 425 million BGL/year.

In order to overcome the current constraints with regard to investments in energy efficiency, the Action Plan proposes various financial and fiscal instruments. The main recommendations are:

- The establishment of a National Energy Efficiency Fund with a budget of approx. 100 million BGL/year, which would operate as a revolving fund, providing medium and long-term soft loans for bankable energy efficiency projects⁴;
- Subsidies to the investment costs of energy efficiency (proposed budget: 10 million BGL/year) and energy efficiency demonstration projects (proposed budget: 6 million BGL/year);
- Grant programme to subsidise energy audits in small and medium size companies (proposed budget: 1 million BGL/year);
- Removal of legal and administrative barriers to third party financing (energy performance contracting) in the public sector, in particular with regard to allowing “budget organisations” to repay capital investments from the savings and to allow “budget” and “contributory” organisations to use the savings for other purposes after repayment of the investment;
- A programme to subsidise public transport to increase its quality and provide a viable alternative to individual car transport. It is proposed to finance this subsidy scheme from increased road tax or excise tax paid by private car users.
- Income tax relief for the installation of energy efficient and recycling technologies by manufacturers and service companies.

Source: EVA, SEEA, ICE, 2001

⁴ A National Energy Efficiency Fund had been established in Bulgaria in 1998 with the assistance of the PHARE Programme; however this Fund had to be abolished in 1999 because of non-compliance with the IMF agreement concluded at that time (IMF demanded the abolishment of all non-budget funds, in order to consolidate the state budget).

In the absence of comprehensive energy efficiency programmes so far, various demonstration projects have been realised, some of them financed by multilateral and bilateral donors.

Among these projects are:

- The energy efficiency demonstration zone in Gabrovo, within the framework of the GHG Mitigation Strategy Through Energy Efficiency Project, financed by GEF, comprising (i) energy efficiency in buildings, (ii) feasibility studies concerning reconstruction of the district heating network, and (iii) the modernisation of street lighting.
- Energy efficiency demonstration zones and centres in the municipalities of Burgas, Blageovgrad and Pernik, within the framework of the UN ECE Projects EE 2000 and EE21. The projects focus on training of local experts and energy efficiency projects in the areas of street lighting, hospitals and district heating.
- Various projects in the framework of the Dutch co-operation programme with the Ministry of Environment and Waters concerning the modernisation of district heating systems in Plovdiv, Samokov, Lovech, Varna and Sofia.
- Projects of various bilateral donors including the EcoLinks Programme of USAID, a project on “Sustainable regional energy planning” for pilot municipalities sponsored by the British Know-how Fund and a study on a “Strategy for performance energy saving contracting in Bulgaria” supported by Germany.
- Several demonstration projects in the field of renewable energy initiated by e.g. PHARE.
- Programmes for the introduction of efficient lighting in households, street lighting, the public, commercial and industry sectors.
- Financial support from the PHARE Programme for the preparation of an energy efficiency strategy, new energy legislation and performance of finalised projects for energy efficiency in the energy sector, industry, buildings and renewable energy sources. PHARE also supported the establishment and operation of the National Energy Efficiency Fund abolished in 1999 (see box 1).
- Projects funded under the SAVE II Programme, including the “Study for the possibility to implement a wide spread energy saving programme in Bulgaria”, which has resulted in the National Energy Saving Study and Database, the National Energy Saving Programme and the National Energy Saving Action Plan presented above and in Box 1.

Renewable energy

Among the renewable energy sources available in Bulgaria, only hydro energy is sufficiently developed to contribute substantially to the energy supply at the national level. In addition to large hydro plants, there is also a growing interest of private investors for the development of small hydro plants. The Government also expects a growing interest in other forms of decentralised and renewable energy options due to the obligation to buy electricity from renewables and cogeneration according to the Energy and Energy Efficiency Law of 1999 (see section 3).

7. Organisation of energy efficiency activities

Government institutions

Responsibilities for energy and energy efficiency policies are defined by the Energy and Energy Efficiency Law (EEEL) of 1999.

It is probably a peculiarity of the Bulgarian system, that both energy policy and energy efficiency policy are not under the responsibility of a specific ministry, but are dealt with by the Council of Ministers, who has delegated certain preparatory and executive tasks to two state agencies and a regulatory commission⁵:

- The State Energy and Energy Resources Agency (SEERA), responsible for energy policy formulation, preparation of energy sector legislation, energy forecasting and indicative planning, represent the shareholder's interests of the state, among others.
- The State Energy Efficiency Agency (SEEA), responsible for the "state energy efficiency policy" (see below).
- The State Energy Regulatory Commission (SERC), responsible i.a. for licensing, price control, consumer protection etc.

According to the EEEL, the State Energy Efficiency Agency (SEEA) is responsible for the "state energy efficiency policy". The tasks and competences of the Chairman of SEEA, as defined by the EEEL, mainly refer to (i) participation in policy formulation, (ii) proposal and drafting of programmes and legislation, (iii) co-ordination of policy implementation and (iv) the granting of permits for energy auditors and the control of compliance with compulsory measures introduced by the Law. Other tasks and competences refer to i.a. the collection and analysis of information related to energy efficiency and renewable energies (including data bases), the representation of Bulgaria in international organisations and programmes, etc.

SEEA is funded by the state budget and has a staff of approx. 30 persons. The Agency coordinates its activities in the fields of energy efficiency and renewable energies with ministries, local governments and NGOs. Specific activities of the Agency include, in addition to the tasks mentioned:

- To organise energy efficiency and renewable energy sources training, promotion, seminars, workshops and conferences;
- To create regional units working in energy efficiency and renewable energy sources;
- To initiate, organise and support projects in the field of energy efficiency and renewable energy;
- To coordinate the fulfillment of the country's international engagements in the field of energy efficiency and renewable energy;
- To carry out analysis and assessments of projects, programmes, etc. in the field of energy efficiency and renewable energy;

⁵ Amendments proposed to the Energy and Energy Efficiency Law foresee that the State Agency of Energy and Energy Resources may become a new Ministry of Energy and Energy Resources, with a new Executive Agency of Energy Efficiency operating under this Ministry (autumn 2001).

- To carry out, directly or indirectly via entitled organisations, energy investigations, audits, and energy services.

Although there is so far no ministry with primary responsibility for energy and energy efficiency, certain aspects are dealt with by the Ministry of Economy, the Ministry of Environment and Water and the Ministry of Regional Development and Public Works:

The Ministry of Economy hosts the Centre for Energy Efficiency in Industry, which has been established in 1995 in cooperation with the Japanese International Co-operation Agency (JICA). The Centre focusses on industrial energy audits and management and the implementation of energy efficiency measures, mainly low-cost measures, taking into consideration the current economic situation. The Centre has investigated more than 80 industrial enterprises and has entered into contracts with various major enterprises from different branches. Since May 2001, the Centre is a separate legal entity, affiliated to the Ministry. Funding for the Centre is provided from the budget and from the revenue of services.

