IN-DEPTH REVIEW OF ENERGY EFFICIENCY POLICIES AND PROGRAMMES OF ROMANIA

ENERGY CHARTER PROTOCOL ON ENERGY EFFICIENCY AND RELATED ENVIRONMENTAL ASPECTS (PEEREA)

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.

[1] Albania, Armenia, Austria, Australia, Azerbaijan, Belarus, Belgium, Bosnia and Hercegovina, Bulgaria, Croatia, Czech Republic, Cyprus, Denmark, Estonia, European Communities, 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.

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 to the Energy Charter Conference for discussion and endorsement.

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

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EXECUTIVE SUMMARY

Romania is a country with an economy in transition. Located in South-East Europe, with a population of 22.4 million and a surface area of 238 391 Km^2, Romania is one of the largest countries of the region. After the fall of the communist dictatorship in 1989, Romania adopted a new constitution in 1991 and started the process of transformation from the former centrally planned economy to a market economy.

While Romania has traditionally been an oil producing country, reserves have been declining during the past decades and Romania has become a net importer. In addition to domestic oil and gas production, Romania has also an important coal mining industry (hard coal, lignite and brown coal). Electricity is mainly produced from thermal power plants, hydropower plants and the Cernavoda nuclear power station. Main primary energy inputs in 2000 were natural gas and oil, followed by coal, renewables and waste, nuclear power and hydroelectricity.

The energy sector is under the supervision of the Ministry of Industry and Resources (MIR), which formulates policy and strategy. Both the electricity and natural gas sectors have been restructured in recent years. The electricity sector comprises separate companies for power transmission (Transelectrica), electricity and district heat production from thermal power plants (Termoelectrica), hydropower generation (Hydroelectrica), electricity distribution and supply (Electrica) and nuclear power generation (Nuclearelectrica). The policy of the Government is to eventually transform the state-owned electricity monopoly into a competitive market, also by privatizing (parts of) generation and distribution. Also the natural gas sector has been unbundled in separate companies for exploration, production and storage (Romgaz), transport, transit and dispatching (Transgaz) and distribution (Distrigaz Nord and Sud).

Approximately 30% of Romania's total building stock receives its heat and hot water from district heating systems, a figure that rises to 58% in urban areas. District heating accounts for about 60% of the country's total heat and hot water demand. A total of 251 towns and cities have district heating networks, most of them receiving heat from Termoelectrica-owned CHP plants. Both thermal power stations and district heating plants and distribution networks are in need of major modernization and rehabilitation; various international co-operation projects have adressed these problems.

Regulatory authorities have been established for the electricity and heat (ANRE), natural gas (ANRGN) and petroleum and mining sectors (NAMR).

The energy policy of Romania is focused on compliance with the EU accession criteria, aiming at the development of a national energy market integrated in the European internal energy market. These principles have been laid down in the "National Medium-term Strategy for Energy Development of Romania 2001-2004", approved by the Government in July 2001.

The Government's strategy to achieve the policy objectives is focused on three lines of action: (i) financial unblocking of the energy sector, (ii) starting the privatisation process first in the distribution of electricity and natural gas and subsequently in the electricity production sector, and (iii) ensuring functional and sustainable development in the medium term by stimulating new investments in the energy sector.

The National Medium-term Strategy for Energy Development foresees an annual reduction of the energy intensity of the national economy of approximately 3% in the period 2001-2004, corresponding to an absolute increase in final energy consumption of 2.5% per year. The Strategy considers energy efficiency as an important option, in particular in the medium and long term.

Industry is still the largest user of final energy (43.2%), followed by the residential sector (33.8%), transport (15.3%), services (3.3%) and agriculture (1.6%). The total final energy consumption has been declining since 1996, with a recovery since 1999. The energy intensity of the economy, expressed in TFC/GDP and the total final energy consumption per capita have been substantially declining during this period. In 2000, TFC/capita first increased since 1991.

The Law 199/2000 concerning the Efficient Use of Energy (including its subsequent revisions) establishes the national policy for the efficient use of energy as an integral part of the energy policy of the State, based on the principles of a competitive energy market, environmental protection and co-operation between consumers, producers, energy suppliers and public authorities. The main objective of the policy is to increase the efficiency of energy utilisation in the whole chain of production, conversion, transport, distribution and final consumption of energy. The Law stipulates that the national policy for the efficient use of energy shall be developed by the Romanian Agency for Energy Conservation ARCE, on behalf of the Ministry of Industry and Resources.

The Law defines obligations of energy users with an annual consumption above 1 000 toe and of municipalities with more than 20 000 inhabitants to develop energy conservation programmes. Consumers with a consumption above 200 toe are obliged to accomplish an energy audit every two years.

The Law also stipulates the elaboration and introduction of energy efficiency standards for energy consuming appliances and equipment and buildings. Financial and fiscal incentives stipulated by the Law are (i) access to the Special Fund for the Development of the Energy System, (ii) exemption of profit tax for profit shares for investments in energy efficiency, (iii) subsidies on interest rates for bank loans for energy efficiency projects, (iv) exemption from custom taxes for imported energy efficient equipment, and (v) exemption of 50% of profit tax for a period of 5 years for energy management and service companies.

While energy efficiency policies and strategies of the Government focus on the residential and industrial sectors, in other sectors - notably services and transport - there is apparently a lack of coherent sectoral energy efficiency policies.

In the past, energy prices in Romania were the subject of subsidies and cross-subsidies. Subsidies still exist in the (socially sensitive) district-heating sector and in coal mining. During the mission, the Government indicated that all cross-subsidies have been eliminated. In the electricity sector, direct cross-subsidies between household and industrial consumers were eliminated in 1999 and cross-subsidies between electricity and heat were eliminated in 2000. In the natural gas sector, according to the Government, cross-subsidies between household and industrial consumers were eliminated in 2000.

In the electricity and gas sector, regulated tariffs (for activities with a natural monopoly character and for captive consumers) coexist with prices resulting from competitive market mechanisms. In both areas, social tariffs for low-income households exist. Heat prices for end-users are established on a local basis for district heating systems, based on a national unified tariff for heat delivered by Termoelectrica. National unified tariffs are also applied to electricity supplies to captive consumers. Although heat prices have been gradually adjusted during the past years, they are still subsidized for residential consumers. Households pay a net reference price, established by Government Decision, the difference being paid from the national and local budgets to the district heating companies.

In 1994, the Special Fund for the Development of the Energy System was established at the level of the Ministry of Industry and Resources. The Fund is financed from a share of the development tax included in the tariffs for electricity (10%) and thermal energy (2%) supplied by all energy producers and self-producers. The tax is applied to all the consumers, except households.

While co-financing from the Special Fund may be provided for projects leading to improving energy efficiency on both the supply and the demand side, it appears that the focus is more on supply side energy efficiency improvements. In addition to domestic financing from the Special Fund for the Development of the Energy System, Romania has received financial support in the energy and energy efficiency field from several international donors.

In 2001, the Ministry of Finance and the World Bank launched the GEF Energy Efficiency Financing Facility Project (FREE). FREE is orientated at leveraging GEF seed money (US$ 10 million, of which US$ 8 million is for investment and US$ 2 million is for technical assistance) by co-financing with Romanian and foreign sources and aims to provide loans for commercially viable energy efficiency projects. The Fund is established as an institution of public interest with its own legal personality, is independent and financially autonomous and will initially operate as a revolving investment fund.

The residential sector in Romania offers very significant potentials for energy conservation, which could be realized on a cost-effective basis. In addition to existing thermal energy standards for new buildings, the Government has formulated specific policies and strategies regarding the rehabilitation and modernisation of buildings and regarding the modernisation of district heating services. Ordinance no. 29/2000 concerning thermal rehabilitation and energy savings in buildings foresees annual national programmes for the thermal rehabilitation of buildings and pertaining installations, including studies, the actualisation of technical regulations and the elaboration of demonstration projects. The Ordinance also stipulates the development of energy certificates for existing buildings, defines the duties of heat supply companies to control heat flows and thermal losses, establishes the procedures to be followed by building owners/administrators in carrying out the rehabilitation and assigns responsibilities at Government level, which are shared by the Ministry of Public Works, Transport and Housing, the Ministry of Industry and Resources, via ARCE and regional administrations.

In the field of energy efficiency standards for domestic appliances, Romania has transposed relevant European Directives concerning labelling and minimum energy efficiency requirements.

The national strategy concerning the modernisation of district heating systems developed by the Ministry of Public Administration identified a need for annual investments of US$ 450 million, over the period 2002-2016. The funds shall be raised by

bank loans, public-private partnerships, EU grants as well as funds from the State and local budgets. In addition to investments in the modernisation of the district heating systems, the strategy also foresees the reform of public community services and a reduction of the number of district heating operators in the country. The Ministry of Public Administration is also considering the creation of protected areas for district heating. So far about fifteen CHP plants in big cities have been, or are in the process of being transferred from Termoelectrica to local authorities.

While the rehabilitation of the infrastructure for heat production, transport and distribution is certainly of major importance, measures directed at improved metering and control of heat supplies to final consumers are also crucial. Several municipal heat suppliers are working on the improvement of this situation, often in co-operation with international donors like the EIB and the EBRD.

Heavy industry still accounts for the major part of the industrial energy consumption, although restructuring and modernisation have significantly lowered specific energy consumptions. Energy efficiency in industry has been promoted since 1991, with the important involvement of ARCE and of international donors. The provisions of the Energy Efficiency Law offer the opportunity to intensify communication with industry with the objective to achieve a more active participation of the sector in energy efficiency activities.

Although energy efficiency programmes exist in some transport enterprises (notably railroad and metro companies), a sectoral approach is still lacking.

So far, the market for ESCOs is still limited. DSM activities of energy companies exist on a modest scale. The promotion of renewable energy is mainly focused on biomass and small hydropower. The Research and Development Programme “Orizont 2000” of the Ministry of Education and Research includes rational use of energy resources and renewable energy as thematic fields.

The Romanian Agency for Energy Conservation (ARCE) was established in 1990 as a part of the Ministry of Industry and Resources. Since 1999, ARCE has operated as a Governmental body under the authority of the Ministry. Since then, ARCE’s staff has been reduced from 80 to 35 and the number of territorial branches has been reduced from 16 to 8. In accordance with the Energy Efficiency Law 199/2000 and its latest revision (Law 120/2000), ARCE will assume an extended role, not only in implementing and monitoring, but also in elaborating the national energy efficiency policy. In addition to the revision of the Law, Government Decisions regarding the application

of the revised Energy Efficiency Law and those regarding the organisation and functioning of ARCE are under preparation. According to these proposals, ARCE would be financed both from the national budget as from other sources, in particular from activities of authorisation, advice, certification and testifying.

In addition to ARCE, other non-governmental and private organisations are active in the field of energy efficiency in Romania.

Environmental protection is the main responsibility of the Ministry of Waters and Environmental Protection (MAPM). In 1999, a Working Group under the co-ordination of MAPM prepared the National Strategy for Sustainable Development. The energy chapter of the Strategy, which makes explicit reference to the Energy Charter Treaty and PEEREA, advocates, among other issues, increased efficiency and environmental protection in the energy sector and the need to diversify energy supplies, including the promotion of renewable energies.

Environmental criteria also play a role in the policies of the Ministry of Industry and Resources. The objectives of the Strategy for Industrial Development on Medium and Long term include the reduction of energy intensity and environmental impact as criteria for the restructuring of industry. In order to integrate environmental aspects into various fields of policy, the Inter-ministerial Committee for Integration of Environmental Policies in Sectoral Policies and Strategies at National Level was established in 2001.

Romania ratified the United Nations Framework Convention on Climate Change in 1994 and the Kyoto Protocol in 2001. As an Annex I country, Romania has committed itself under the Kyoto Protocol to reduce CO_2 emissions by 8% in the first commitment period until 2008-2012, compared to 1989 levels. According to the aggregated emission projection of greenhouse gases, presented in the Second National Communication to the UNFCCC of April 1998, the national target can be achieved in 2010 for all scenarios considered.

Romania has signed memoranda of understanding concerning co-operation on Activities Implemented Jointly (AIJ) with Switzerland and Joint Implementation (JI) with the Netherlands and Norway. A proposal for a Host Country Agreement between Romania and the IBRD as a trustee of the Prototype Carbon Fund (PCF) is under discussion.

In summary, while Romania is progressing well in implementing PEEREA, the review team identified a need for more and specific action in various fields, including

the need to integrate end-use energy efficiency in a more balanced way in the ongoing energy market reforms, in Government policies and programmes, and the completion of energy efficiency legislation and effective implementation of existing and new regulations. Securing the financing of the ambitious programmes of the Government in the residential and district heating sectors appears to be a critical issue. There is also a need for coherent sectoral energy efficiency programmes in the services and transport sectors. The strengthening of the role of ARCE as stipulated by the Energy Efficiency Law and its amendments should be accompanied by improved communication between market actors and the Government. In the field of energy pricing and taxation, future work appears necessary to secure best price differentiation between the various categories of consumers. Finally, energy efficiency and environmental policies do not appear to be integrated optimally.

Based on the findings of the review team, the report provides a series of recommendations to the Government of Romania, which - in addition to general recommendations referring to overall energy policies and strategies - relate to areas like: the legal, regulatory and institutional frameworks for energy efficiency; energy market and pricing; energy efficiency funding and fiscal policies; specific programmes and instruments; demand-side management and district heating; data collection and monitoring; education and information, and energy efficiency and environmental policies.

IN-DEPTH REVIEW OF ENERGY EFFICIENCY POLICIES AND PROGRAMMES OF ROMANIA

1. Introduction to the PEEREA Review

In April 2002, 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 Romania.

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 used to assess progress, promote continuous dialogue and transfer information.

The review team comprised of Mr. W. Stinglwagner of Germany who chaired the review, Mr. R. Babut of Poland, Mr. W. Cariani of Italy and Mr. H. Kulbas of Estonia. Mr. T. Constantinescu of the Energy 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 Romanian participants in meetings for the period of the review. Special thanks go to officials of the Ministry of Industry and Resources and the Romanian Agency for Energy Conservation, 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 Romania as well as data and analyses from various other sources, including the International Energy Agency, OECD, UNFCCC and other related materials. Statistical data are presented according to the most actual data available.

2. Overview

Romania is a country with an economy in transition. Located in South-East Europe, with a population of 22.4 million and a surface area of 238 391 km^2, Romania is one of the largest countries of the region. The country comprises three major geographical areas: Muntenia, which occupies the plains south of the Carpartian mountains,

Moldova in the east and north-east and Transilvania, which occupies the north-western part of the country. The Danube forms a large part of Romania's southern border.

The capital is Bucharest, with slightly more than 2 million inhabitants. Other major cities are Iaşi, Constanţa, Cluj-Napoca, Timişoara and Galaţi. Romania borders Bulgaria, Yugoslavia, Hungary, Ukraine and Moldova. It has a coastline of almost 200 km with the Black Sea.

FIGURE 1: ROMANIA

After the fall of the communist dictatorship in 1989, Romania adopted a new constitution in 1991 and started the process of transformation from the former centrally planned economy to a market economy. With a legacy of a largely obsolete industrial base and a pattern of output unsuited to the country's needs, economic restructuring over the past decade has lagged behind some other Central European countries. In 2000, Romania emerged from a three year recession. Table 1 shows the development of GDP and inflation between 1995 and 2000.

