

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

# IN-DEPTH REVIEW OF ENERGY EFFICIENCY POLICIES AND PROGRAMMES



# MOLDOVA



ENERGY CHARTER SECRETARIAT



# In-depth Review of Energy Efficiency Policies and Programmes of the Republic of Moldova

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<sup>1</sup>. 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 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 fifty-one states that signed the Treaty itself. It requires its Signatories to formulate energy efficiency strategies and policy aims, to establish appropriate regulatory frameworks, and to develop specific programmes for the promotion of efficient energy usage and the reduction of harmful environmental practices in the energy sector.

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

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<sup>1</sup> Albania, Armenia, Australia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, 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, United Kingdom, Uzbekistan.



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# EXECUTIVE SUMMARY

## BACKGROUND

The Republic of Moldova is situated in Southeast Europe, bordering Ukraine and Romania. The country covers 33.8 thousand square km and has a population of 4.27 million, 47% of which urban. The city of Chisinau, the capital of the country, has a population of about 750 thousand. Moldova has moderate continental climate and a favourable combination of climate and soil conditions for agriculture. Main industries are based or related to agriculture.

The Republic of Moldova is an independent state since August 27, 1991. The transition period has been characterized by political instability, with ten Governments since independence. At the last parliamentary and presidential elections in 2001 the Communist Party of Moldova won a majority in the Parliament.

As a result of reforms carried out in recent years, there have been a number of positive developments in Moldova. The decline in GDP stopped in 2000, the industrial production has slightly increased, and a marked trend towards economic stabilization has become apparent. Integration into EU structures is a priority of Moldova's foreign policy, which is reflected in the efforts for transposition of the EU acquis into national legislation.

Moldova has insignificant reserves of solid fuels, petroleum and gas, and a low hydroelectric potential. This has led to a high dependence on energy imports (mainly from Russia and Ukraine) – with import levels reaching 98% of total consumption. At the same time the energy intensity in Moldova is relatively high. The efficiency of energy transformation is low, mainly caused by the obsolete production technology and equipment in place and big system losses.

The years of transition have brought about changes in the fuel mix. Coal use has substantially decreased, while natural gas has become the main fuel with a share of 74% of the Total Primary Energy Supply (TPES) and 31% of the Total Final Consumption (TFC).

About 75% of the urban dwellings in Moldova have district heating. From the mid-1990s began a progressive collapse of the heating networks throughout the country. Currently the utilization of the installed heat generation capacity is extremely low and non-payment is chronic. The heating services have worsened and many customers are refusing the heat supply.

All end-use sectors, except services, have reduced substantially their energy consumption during the transition period. The reduction in energy consumption is not a sign of improved energy efficiency, but is due to many other factors inherent to the transitional period, including the economic crisis, financial difficulties and irregular energy supply. All sectors have big potential for energy efficiency improvements.

## ENERGY POLICY

Moldova started in 1997 an ambitious set of reforms of the energy sector, with the main objective to commercialize energy supply, accompanied by social policies to protect the most vulnerable groups.

In 2000 Moldova developed and approved an Energy Strategy for the period until 2010. The strategy attached substantial importance to the increase of the energy efficiency in energy generation, transmission, distribution and consumption, and utilization of local energy resources, including renewables.

The Ministry of Energy was established in 2001 with responsibility and executive authority for the development and implementation of the energy policy in Moldova.

An energy conservation programme for the energy sector and a National Gasification Programme have been developed. Wider introduction of natural gas is a priority for the next 20 years. The construction of new gas pipelines and distribution networks are planned.

The Energy Law from 1998 introduced the principle of cost-reflective energy tariffs. This, together with the creation of the independent National Agency for Energy Regulation (ANRE) in 1997 and the approval of the Electricity and the Gas Laws in 1998, has been an important prerequisite for establishing appropriate economic principles in the energy price regulation.

On the background of serious economic problems, the tariff policy of the National Agency for Energy Regulation has been influenced by political and social factors. In 2003 ANRE finally approved differentiated electricity and gas tariffs, reflecting costs, consumption and voltage level. The electricity price is above 5 US cents/kWh and is comparable with the price in the OECD countries. The tariff setting for heat supply was transferred to municipalities in 1999.

The increase in energy prices, combined with the low level of income, has resulted in low rates of payment collection. Social tariffs have been introduced for very low level of consumption for both electricity and natural gas. In addition, schemes for direct subsidies exist for low-income households, for disabled people, for veterans, etc.

## ENERGY EFFICIENCY POLICIES AND PROGRAMMES

Energy efficiency has a high priority in the Republic of Moldova. The Energy Strategy stipulates an annual 2-3% decrease in energy intensity and includes a number of actions directed at improving the energy efficiency. A Law on Energy Conservation, also considering the utilization of RES, was passed in December 2000 and a National Energy Conservation Programme for 2003-2010 was developed in 2003.