The Ministry of Environment and Water (MoEW) is responsible for developing, co-ordinating and implementing Bulgaria's obligations under the United Nations Framework Convention on Climate Change (UNFCCC).

The Ministry of Regional Development and Public Works is responsible i.a. for the national policy in housing and public works, including town planning and technical infrastructure for district heating, electricity supply, waste management, etc. There is a special department in the Ministry which is responsible for controlling the requirements for energy efficiency of new constructions, focussing on thermal insulation of the building envelope. The National Centre for Regional Development and Housing Policy is a commercial company with state participation, affiliated to the Ministry of Regional Development and Public Works.

Figure 10 shows the interrelation among the main state institutions involved. Figure 11 shows the administrative structure of the State Energy Efficiency Agency.

Stakeholders and Non-governmental Organisations

In Bulgaria, many non-governmental organisations, in particular “energy centres” and “energy efficiency centres” – have been established in order to promote energy efficiency on the national, regional and municipal level. All these organisations receive public funding, in particular from international and bilateral institutions, like the European Union, USAID, etc.

In the following, a concise overview of these organisations and their fields of activity is given, followed by a brief discussion of their interaction with the energy efficiency institutions of the national government and of local self-governments, in particular municipalities.

The ***Sofia Energy Centre (SEC)*** is the successor of the EC Energy Centre Sofia, which was established in 1992 within the THERMIE Programme. Since 1997, Sofia Energy Centre has continued its activities as an independent consulting company. Main activities of the Centre are: (i) to disseminate information and publications on energy efficient and environmentally friendly technologies by organising seminars, workshops, conferences, training courses, etc., (ii) to publish an energy newsletter, brochures, conference reports, etc., (iii) to maintain databases; etc. In 1998, Sofia Energy Centre, in cooperation with the public limited company Energoprojekt plc, joined the European Network of Organisations for the Promotion of

Energy Technologies (OPET) as FEMOPET Bulgaria. Since 2000, the Sofia Energy Centre and the Institute of Power Studies and Design of Romania have joined forces to become the “Balkan OPET”, which is a full member of the new OPET Network under the Fifth Framework Programme for Research, Technological Development and Demonstration of the European Commission. Under the “Five-year Development Assistance Programme of the Greek Government”, the SEC has been involved in the establishment of Energy Offices in the municipalities and/or districts of Radomir, Smoljan and Varna. The SEC has a permanent staff of 6-7 persons and cooperates with external experts on specific subjects.

There are several *regional energy agencies and centres*, like the Energy Agency in Plovdiv, Stara Zagora and Ruse, which have been established under the SAVE II Programme. These agencies operate with limited staff and budget and typically work with municipalities and local enterprises to promote energy efficiency on the local political level and to foster the implementation of demonstration projects.

The Regional Energy Centres Haskovo and Lovech were established in the framework of the PHARE Programme and have carried out several demonstration projects in the fields of energy efficiency and renewable energies in buildings and industrial plants, including energy audits and regional and municipal energy planning. Regional and municipal energy efficiency centres also exist in Gabrovo, Varna and Kuystendil. The cities of Radomir and Smolyan have established municipal energy offices. The Energy Centre of the Municipality of Sofia, also established in the framework of SAVE II has developed an Energy Efficiency Action Plan of Municipal Buildings in Sofia.

Another non-governmental organisation is the Centre for Energy Efficiency EnEffect, a non-profit organisation established in 1992 in Sofia with the initial financial support of various US organisations, including USAID. EnEffect acts as the secretariat of the municipal energy efficiency network “EcoEnergy”, which includes 31 municipalities and 19 regional centres (municipal energy offices) located at the municipalities. The activities of the Network are currently mainly supported by the GEF/UNDP. EnEffect employs about 20 permanent staff.

In the framework of the SYNERGY Programme of the European Commission, the Black Sea Regional Energy Centre was established in Sofia in 1995. The Centre acts as a focal point for energy related activities in the Region, including activities like the promotion of energy policy development and application; promotion of investment, funding and joint ventures in the Region and facilitating access to EU institutions and programmes.

An important role in providing expertise for the Bulgarian energy sector is assumed by Energoprojekt plc, a public limited company with more than 400 staff. The System Analysis Department of Energoprojekt acts as a consultant to the Government on issues like forecasting in the energy sector, the National Climate Change Action Plan, GHG inventories and the National Communications of Bulgaria under the UNFCCC.

Mentioning should also be made of the Bulgarian Energy Policy Association, an independent forum to exchange views and experiences and to ease interaction between Government institutions and stakeholders. The Association was established in 1997 with the assistance of the SYNERGY Programme of the European Commission.

Financial institutions

Funding of energy efficiency projects and measures is not a usual practice of Bulgarian banks. The only commercial bank involved in financing energy efficiency projects in Bulgaria is the United Bulgarian Bank (UBB), who participated in two USAID sponsored guarantee programmes. UBB is working with USAID on the Development Credit Authority Mechanism, under which municipalities and industrial enterprises receive loans from the bank, 50% of the guarantee being covered by the US government.

There are also specific legal problems which impede the application of financing mechanisms in municipalities: the existing legal framework does not allow municipalities to recover the savings received from the implementation of energy efficiency measures. This is a major barrier for municipal energy efficiency projects in general and for the application of the usual shared-savings formulas by energy service companies (ESCOs) in particular.

Interaction between government, non-governmental organisations and stakeholders

In general, a certain top-down approach in implementing energy efficiency can be observed. While the decentralisation of responsibilities to regional and local authorities may be an important step towards a more participatory approach, there is also a need to build experience at these levels. Improved communication and cooperation between central government bodies, regional and local authorities, NGOs and the various stakeholders seems to be an important aspect in effectively delivering energy efficiency to the consumers.