TABLE 1: DEVELOPMENT OF GDP AND INFLATION, 1995-2000

Indicator	Unit	1995	1996	1997	1998	1999	2000
GDP in current prices	€ billion	27.1	27.8	31.2	37.2	33.0	40.0
Real GDP growth rate	%	7.1	3.9	-6.1	-5.4	-3.2	1.6
Inflation rate (annual average)	%	32.3	38.8	154.8	59.1	45.8	45.7

Source: European Commission, 2002

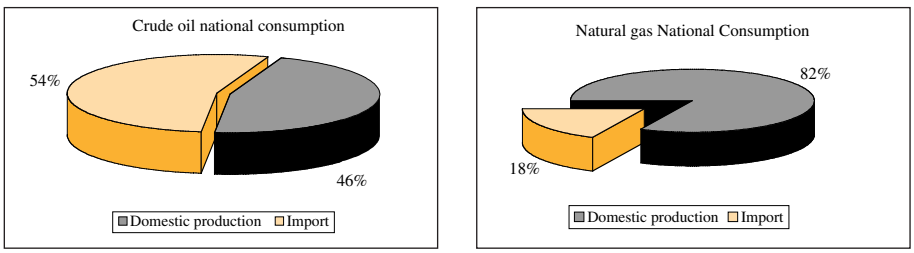
In 2000, GDP came 53.5% from services, 32.6% from industry and 13.9% from agriculture. The main import-export partners are Italy, Germany, France and Russia. Romania exports mainly textiles and footwear, metals and metal products, machinery and equipment and minerals and fuels. Foreign trade has considerably grown since 1999. The trade balance is slightly negative.

Accession to the European Union is a central priority for the Government. In March 2002, the energy chapter of the *acquis communautaire* was opened for negotiations. The Romanian Government is making efforts to adopt the *acquis communautaire* and to incorporate the suggestions of the European Commission into its national energy policy.

Romania has traditionally been an oil producing country, with one of the first functioning oil industries in the world. Until the second half of the Twentieth Century, Romania remained an important oil producer.

During the past decades, reserves have been declining, and Romania has become a net importing country. Figure 2 shows the shares of imports and domestic production of crude oil and natural gas. The domestic production of crude oil in 2001 was only slightly more than 40% of the production in the peak year 1976.

FIGURE 2: IMPORTS AND DOMESTIC PRODUCTION OF CRUDE OIL AND NATURAL GAS, 2001



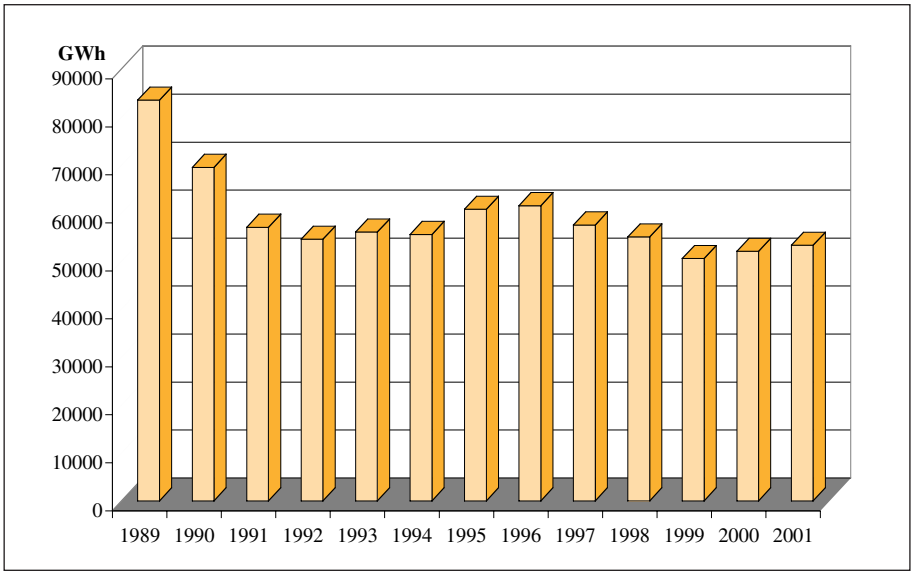
Source: ANRGN, 2002

In addition to domestic oil and gas production, Romania has also an important coal mining industry (hard coal, lignite and brown coal). Electricity is mainly produced from thermal power plants, hydropower plants and the Cernavoda nuclear power station.

The country's main primary energy inputs in 2000 were natural gas with 13.68 Mtoe or 37.6% of TPES, oil with 9.81 Mtoe or 27.0%, coal with 7.48 Mtoe or 20.6%, renewables and waste with 2.76 Mtoe or 7.6%, nuclear power with 1.34 Mtoe or 3.7% and hydropower with 1.27 Mtoe or 3.5%. Total final energy consumption in 2000 was distributed as follows: industry 10.78 Mtoe or 43.2%, residential sector 8.44 Mtoe or 33.8%, transport sector 3.81 Mtoe or 15.3% and others (including the commercial and public sectors and agriculture) 1.93 Mtoe or 7.8% of TFC.

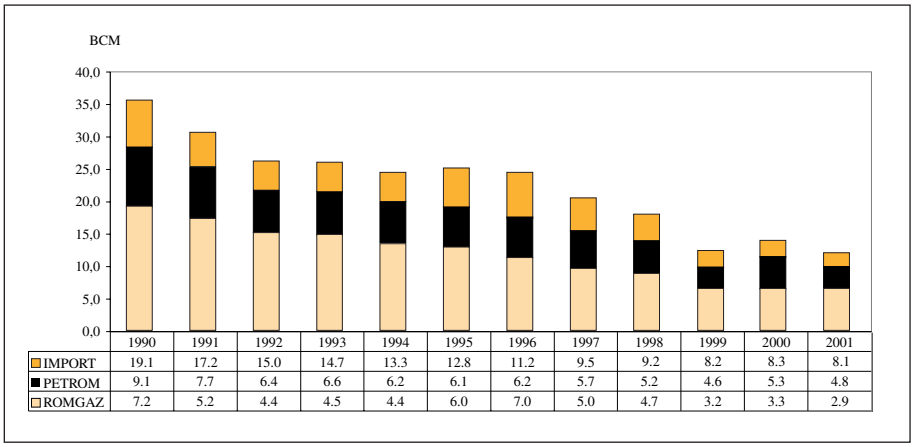
Electricity consumption in Romania, which decreased between 1996 and 1999, has increased since then (Figure 3), natural gas consumption is still declining (Figure 4).

FIGURE 3: ELECTRICITY GENERATION 1989 - 2001



Source: ANRE, 2002

FIGURE 4: EVOLUTION OF NATURAL GAS INTERNAL CONSUMPTION, PRODUCTION AND IMPORT



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
IMPORT	19.1	17.2	15.0	14.7	13.3	12.8	11.2	9.5	9.2	8.2	8.3	8.1
PETROM	9.1	7.7	6.4	6.6	6.2	6.1	6.2	5.7	5.2	4.6	5.3	4.8
ROMGAZ	7.2	5.2	4.4	4.5	4.4	6.0	7.0	5.0	4.7	3.2	3.3	2.9

Source: ANRGN, 2002

The energy intensity of the Romanian economy and the energy consumption per capita are declining: compared to 1991, these indicators had declined in 1999 by 23% (primary energy intensity), 27% (final energy intensity) and 27% (TPES/capita) respectively (see Annex 1).

The energy sector is under the supervision of the Ministry of Industry and Resources (MIR), which formulates policy and strategy.

In June 1998, following the adoption of the Government Ordinance 63/1998 (also referred to as the Energy Law), a restructuring programme was adopted by former electricity monopolist RENEL (*Regia Nationala de Electricitate*), resulting in the creation of the joint stock company CONEL (*Compania Nationala de Electricitate S.A.*). On 31st July 2000, CONEL was divided into four companies: (i) Transelectrica S.A., the national company for operating the national power transmission system and - via its subsidiary Opcom S.A. - administering the inceptive electricity market, (ii) Termoelectrica S.A., the commercial company for electricity and (district) heat production from thermal power plants, (iii) Hydroelectrica S.A., the commercial company for hydropower generation, and (iv) Electrica S.A., the commercial company for the distribution and supply of electric energy. SN Nuclearelectrica SA operates the Cernavoda Nuclear Power Station as a separate entity. The policy of the Government is to eventually transform the state-owned electricity monopoly into a competitive market, also by privatising (parts of) generation and distribution. While some progress

has been made in this respect, further steps are still necessary in order to fully comply with EU accession criteria (*acquis communautaire*), in particular in the fields of energy sector restructuring and energy efficiency.

First steps have also been undertaken to restructure the natural gas sector: former monopolist Romgaz was split up in June 2000. At present the following actors operate in this sector: (i) Romgaz, responsible for exploration, production and storage of natural gas, (ii) Transgaz, responsible for gas transport, international transit and dispatching, and (iii) Distrigaz Nord and Distrigaz Sud, responsible for natural gas distribution. In the petroleum sector, SNP Petrom, the vertically integrated oil company, is subject to restructuring and partial privatisation. The coal sector is suffering from a decline of production, outdated infrastructure and social unrest.

Approximately 30% of Romania's total building stock receives its heat and hot water from district heating systems, a figure that rises to 58% in urban areas. District heating accounts for about 60% of the country's total heat and hot water demand. A total of 251 towns and cities have district heating networks, most of them receiving heat from Termoelectrica-owned CHP plants.

Both thermal power stations and district heating plants and distribution networks are in need of major modernisation and rehabilitation; various international co-operation projects have addressed these problems.

In 1998, the National Regulatory Authority for Electricity and Heat (ANRE) was established, followed by the establishment of a national regulatory body for natural gas (ANRGN) in 2000. ANRE has granted licenses to a number of large energy consumers, allowing them to select their own electricity suppliers and is planning to substantially open up the energy market during the next few years. The National Agency for Mineral Resources (NAMR), established in 1993, is responsible for the petroleum and mining sectors.

3. Main Energy Policy Highlights

The energy policy of Romania is focused on compliance with the EU accession criteria, aiming at the development of a national energy market integrated in the European internal energy market. These principles have been laid down in the "National Medium-term Strategy for Energy Development of Romania 2001-2004", approved by the Government in July 2001 (Government Decision no. 647/2001). The main objective of this strategy is "the creation of efficient energy markets, whose development

could be ensured in a durable way, in high quality and security conditions of the energy supply, observing the EU energy and environmental protection standards."

The "National Medium-term Strategy for Energy Development of Romania 2001-2004" follows the "Strategy of the Romanian Energy Sector for Medium Term Development and Forecasts for 2010" of July 1998.

The Government's strategy to achieve the policy objectives is focused on three lines of action: (i) financial unblocking of the energy sector, (ii) starting the privatisation process first in the distribution of electricity and natural gas and subsequently in the electricity production sector, and (iii) ensuring functional and sustainable development on medium term by stimulating new investments in the energy sector.

Secondary objectives of the strategy are:

- Development of the Romanian energy sector in the framework of sustainable development, making use of market mechanisms in the process of restructuring and consolidation;
- To interconnect the national electricity grid with the UCPTE system;
- To ensure stable and diversified supply sources of energy, including sufficient stocks;
- To mitigate the environmental impacts of the energy system;
- To legally correlate hydroenergy with water management and flood protection;
- Technological development in the entire energy chain: resources - production - transport - distribution - consumption;
- To improve and complete the institutional and legal framework, and
- To promote competition mechanisms in the energy market.

The principles of the energy sector reform are summarised below for different sectors and areas.

Electricity sector

The principles for the reform of the electricity sector are:

- Separation of the basic activities in the sector (production, transport, distribution and marketing);
- Introduction of competition to output and marketing by the creation of various commercial companies, electricity transport remaining state-owned;
- Statement of the right of eligible consumers to buy electricity directly from the producers, and
- Guaranteeing the non-discriminatory access to transport and distribution networks for electricity producers, distributors and eligible consumers.

The restructuring of the sector in independent companies for generation, transport and distribution is accompanied by the rehabilitation of the transmission infrastructure, the closure of inefficient plants and the transfer of large cogeneration plants to local public administrations.

SC Electrica SA has been restructured in eight electricity distribution and supply subsidiaries. This restructuring has been realised with a view to securing economic viability and attractiveness for investors. The privatisation process of two branches (Dobrogea and Banat) has started following this restructuring, with the help of the Office for State Participation in Industry. In addition to the restructuring and subsequent privatisation of the energy sector, inter-connection with the UCPTE electricity system is another priority for the Government. So far, a first 400 kV inter-connection has been realised with Hungary, further inter-connections are under preparation. Inter-connection with Western Europe will provide the technical infrastructure for the future participation of Romania in the European Internal Energy Market.

The competitive electricity market in Romania, i.e. the market segment which has been opened up for competition, comprises both negotiated bilateral contracts and a spot market (see Section 6 for a further discussion).

By Law no. 789/2001, the independent statute of the National Authority for Energy Regulation (ANRE) has been consolidated, its President being nominated by the Prime Minister. ANRE is a public institution which co-ordinates its activity with the Ministry of Industry and Resources. Its mission is "to create and implement fair and independent regulations to ensure an efficient, transparent and stable functioning of the electricity and heat sector and markets while protecting the interests of consumers".

The main functions of ANRE as a regulatory body are: (i) to issue and withdraw authorisations and licences, (ii) to regulate the access to the transmission and distribution networks, (iii) to draw up the pricing methodology and set tariffs and prices for activities with monopoly characteristics, (iv) to issue technical and commercial regulations and to supervise the functioning of market mechanisms, and (v) to protect the interests of investors and energy end-users. In fulfilling its competences, ANRE works together with other central or local public administration bodies, electricity and heat utilities and investors, electricity and heat consumer associations and international organisations. Price and tariff setting and control are among the central tasks of ANRE (see Section 4).

The target for opening the electricity market by 25% in 2001 was not reached to its full extent in practice; contracts signed between licensed suppliers amounted to 8%. For 2002, the Government indicated that the target of the market opening by 33% is accomplished. Part of the market opening is the liberalisation of electricity exports and imports, granting eligible consumers the right to export and import electricity without restrictions.

District heating

In 2001 the district heating sector was dominated by Termoelectrica SA, with a share of 63% of the market. Only 8% of the district heating requirements were supplied by independent producers, the remainder being produced by heating plants. For budgetary reasons, the Government is in the process of transferring large cogeneration plants under the authority of municipalities.

Transmission and distribution losses in district heating systems are still high: 30-35% according to the Government's strategy concerning the modernisation of district heating services (see Section 6).

The district heating policies of the Government will be discussed in detail in the following sections.

Natural gas sector

Strategic objectives of the Government in the natural gas sector are:

- Assuring security of supply by rehabilitation and upgrading of transport and distribution networks, development of underground storage and realising regional interconnections, e.g. with Hungary;
- Research and exploitation in order to expand domestic reserves, and
- Upgrading metering of natural gas consumption.

At the moment, there are two main producers: Romgaz (the natural gas production and storage company resulting from the splitting-up of the former integrated monopolist) and SNP Petrom, the vertically integrated oil company of Romania. While SN Transgaz SA is the only company responsible for gas transport, international transit and dispatch, SC Distrigaz Nord SA, SC Distrigaz Sud SA and several other private companies (e.g. in the cities of Craiova, Arad and Oradea) ensure the distribution of natural gas to final consumers. Independent producers and suppliers of imported natural gas have equal access to the natural gas transportation network.

Like ANRE, also the National Authority for Natural Gas Regulation (ANRGN) has

the statute of independent authority, its President being nominated by the Prime Minister. The tasks of ANRGN refer to (i) the liberalisation of the domestic natural gas market (gradual opening 10% in 2001, 25% in 2002 and 35% in 2006 by assigning eligible consumers), (ii) the establishment of the authorisation procedure for new capacities, (iii) transposing EU procedures concerning price transparency, and (iv) elimination of subsidies (see Section 4).

Petroleum and mining sectors

Oil upstream and downstream activities in Romania are regulated by the Petroleum Law no. 134/1995, amended by Emergency Ordinance no. 47/11.04.2002. Exploration and production activities are subject to concessions; refineries are operated by SNP Petrom, foreign companies and consortia. Refineries in Romania are operating under capacity and several are in need of investments for maintenance and modernisation.

According to the Government's strategy, coal, in particular hard coal will continue to play an important role in thermal power generation. Restructuring the coal mining industry, in order to arrive at an economically viable sector, consists of: (i) concentration of activities in mines with a potential for efficient operation, (ii) upgrading of these mines, and (iii) implementation of the closure programme for non-viable mines. Nine mines were closed in 2001, to be followed by 65 closures in the period 2002-2004. In co-operation with the World Bank's Mine Closure and Social Mitigation Project, state aids will be granted for the modernisation of viable mines, for mine closures and for the environmental recovery of affected areas.

The National Agency for Mineral Resources (NAMR), a specialised body under the co-ordination of the Ministry of Industry and Resources, is in charge of the application of the Petroleum Law No. 134/1995, amended by Emergency Ordinance no. 47/11.04.2002 and the Mining Law of 61/1998 in the fields of prospection, exploration, exploitation and transportation of oil through the national pipeline system. NAMR awards petroleum and mining concessions, regulates and controls concession holders, establishes tariffs for the transport of petroleum through the national pipeline system and undertakes the responsibilities conferred by law with regard to royalties and prospecting/exploration and exploitation taxes. The observation of the application of environmental measures, during or after the conduct of petroleum of mining activities, is among the competences of NAMR.

Energy efficiency

The National Medium-term Strategy for Energy Development foresees an annual reduction of the energy intensity of the national economy of approximately 3% in the period 2001-2004, corresponding to an absolute increase in final energy consumption of 2.5% per year. The Strategy considers energy efficiency as an important option, in particular in the medium and long term. The Strategy refers to the Energy Efficiency Law 199/2000 and the increasing role of the Romanian Energy Conservation Agency (ARCE) in this field.

The Law 199/2000 concerning the Efficient Use of Energy [1] establishes the national policy for the efficient use of energy as an integral part of the energy policy of the State, based on the principles of a competitive energy market, environmental protection and co-operation between consumers, producers, energy suppliers and public authorities. The main objective of the policy is to increase the efficiency of energy utilisation in the whole chain of production, conversion, transport, distribution and final consumption of energy. The Law stipulates that the national policy for the efficient use of energy shall be developed by the Romanian Agency for Energy Conservation ARCE, on behalf of the Ministry of Industry and Resources.

The Law defines obligations of energy users with an annual consumption above 1 000 toe and of municipalities with more than 20 000 inhabitants to develop energy conservation programmes. These programmes shall include both short term low cost measures and "long term" measures, to be included in a 3-6 year energy efficiency investment programme. ARCE, as well as the Ministry of Public Works, Transport and Housing (MLPTL) have been assigned by the Law to provide free advice to consumers and municipalities in introducing these programmes. The Law defines in detail the tasks and responsibilities of ARCE (see Section 7). Consumers with a consumption above 200 toe are obliged to accomplish an energy audit every two years.

The Law also stipulates the elaboration and introduction of energy efficiency standards for energy consuming appliances and equipment and buildings. Financial and fiscal incentives stipulated by the Law are (i) access to the Special Fund for the Development of the Energy System (see Section 6), (ii) exemption of profit tax for profit shares for investments in energy efficiency, (iii) subsidies on interest rates for bank loans for energy efficiency projects, (iv) exemption from custom taxes for

[1] Law 199/2000 has been adopted by Parliament in October 2000 and subsequently revised by Ordinance no. 78/2001. The following text refers to this revised version and a more recent proposal for further modifications submitted to Parliament in April 2002.

imported energy efficient equipment, and (v) exemption of 50% of profit tax for a period of 5 years for energy management and service companies. By Emergency Ordinance no. 124/2001, the Government ordered the establishment of the Romanian Energy Efficiency Fund (see Section 6).

While energy efficiency policies and strategies of the Government focus on the residential and industrial sectors, in other sectors - notably services and transport - there is apparently a lack of coherent sectoral energy efficiency policies (see Section 6).

4. Energy pricing and taxation

In the past, energy prices in Romania were subject to subsidies and cross-subsidies. Subsidies still exist in the (socially sensitive) district heating sector and in coal mining. During the mission, the Government indicated that all cross-subsidies were eliminated. In the electricity sector, direct cross-subsidies between household and industrial consumers were eliminated in 1999 and cross-subsidies between electricity and heat were eliminated in 2000. In the natural gas sector, according to the Government, cross-subsidies between household and industrial consumers were eliminated in 2000.

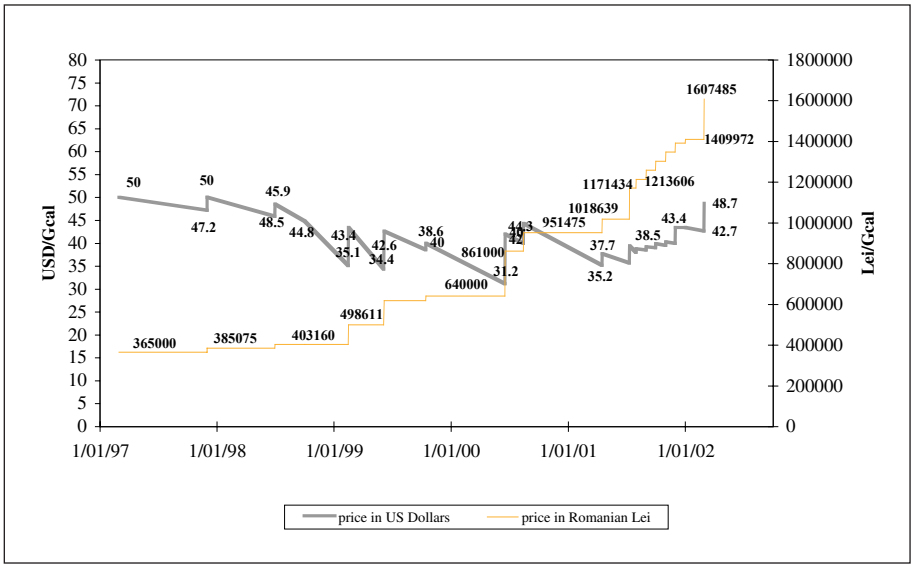
Electricity

In Romania, two categories of electricity prices and tariffs are applied: (i) prices resulting from competition market mechanisms, and (ii) regulated tariffs. Regulated tariffs are applied in particular for activities with a natural monopoly character (transmission and distribution) and for supplying electricity to captive consumers. A peculiarity of the Romanian tariff system is that there is a National Unified Tariff for all regulated consumers across the country (similar to the principle of regional equalisation of prices - *perification* - in France), which is determined using a bottom-up approach based on "justified costs" for generation, transmission, distribution, market administration, etc.

The principle of the National Unified Tariff poses some problems, like the establishment of necessary mechanisms to manage differences of costs and revenues of the eight electricity distribution branches of Electrica SA.

Figure 5 shows the development of the average price of electricity delivered to end-users in the period 1997-2002.

FIGURE 5: EVOLUTION OF THE AVERAGE PRICE FOR ELECTRICITY DELIVERED TO END USERS DURING 1997-2002



Source: ANRE, 2002

There are different tariffs for residential consumers: a standard tariff and a differentiated tariff, consisting of a low tariff for a consumption of up to 60 kWh/month and a high tariff for the consumption exceeding this threshold. Despite some imperfections (like low electricity bills for second homes and high bills for large families), this "social tariff" tends to favour low consumption in poor households and to punish high consumptions. According to ANRE, cross-subsidisation effects caused by the differentiated tariff tend to be very low. The collection rate for electricity bills is > 90%, and for domestic consumers even higher.

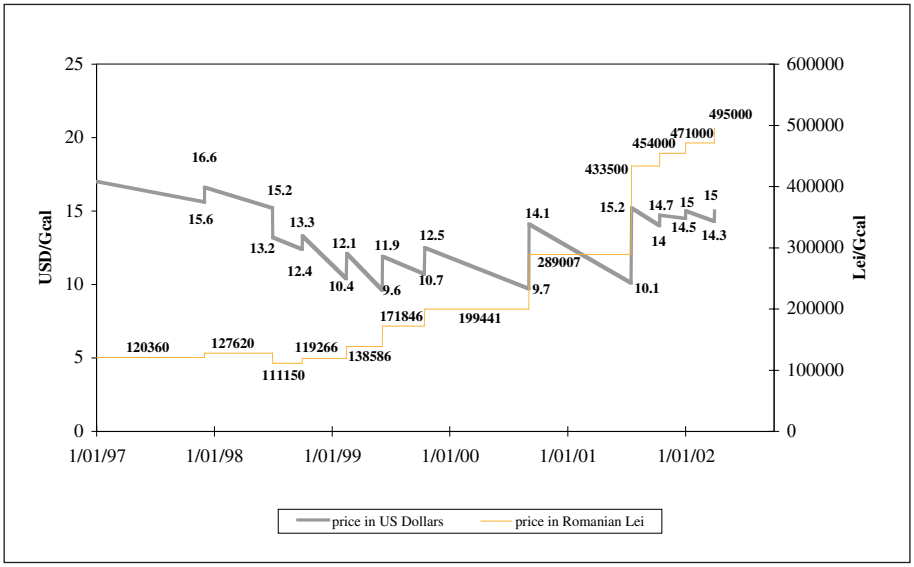
District heating

While prices for heat are established on a local basis for district heating systems, the heat delivered by Termoelectrica SA to heat distributors has a national unified tariff. ANRE is responsible for the establishment and adjustment of heat prices - including the national unified tariff for Termoelectrica SA. In this respect, ANRE issued the methodology to allocate CHP costs between electricity and heat and the methodology to set up the national reference price. The national reference price (currently 15 US$/Gcal, planned to be raised to 20 US$/Gcal in July 2002) is set up by Government Decision.

Although heat prices have been gradually adjusted during the past years, they are still subsidised for residential consumers (tariffs for commercial consumers are not subsidised). Households pay a net reference price, established by Government Decision, the difference being paid from the national and local budgets to the district heating companies. According to the 2002 budget law, 45% of the subsidies are from the state budget and 55% from local budgets. Local authorities can however establish a different local price if they are unable to cover their part of the subsidy. Problems for suppliers often arise from considerable delays in the payment of the local subsidies. In 2002, subsidies amounted to 4 700 billion ROL (approx. US$ 156 million).

Figure 6 shows the development of the average price of heat delivered by Termoelectrica SA in the period 1997-2002.

FIGURE 6: EVOLUTION OF THE AVERAGE PRICE FOR HEAT DELIVERED BY TERMOELECTRICA SA DURING 1997-2002



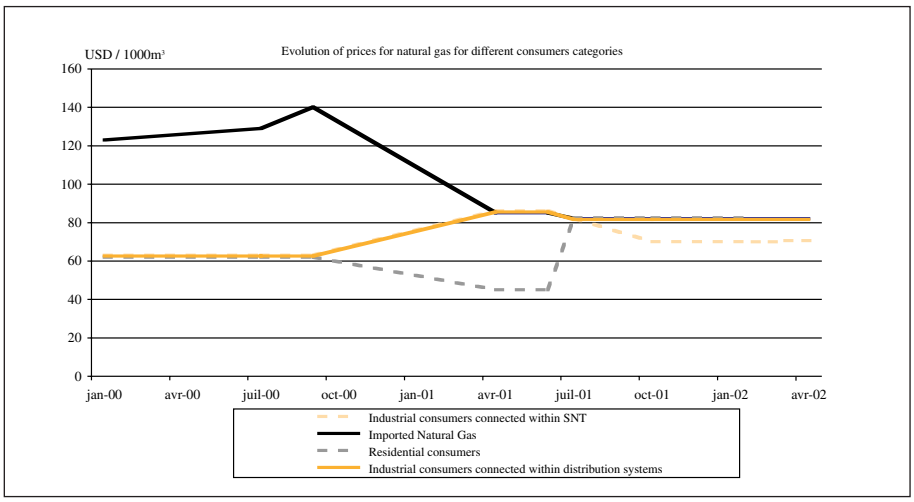
Source: ANRE, 2002

Natural gas

In the natural gas sector, contracts between distributors and captive consumers are subject to the approval of the end user's price by ANRGN. The end user's price is calculated from the price of natural gas, plus regulated transportation, storage and distribution tariffs. There is also a social tariff for low-income households, which means a 25% price decrease for certain quantities of gas (100 m^3/month in the summer period, 300m^3/month in the winter period).

Figure 7 shows the recent development of natural gas prices.

FIGURE 7



Source: ANRGN, 2002

In 2002, ANRGN indicated that there are plans to introduce different tariffs for various categories of captive consumers. These tariffs will be different for residential and commercial consumers, as well as for electricity producers and thermal energy suppliers.

Petroleum and coal

In the petroleum sector, NAMR establishes reference prices, which are used to determine royalties and exploration tax. The reference prices are not compulsory within the integrated companies or in commercial operations.

Coal prices are set by the Competition Office based on proposals made by the Ministry of Industry and Resources and endorsed by NAMR.

Transport

Prices in the public transport sector are still substantially subsidised. In railway transport, e.g. passenger tickets are still 30-35% subsidised (although subsidies are reduced every year), for the Bucharest metro the subsidy is approximately 60%. There are no subsidies on the energy inputs of the different transport modes.

Energy taxation

Since April 2000, 19% VAT is applied to domestic energy prices. There are several financial and fiscal incentives for energy efficiency projects and energy efficient equipment which are discussed in more detail in Section 6. The Special Fund for the Development of the Energy System is financed from a share of the development tax included in the tariffs for electricity (10%) and thermal energy (2%) for non-residential consumers. The application of fiscal incentives for the thermal rehabilitation of buildings needs to be correlated with the requirements of the International Monetary Fund.

5. END-USE SECTORS

The total final energy consumption (TFC) in Romania in 2000 was 24.951 Mtoe, which was distributed as follows among sectors:

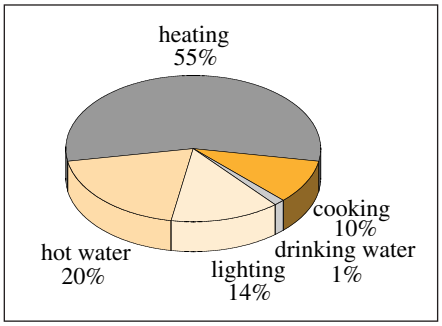
❑ Industrial:	10.777	Mtoe	(43.2%)
❑ Residential:	8.439	Mtoe	(33.8%)
❑ Services:	0.830	Mtoe	(3.3%)
❑ Transport:	3.810	Mtoe	(15.3%)
❑ Agriculture:	0.395	Mtoe	(1.6%)
❑ Non-specified:	0.709	Mtoe	(2.8%)

Residential

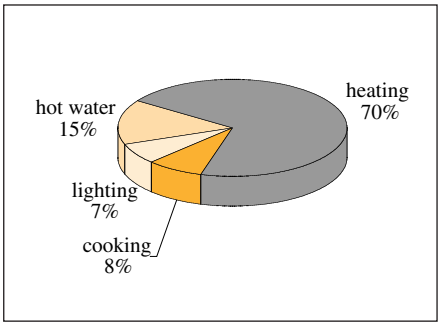
The existent housing building stock in Romania comprises approximately 8 million dwellings in 4.6 million buildings. 53% of the buildings are older than 40 years, 37% between 20 and 40 years old and 10% under 20 years old. Dwellings are predominantly in single family dwellings (56%, mainly in rural areas) and in apartment blocks (39%, mainly in urban areas). Only 5% of all dwellings are located in connected multifamily dwellings other than apartment blocks.

Figure 8 shows the consumption percentages for energy end-use in a typical apartment in Bucharest and in an individual building. Heating and hot water preparation are in both cases the largest energy uses.

FIGURE 8: CONSUMPTION PERCENTAGES IN ANNUAL ENERGY BALANCE OF A MEDIUM APARTMENT IN BUCHAREST AND OF AN INDIVIDUAL BUILDING



Medium apartment in Bucharest



Individual building

Source: IPCT, 2002

Table 2 shows the development of global U-values for buildings. According to the standard C107/1997, the heat transmission values of various construction elements of new buildings (exterior walls, windows, roofs, basement and ground floor) are maximum values which appear to be close to relevant European standards. Although further improvements of the standards are certainly possible and also taken into consideration, the urgent problem in Romania is the poor enforcement of these standards. While education of the population may help in overcoming this barrier, other targeted measures may also be recommended (see Section 9).