Figure 10: Inter-relations among state institutions

Source: SEEA, 2001

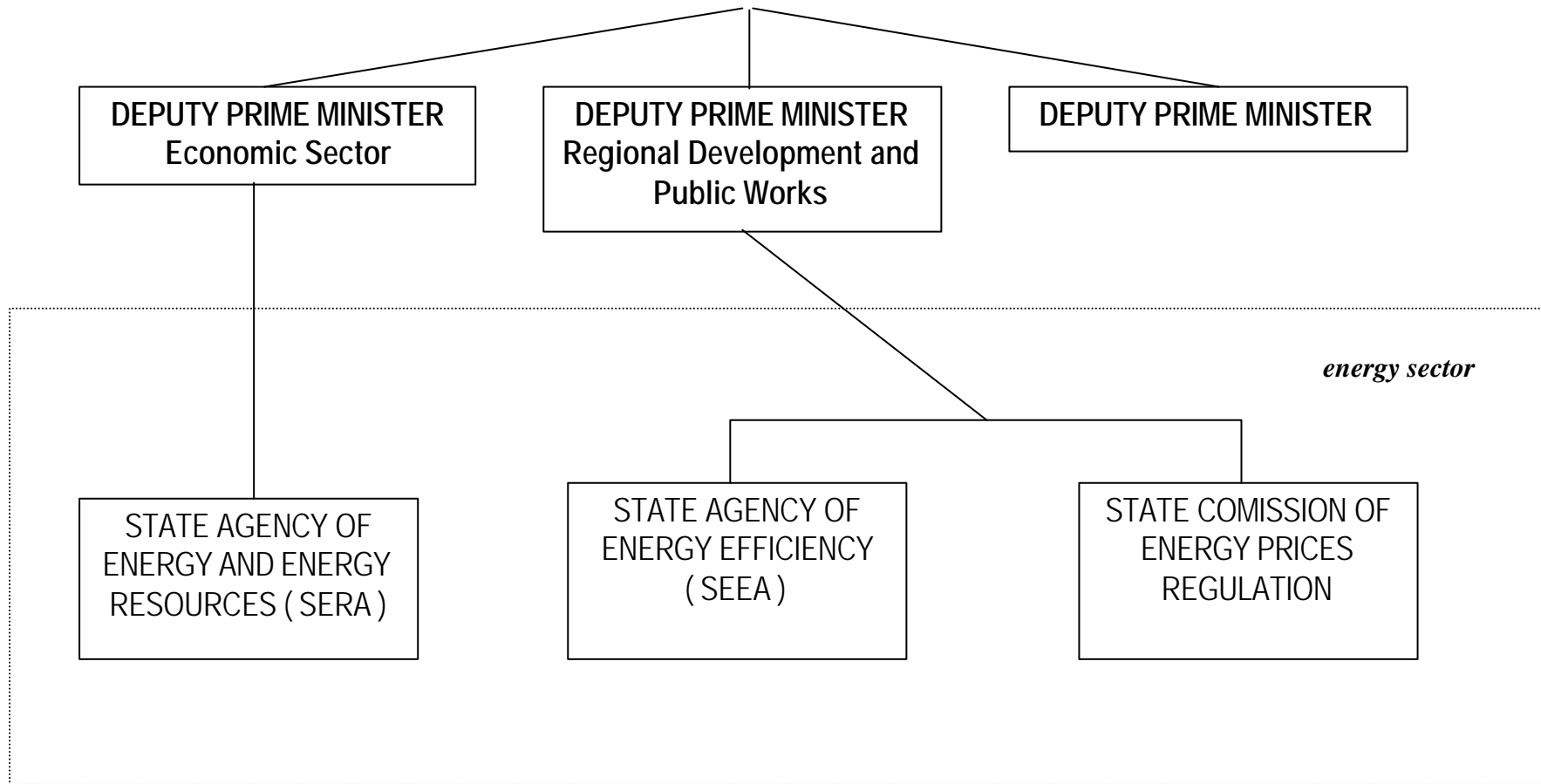
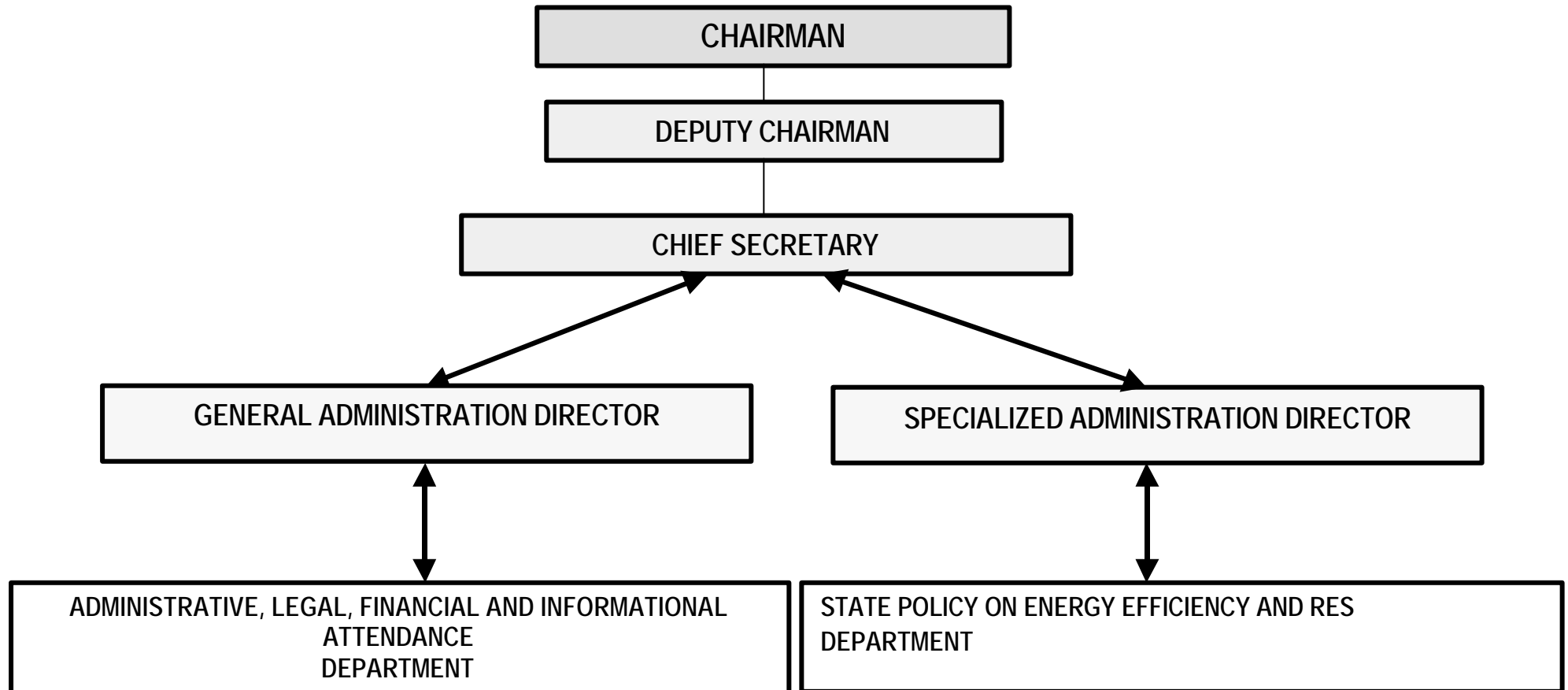


Figure 11: State Energy Efficiency Agency (SEEA) – Administrative Structure

Source: SEEA, 2001



8. Energy efficiency and the environment

The Ministry of Environment and Water (MoEW) is responsible for the environmental policy of Bulgaria.