TABLE 2: EVOLUTION OF THE GLOBAL U - VALUE (W/M²K) FOR BUILDINGS (AVERAGE VALUE FOR BUILDING)

Type of building		Period of construction				
		Before 1944	1945-1960	1961-1980	1980-1991	After 1992
A.a. Individual building with one apartment-brick	W/ m²K	0.79	0.79	0.78	0.73	0.66
B.a. Individual building with two or more apartment-brick	W/ m²K	0.73	0.73	0.72	0.67	0.62
C.c. Block of flats - exterior concrete walls	W/ m²K	1.96	1.96	1.54	1.35	1.04

Source: IPCT, 2002

District heating

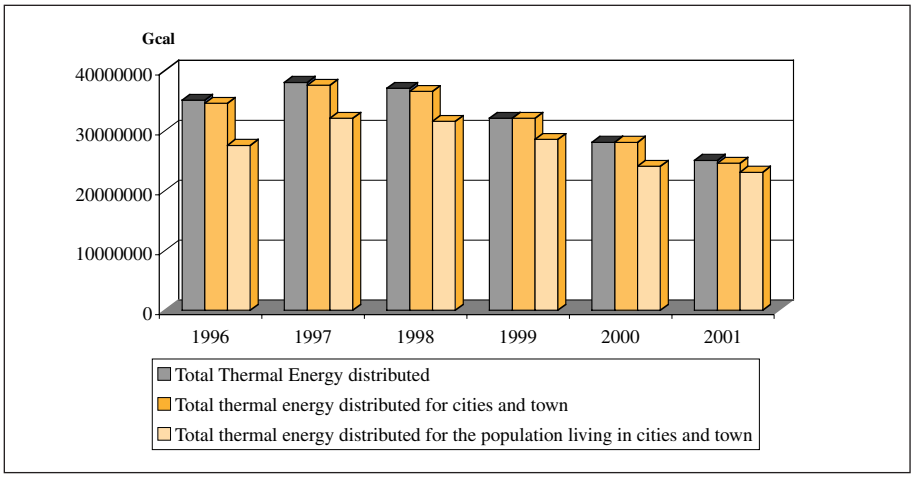
The number of dwellings connected to district heating systems during the winter of 2001-2002 were 2 353 506, of which 2 330 012 in urban areas. In total, 251 municipalities are endowed with district heating systems, out of which 204 systems were operational in 2000 and 179 in 2001. The major part of these systems include heat production by the municipality, while others operate only as distributors and suppliers and buy the heat from third parties, in particular Termoelectrica.

As in other Central and Eastern European countries, district heating systems in Romania suffer from inefficiencies in heat production, transport, distribution and end-use. In many cities, these problems have been addressed by large-scale rehabilitation projects, sometimes co-financed by international financial institutions like the World Bank, the EBRD and the EIB.

Still, however, the district heating sector poses many problems. Among these problems are rising fuel prices leading to a reduced effect of subsidies on end-user prices. Along with general consumer dissatisfaction due to poor service, increasing heat prices lead to delays and failure to pay the heat invoices, and uncontrolled disconnection of consumers, down to the apartment level. Marketing efforts by natural gas companies and suppliers of individual heating equipment aggravates the loss of consumers by district heating companies, as shown in Figure 9. Individual heating systems using natural gas have so far been installed in 65 000 apartments in the southern part of Romania. In some medium cities, more than 50% of apartments are already heated by individual units. In the town of Baia Mare, the disconnection rate is 95% [2].

[2] The price of an individual heating system is typically between 1500 and 2000 US$, with a payback period of 4-5 years.

FIGURE 9: DEVELOPMENT OF DISTRICT HEAT SUPPLY 1996-2001



Source: Ministry of Public Administration, 2002

In order to overcome these problems, the Ministry of Public Administration has developed a national strategy concerning the modernisation of district heating systems (see Section 6).

Industry

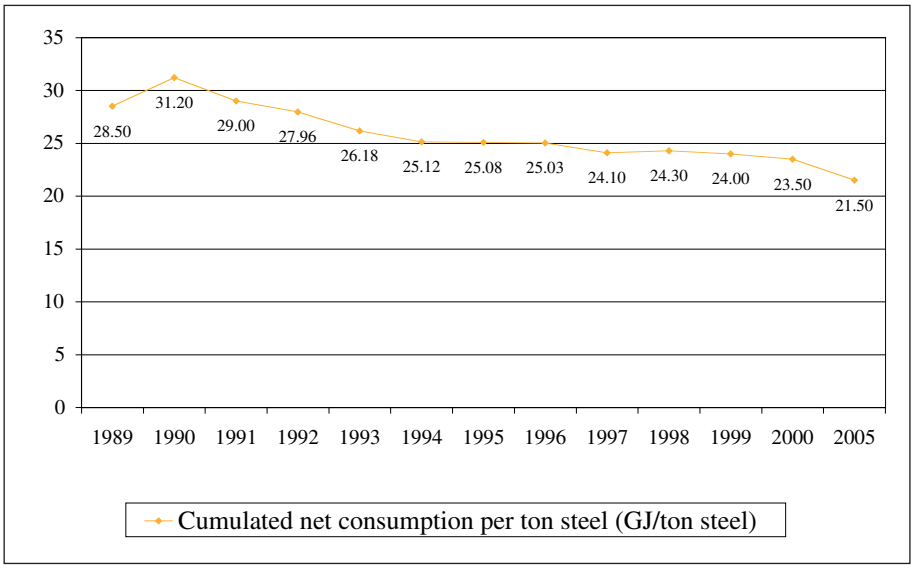
Although the share of industry in total final energy consumption has been reduced from about two thirds of the total final energy consumption of the country in 1989 to about 43% in 2000, industry remains the most important energy consumer. Studies carried out by ARCE and APER (see Section 7) indicate major energy savings potentials in different industrial sectors:

- Cast iron production: 20%
- Steel production in electrical furnaces: 20%
- Ammonia production: 10-30%
- Sodium hydroxide production: 15-30%
- Petrochemical industry: 12-50%
- Pulp and paper production: 25-45%

Heavy industry still accounts for the major part of the industrial energy consumption, although restructuring and modernisation have significantly lowered specific energy consumptions. Figure 10 shows as an example the development of specific fuel and electricity consumptions in steelmaking. Similar trends can be observed in other industrial branches, such as the chemical, petrochemical and building materials industry.

Restructuring and modernisation of industries are paralleled by the reduction of over-capacities and ongoing privatisation of enterprises, under the co-ordination of the Ministry of Industry and Resources.

FIGURE 10: EVOLUTION OF THE SPECIFIC ENERGY CONSUMPTION IN STEELMAKING



Source: MIR, 2002

Services

Public buildings, like schools and hospitals, are generally energy inefficient. This is mainly due to the poor quality of materials and insulation, the age of the buildings, failures in some building design and construction, and poor maintenance practices. Additionally, most Romanian public buildings have heating system problems, resulting in low thermal comfort despite high energy consumption.

Unlike the development in the industrial and residential sectors, where total final energy consumption has been declining, energy consumption in the service sector has been rising over the past years.

Transport

Energy consumption in the transport sector has also been declining. Of a total final energy consumption of 3 810 ktoe in 2000, 3 131 ktoe (82.2%) was consumed in road transport, followed by 377 ktoe (9.9%) in railway transport and 153 ktoe (4.0%) in air

transport. During recent years, the number of road vehicles and the energy consumption due to road transport has been increasing.

The former national railway company SNFR was split up in 1998 into five separate companies, among these CFR SA and separate companies for passenger and goods transport.

6. Energy efficiency policies and programmes

Financing of energy efficiency measures

In 1994, the ***Special Fund for the Development of the Energy System*** was established by Law 136/1994, at the level of the Ministry of Industry and Resources. The Fund is financed from a a share of the development tax included in the tariffs for electricity (10%) and thermal energy (2%) supplied by all energy producers and self-producers, regardless of their property status. The tax is applied to all consumers, except households.

Co-financing from the Special Fund is provided for the following categories of projects: (i) projects related to the production of electrical and thermal energy, (ii) reduction of losses in transport and distribution of electricity and heat, (iii) improving energy efficiency at end-users, and (iv) implementation of renewable energy and fuel substitution.

Since 1999, ARCE has been concerned with the promotion and monitoring of new investment projects co-financed from the Special Fund, for both the industry and municipality sectors. In the period 1999-2002, ROL 143.4 billion (corresponding to US$ 4.97 million, taking into consideration average annual exchange rates) was allocated to 52 projects. Co-financing from the Special Fund is limited to a maximum of 25-30% of the investment value. Projects may be co-financed by other sources, including international ones.

Most energy efficiency projects supported by the Special Fund were in the municipal sector, in particular in district heating, utilisation of biofuels (sawdust) and water pumping. Three projects have received support so far in industry; also the implementation of an energy efficiency testing laboratory for electric appliances at ICEMENERG has received support.

Barriers encountered to increase the number of projects in industry co-financed by the

Special Fund are a lack of own funding sources of the beneficiaries and problems due to the privatisation process.

In addition to domestic financing from the Special Fund for the Development of the Energy System, Romania has received financial support from international donors, in particular from EU programmes like PHARE, SAVE, ALTENER and SYNERGY. EU-funding for energy efficiency project was reduced after 1999, apparently due to a certain lack of effectiveness in using the funds and also not mobilising appropriate domestic resources. Other important donors include EBRD, US-AID, UNDP/GEF, CIDA, GTZ and the Dutch PSO Programme.

In 2001, the Ministry of Finance and the World Bank launched the ***GEF Energy Efficiency Financing Facility Project*** (Fondul Roman pentru Eficienta Energiei - FREE). FREE is orientated at leveraging GEF seed money (US$ 10 million, of which US$ 8 million is for investment and US$ 2 million is for technical assistance) by co-financing with Romanian and foreign sources. It aims to provide loans for commercially viable energy efficiency projects.

FREE will initially operate as a revolving investment fund. According to Emergency Ordinance 124/2001, the Fund is established as an institution of public interest with its own legal personality, is independent and financially autonomous. It administers the money received by Romania from GEF through IBRD under an implementation agreement concluded between IBRD and Romania. Co-financing is provided under a subsidiary grant agreement through the Ministry of Finance and from private sources, in particular Romanian and foreign banks. FREE aims at operating as a commercial financing facility, focusing on "targeted investments", i.e. projects with a high return on investment of which at least 50% of the benefits are due to energy savings. There are no sectoral preferences, instead the emphasis is on the financial soundness and creditworthiness of the client. Corporate financing of energy service companies could be part of the Fund's portfolio. Financing may be up to 80% of the capital cost of approved energy efficiency projects. It is expected that FREE will be open for business in late summer 2002 [3].

[3] It should be mentioned, in this context, that EBRD has failed in 1997-1998 in setting up a 20 million ECU Energy Efficiency Fund, mainly because of the attitude of Romanian banks, regulations and "particularities of the Romanian market".

Residential

The residential sector in Romania offers very significant potential for energy conservation, which could be realized on a cost-effective basis.

The Government has formulated specific policies and strategies regarding the rehabilitation and modernisation of buildings and regarding the modernisation of district heating services. As a matter of fact, energy use in centrally heated buildings (in particular apartment blocks) and of district heating systems themselves are areas of major inefficiencies, which interrelate with each other.

The Government's policy and programme regarding energy efficiency rehabilitation of buildings has as a legal basis Ordinance no. 29/2000 concerning the thermal rehabilitation of existing buildings and stimulation of economisation of thermal energy [4]. According to the Ordinance, the Government has to adopt annual national programmes for the thermal rehabilitation of buildings and pertaining installations, including studies, the actualisation of technical regulations and the elaboration of demonstration projects. The Ordinance also stipulates the development of energy certificates for existing buildings, defines the duties of heat supply companies to control heat flows and thermal losses, establishes the procedures to be followed by building owners/administrators in carrying out the rehabilitation and assigns responsibilities at Government level. While the Ministry of Public Works, Transport and Housing (MLPTL) is mainly responsible for the elaboration of the annual programmes and for the development and enforcement of the legal and normative basis, the Ministry of Industry and Resources, via ARCE, assumes responsibility for studying priorities, monitoring, and public education and promotion. Counties and the Bucharest municipality are responsible for issuing energy certificates.

According to the Ordinance, the thermal rehabilitation programme shall be financed from allocations from local and county budgets, building owners' own funds, as well as funds from ESCOs and heat suppliers. Owners are exempted from taxes for the elaboration of energy certificates and construction permits for thermal rehabilitation.

As stipulated by the Ordinance, the MLPTL has developed a series of legislative documents, including annual framework plans, technical "framework solutions" for the rehabilitation of buildings, as well as standards for energy auditing, the award of energy certificates, certification of auditors, etc.

[4] The Ordinance has been approved by Senate in March 2002 as a Law.

The actual Framework Plan of the National Programme for the Thermal Rehabilitation of Buildings (MP-013-2001) foresees the realisation of four sub-programmes:

- Sub-programme 1: Thermal rehabilitation and modernisation of buildings and building installations;
- Sub-programme 2: Promotion of the utilisation of non-conventional energy sources, cogeneration and centralised energy supply systems;
- Sub-programme 3: Financial sources and fiscal facilities, and
- Sub-programme 4: Education, information, incentives and motivation

It appears that all these sub-programmes are still in a very initial, explorative stage.

Figure 11 shows the front page of a proposed energy certificate for existing buildings which, in accordance with Government Ordinance 29/2000, is to be introduced in 2005. The certificate compares actual heat requirements (space heating at the left and hot water at the right) to a minimum reference value, and assigns efficiency classes to space heating, hot water supply and the overall performance of the dwelling. In the example, the efficiency class of space heating is C, of hot water supply G and the overall performance of the building D.

FIGURE 11: PROPOSED ENERGY CERTIFICATE FOR BUILDINGS

CERTIFICAT ENERGETIC

Clădire de locuit

Nr. B6-0005-01
Din 10-12-2001

Date identificare clădire:

Proprietar:	Asoc. Proprietari Bloc xxx
Adresă:	Str. xxx xxx x
Oraş, judeţ:	Bucureşti
Cod poştal:	77xxx
Telefon:	789 xx xx

Date identificare expert energetic:

Nume, prenume:	Cernat Aurel
Firmă / organizaţie:	-
Telefon:	255 xx xx
Nr. certificat expert:	1056

Anul/perioada construirii :		1973-74
Suprafaţa încălzită	[m²] :	2.613
Volumul clădirii	[m³] :	8.811

Indice de necesar de căldură pentru încălzire aferent construcţiei: 131,0 kWh/m²an

Motivul eliberării certificatului energetic:
- ☒ *informativ*
- ☐ *asigurare*
- ☐ *vânzare cumpărare*
- ☐ *alt motiv:*

Consum de căldură (încălzire + a.c.m.) **301,0 kWh/m²an**

Nota: 58,3 **D**

Clasificare energetică[1]

ÎNCĂLZIREA SPAŢIILOR	APA CALDĂ MENAJERĂ
Clădire foarte eficientă energetic	Clădire foarte eficientă energetic
A, B, C ← C, D, E, F, G, H, I, J	A, B, C, D, E, F, G, H, I, J ← G
Clădire cu eficienţă energetică foarte redusă	Clădire cu eficienţă energetică foarte redusă

151,8 kWh/m²an — *Consum anual estimat*

149,2 kWh/m²an — *Consum anual estimat*

Eliberat de:	Primăria Municipiului Bucureşti - Direcţia de Urbanism şi Amenajarea Teritoriului	*Data:*	10.12.2001
Responsabil	Arh. Mirela Zamfirescu	*Nr. dosar expertiză energetică:*	1056-03-01
Ştampila şi semnătura:		*Ştampila şi semnătura expert energetic:*	

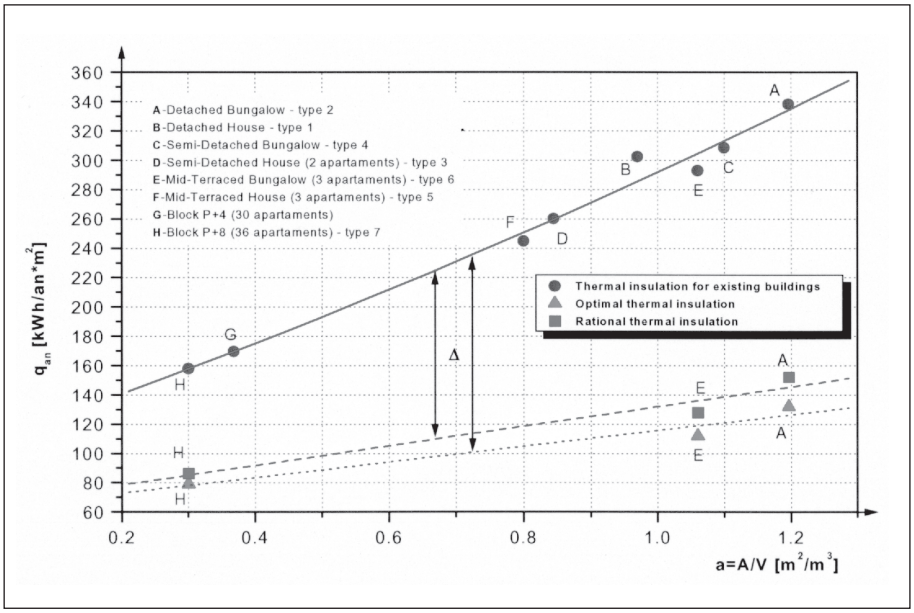
Programul de calcul utilizat: CERBUILD , **versiunea:** 1.0

[1] Clasificarea energetică a clădirii este făcută funcţie de consumul total de căldură pentru încălzirea spaţiilor şi prepararea apei calde menajere, estimat prin expertiza termică si energetică a construcţiei si instalaţiilor aferente şi afectat de penalizări datorate utilizării neraţionale a energiei.

Source: INCERC, 2002

As Figure 12 shows, the potential gains from thermal rehabilitation are very substantial. Measures proposed to achieve these improvements include insulation of walls, floors and roofs, double glazing of windows and tightening of window frames and shutters.

FIGURE 12: SPECIFIC ANNUAL HEAT REQUIREMENT VARIATION OF RESIDENTIAL BUILDINGS BEFORE AND AFTER THERMAL REHABILITATION



Source: IPCT, 2002

The Government's Building Design, Research and Software Institute IPCT has developed alternative scenarios to implement the National Programme for Thermal Rehabilitation of Buildings, among them a "minimal variant" of rehabilitation of 1% of the existing building stock (scenario 1), a "medium variant" of rehabilitating 5% (scenarios 2a and b, referring to different insulation requirements) and a "maximum" variant of rehabilitating 20 % of the existing stock (scenario 3). Table 3 shows the projected results of these variants, which also refer to short, medium and long-term investment planning strategies.

TABLE 3: SYNTHESIS OF THE NATIONAL PROGRAMME RESULTS FOR THE HOUSING SECTOR THERMAL REHABILITATION IN ROMANIA

Scenarios	Investment costs [mil. Euro]	Energy savings [TWh/year]	Savings in the heating costs [mil. Euro/year]	Reduction of the CO_2 emissions [10^3t/year]	Straight Payback Period [years]
1	147.7	0.928	18.5	267	8
2a	736.6	4.641	92.8	1339.2	7.9
2b	876.9	5.104	102	1472.8	8.6
3	3508	20.417	408.3	5891.8	8.6

Source: IPCT, 2002

As Table 3 shows, the payback periods for investments in thermal rehabilitation are between 7.9 and 8.6 years. While this is a clear indication of the economic benefits of these measures, the problem may still be the large amounts of investment needed and the lack of a viable plan for financing these investments (see Section 9).

In the field of energy efficiency standards for domestic appliances, Romania has transposed relevant European Directives, including the framework directive on energy efficiency labelling (92/75/EEC), the directives concerning energy labelling and minimum energy efficiency requirements for refrigerators and freezers (94/2/EC and 96/57/EC respectively), as well as the directives concerning energy labelling of household washing machines (95/12/EC), household combined washer dryers (96/60/EC), household lamps (98/11/EC), household electric tumble dryers (95/13/EC), household dishwashers (97/17/EC) and hot water boilers fired with liquid or gaseous fuels (92/42/EC).

District heating

The national strategy concerning the modernisation of district heating systems developed by the Ministry of Public Administration foresees annual investments of US$ 450 million, over the period 2002-2016. The funds shall be raised by bank loans, public-private partnerships, EU grants as well as funds from the State and local budgets. In addition to investments in the modernisation of district heating systems, the strategy also foresees the reform of public community services and a reduction of the number of district heating operators in the country, from 251 at present to 100-150 in a first stage. The reform of public community services foresees service delegation contracts, which will be monitored by the local public authorities and supervised by the regulatory

authority. The reforms include the regulation of user charges and their indexation [5]. The reduction of district heating operators shall be carried out according to economic and other criteria, taking into consideration factors like (i) the size of the municipality and the number of clients, (ii) the institutional capacity of the operators and, (iii) avoiding interference from local interest groups. The legal organisational status of the operators can vary between commercial companies, commercial municipal companies, joint stock companies and specialised services within the structure of local public administration authorities.

Fifteen CHP plants in major cities are in the process of being transferred from Termoelectrica to local authorities (see Section 3). However, this transfer may not be enough to provide a long-term solution to the problems of the district heating sector.

Taking into consideration the strong competition from individual gas supply, the Ministry of Public Administration is also considering the creation of protected areas for district heating. In addition to concerns with regard to the functionality, economic viability and survival of district heating companies, safety risks related to the installation of unreliable individual heating equipment are an important reason for the Government to face the problem of uncontrolled disconnection. It must be stated that the problem of disconnection is not only due to general consumer dissatisfaction and competition by natural gas, but also due to the inability by an increasing number of customers to pay the heat bill.

While the rehabilitation of the infrastructure for heat production, transport and distribution is certainly of major importance, measures directed at improved metering and control of heat supplies to final consumers are also crucial. Several municipal heat suppliers are working on the improvement of this situation, often in cooperation with international donors like the EIB and the EBRD. In particular, the following initiatives have been presented to the review team:

The Thermal Energy Conservation Project 1997 - 2003 of the Ministry of Public Works, Transport and Housing and EBRD (total amount of loan: € 82.9 million), originally focused on the rehabilitation of heat production and distribution networks and since 2000 has also focused on the “thermostatisation” of apartment buildings in

[5] The reform of public community services is stipulated in the Law of Public Services of Communal Administration (Law No. 326/2001), which foresees also the establishment of the National Regulatory Authority for Public Services of Communal Adminstration. Establishing tariff adjustment mechanisms would be among the duties of this Authority.

various Romanian cities. The concept pursued in the project includes the establishment of tenant associations from individual apartment buildings, who work together in associations at municipal level, both with legal status. These "umbrella organisations" of tenants conclude contracts with the municipality to install heat cost allocators and thermostatic valves in the apartments of their members. The equipment is installed by an economic agent selected by a tender process, who is responsible for the financing and installation of the system and for allocating the heating costs to individual consumers during a five-year period. The costs of installing the equipment are recovered by the services provided by the contractor.

The EBRD Thermal Conservation Project is implemented in the cities of Buzău, Făgăraş, Oltenița, Pascani and Ploieşti. Technical assistance and project management is provided by the German Agency for Technical Co-operation (GTZ) in co-operation with a German municipal energy company.

The project "Metering the sales of heat and tap water" is carried out by the Bucharest district heating company RADET, with a loan of € 22.35 million provided by the European Investment Bank to the Bucharest municipality, who contributes with € 27.65 million from its own funds. The purpose of the project is to install heat meters at each staircase of the buildings connected with the heat distribution system. The project starts in 2002 and shall be completed within 3 years, resulting in the installation of some 26 800 meters.

In the municipality of Sibiu, S.C. Nuonsib S.r.l., a joint venture between the council of the municipality and the Dutch energy company Nuon, operates the district heating system. The company introduced cogeneration and rehabilitated the heat transmission and distribution network, and is also carrying out a DSM project aiming at a 25% reduction of the thermal consumption of its customers, which is supported by the Dutch PSO Programme. The project includes the replacement of installations inside buildings and the installation of thermostatic valves. The objective of the project is to reduce customers' bills, while increasing the unit price of heat delivered.

A complete rehabilitation of the urban district heating has also been realized by the municipal service company of the city of Fagaras. Fagaras has signed a Memorandum of Understanding with the Norwegian Authority for Pollution Control regarding a Joint Implementation project.

In the municipality of Târgoviste, losses in the district heating system have been reduced by 9.5% with modest investments of US$ 2.3 million, financed by supplier

credits and supported from the Special Fund for the Development of the Energy System. Nuonsib is preparing a JI project with Târgoviste in the field of municipal cogeneration.

In various towns, small scale cogeneration and boiler plants have been installed and are operated by joint ventures between municipalities and equipment suppliers, who act as ESCOs. In some cases, the optimal application of cogeneration is hampered by stable prices for heat and electricity delivered to the grid.

Industry

Since its establishment in 1991, the Romanian Agency for Energy Conservation (ARCE, see Section 7) has been very active in promoting energy efficiency in industry. There was also a significant number of energy efficiency related activities and studies which received assistance from international donors such as the EC PHARE Programme, USAID, EBRD, UNDP, UNESCO and the World Bank.

From 1991 to 1993, in the framework of the Ministry of Industry's Grant Programme for Energy Efficiency Investments, ARCE granted up to 30% of the total investment costs of energy efficiency projects from the public budget. The major objective was to promote investments in energy efficient technologies, such as low NO_x emission burners, high efficiency boilers, motor controls, steam traps, energy management systems, pre-insulated pipes, etc. Many energy efficiency investments which were supported by the Special Fund for the Development of the Energy Sector were also directed to the industrial sector. ARCE has also carried out specific programmes in the fields of energy management, variable speed drives and the refurbishment of industrial furnaces and boilers.

ARCE's mandate to ensure the implementation of the provisions of the Energy Efficiency Law, like the duty of consumers to assign an energy manager, to carry out regular energy audits, to draw up and update energy balances, to identify energy conservation measures and to develop energy conservation programmes, bears the potential risk that ARCE might be perceived as a kind of "energy police". In order to avoid this kind of perception, ARCE uses its mandate to enter into a dialogue with the consumer by providing e.g. free advice on best available techniques and by raising its awareness on economic advantages that can be obtained by the introduction of effective energy management practices.

In order to improve the communication with industry and achieve a more active participation of the sector in energy efficiency activities, ARCE is interested in promoting

voluntary agreements with industry. A study carried out under the SAVE Programme of the European Union concludes that various preconditions need to be fulfilled in order to be able to succesfully introduce voluntary agreements. According to the study, these preconditions include factors like social stability, policy continuity, interest in energy efficiency and environmental issues, confidence in economic policy, political and organisational cooperation, feasibility of energy efficiency programmes and interest of industrial branches in participating. It appears that most of these preconditions do not yet exist. Development of a legal and institutional basis are among the actions necessary to foster the fulfilment of the conditions.

There are some energy service companies operating in the industrial sector, in particular in the process industry. According to the representative of one of these companies, there are still various barriers which hamper a broader application of the ESCO-concept in Romania. Among these are: (i) the lack of clear rules regarding the application of the Energy Efficiency Law, (ii) the lack of transparent mechanisms on energy price control, (iii) insufficient "business and financial culture" on part of managers, (iv) weak legal enforcement of contract laws, (v) lack of adequate financing mechanisms at the bank level, and (vi) the high risk factor for loans in Romania.

Transport

In the transport sector, the companies responsible for the railway infrastructure and the operators for passenger and goods transport (*CFR Calatori* and *CFR Marfa*) are involved in important modernisation programmes which include energy efficiency both in terms of targeted measures to reduce energy consumption and modernisation of infrastructure and rolling stock, which indirectly results in lower energy consumption per passenger and freight kilometre. A similar modernisation programme is carried out by Metrorex, the operator of the Bucharest metro system. The modernisation programmes are supported by loans of multilateral and bilateral institutions, including the EIB and the EBRD, with co-financing provided by the Romanian Government.

Both railway and metro companies are suffering from high electricity consumptions and bills, which provides a strong incentive to reduce excessive energy consumption, while improving the quality of service and the financial situation of the companies [6].

[6] In particular the operator for passenger transport CFR Calatori is suffering from loss of clients to private road transport operators, while tariffs are still subsidized.

In road transport, a road tax was established by the Ministry of Transport in 1997 and a requirement for catalytic converters on new cars in 1998.

There is a lack of integration between different transport modes in urban areas.

Resource planning and demand-side management

The competitive electricity market in Romania, i.e. the market segment which has been opened up for competition, comprises both negotiated bilateral contracts and a spot market. Competition in the market is however subject to the following constraints: (i) the market must accept the full quantity of electricity produced by the Cernavoda Nuclear Power Plant, (ii) preferences for utilisation of indigenous coal for power generation, (iii) water constraints in the operation of hydropower facilities, (iv) observance of power purchase agreement contracts, and (v) ensuring the constrained electrical load of cogeneration units. This means that the market apparently includes some safeguards for independent power producers and CHP operators.

The Ministry of Industry and Resources periodically prepares the Medium Term (four years) Energy Strategy for Romania, in co-operation with the subordinated energy companies, which summarizes the strategies of the companies. In addition, the so-called "winter programme" is prepared for the period of September to March every year, with the purpose of avoiding shortages. The planning applied by the Ministry focuses on (i) optimum sizing of generation capacities in the medium and long term, (ii) operation of generation capacities according to merit order, and (iii) annual performance contracts concluded between the licensed generators and suppliers of the regulated electricity market. Other activities focus on the supply side as well, such as loss reduction in the production, transportation and distribution of natural gas and oil products.

Demand-side management activities carried out by electricity companies focus on the reduction of commercial energy losses, improvement of metering and billing procedures, analysis of load curves and - on a rather limited basis - offering advice to clients. Natural gas distributors face the challenge of having to deal with an increasing number of residential consumers who are switching to individual heating systems based on natural gas [7].

[7] To some extent this development compensates the loss of industrial consumers by gas companies, due to restructuring and decrease of production in energy-intensive industrial branches.

ANRE has agreed to include DSM measures in costs.

In the case of Electrica SA, an EBRD loan is used to reduce technical losses and commercial losses by improving metering and collection. The company also distributed free of charge 100 000 compact fluorescent lamps to so-called budgetary entities (education centres, social welfare and sanitary units). Other activities to promote energy efficiency at customers include public contests by which to influence consumer behaviour, co-operation with ARCE and foreign agencies to promote efficient public lighting and education of consumers. Electrica SA has also organised 240 service centres in various towns, providing information to customers about the best available energy technologies and practices.

Renewable energy

In 1995 and 1996, the study "Strategy on Renewable Energy Sources in Romania" was elaborated in the framework of the PHARE Programme. The study recommends targets for the contribution of renewable energy sources, assesses the economics of the various sources of renewable energy and defines budget requirements. According to the study, the most important potentials exist for biomass and small hydropower.

In 1999, a demonstration project replacing two light oil-fired boilers by biomass boilers in the city of Campeni was co-financed by PHARE; a similar project for sawdust utilisation was financed in the same year by the Danish Environmental Protection Agency in the Neamt county. The Sawdust 2000 project, carried out by ARCE, in co-operation with Denmark, aims to disseminate this experience in several cities. Financing of the project is based on co-financing with a base investment from the municipality, assisted by the Special Fund for Energy System Development, a grant from the Danish Government and EU funds from the regional development programme.

Electrica SA intends to attract investors to establish partnerships for small hydropower stations now operated by the company's branches for energy services and maintenance.

Research and Development

The Research and Development Programme "Orizont 2000" of the Ministry of Education and Research, established in 1996, incorporates 20 R&D directions oriented by thematic fields. It aims at supporting and developing the existing research-development potential that is of general interest and of strategic importance to economy and society.

Rational use of energy resources and renewable energy are among the directions of the programme. In the field of energy efficiency, ROL 14 billion have been allocated so far to 25 projects, involving 12 R&D institutions and 60 researchers. Projects have been carried out in the fields of (i) energy efficiency increase and risk evaluation in the energy supply system, (ii) energy efficient utilisation in industry, transport and services, (iii) improvement of the institutional framework of energy management financing mechanisms, and (iv) implementation of European and international requirements relating to efficient energy use. Other projects include a database for industrial technologies, low energy consumption dwellings, multi-criteria analysis methodology for energy efficiency projects, national energy efficiency indicators harmonised with European standards and research on implementing voluntary agreements.