The main legal foundation of environmental policy in Bulgaria is the Environmental Protection Act adopted in 1991 and amended in 1992. The Act sets the right of each citizen to clean environment and access to information concerning environmental issues and assessments about the environmental impact in construction, reconstruction or expansion of a wide range of projects, including energy projects.

The Clean Air Act was adopted by Parliament in 1996 and has given rise to various ordinances regarding the emissions and admissible concentrations of air pollutants like particulates, sulphur dioxide (SO₂) and nitrogen oxides (NO_x).

The Environmental Protection Act defines the financial mechanisms to support environmental projects: the National Environmental Fund and the Municipal Environmental Funds. The sources of the National Environmental Fund are mainly charges for pollution, both within and – as a penalty – above environmental standards, as well as import duties for cars older than ten years, revenues from the privatisation of state enterprises and charges on gasoline, diesel and other fuels.

In Bulgaria, various environmental levies and taxes exist, e.g. levies on the pollution of the environment, both within admissible limits and – as a penalty – for pollution above admissible limits, which are allocated to the Municipal and National Environmental Funds (see section 8).

According to the Law on Liquid Fuels Taxation of 1996, a substantial part (approx. 26%) of the total taxation of gasoline and diesel fuel is accumulated in the National Environmental Fund. Several small hydro power plants have been financed under the National Environmental Fund.

The Municipal Environmental Funds function at the municipality level; the sources are from pollution charges and fees for the use of natural resources.

Another fund that is active in the environmental protection field is the Environment Trust Fund (Ecofund), which is a fund based on a debt-for-environment and debt-for-nature swap of Swiss Franc 20 million with Switzerland. The Ecofund works in the following priority areas: (i) clean up of past pollution and environmental damages, (ii) air pollution reduction, (iii) water pollution protection and (iv) protection of biodiversity. During its first two years of operation (1996 – 1998) projects with a total amount of 9.1 million BGL were approved, including various projects for the introduction of natural gas in heating plants.

There are also import duty exemptions for certain environmentally friendly goods, including installations and equipment for energy production from renewables and materials and elements for the production of energy saving lamps.

The MoEW is also responsible for developing, co-ordinating and implementing Bulgaria's obligations under the United Nations Framework Convention on Climate Change (UNFCCC)

and has published the National Climate Change Action Plan, which was approved by the Government in July 2000. The Action Plan proposes a series of GHG mitigation measures in Bulgaria, both sectoral measures and integrated measures at national level. Many of the sectoral measures proposed relate to energy efficiency both in the energy supply sector and on the demand-side (industry, transportation, services, households and agriculture). Integrated measures proposed refer to the institutional and legislative frameworks; economic, fiscal and price instruments, etc.

According to the Kyoto Protocol, signed by Bulgaria as an Annex B country in 1998, Bulgaria has the obligation to reduce its GHG emissions by 8% during the period 2008 – 2012, compared to the base year 1988.

The main GHG emissions in Bulgaria are CO₂, CH₄ and N₂O. Although the share of Bulgaria in the global antropogenic emissions of greenhouse gases is only about 0.3 – 0.4% (56.78 Mtons/year in 1999), the emissions per capita are comparatively high (6.93 tons/inhabitant in 1999). The major source of CO₂ emissions is the energy sector, followed by transport and industrial processes. CH₄ is mainly emitted from waste and leakage from fossil fuel production and distribution.

Bulgaria has ratified the Vienna Convention to preserve the ozone layer and the Montreal Protocol to phase out ozone depleting substances (ODS). A national programme for gradual reduction of ODS has been developed and is under implementation with assistance of the Global Environmental Facility (GEF).

The National Strategy for Development of Energy and Energy Efficiency until 2010 foresees in environmental measures directed among others at the re-cultivation of lands in the coal mining sector, the reduction of SO₂ emissions in thermal power and heat generation (70 – 80% of SO₂ emissions are due to electricity generation in thermal power plants) and the reduction of CO₂ emissions in line with international commitments.

Bulgaria has signed the “Protocol for future reduction of sulphur emissions of the Convention of Trans-border contamination of air at long distances” and the “Protocol for reduction of acidified action, eutrofication and troposphere ozone to the Convention of Trans-border contamination of air at long distances”, which include the obligation to substantially reduce SO₂, NO_x and other emissions. These obligations shall be partly met by the installation of flue gas desuphurisation plants in thermal power stations.

The Bulgarian Government supports the joint implementation mechanism under the UNFCCC. A Project Preparation Unit attached to the Bulgarian Ministry of Environment has been established to ensure the effective fulfilment of the UNFCCC commitments.

In 2000, a Joint Implementation (JI) Unit for joint energy efficiency projects with Bulgarian and Dutch participation was established, based on an agreement between the Ministry of Environment and the Dutch Ministry of Economic Affairs for co-operation in the area of greenhouse gas emission reductions. The JI Unit is an independent evaluating unit, hosted by SEEA and under the direct supervision of MoEW. It is meant to act as “the driving force of the JI co-operation with the Netherlands” and as “the knowledge centre on JI in the country”.

Main activities of the II Unit so far have been the evaluation of project proposals submitted to the Netherlands and to advise the Bulgarian authorities on issues such as credit sharing, to maintain communications with project developers, etc.

In the framework of the negotiations between the European Union and Bulgaria following the the 1999 “Understanding between the Republic of Bulgaria and the European Commission concerning Kozlodoy NPP”, a substantial share of the funds provided in the framework of the closure of Units 1 and 2 of the Kozlodoy Nuclear Power Plant will be directed to energy efficiency.

9. Assessment of Progress

Government Policy and Strategy – Overall Assessment

Since the beginning of the political and economic transformation in 1990, Bulgaria has taken cautious steps to adapt its energy economy to market principles. The energy sector has been subject of initial restructuring. Former monopoly supplier NEK (National Electricity Company) has been split up in independent distribution companies and several independent producers, while still owning the transmission network and the large majority of generation plants. In the natural gas sector, monopoly supplier Bulgargaz has been subject to accounting separation, without any further steps towards market liberalisation so far. The district heating sector, which is mainly owned by the state, is subject of accounting separation and technical and financial rehabilitation.

Full restructuring of the energy sector – in accordance with EU-accession requirements – and privatisation are viewed by the Government as medium term targets.

Progress has been made towards an environmentally more sustainable energy sector, in particular emission limits and nuclear safety regulations have been established and National and Municipal Environment Funds have been created, which are financed from levies on emissions.

The National Strategy for Development of Energy and Energy Efficiency until 2010 of 1998 and the subsequent Energy and Energy Efficiency Law of 1999 establish the framework for Government intervention in the energy and energy efficiency fields. While separate chapters in both documents are dedicated to energy efficiency, both documents also demonstrate a comparatively strong commitment towards energy efficiency improvements on the *supply-side*, while relatively few measures are proposed for *demand-side* or end use energy efficiency.

The establishment of two state agencies and a regulatory commission: (i) the State Energy and Energy Resources Agency – SEERA, (ii) the State Energy Efficiency Agency – SEEA and (iii) the State Energy Regulatory Commission – SERC, have been part of this process. While, at present, both SEERA and SEEA report to the Council of Ministers, SEERA might be transformed into a new Ministry of Energy and Energy Resources, with a new Executive Agency of Energy Efficiency operating under this Ministry. While the “streamlining” of state agencies is certainly a valid objective, it would also be important to make sure that energy efficiency is not overruled by a dominance of supply-side over demand-side issues, both in legislation and in the institutional setting.

SEEA, with the assistance of international partners in the framework of the SAVE II Programme, is proposing a National Energy Saving Programme and Action Plan, in order to translate the existing legal framework into concrete action. Furthermore, amendments to the Energy and Energy Efficiency Law have been proposed and secondary legislation is under preparation.

Notwithstanding the progress made so far, the Review Team would like to share some concerns with the Bulgarian authorities, as detailed in the following paragraphs.

Energy Efficiency Programmes and Funding

Energy efficiency activities in Bulgaria have so far mainly been promoted in the framework of international cooperation. Examples are the various energy efficiency centres set up on the national and regional level and a considerable number of demonstration projects in the areas of district heating modernisation, industrial energy management and conservation, energy efficiency in municipalities, etc.

Financing of energy efficiency projects from national and/or commercial sources has turned out to be a major problem.

It seems therefore of highest importance to create conditions which (i) secure sufficient public funding levels, (ii) facilitate the engagement of investors in energy efficiency, district heating and renewable energy projects and (iii) encourage energy service companies and other actors to offer innovative financing mechanisms, like third party financing.

Furthermore, Government involvement should focus on the formulation and implementation of well-defined programmes and actions to promote energy efficiency in various sectors of the economy (industry, transport, residential and services). The proposals made in the National Energy Saving Programme and Action Plan are steps into the right direction.

Legal instruments to promote energy efficiency

The Government's approach to energy efficiency, as described in the National Strategy for Development of Energy and Energy Efficiency until 2010 and defined in the Energy and Energy Efficiency Law is largely based on legal instruments, in particular: (i) mandatory energy consumption/efficiency indicators for industrial production processes and products and (ii) mandatory labelling of locally produced and imported goods and buildings, including certification of compliance with energy efficiency standards. Energy efficiency standards for buildings and household appliances are apparently under development.

The following remarks should be made with regard to this approach:

- As the experience of many, including Western European, countries shows, successful promotion of energy efficiency depends on the application of complementary legal, financial, institutional and human-behaviour related instruments. Legal and regulatory instruments should therefore be viewed as an integral part of a wider approach.
- The application of mandatory energy consumption/efficiency indicators for industrial processes and products is a very complex task, which inherently presents many technical

and administrative problems, which may make it difficult in practice to enforce them. It may be worthwhile for the Government to focus on some key measures and technologies (like industrial boilers, electric motors, etc.) instead of pursuing a probably too ambitious logic of intervention.

- Energy efficiency standards and labelling schemes for buildings and household appliances should fully take into account the latest developments and the legal base in the European Union and the requirements of the *acquis communautaire*.

These aspects should also be taken into consideration in the planned amendments to the Energy and Energy Efficiency Law and in the secondary legislation to be developed under the Law.

Organisation

A considerable number of actors is active in the Bulgarian energy efficiency scene: state agencies, energy centres at the national and regional level, municipal energy offices, several (potential) energy service companies, universities, NGOs, etc.

While this variety of actors has certainly its merits, some critical notes may be made:

- Many of these organisations depend on external financing, in some cases to an extent that their very survival would be endangered without international cooperation money.
- Although there are many organisations involved in energy efficiency, coordination among these organisations may not always be the very best.
- There is apparently a lack of a central responsibility for energy efficiency policy and implementation on the ministerial level. The possible transformation of SEERA into a new Ministry of Energy and Energy Resources, with a new Executive Agency of Energy Efficiency operating under this Ministry, should be made with a view to maintain and further strengthen the capacity already built in SEEA.
- The interrelations and interactions between the state agencies responsible, in particular the State Energy Efficiency Agency, and other institutions (mainly on the regional and municipal level) may also not be optimal.

All these observations would suggest a better definition of state responsibility to coordinate actors and stakeholders in the energy efficiency field. At the same time, certain intermediary organisations such as housing associations in the residential sector might be encouraged to play a more active role in improving energy efficiency.

Energy Pricing and Taxation

Recognising the policy of gradual steps towards “real prices and self funding” of the energy industry; more transparency of costs and prices in generation, transmission and distribution, and adjustments of end user prices for energy – taking into consideration the social reality of the country; there seems still some need to fully eliminate cross-subsidies in the electricity, natural gas and district heating sectors. At the same time other fiscal and taxation instruments could be used to promote improvements in energy efficiency and the use of energy efficient technologies.

The Government's policy to replace subsidies on heat consumption by target-oriented monetary assistance for space heating costs to low income persons and families in the framework of social care regulations, should be commended as a measure which targets both energy sector and social problems in the correct way.

Environment

Bulgaria is apparently making good progress in adapting environmental standards to EU regulations. Furthermore, targets to reduce GHG emissions in accordance with the Kyoto Protocol are very likely to be achieved.

Although these developments are of course positive, further strengthening of energy efficiency policies and in particular, of coordination with other policy fields, like environment, transport and housing, seems to be very important, in order to further improve energy efficiency, environmental quality and GHG emission reduction.

It seems that the potentials of energy efficiency and renewable energies to reduce pollution and CO₂ emissions are still far from being exhausted. Joint Implementation Mechanisms under the Kyoto Protocol and the agreements with the European in the framework of the closure of Units 1 and 2 of the Kozlodoy Nuclear Power Plant may substantially contribute to achieve market penetration of energy efficiency and renewable energies in the Bulgarian energy sector.