7. Organisation of energy efficiency activities

The Romanian Agency for Energy Conservation (ARCE) was established in 1990 as part of the Ministry of Industry and Resources. ARCE's organizational structure was inspired by the French agency ADEME (then: AFME), comprising headquarters in Bucharest, along with 16 territorial branches.

Since 1999, ARCE has operated as a Governmental body under the authority of the Ministry. Since then, ARCE's staff has been reduced from 80 to 35 and the number of territorial branches has been reduced from 16 to 8. At present, ARCE is fully financed from the state budget. ARCE co-finances projects through the Special Fund for the Development of the Energy Sector and takes part in various international programmes like PHARE, SAVE, UNDP-GEF. For the past ten years, ARCE has played a pivotal role in many international co-operation projects with multilateral and bilateral institutions. ARCE also co-operates with similar energy efficiency institutions in the European Union.

So far, the responsibilities of ARCE include:

- Co-ordination and implementation of energy conservation actions and programmes at national and regional levels;
- Initiation of regulatory acts concerning the rational use of energy, and
- International co-operation concerning energy conservation and administration of financial support granted to Romania through international technical assistance programmes.

In accordance with the Energy Efficiency Law 199/2000 and its latest revision (Law

120/2000), ARCE will assume an extended role not only in implementing and monitoring, but also in elaborating the national energy efficiency policy (see Box 1).

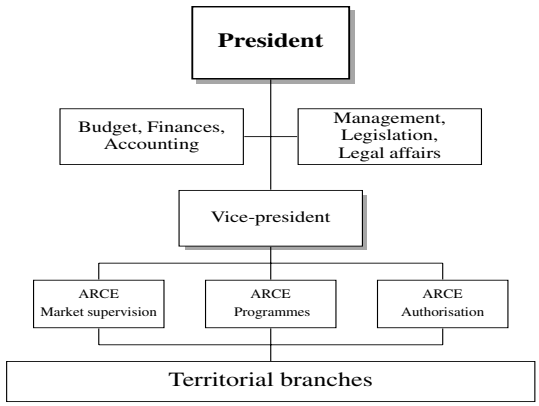
Box 1: Proposed attributions and responsibilities of ARCE

According to the revised Energy Efficiency Law and the proposed secondary legislation, ARCE would become the specialized body on energy efficiency at the national level, being a legal body with financial and administrative autonomy, subordinated to the Ministry of Industry and Resources. ARCE would have the following attributes and responsibilities:

- To elaborate the national energy efficiency policy as part of the national energy strategy;
- To implement and monitor the energy efficiency policy and national energy efficiency programmes;
- To co-operate with domestic and international institutions with regard to energy efficiency and environmental protection;
- To participate in the elaboration of energy efficiency regulation;
- To certify energy use and metering equipment in conformity with the planned technical regulations;
- To authorise energy auditors and managers;
- To co-ordinate energy efficiency projects financed from internal or international sources;
- To evaluate energy efficiency projects co-financed from the Special Fund for the Development of the Energy System;
- To elaborate the synthesis of the energy efficiency programmes at the national level;
- To co-operate with competent institutions in the drawing up of energy balances;
- To provide free consultancy for local authorities, companies and building administrators for energy efficiency projects;
- To elaborate and coordinate training programmes for energy managers;
- To advise other ministries with regard to their own energy efficiency programmes;
- To assure the application of energy efficiency regulation;
- To promote renewable energies.

In addition to the revision of the Law, government decisions regarding the application of the revised Energy Efficiency Law and the organization and functioning of ARCE are under preparation. According to these proposals, ARCE would be financed both from the national budget and from other sources, in particular from activities of authorisation, advice, certification and testifying (see Box 1). Figure 13 shows the proposed organisational structure of ARCE, which would provide three main units: (i) market supervision, (ii) programmes and (iii) authorisation. The proposed organisation includes 15 territorial branches.

FIGURE 13: PROPOSED ORGANIZATIONAL STRUCTURE OF ARCE



Source: ARCE, 2002

The specific tasks of the territorial branches refer mainly to the technical support to municipalities and enterprises; the monitoring of their legal obligations in accordance with the Energy Efficiency Law; the realisation of energy analysis and audits, including free technical support to consumers; the identification of new projects to be co-financed from the Special Fund for the Development of the Energy Sector and general dissemination and promotion activities.

In addition to the Government agency ARCE, other non-governmental and private organisations are active in the field of energy efficiency in Romania.

The Romanian Association for Energy Efficiency (SOCER) is a non-governmental technical organisation established in 1990. The mission of the Association is to promote the rational use of energy, the use of renewable energy sources and environmental protection. SOCER is a membership organisation located in Craiova, working mainly with local authorities and industrial enterprises to provide technical and financial assistance and organise dissemination activities. SOCER has a strong

focus on local authorities and co-operates with ARCE on regional activities, in particular in the southern Oltenia region. SOCER is member of the European Federation of Regional Energy and Environment Agencies (FEDARENE) and has participated in various EU co-operation programmes.

The Romanian Energy Cities Network (OER) is a member of the European Energie-Cités network, which represents 37 municipalities with 3.9 million inhabitants. OER's main activities are: (i) the organisation of regional, national and international events like conferences, seminars and workshops, (ii) training sessions for local authorities, and (iii) the dissemination of information. Several energy masterplans and guides for good practice in municipalities have been prepared in the framework of international co-operation projects, notably PHARE and SAVE.

The National Association of Energy Consumers (ANCER), established in 1994, represents the interests of (in particular large) energy consumers vis-à-vis the Government and the energy sector. ANCER advocates a stronger influence on Government decisions and a higher percentage of end-use energy efficiency projects in the portfolio of the Special Fund for the Development of the Energy Sector.

The Center for the Promotion of Clean and Efficient Energy (ENERO) is a non-governmental organisation founded in 1999, focusing on the promotion of new energy technologies and EU energy policy, programmes and projects in Romania. ENERO, which is a member of the OPET-network of the European Commission, focuses on dissemination, promotional, public awareness raising, marketing and networking activities. It also provides secretarial assistance to the "Orizont 2000" National Research and Development Programme on Energy (see Section 6).

The Romanian Energy Policy Association (APER), which was established in 1995 with the support of the SYNERGY Programme, has been instrumental in creating a platform for discussion on energy policy in Romania. In 1997, APER also prepared the White Book for Energy Efficiency, which advocated the establishment of adequate legal, institutional and financial frameworks and instruments for energy efficiency.

8. Energy efficiency and the environment

Environmental protection is the main responsibility of the Ministry of Waters and Environmental Protection (MAPM). MAPM is responsible for the National Strategy for Environmental Protection (first developed in 1992 and updated in 1996) and the National Action Plan for the Environment, which was upgraded in line with the

National Programme for Accession of Romania to the European Union and with the National Plan for the adoption of the *acquis communautaire*.

The objectives for environmental protection in the energy sector are:

- Reduction of gas emissions into the atmosphere;
- The use of "clean fuels";
- Reflection of environmental cost throughout the energy cycle;
- Promoting and stimulating the production of energy from renewable sources, and
- Considering electricity and heat production by waste incineration.

Proposed actions in the energy sector for sustainable development promotion are:

- Promoting the use of efficient technologies in the production of power that will have less negative effects on the environment;
- Increasing energy efficiency at consumers;
- Promoting regulations and standards;
- Using incentives and adequate fiscal policy;
- Establishing mechanisms for taking into consideration environmental externalities throughout energy field;
- An intensification of research-development activities, and
- Introducing and stimulating competition in the domestic energy markets.

In 1999, a Working Group under the co-ordination of MAPM prepared the National Strategy for Sustainable Development.

The energy chapter of the National Strategy for Sustainable Development, which makes explicit reference to the Energy Charter Treaty and PEEREA, advocates increased efficiency and environmental protection in the energy sector, the need for a Governmental nuclear strategy and the creation of a fund for the protection and development of the nuclear industry, and the need to diversify energy supplies, including the promotion of renewable energies. Recommendations in the Strategy to achieve sustainable development in the energy sector focus on measures like the promotion of efficient technologies, improving regulations and standards and promoting research and development, both on the supply and demand side.

Environmental criteria also play a role in the policies of the Ministry of Industry and Resources. The objectives of the Strategy for Industrial Development on Medium and Long term include the reduction of energy intensity and environmental impact as criteria for the restructuring of industry. The programme to reduce pollution in industry aims (among other effects like the rehabilitation of degraded water flows and soils) at

significant reductions of SO_2, NO_x and VOCs emissions. It is estimated that the implementation of the programme would also lead to reductions of CO_2 emissions by 18% in the period 2008-2012 compared to 1989 [8]. Environmental criteria also play an important role in the restructuring and rehabilitation of the national energy system. Measures envisaged include the improved performance of existing installations, the promotion of clean technologies and cogeneration, the internalisation of environmental costs, and measures to protect the environment. The strategy foresees a phased reduction of SO_2 and NO_x emissions until 2012, in order to comply with the Large Combustion Plants (LCP) Directive 2001/80/EC (replacing 88/609/EEC) of the European Union. Compliance with the requirements of the EU Integrated Pollution Prevention and Control (IPPC) Directive 96/61/EC is foreseen for 2015. Romania has asked for a transitional period in order to comply with the requirements of these Directives, because of the high sulphur content of its fuels and the need to install desulphurisation and denitrification equipments.

In order to integrate environmental aspects into various fields of policy, the Inter-ministerial Committee for integration of environmental policies in sectoral policies and strategies at national level was established in 2001 by Government Decision no. 1097/2001. The Inter-ministerial Committee has the following attributes: (i) approval of programmes and plans for integration of environmental policies in sectoral policies and strategies implementation, (ii) monitoring of strategies, programmes and plans implementation, and (iii) establishing priorities in the environmental protection field in order to assure financing.

In order to support the implementation of the National Action Plan for the Environment, the environmental fund has been established as a special extrabudgetary fund managed in compliance with Law no. 73/2000 amended by Emergency Ordinance no. 93/2001 [9]. The Fund will be financed from environmental taxes and charges, the sale of shares, payments, donations, interest, financial assistance from international financial institutions and others. According to Government Ordinance 93/2001, taxes will be applied to emissions of greenhouse gases (including CO_2), SO_x, NO_x, particles and persistant organic pollutants (POPs). The Fund will provide reimbursable and non-reimbursable loans, co-financing, grants and interest subventions. The Fund's budget in its first year of operation is approximately € 100 million. Energy efficiency projects are not the central focus of the Fund, taking into

[8] This is well above the national target of reduction of CO_2 emissions by 8% until 2008-2012, compared to 1989.

[9] At the time of writing this report, the Environmental Fund was in the process of being approved by the President.

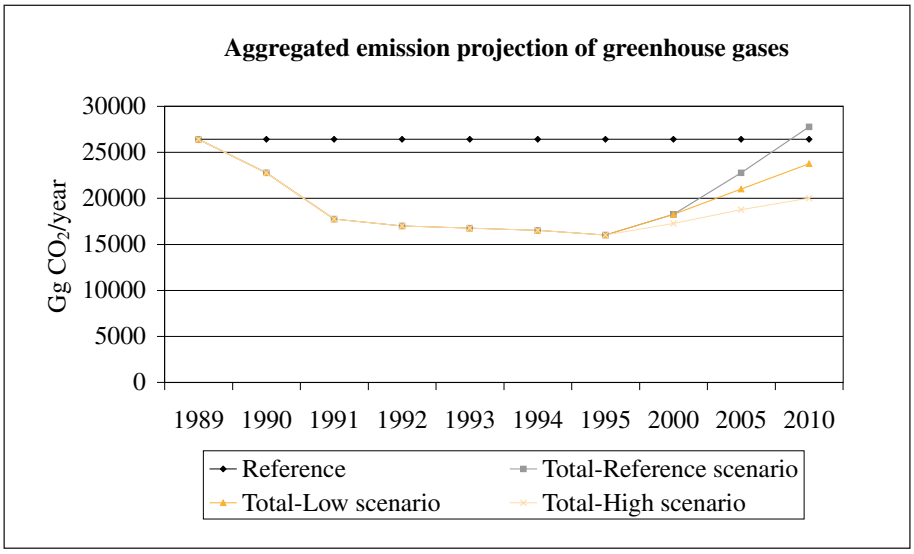
consideration the establishment of the Romanian Energy Efficiency Fund FREE (see Section 6), which is dedicated to energy efficiency projects.

The National Commission on Climate Change was established in 1996 by Government Decision no. 1275/1996. Co-ordinated by the Ministry of Waters and Environmental Protection, its purpose is to promote the necessary measures and actions for the application of the objectives and the provisions in the UNFCCC and the Kyoto Protocol in Romania.

Romania ratified the United Nations Framework Convention on Climate Change in 1994 and the Kyoto Protocol in 2001. As an Annex I country, Romania has committed itself under the Kyoto Protocol to reduce CO_2 emissions by 8% in the first commitment period until 2008-2012, compared to 1989 levels.

According to the aggregated emission projection of greenhouse gases, presented in the Second National Communication to the UNFCCC of April 1998, the national target can be achieved in 2010 for all scenarios considered (see Figure 14).

FIGURE 14



Source: Second National Communication to UNFCCC, 1998

Romania has signed memoranda of understanding concerning co-operation on Activities Implemented Jointly (AIJ) with Switzerland and Joint Implementation (JI) with the Netherlands and Norway. A proposal for a Host Country Agreement between

Romania and the IBRD as a trustee of the Prototype Carbon Fund (PCF) is under discussion.

The two Memoranda of Understanding signed with the Netherlands in 1999 and 2000 aim at a total reduction of 7 Mton CO_2 equivalent/year for the period 2008-2012. Two JI projects have been selected under the ERUPT 2000 tender: municipal cogeneration in Târgoviște (see Section 6) and a project concerning the hydropower plant Surduc-Nehoiașu. Also under the ERUPT tender 2002 (Carboncredits Programme), Romania has submitted various projects, mainly related to the rehabilitation of thermal power units and industrial modernisation and energy efficiency.

The co-operation with Switzerland concerns the "Swiss Thermal Energy Project" in Buzău and Pașcani, while co-operation with Norway consists in the project "Development of municipal utilities - Modernisation of Heating Systems" in Făgăraș.

9. Assessment of Progress

Government Policy and Strategy - Overall Assessment

In 1990, Romania began an important process of democratic and economic reform. This process was also reflected in the energy sector. Former electricity monopolist RENEL was transformed in 1998 into the joint stock company CONEL, which was divided in 2000 in separate companies for electricity production, transmission and distribution. Production of district heat from CHP plants remains largely within the domain of the major electricity producer, Termoelectrica SA. While most of the electricity companies are state owned, first steps have been taken towards the privatisation of branches of the distribution company Electrica SA.

Similar to the electricity sector, the former natural gas monopoly ROMGAZ has also been split up into separate entities for gas production and storage, transport and distribution. Independent producers and importers are gaining importance.

Taking into consideration the strong motivation of the Romanian Government not to delay the accession process to the European Union, the transposition of the *acquis communautaire* is considered a top priority. With regard to the energy chapter of the *acquis*, and apart from energy sector reform and liberalisation, the *acquis* also includes other prerequisites including energy price reform and energy efficiency.

In the field of energy efficiency, the Government is apparently in the process of taking

steps to implement updated legislation and to strengthen the role of ARCE as the key institution by which to promote energy efficiency, including the effective implementation of the Energy Efficiency Law and the preparation of pertaining secondary legislation. Concluding the legislative process in this respect appears to be crucial in order to enable Romania not only to comply with the requirements of the EU acquis communautaire, but also to promote and improve in a consistent manner energy efficiency throughout the economy. A proper legislative base will make it easier for the Government to integrate energy efficiency into mainstream energy policies and induce consumers to implement energy efficiency measures.

While good progress in implementing PEEREA has been noted, the review team identified a need for more and specific action in various fields.

Market liberalisation and energy efficiency

The Government has taken steps to liberalise the energy market and to prepare for the privatisation of parts of it. Regulatory agencies have been established for the petroleum and mining, electricity and natural gas sectors. As a matter of fact, the restructuring and upcoming privatisation process is a major challenge, taking into consideration the difficult financial situation of many energy enterprises and the need for major rehabilitation and modernisation of the energy system.