Recommendations

Taking note with appreciation of the steps taken to develop energy efficiency policies and legislation, the following recommendations are provided by the review team:

General

- Building on the positive steps taken so far through the 1999 Energy and Energy Efficiency Law, the Government should ensure that new intended changes and secondary legislation will better define the legal framework and the economic conditions for promoting energy efficiency.
- The Government should assess the status of energy efficiency in all sectors of the economy; periodical review of progress in improving energy efficiency should also be undertaken.
- The Government should follow up on the findings of the 1999 “Understanding between the Republic of Bulgaria and the European Commission concerning Kozlodoy NPP” with a view to secure the contribution of energy efficiency measures to increase the country’s energy security and balance the effects of closing units in Kozlodoy Nuclear Power Plant.

Energy efficiency policies, strategies and programmes

- The National Strategy for Energy and Energy Efficiency until 2010 should serve as a basis for further developing a National Energy Efficiency Programme, for all end-use sectors, with clear objectives, tasks, targets and monitoring provisions.
- The Government should be committed to integrate energy efficiency in other economic, environmental and social policies.
- In the process of developing energy efficiency strategies and programmes, the Government should make use of the work and expertise made already available through the technical assistance of various international institutions and programmes, including those of the European Commission.
- Government institutions responsible for energy efficiency should ensure a better balance between policy development and implementation activities.

Institutional framework

- The Government should secure that the capacity, operational independence and authority built in the State Energy Efficiency Agency are maintained and continuously strengthened to secure proper development and implementation of energy efficiency policies, strategies and programmes.
- The Government should ensure better coordination between the various governmental institutions acting in the area of energy efficiency.
- The Government should take action to support the participation of the private sector and of municipalities in promoting energy efficiency.

- The Government should also encourage professional associations and NGOs in their efforts to promote energy efficiency and related environmental activities.

Energy pricing

- The Government should take action to eliminate subsidies and cross-subsidies in end-use energy prices; social problems arising from market pricing should continue to be addressed by social policies.
- The Government should continue efforts towards introducing market oriented prices and consider the reflection of environmental costs.
- The regulatory mechanism for establishing energy prices should be transparent, more independent and take into consideration energy efficiency activities of the energy companies on both supply and demand-side.

Energy efficiency funding and fiscal policies

- A better balance should be secured between energy efficiency objectives and funding at national and regional / municipal level.
- The Government should consider allocating special funds at national and municipal level for supporting the implementation of energy efficiency policy objectives.
- The Government should encourage the development of innovative financing mechanism which support implementation of energy efficiency activities by end-users and by specialised service companies.
- The Government should further develop fiscal and taxation policies which support improvements in energy efficiency.
- Better information on the planning and operation of the National Environmental Fund should be provided to the market actors in order to facilitate and promote the financing of energy efficiency projects.

Implementation of specific energy efficiency measures

- Priority should be given to implementing low cost measures identified in the industrial sector, including energy management, auditing and training; low cost measures should be also implemented without delay in other sectors of the economy.
- Efforts should continue to complete energy efficiency standards and labelling legislation in accordance with the EU legislation in this area.
- The Government should consider allocation of special resources for research and development activities supporting the penetration and deployment of energy efficient and environmental friendly technologies.

- A policy on the use of flexible mechanisms under the Kyoto Protocol should be better defined and promoted; the potential share of energy efficiency projects in such activities should be identified.
- Building on the positive experiences undertaken so far, additional efforts should be made to secure completion of the metering programme planned for the district heat consumers.
- Priority should be given to the attraction of private investments in the process of rehabilitation of the district heating systems.
- Awareness on benefits resulting from energy efficiency improvement should be promoted within all sectors of the economy and society through information and dissemination activities.
- Education and training activities related to energy efficiency should be considered in the various stages of the education process.
- The potential for employment creation through implementation of energy efficiency activities should be investigated and tapped, taking into consideration the experience of other countries in this area.

Promotion of renewable energy and cogeneration

- The Government should favour the development of framework conditions for promotion of renewable energy sources and cogeneration, including appropriate tariffs and other instruments, which would support completion and implementation of a national renewable energy programme.

Data collection, monitoring and forecasting

- Every effort should be made to secure that energy data basis and statistics are harmonized with those of Eurostat and IEA.
- In order to facilitate the design and evaluation of energy efficiency policies and programmes, the Government should take the necessary steps to secure that energy efficiency indicators at national, regional and sectoral level are developed.
- Technological development and structural changes of the economy should be taken into consideration in developing energy demand and supply scenarios.
- The Government should secure the evaluation of the results obtained by energy efficiency projects implemented under existing pilot and funding schemes; such evaluations should further serve in the process of developing future programmes.

Annex 1: Energy Situation in Bulgaria

The Bulgarian energy sector is characterised by high shares of coal (35.5%) and nuclear energy (22.7%) in total primary energy supply (TPES). Petroleum accounts for 24.5% and natural gas for 14.8% of TPES. Although coal is mainly an indigenous resource, like nuclear energy, import dependence is high (about 60% of TPES). Almost all petroleum and natural gas supplies are imported, to a large extent from Russia.

Final energy consumption is concentrated in the industry (44.2%), residential (22.4%) and transport (21.3%) sectors. The shares of the service and of the agricultural sectors are only 6.7% and 3.2% respectively.

The primary energy intensity in 1999 was 0.48 Mtoe/billion 1995 US\$, compared to the final energy intensity of 0.254 Mtoe/billion 1995 US\$ and a per capita consumption of 1.19 toe/capita.

According to the National Strategy for Development of Energy and Energy Efficiency until 2010, the consumption of coal is expected to increase by more than 50% until 2005. Although at a lower rate, substantial increase in consumption is also expected for liquid fuels, mainly in the transport sector. Natural gas consumption is expected to slightly increase, in particular due to the penetration of natural gas in the residential sector. Of all the renewable energy sources available in Bulgaria (hydro, solar, wind, geothermal energy, biomass, firewood, garbage and biogas) only hydro energy contributes so far to the energy supply on a significant level.

In the electricity sector, increasing demand and the closure of Units 1 and 2 of the Kozloduy Nuclear Power Plant, require a comprehensive programme of rehabilitation of existing and construction of new power stations. Investments foreseen in the National Strategy include the rehabilitation of various thermal power units, replacement of capacities at the Maritsa East coal fired power station, the rehabilitation and extension of lifetime of some units at Kozloduy NPP, backfitting of gas turbines to district heating plants and the construction of new thermal, hydroelectric and nuclear units. Integration of the Bulgarian high voltage transmission network into the UCPTE system is another priority.

In the natural gas sector, the extension and modernisation of the national transport infrastructure and the development of regional and local gas distribution networks are among the priorities of Bulgargaz. Bulgaria is also an important transit country for natural gas.

In the coal mining sector, the focus is on rehabilitation and further development of the remaining profitable mines, e.g. the Maritsa Iztok Mines, who provide coal to the Maritsa Iztik thermal power complex.

Also in the district heating sector, substantial investments in the rehabilitation of economically viable systems are foreseen. These investments concern production supply-side (e.g. retrofitting of conventional heating or steam turbine CHP plants by gasturbines), as well as heat transmission networks (including substations) as improved regulation and metering equipment for end users.

Table A1.1
Energy Balance for Bulgaria

		1990	1996	1997	1998	1999
Total Primary Energy Production	Mtoe	9.61	10.345	10.108	10.146	9.056
Net imports	Mtoe	18.19	13.149	10.671	10.102	8.829
Total Primary Energy Supply (TPES)	Mtoe	28.82	22.598	20.890	20.118	18.203
Total Final Consumption	Mtoe	17.64	12.514	10.705	10.935	9.716
Total Electricity Consumption	TWh	41.488	36.690	33.243	32.469	29.822

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1998-1999; 1997-1998; 1996-1997; several editions.

Table A1.2
Basic Indicators

		1990	1996	1997	1998	1999
Population	Million	8.7	8.4	8.3	8.3	8.2
GDP (using exch. rates)	billion 1995 US\$	15.0	11.8	10.9	11.3	11.6
GDP (using PPPs)	billion 1995 US\$	49.2	38.8	36.0	37.3	38.2
Primary Energy Intensity *	TPES/GDP	0.586	0.58	0.58	0.54	0.48
Final Energy Intensity *	TFC/GDP	0.363	0.323	0.297	0.293	0.254
Electricity Consumption	KWh/capita	4759	4391	3999	3932	3633
Energy-related CO ₂ emissions **	Mt CO ₂	6.70	1.82	1.49	1.47	n.a.

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1998-1999; 2001 Edition.

* using Purchasing Power Parities (PPPs)

** OECD – IEA Statistics, CO₂- Emissions from Fuel Consumption 1971-1998; 2000 Edition

Table A1.3
Total Primary Energy Supply (TPES)

		1990	1996	1997	1998	1999
Crude Oil	Mtoe	9.70	7.051	6.048	5.678	5.773
Petroleum Products	Mtoe	n.a.	-1.477	-1.487	-0.853	-1.301
Gas	Mtoe	5.39	4.676	3.699	3.128	2.685
Coal	Mtoe	9.241	7.283	7.612	7.397	6.453
Nuclear	Mtoe	n.a.	4.718	4.633	4.411	4.128
Hydro	Mtoe	n.a.	0.144	0.237	0.266	0.237
Comb. Renewables and Wastes	Mtoe	0.356	0.240	0.260	0.416	0.414
Electricity Trade	Mtoe	n.a.	-0.039	-0.305	-0.314	-0.168
Total Supply	Mtoe	28.82	22.598	20.860	20.118	18.203
Energy Production	Mtoe	9.61	10.345	10.108	10.146	9.056
Energy Production / TPES	-	0.333	0.458	0.485	0.504	0.498
TPES / capita	toe/capita	3.31	2.78	2.51	2.44	2.22

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1998-1999; 1997-1998; 1996-1997; several editions.

Table A1.4
Total Final Energy Consumption (TFC) by End-use Sector

		1990	1996	1997	1998	1999
Residential	Mtoe	3.030 *)	2.622	2.140	2.364	2.177
Industry	Mtoe	10.45	7.067	5.962	5.447	4.299
Services	Mtoe	0.081 *)	0.244	0.136	0.183	0.648
Transport	Mtoe	2.57	1.574	1.667	2.048	2.067
Agriculture	Mtoe	0.944 *)	0.442	0.317	0.292	0.310
Non-specified	Mtoe	0.639 *)	0.555	0.458	0.466	0.010
Total (TFC)	Mtoe	17.64	12.514	10.708	10.935	9.716
TFC / GDP (PPP)	toe/1000 1995 US\$	0.36	0.326	0.297	0.293	0.254
TFC /capita	toe/capita	2.028	1.49	1.29	1.32	1.19

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1998-1999; 1997-1998; 1996-1997; several editions

*) data received from SEEA

Annex 2: Selected end-use data tables

Table A2.1
Final Energy Consumption of the Residential Sector by Energy Source

		1990	1996	1997	1998	1999
Total	Mtoe	3.030 *)	2.622	2.140	2.364	2.177
a. Electricity	Mtoe	0.901 *)	0.988	0.850	0.906	0.870
b. Heat	Mtoe	0.988 *)	0.665	0.621	0.591	0.584
c. Oil Products	Mtoe	0.428 *)	0.242	0.008	0.014	0.019
d. Gas	Mtoe		-	-	-	-
e. Coal	Mtoe	0.803 *)	0.556	0.482	0.495	0.346
f. Comb. Renewables and Wastes	Mtoe	0.356 *)	0.171	0.180	0.357	0.358
g. Others	Mtoe	n.a.	-	-	-	-

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1998-1999; 1997-1998; 1996-1997; several editions.

*) data received from SEEA

Table A2.2
Final Energy Consumption of Services (commercial and non-commercial) by energy source

		1990	1996	1997	1998	1999
Total	Mtoe	n.a.	0.244	0.136	0.183	0.649
a. Electricity	Mtoe	n.a.	0.141	0.117	0.127	0.380
b. Heat	Mtoe	n.a.	0.021	0.002	0.002	0.116
c. Oil Products	Mtoe	n.a.	0.044	-	0.033	0.122
d. Gas	Mtoe	n.a.	0.032	0.014	0.020	0.016
e. Coal	Mtoe	n.a.	0.004	0.003	0.001	0.001
f. Comb. Renewables and Wastes	Mtoe	n.a.	0.003	-	-	0.014
g. Others	Mtoe	n.a.	n.a	n.a	n.a	n.a

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1998-1999; 1997-1998; 1996-1997; several editions.