Energy efficiency, which is another concern of the Government, is focused to an important extent on the supply side, i.e. on enhancing the efficiency in energy production, transport and distribution. Although an improved efficiency on the supply side is certainly imperative, end-use energy efficiency should be integrated in a more balanced way in ongoing energy market reforms. As seen also in many EU countries, this is even more challenging in the context of market liberalisation. Important steps in this direction would be to integrate demand-side management and integrated resource planning in the regulatory framework of the energy sector, following a least cost approach.

Energy Efficiency Programmes and Funding

The "National Medium-term Strategy for Energy Development of Romania 2001-2004" refers explicitly to energy efficiency as an important objective, despite the fact that the energy efficiency section does not appear to be a core part of the strategy. However, the Energy Efficiency Law and its (proposed) amendments should serve as a basis for new, comprehensive actions in the area of energy efficiency.

The ***residential sector*** is a potential source for substantial energy savings, with

favourable payback periods and with social benefits. Specific action in this area is therefore imperative.

The Ministry of Public Works, Transport and Housing and the technological institutes of the building sector have developed a sound technical and methodological basis for appropriate action, which should be put in place without delay. The main barrier to putting these programmes and measures into practice seems to be the lack of a sound financing plan and the difficulty to grant financial and fiscal incentives to (low income) residential consumers. It appears that fiscal policies in response to IMF requirements should be more flexible in this field.

Energy efficiency standards for new buildings in Romania appear to be close to relevant European standards. While further improvements of these standards are certainly possible and taken into consideration, the main problem is the poor enforcement of these standards. It is therefore necessary to raise awareness of these standards not only among building owners, but in particular among building professionals like architects and craftsmen and local authorities.

In addition to the necessary rehabilitation and modernisation of district heating systems (heat production, transport and distribution), control and reduction of end-use of heat in apartment buildings has recently attracted the attention of policy makers, international financial institutes and economic actors in the sector. Several important projects are focusing on the introduction of heat meters and thermostatic valves in buildings and apartments. Apart from financing these (profitable) measures, institutional arrangements with owners and tenants associations appear to be critical for the success of these measures.

Subsidies for district heat consumers are at present paid to heat suppliers from the national and local budgets. Taking into consideration the difficult financial situation of the district heat suppliers on the one hand, and the problems of paying the heat bills encountered by many consumers (including the quite dramatic increase of disconnections) on the other, a shift from subsidising heat supply to target-oriented monetary assistance to low income persons and families in the framework of social care regulations may be a viable alternative to be considered by the Government.

Energy efficiency in ***industry*** cannot be considered separately from the restructuring and modernisation process of the sector. While restructuring and modernisation leads inherently to efficiency gains, focused programmes and instruments directed to specific industrial branches and technologies have proved both necessary and successful. The Energy Efficiency Law foresees such measures.

Although energy efficiency programmes and measures are implemented at company and building level respectively, broader energy efficiency measures are still missing in the ***services*** and ***transport*** sectors

The Energy Efficiency Law provides some ***financial and fiscal incentives***, such as the access to the Special Fund for the Development of the Energy System, the exemption of profit tax related to investments in energy efficiency, subsidies on interest rates for bank loans for energy efficiency investments, exemption from custom taxes for imported energy efficiency equipment and a partial exemption of profit tax for energy management and services companies.

While the Special Fund for the Development of the Energy System, which exists since 1994, has co-funded since then various energy efficiency projects, notably in industry and municipalities, it appears that the end-use energy efficiency projects could have a more important place in the Fund's portfolio. The Energy Efficiency Fund (FREE), initiated by GEF/IBRD could assume an important additional role in financing energy efficiency in Romania. Funding of energy efficiency projects from the Environmental Protection Fund seems rather unlikely, when taking into consideration the main focus of the Ministry of Waters and Environmental Protection on pollution prevention.

Organisation

The Romanian Agency for Energy Conservation (ARCE) was established in 1990. Over the years, ARCE has developed a fruitful relationship with energy consumers and other actors in the energy and energy efficiency field, despite the fact that its activities did not always reflect the initial expectations. Under the authority of the Ministry of Energy and Resources, the Agency has become an active intermediary between the Ministry and the market. While the reduction of ARCE's budget and human resource base during the recent period has significantly reduced its ability to effectively fulfil this vital function, the actual legislative proposals give rise to the hope that the Agency will regain and extend its role.

It appears that ARCE's co-operation and interaction with other players such as consumers, NGOs and ESCOs are fluent and complementary. The confirmation and strengthening of ARCE's position proposed in the modified legislation should give rise to an extended role of ARCE in the energy efficiency market and develop an "efficiency culture" in the country. Its mandate to elaborate the national energy efficiency strategy will ensure that the needs and the signals from the market will be taken into due consideration in the process of policy formulation and update. Adequate financing

and staffing of ARCE are crucial in this respect. At the same time, the Ministry of Industry and Resources should assume a more proactive role in energy efficiency policy and target formulation.

The Energy Efficiency Law obliges individual energy users above a certain threshold, along with medium and large municipalities to develop energy conservation programmes and implement organisational and technical measures like energy management, energy audits and energy conservation measures. It appears very important that the Government, in particular ARCE, approach these obligations not in a bureaucratic, mainly controlling way, but using these regulations as an instrument by which to further improve communication with (mainly industrial) consumers and municipalities and to induce them via this dialogue to implement economically beneficial energy conservation measures. Voluntary agreements with industrial branches may be a subsequent step, subject to the development of a favourable environment for such an instrument.

Energy Pricing and Taxation

Reforming energy prices and the removal of subsidies and cross-subsidies was one of the priorities of the Romanian Government. Future work appears necessary in order to secure best price differentiation between the various categories of consumers.

It also appears that the financial and fiscal provisions of the Energy Efficiency Law may require additional action to be fully implemented in practice.

Proper pricing of district heat, and the elimination of subsidies in this area are major challenges for the Government and for Romanian society.

Energy efficiency and environmental policies

In its environmental policies and strategies, the Ministry of Waters and Environmental Protection (MAPM) refers to the energy sector as a major source of pollution and greenhouse gas emissions. Specific objectives and actions have therefore been proposed to improve energy efficiency throughout the energy cycle and to reduce emissions. Financing of the proposed Environmental Fund by taxes on greenhouse gas emissions and pollutants appears to be a step into the right direction in internalising the environmental costs of the energy system.

It is not evident, however, whether and to which extent the objectives and actions focused on end-use energy efficiency and renewable energies formulated by MAPM

are likely to be put into practice. Excessive reliance on Kyoto-mechanisms might distract authorities from entering into national political and financial commitments to promote renewable energies and energy efficiency in the country. At the same time, scarce domestic resources may not be used for the most cost effective projects.

Cogeneration and renewable energy

Although a renewable energy strategy for Romania has been the subject of a comprehensive study and some projects have been realised in the fields of biomass and small hydropower, a coherent strategy to promote renewable energy does not currently exist. The same appears to be the case for district heating related and decentralised cogeneration systems.

RECOMMENDATIONS

Based on the findings of the Review Team, and on the assessment of progress, the following recommendations are provided to the Government of Romania:

General

Energy efficiency should be a major component of a long-term energy policy which has to be developed integrating all aspects relating to restructuring, modernisation and privatisation of the supply industry and increasing the effective use of energy throughout the whole energy cycle.

Energy efficiency improvements should be an important instrument to equally address economic, environmental and social problems.

The energy policy should ensure a better balance between supply-side and demand-side measures, comparing the least-cost solutions on an equal footing.

Energy Efficiency Policies, Strategies and Programmes

The Governmental energy policy should reflect the potential contribution of energy efficiency in improving the security of supply, reducing energy imports, supporting economic growth, mitigating social problems and increasing the competitiveness of the Romanian industry in international markets.

The Government should complement the existing strategy on medium term of the energy sector with a strategy on improving energy efficiency in the end-use sectors of the economy elaborated on medium to long term and accompanied by action plans.

Legal and regulatory framework

The Government should develop and implement the secondary legislation necessary to secure the operational implementation of the energy efficiency law.

In implementing the provisions of the energy efficiency law, the Government should focus on building a dialogue with the consumers and on promoting measures and instruments compatible with the market economy.

Institutional framework

The Ministry of Industry and Resources should continue to lead the process of developing the national energy efficiency policies and strategies, taking into account a suitable balance between the energy efficiency objectives and the tasks assigned to ARCE under the energy efficiency law, and the human and financial resources allocated for the implementation of these provisions.

Where necessary, the Government should evaluate and facilitate the development of adequate structures at the various levels of public administration for developing, implementing and evaluating strategies and programmes for energy efficiency.

At the level of Government, a better co-ordination appears to be necessary between various institutions responsible for developing and implementing energy efficiency policies and measures in various branches of the transport sector.

A better communication between the various actors active in the area of energy efficiency including NGOs, professional associations, ESCOs, etc. would lead to improved awareness and commitments towards energy efficiency in the society; ARCE would play a catalytic role in this process.

Energy market and pricing

Taking into account the restructuring process in the energy production and distribution sectors, the Government should continue the necessary measures in order to ensure an efficient functioning of the energy market.

The Government should continue its policy to cover long-term marginal costs for various categories of consumers and reflect as much as possible the environmental externalities; pricing policy may be accompanied by direct measures addressing the problems of low income households.

Energy pricing policies should also support the efficient, safe and sustainable development of the energy sector, penetration of renewables and the efficient use of cogeneration.

Energy efficiency funding and fiscal policies

The Special Fund for the Development of the Energy System should be used also for financing end-use energy efficiency projects in accordance with relevant Government policies and strategies.

The Government should further consider the opportunity to introduce fiscal incentives for promoting investments in energy efficiency on the demand-side, also in the building sector; a similar approach should be applied to promoting renewable energy sources.

The Government should seek to achieve the right balance between domestic and international financial resources to promote energy efficiency projects.

Specific programmes and instruments

The Government should develop specific programmes for improving energy efficiency in the various sectors of the economy (transport, industry, residential, services); such programmes should aim to include specific targets and a monitoring system for continuous evaluation of their implementation.

The Government should further investigate and exploit the potential for using voluntary agreements as a possible tool for improving energy efficiency, notably in industry.

There are extensive potentials for energy savings within reasonable pay-back periods available in Romania, in particular in the building sector. In order to facilitate the thermal rehabilitation of buildings, the Government should complement the legal and regulatory framework with appropriate provisions to eliminate barriers and strengthen specific awareness programmes.

Regulations related to thermal insulation and heating efficiency in the building sector should be applied in a more consequent and transparent manner.

Adequate efforts should be made to promote and strengthen the role and functions of energy managers.

Building on the results of the studies and demonstration projects undertaken so far, the

Government should develop and introduce specific instruments which facilitate the market penetration of renewables.

Demand-side management and district heating

In order to encourage distributors to implement DSM programmes, in accordance with the developments of EU regulations, the Regulatory Authorities should consider the possibility to include in tariff structures a component for compensating the missed revenues related to reduced energy sales.

Heat suppliers in order to monitor and bill end-users according to their actual consumption should effectively install energy metering and management equipment; at the same time, billing of individual dwellings should be further developed to properly cover the costs of the suppliers and to raise the consumers' awareness on energy efficient behaviour.

Disconnection of users from the district heating, i.e. caused by social problems or due to switch to gas-fired facilities, causing decrease of effectiveness of the district systems, should be addressed; increased action of the national and local authorities as well as of energy suppliers is required in order to optimise the use of local resources and secure sustainable energy development.

Data collection and monitoring

Efforts should continue to secure appropriate data collection and building of disaggregated energy efficiency indicators which would help in evaluating energy efficiency programmes and in assessing energy efficiency improvements.

Education and information

Educational energy efficiency programmes and public awareness campaigns should be developed in order to increase the chance to reach goals indicated in national policies and strategies, international programmes and local initiatives.

Energy management and auditing training schemes should be developed by Romanian institutions, notably ARCE, using best practices and available international experience.

Energy efficiency and environmental policies

The environmental benefits of energy efficiency should be better acknowledged and integrated in environmental policies, strategies and programmes.

The Government should identify the cost effective potential for CO_2 emission reductions in the various sectors of the economy which can be achieved through the implementation of energy efficiency measures.

In implementing the Government policy on joint implementation specific attention should be paid to secure an optimal balance between the need for foreign investment and the need to make best use of the domestic financial resources.

ANNEX 1: ENERGY SITUATION IN ROMANIA

Romania has traditionally been an important oil producing country. While domestic oil reserves and production have been declining since the 1970s, there are still important reserves of natural gas and coal.

The country's main primary energy inputs in 2000 were natural gas with 13.68 Mtoe or 37.6% of TPES, oil with 9.81 Mtoe or 27.0%, coal with 7.48 Mtoe or 20.6%, renewables and waste with 2.76 Mtoe or 7.6%, nuclear power with 1.34 Mtoe or 3.7% and hydropower with 1.27 Mtoe or 3.5%. The shares of energy carriers in TPES have remained more or less constant over the last years, with a slight decline of the share of natural gas and a slight increase of the share of oil in the period of 1996-2000. Total primary energy supply has been steadily declining since 1996, with some signs of stabilisation since 1999.

Total final energy consumption in 2000 was distributed as follows: industry 10.78 Mtoe or 43.2%, residential sector 8.44 Mtoe or 33.8%, transport sector 3.81 Mtoe or 15.3%, service sector 0.83 Mtoe or 3.3%, agriculture 0.40 Mtoe or 1.6% and non-specified 0.71 Mtoe or 2.8%. Over the period 1996-1999, the relative share of industry has been steadily declining, while the share of the residential sector has increased correspondingly. The share of the transport sector has slightly grown. The total final energy consumption has declined since 1996, with a recovery since 1999.

The energy intensity of the economy, expressed in TPES/GDP and the total final energy consumption per capita have declined substantially during this period. In 2000, TFC/capita saw its first increase since 1991.

With the exception of petroleum, most of the country's energy demand is met by domestic supplies, in particular natural gas, coal and electricity, including nuclear power from the Cernavoda nuclear power station and some hydroelectricity. As in other Central and Eastern European countries, district heating is an important component of the Romanian energy supply system. Both conventional power stations and CHP plants and systems suffer from inefficiencies, and are the subject of plant closure, rehabilitation and transfer of ownership. The same applies to the important Romanian oil refining industry, the natural gas industry and the coal mining industry.

The restructuring of the Romanian energy sector aims to implement a competitive energy market with financially sound enterprises. Privatisation is part of this strategy, which is guided by the Government's priority to comply with EU accession criteria.

Important steps have been taken to restructure the former state monopolies for electricity and natural gas, to partially open markets for competition, and to prepare parts of the restructured companies for privatisation. Independent regulatory agencies have been created for the petroleum and mining, electricity and heat and natural gas sectors.

While energy end-use efficiency might not have received sufficient attention in the past, the Energy Efficiency Law of 1999, along with its amendments and secondary legislation currently under preparation, indicate an increasing commitment by the Romanian Government to effectively integrate energy efficiency into mainstream energy policies.

TABLE A1.1
ENERGY BALANCE FOR ROMANIA

		1991	1996	1997	1998	1999	2000*
Total Primary Energy Production	Mtoe	35.97	35.21	31.45	28.81	27.86	28.19
Net imports	Mtoe	14.44	14.50	14.46	11.52	7.76	7.28
Total Primary Energy Supply (TPES)	Mtoe	51.48	49.89	44.72	40.64	36.43	36.37
Total Final Consumption	Mtoe	35.09	32.73	29.74	26.84	23.74	24.95
Total Electricity Consumption	TWh	45.59	39.77	38.38	36.63	33.96	33.96

Sources: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1996-1997, 1999 Edition and 1998-1999, 2001 Edition; *National Statistical Office (2000)

TABLE A1.2
BASIC INDICATORS

		1991	1996	1997	1998	1999	2000*
Population	Million	23.2	22.6	22.6	22.5	22.5	22.4
GDP	billion 1995 US$	30.9	33.2	31.0	29.5	28.5	n.a.
Primary Energy Intensity	TPES/GDP	1.66	1.50	1.44	1.38	1.28	n.a.
Final Energy Intensity	TFC/GDP	1.14	0.99	0.96	0.91	0.83	n.a.
Electricity Consumption	kWh/capita	2501	2431	2251	2108	1937	2072
Energy-related CO_2 emissions	Mt CO_2	n.a.	120.74	110.96	96.10	81.82	n.a.