Table A2.3
Final Energy Consumption of the Industry Sectors by Energy Source (1999)

		Mining	Manufacturing						Constr.	Total	
			Iron & steel	Chemical & petrochemical	Non-ferrous metals	Food & tobacco	Pulp & paper, print	Non-metallic minerals	Other		
Coal	Mtoe	0.006	0.300	0.113	0.053	0.034	-	0.066	0.006	0.004	0.582
Crude oil	Mtoe	-	-	-	-	0.001	-	-	0.001	-	0.002
Petroleum products	Mtoe	0.031	0.024	0.878	0.051	0.138	0.038	0.139	0.158	0.028	1.485
Gas	Mtoe	-	0.268	0.568	0.007	0.047	0.031	0.244	0.058	0.001	1.224
Nuclear	Mtoe	-	-	-	-	-	-	-	-	-	-
Hydro	Mtoe	-	-	-	-	-	-	-	-	-	-
Geothermal, solar, etc.	Mtoe	-	-	-	-	-	-	-	-	-	-
Comb. Renewables & waste	Mtoe	-	-	0.001	-	0.006	0.002	-	0.014	0.001	0.024
Electricity	Mtoe	0.074	0.118	0.160	0.062	0.077	0.022	0.056	0.143	0.016	0.728
Heat	Mtoe	0.001	0.005	0.187	0.001	0.022	0.006	0.002	0.028	0.001	0.253
Total	Mtoe	0.111	0.715	1.909	0.173	0.326	0.099	0.506	0.409	0.051	4.299

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1998-1999; 2001 Edition

NB: industry non-energy use is not added to TFC

Table A2.4

Transport Indicators (1998)

	Freight	Travel	Total
FC (Mtoe)	n.a.	n.a.	1.981*)
Tonne-km (* 10 ⁹)	76.039 *)		
TFC/10 ⁶ tonne-km	n.a.		
Person-km (* 10 ⁹)		17.564 *)	
TFC / 10 ⁶ person-km		n.a.	
Number of cars / 10 ³ inhabitants	n.a.	n.a.	n.a.

*) data received from SEEA; Source: NSI

Annex 3: Energy Prices

Table A3.1: Energy Prices End-use Sectors, 1999 (BGL per Unit)

	Un-leaded gasoline premium	Light fuel oil	Diesel	Heavy fuel oil	Natural gas	Steam coal	Electricity
	litre	1000 litres	litre	tonne	10 ³ kcal GCV	tonne	kWh
Industry	0,98	700	0,73	n.a.	268	n.a.	3 tariffs 0.092 BGL
Households (incl. VAT)	0,98	700	0,73	n.a.	-	n.a.	2 tariffs 0.072
Electricity generation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	

* Gross calorific value

Note: Please indicate the exchange rate

Present prices: Unleaded gasoline – 1,52 BGL/l; Light oil 1,2 BGL/l; Heavy oil =442 BGL/ton; Natural gas = 312 BGL/l; electricity – industry 0,1035; .

Remark: The prices of heavy fuel oil and natural gas are not observed by the NSI – the average prices for 1999 are given in the table

Source: NSI

Energoprojekt (Áíãããĩ ðíæð)

“Chaim” OOD (“×àèí” ÎÏÄ)

Stimulate Bank (Íànúð-èòæèà ááíéà)

Stalker-KM (Ñòæéæð – ÈÌ)

ORKIKEM (ÎÐÊÊÊÂÌ)

Danfoss (Äáôîñ)

Erato Holding (Åðàðî Õíèäèíã)

Honeywell (Õàíèóæ)

SAC (ÑÀÊ)

Andersen (Áíãããĩ)

Brunata (Áðóíàðà)

Siemens (Ñèì ãñ)

Bulgarian Energy Policy Association (Áúèããðñèà Àñíòèèòèà Áíããèéà Ì ìèèèèè)

Glossary

ADEME	<i>Agence de l'Environnement et de la Maîtrise de l'Énergie</i> (French Agency for the Environment and Energy Conservation)
Art.	Article
BGL	Bulgarian Lev
CH ₄	Methane
CHP	Combined heat and power, also known as cogeneration
CO ₂	Carbon Dioxide
DIN	German standard
EC	European Commission
Ecofund	Environment Trust Fund
EE 2000	Energy Efficiency 2000 Project of the United Nations Economic Commission for Europe (UN ECE)
EE21	Energy Efficiency 21 Project of the United Nations Economic Commission for Europe (UN ECE)
EEEL	Energy and Energy Efficiency Law of 1999
EnEffect	Centre for Energy Efficiency
Enerdata	Enerdata S.A., France
ESCO	Energy Service Company
EU	European Union
E.V.A.	<i>Energieverwertungsagentur</i> (Austrian Energy Agency)
FC	Final Consumption
FEMOPET	Fellow Member – Organisation for the Promotion of Energy Technologies
FYROM	The Former Yugoslav Republic of Macedonia
GCV	Gross Calorific Value
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse gas
I.C.E.	<i>International Conseil Énergie</i> , France
IEA	International Energy Agency
IMF	International Monetary Fund
JI	Joint Implementation, a flexible mechanism under the Kyoto Protocol of the UNFCCC
JICA	Japanese International Co-operation Agency
kcal	Kilocalorie

km	Kilometre
km ²	Square kilometre
ktoe	Thousand tonne of oil equivalent
kWh	Kilowatt hour
l	litre
MoEW	Ministry of Environment and Water
Mtoe	Million tonne of oil equivalent
MW	Megawatt
MWh	Megawatt hour
N ₂ O	Nitrous Oxide
NEK EAD	National Electricity Company
NGO	Non Governmental Organisation
NOVEM	Netherlands Agency for Energy and the Environment
NO _x	Nitrogen Oxides (Nitric Oxide NO, Nitrogen dioxide NO ₂)
NPP	Nuclear Power Plant
NSI	National Statistical Institute
ODS	Ozone depleting substances
OECD	Organisation of Economic Co-operation and Development
OPET	Organisation for the Promotion of Energy Technologies
PEEREA	Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects
PHARE	EU assistance programme for economic restructuring in the countries of Central and Eastern Europe
PPP	Purchase power parity
RES	Renewable Energy Sources
SAVE II	EU programme for the promotion of energy efficiency
SEC	Sofia Energy Centre
SEEA	State Energy Efficiency Agency
SEERA	State Energy and Energy Resources Agency
SERC	State Energy Regulatory Commission
SO ₂	Sulphur Dioxide
SYNERGY	EU international energy cooperation programme
TFC	Total Final Energy Consumption
THERMIE	EU Programme for the promotion of research, development and demonstration in non-nuclear energy technologies (under the Fourth Framework Programme for Research, Technological Development and Demonstration)

toe	Tonne of oil equivalent
TPES	Total Primary Energy Supply
TWh	Terawatt hour
UBB	United Bulgarian Bank
UCPTE	<i>Union pour la Coordination de la Production et du Transport de l'Electricité</i>
UN	United Nations
UNDP	United Nations Development Programme
UN ECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
US	United States (of America)
USAID	United States Agency for International Development
US\$	United States Dollar
VAT	Value Added Tax