Sources: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1996-1997, 1999 Edition and 1998-1999, 2001 Edition; *National Statistical Office (2000)

TABLE A1.3
TOTAL PRIMARY ENERGY SUPPLY (TPES)

		1991	1996	1997	1998	1999	2000*
Crude oil	Mtoe	n.a	13.547	12.655	12.251	10.429	10.807
Petroleum Products	Mtoe	n.a.	-0.465	0.072	-0.691	-0.273	-0.998
Gas	Mtoe	n.a.	19.413	15.934	14.919	13.727	13.679
Coal	Mtoe	n.a.	9.923	8.741	7.080	6.851	7.475
Nuclear	Mtoe	n.a.	0.361	1.407	1.383	1.362	1.338
Hydro	Mtoe	n.a.	1.355	1.506	1.624	1.573	1.272
Comb. Renewables and Wastes	Mtoe	n.a.	4.910	3.374	3.013	2.816	2.762
Electricity Trade	Mtoe	n.a.	0.069	0.019	0.033	-0.071	-0.060
Total Supply	Mtoe	n.a.	49.114	43.770	39.612	36.432	36.374
Energy Production	Mtoe	35.97	35.21	31.45	28.81	27.86	28.19
Energy Production / TPES	-	0.70	0.71	0.70	0.71	0.76	0.78
TPES / capita	toe/capita	2.22	2.21	1.98	1.81	1.62	1.62

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1996-1997, 1999 Edition and 1998-1999, 2001 Edition; *National Statistical Office (2000)

TABLE A1.4
TOTAL FINAL ENERGY CONSUMPTION (TFC) BY END-USE SECTOR

		1991	1996	1997	1998	1999	2000*
Residential	Mtoe	n.a.	10.480	9.638	9.497	8.746	8.439
Industry	Mtoe	n.a.	14.747	13.071	10.473	9.456	10.777
Services	Mtoe	n.a.	0.035	-	0.719	0.735	0.830
Transport	Mtoe	n.a.	4.229	4.272	4.007	3.229	3.810
Agriculture	Mtoe	n.a.	0.852	0.920	0.779	0.469	0.395
Non-specified	Mtoe	n.a.	1.704	1.120	0.582	0.421	0.709
Total (TFC)	Mtoe	35.09	32.729	29.735	26.835	23.741	24.951
TFC / GDP	toe/1000 US$	1.136	0.840	0.847	0.809	0.73	n.a.
TFC /capita	toe/capita	1.51	1.23	1.16	1.06	0.93	0.98

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1996-1997, 1999 Edition and 1998-1999, 2001 Edition; *National Statistical Office (2000)

ANNEX 2: SELECTED END-USE DATA TABLES

TABLE A2.1
FINAL ENERGY CONSUMPTION OF THE RESIDENTIAL SECTOR BY ENERGY SOURCE

		1991	1996	1997	1998	1999	2000*
Total	Mtoe	n.a.	10.480	9.638	9.497	8.746	8.433
a. Electricity	Mtoe	n.a.	0.698	0.683	0.681	0.687	0.659
b. Heat	Mtoe	n.a.	3.202	3.458	3.440	3.052	2.600
c. Oil Products	Mtoe	n.a.	0.196	0.422	0.450	0.424	0.445
d. Gas	Mtoe	n.a.	1.711	2.057	2.230	2.032	2.217
e. Coal	Mtoe	n.a.	0.122	0.109	0.017	0.047	0.040
f. Comb. Renewables and Wastes	Mtoe	n.a.	4.551	2.910	2.679	2.509	2.453
g. Others	Mtoe	n.a.	-	-	-	-	0.019
Floor area	10^6 m^2	258.5	266.7	268.9	270.5	272.2	273.9
Number of dwellings	x 10^6	7.659	7.811	7.837	7.860	7.885	7.907
Residential use per dwelling	ktoe/1000 dwellings	n.a.	1.342	1.230	1.208	1.109	1.067
Residential use per surface	ktoe/1000m^2	n.a.	0.039	0.036	0.035	0.032	0.031

Sources: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1996-1997, 1999 Edition and 1998-1999, 2001 Edition; *National Statistical Office (2000).

TABLE A2.2
FINAL ENERGY CONSUMPTION OF SERVICES (COMMERCIAL AND NON-COMMERCIAL) BY ENERGY SOURCE

		1991	1996	1997	1998	1999	2000
Total	Mtoe	n.a..	0.035	-	0.719	0.735	0.830
a. Electricity	Mtoe	n.a.	-	-	o.231	0.294	0.336
b. Heat	Mtoe	n.a.	-	-	-	-	-
c. Oil Products	Mtoe	n.a.	0.035	-	0.035	0.063	0.185
d. Gas	Mtoe	n.a.	-	-	0.453	0.376	0.309
e. Coal	Mtoe	n.a.	-	-	-	0.003	-
f. Comb. Renewables and Wastes	Mtoe	n.a.	-	-	-	-	-
g. Others	Mtoe	n.a.	-	-	-	-	-

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1996-1997, 1999 Edition and 1998-1999, 2001 Edition

TABLE A2.3
FINAL ENERGY CONSUMPTION OF THE INDUSTRY SECTORS BY ENERGY SOURCE (1999)

		Mining	Manufacturing							Constr	Total
			Iron & steel	Chemical & petrochemical	Non-ferreous metals	Food & tabacco	Pulp + paper print	Non-metallic minerals	Other		
Coal	Mtoe	0.001	0.554	0.149	-	0.002	0.001	0.010	0.012	-	0.729
Crude oil	Mtoe	-	-	-	-	-	-	-		-	-
Petroleum products	Mtoe	0.038	0.203	0.730	-	0.126	0.045	0.196	4.714	0.138	6.190
Gas	Mtoe	0.015	0.928	1.569	-	0.302	0.101	0.587	3.533	0.043	7.078
Nuclear	Mtoe	-	-	-	-	-	-	-	-	-	-
Hydro	Mtoe	-	-	-	-	-	-	-	-	-	-
Geothermal, solar, etc.	Mtoe	-	-	-	-	-	-	-	-	-	-
Comb. Renewables & waste	Mtoe	-	-	0.001	-	0.021	0.057	0.001	2.720	0.002	2.802
Electricity	Mtoe	0.050	0.632	0.270	-	0.103	0.047	0.156	1.610	0.050	2.918
Heat	Mtoe	-	0.021	0.172	-	0.068	0.017	0.019	3.648	0.022	3.967
Total	Mtoe	0.105	2.339	2.891	-	0.622	0.268	0.969	16.292	0.255	23.741

Sources: 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
NUMBER AND STRUCTURE OF HOUSING STOCK

Number of households (in thousands) (1992)		Period of construction of dwelling stock (number, %) (1992)	
Households	7281	1991- 6 January 1992	34 606 (0.8%)
Dwellings	7659	1981 — 1990	298 692 (6.7%)
Dwellings (permanently occupied)	7187	1971 — 1980	648 542 (14.5%)
-- in family houses	3904	1961 — 1970	1 037 064 (23.2%)
-- in multidwelling houses	3253	1945 — 1960	1 282 103 (28.7%)
Average surface (m2)	33.8	1930 — 1944	517 559 (11.6%)
		1915 — 1929	249 839 (5.6%)
		before 1915	393548 (8.8%)

Source: National Statistical Office

TABLE A2.5
TRANSPORT INDICATORS
(1999)

	Freight	Travel	Total
FC (Mtoe)	n.a.	n.a.	3.810
Tonne-km (* 10^9)	46		
TFC/10^6 tonne-km	n.a.		
Person-km (* 10^9)		42	
TFC / 10^6 person-km		n.a.	
Number of cars / 10^3 inhabitants	n.a.	133	n.a.

Source: National Statistical Office

TABLE A2.6 ENERGY BALANCE IN TRANSPORT MODES (KTOE)

	1991	1996	1997	1998	1999	2000
All transport modes	n.a.	4229	4272	4007	3229	3810
Railways	n.a.	442	434	379	293	377
Road	n.a.	3473	3292	3207	2507	3131
Air transport	n.a.	94	136	118	142	153
Internal navigation	n.a.	149	340	218	217	113
Pipeline transport	n.a.	11	6	36	27	36

Sources: OECD - IEA Statistics, Energy Balances of Non-OECD Countries 1996-1997, 1999 Edition and 1998-1999, 2001 Edition; National Statistical Office (2000)

ANNEX 3: ENERGY PRICES

TABLE A3.1: ENERGY PRICES END-USE SECTORS, 2001 (US$/UNIT*), AVERAGE PRICES)

	Un-leaded gasoline premium	Light fuel oil	Diesel	Heavy fuel oil	Natural gas	Steam coal	Electricity
	litre	tonne	litre	tonne	103 m^3	tonne	MWh
Industry	0.52	317.47	0.45	135.53	82.5	12.5	39.1
Households	0.52	n.a.	0.45	-	82.5	12.5	48.8
Electricity generation	-	-	n.a.	n.a.	n.a.	12.5	

Source: Ministry of Industry and Resources, 2002
*) based on average exchange rate 2001: 1 US$ = 29 061 ROL

ANNEX 4: ORGANISATIONS VISITED BY THE REVIEW TEAM

The review team met representatives of the following organisations:

- Ministry of Industry and Resources (Ministerul Industriei si Resurselor - MIR)
- Ministry of Public Works, Transport and Housing (Ministerul Lucrarilor Publice, Transportului si Locuintelor - MLPTL)
- Ministry of Waters and Environmental Protection (Ministerul Apelor si Protectiei Mediului - MAPM)
- Ministry of Public Administration (Ministerul Administratiei Publice - MAP)
- National Authority for Energy Regulation (Autoritatea Nationala de Reglementare in domeniul Energiei - ANRE)
- National Authority for Natural Gas Regulation (Autoritatea Nationala de Reglementare in domeniul Gazelor Naturale - ANRGN)
- National Agency for Mineral Resources (Agentia Nationala pentru Resurse Minerale - ANRM)
- The Romanian Agency for Energy Conservation (Agentia Romana de Conservare a Energiei - ARCE)
- National Institute for Energy Research and Development (Institutul National de Cercetari si Modernizari Energetice - ICEMENERG)
- The National Institute of Statistics (Institutul National de Statistica - INS)
- Romanian Railway Company (Societatea Nationala CFR - S.N.CFR)
- Bucharest subway company (METROREX)
- National Electricity Grid (Compania Nationala TRANSELECTRICA)
- National Institute for Research in Buildings (Institutul National de Cercetari in Constructii - INCERC)
- Building, Research and Software Institute (Institutul de Proiectare si Tehnica de Calcul pentru Constructii - IPCT)
- Romanian Fund for Energy Efficiency (Fondul Roman pentru Eficienta Energetica - FREE)
- World Energy Council - Romanian National Committee (Comitetul National Roman al Consiliului Mondial al Energiei)
- Romanian Energy Improvement Comsumption Association (Societatea pentru Optimizarea Consumurilor de Energie din Romania - SOCER)
- Center for the Promotion of Clean and Efficient Energy (Centrul pentru Promovarea Energiei Curate si Eficiente din Romania - ENERO)
- Energy Consumers National Association (Asociatia Nationala a Consumatorilor de Energie din Romania - ANCER)

- Romanian Energy Cities Network (Asociatia Orase-Energie din Romania - OER)
- Romanian Energy Policy Association (Asociatia pentru Politici Energetice din Romania - APER)
- Electricity Distribution Company (SC ELECTRICA S.A)
- Distribution Gas Companies (S.C. DISTRIGAZ NORD and S.C. DISTRIGAZ SUD)
- District Heating Company - S.C.TERMICA S.A.Targoviste
- R.A.D.E.T. Bucharest - District Heating Company
- Water and Municipal Services Regia (Regia de Apa si Servicii Comunale) Fagaras
- TECP Consulting Team - German Agency for Technical Cooperation (GTZ)
- S.C. ENERIA
- S.C. ENERGY SERV S.A.
- S.C. NUONSIB S.R.L.

GLOSSARY

ADEME	*Agence de l'Environnement et de la Maîtrise de l'Energie* (French Agency for the Environment and Energy Conservation)
AFME	*Agence Française pour la Maîtrise de l'Énergie* (former French Agency for Energy Conservation)
AIJ	Activities Implemented Jointly under the UNFCCC
ALTENER	EU programme for the promotion of renewable energy
ANCER	National Association of Energy Consumers
ANRE	National Authority for Energy Regulation
ANRGN	National Authority for Natural Gas Regulation
APER	Romanian Energy Policy Association
ARCE	Romanian Agency for Energy Conservation
BCM	Billion cubic metre
CFR	Romanian Railway Company
CHP	Combined heat and power, also known as cogeneration
CIDA	Canadian International Development Agency
CONEL	*Compania Nationala de Electricitate S.A.*
CO_2	Carbon Dioxide
DSM	Demand-side management
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECU	European Currency Unit (until 1998)
EIB	European Investment Bank
ENERO	Center for the Promotion of Clean and Efficient Energy
ERUPT	Emission Reduction Unit Procurement Tender
ESCO	Energy Service Company
EU	European Union
€	Euro

FC	Final Consumption
FEDARENE	European Federation of Regional Energy and Environment Agencies
FREE	Romanian Fund for Energy Efficiency
Gcal	Gigacalorie
GDP	Gross Domestic Product
GEF	Global Environmental Facility
Gg	Gigagram
GJ	Giga Joule
GTZ	*Deutsche Gesellschaft für Technische Zusammenarbeit* (German Agency for Technical Co-operation)
GWh	Gigawatt hour
IBRD	International Bank for Reconstruction and Development
ICEMENERG	National Institute for Energy Research and Development
IEA	International Energy Agency
IMF	International Monetary Fund
INCERC	National Institute for Research in Buildings
IPCT	Building, Research and Software Institute
IPPC	Integral Pollution Prevention and Control (Directive)
JI	Joint Implementation, a flexible mechanism under the Kyoto Protocol of the UNFCC
km	Kilometre
km^2	Square kilometre
ktoe	Thousand tonne of oil equivalent
kWh	Kilowatt hour
kWh/m^2an	Kilowatt hour per square metre per year
LCP	Large Combustion Plants (Directive)
m^2	Square metre
m^3	Cubic metre

MAPM	Ministry of Waters and Environmental Protection
Mil.	Million
MIR	Ministry of Industry and Resources
MLPTL	Ministry of Public Works, Transport and Housing
Mt, Mton	Million tonne
Mtoe	Million tonne of oil equivalent
MWh	Megawatt hour
NAMR	National Agency for Mineral Resources
NGO	Non Governmental Organisation
NO_x	Nitrogen Oxides (Nitric Oxide NO, Nitrogendioxide NO_2)
OECD	Organisation of Economic Co-operation and Development
OER	Romanian Energy Cities Network
OPET	Organisation for the Promotion of Energy Technologies
PCF	Prototype Carbon Fund
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
POPs	Persistant Organic Pollutants
PSO	Programme for Co-operation with Central and Eastern Europe
R&D	Research and Development
RADET	Bucharest district heating company
RENEL	*Regia Nationala de Electricitate*
ROL	Romanian Lei
SAVE	EU programme for the promotion of energy efficiency
SNFR	Former Romanian National Railway Company
SO_2	Sulphur Dioxide
SO_x	Sulphur Oxides (Sulphur Dioxide SO_2, Disulphur Oxide S_2O)
SOCER	Romanian Association for Energy Efficiency

SYNERGY	EU international energy co-operation programme
t	Tonne
toe	Tonne of oil equivalent
TFC	Total Final Energy Consumption
TPES	Total Primary Energy Supply
TWh	Terawatt hour
UCPTE	*Union pour la Coordination de la Production et du Transport de l'Electricité*
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
US$, $, USD	United States Dollar
U-value	Coefficient of Heat Transmission
VAT	Value Added Tax
VOCs	Volatile Organic Compounds
W/m^2K	Watt per square metre per Kelvin