Since 2002 the Ministry of Energy has had the overall coordination of energy efficiency activities. The National Energy Conservation Agency is empowered with important functions in the development and implementation of the energy conservation policies and programmes. The State Energy Inspectorate, in parallel with its control over the

implementation of the technical and security standards and norms, controls the specific energy consumption in various parts of the economy. Other governmental and non-governmental organisations are also involved in energy efficiency activities.

The energy efficiency measures already implemented in Moldova are mainly directed at the district heating sector and to improvements in residential, public and industrial buildings.

For the district heating sector, a package of Government documents has been developed: Concept of the Heat Supply System Renewal, Programme of Heating System Renovation and Decentralisation, and a Draft Heat Law. The Draft Heat Law will introduce a liberalised heat market and stimulate private initiatives in the heat supply.

A Programme of Heating System Renovation and Decentralisation was adopted in 2003 for the retrofit of the local heating systems in 36 cities. Some projects under agreements with international and foreign financial institutions and donors (European Bank for Reconstruction and Development - EBRD, World Bank, United States Agency for International Development - USAID) were also implemented.

Energy efficiency in buildings has a high priority for the Moldavian Government, and especially energy efficiency improvements in the residential sector. A number of ambitious measures have been launched. They include an Energy Certificate of Buildings (Energy Passport) for new and existing buildings under reconstruction.

More than 80 audits in industry, mainly in the processing of agricultural products, have been completed by the National Energy Conservation Agency. A number of audits and projects in public and industrial buildings have been completed with support provided by the Norwegian Government. The audits were combined with training of the staff of the enterprises and ended with implementation of about 60% of the projects.

Moldova has substantial investment and rehabilitation needs both in the public and in the private sector, and at the same time limited access to capital. This again leads to limited possibilities of solving the financing issues of the energy efficiency policy and hampers the practical implementation of the adopted programmes.

The National Fund for Energy Conservation started operating in 2003 with a small budget allocation. In order to secure the financing of the planned energy conservation measures, the Government has planned that 20% of the income of the national and of the local budgets will go to investments in the energy area, including energy efficiency measures.

The strong dependence of Moldova on energy imports makes the use of local sources, including renewables, a priority. Purchasing obligations for electricity produced by combined heat and power plants (CHP) and renewable energy sources (RES) have been introduced and a draft strategy for renewable energy has been recently developed.

The environmental policy of Moldova considers energy efficiency as being important for the protection of the environment by reducing harmful emissions, and also for fulfilling the commitments of the country to a number of ratified international conventions, especially the UNFCCC and the Kyoto Protocol.

## OVERALL ASSESSMENT OF PROGRESS

Energy efficiency is a priority in the Republic of Moldova and strategic policy objectives for energy conservation are defined. A set of sectoral legal documents is in place. The national objective of an annual 2-3% decrease in the energy intensity of GDP, stipulated by the Energy Strategy, is a very ambitious task. To achieve it in practice requires actions over a broad front in the area of secondary legislation, institutional capacity building, developing sectoral programmes, and securing financing.

# IN-DEPTH REVIEW OF ENERGY EFFICIENCY POLICIES AND PROGRAMMES OF THE REPUBLIC OF MOLDOVA

## 1. INTRODUCTION TO THE PEEREA REVIEW

The Republic of Moldova ratified the Energy Charter Treaty (ECT) and the Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) in 1996. By ratifying PEEREA, countries commit themselves to formulate and implement policies for improving energy efficiency and reducing the negative environmental impacts of the energy cycle (Art.5). The guiding principle of PEEREA is that contracting parties shall cooperate and, as appropriate, assist each other in developing and implementing energy efficiency policies, laws and regulations (Art.3).

In this context the in-depth Review of the Energy Efficiency Policy of Moldova was initiated and carried out in April 2004. The purpose of the review was to assess the progress of the country in fulfilling its commitments under the Protocol, and also to enhance the level of co-operation among PEEREA Parties and promote continuous dialogue and transfer of experience and information.

The in-depth review was carried out by a team, comprising officials from four countries: Mr. Ture Hammar from Denmark (team leader), Mr. Miroslav Marias from the Slovak Republic, Mr. Corneliu Radulescu from Romania, and Mr. Oleksandr Zakrevsky from Ukraine. The team was supported by Mr. Tudorel Constantinescu and Mrs. Valya Peeva from the Energy Charter Secretariat. The review team visited Moldova during the period 5-8 April 2004 and met with representatives of a number of organisations, listed in Annex 4. The organisation of the mission was undertaken by officials of the Ministry of Energy, to whom the team addresses special thanks.

The report is based mainly on materials provided by Moldova. Other relevant sources of information, e.g. publications of the International Energy Agency (IEA), the World Bank, EBRD, UNDP, etc. were also used. Most recent statistical data available were used and presented in the report.

## 2. OVERVIEW

### BRIEF COUNTRY PRESENTATION



Figure 1: Map of Moldova

(Source: *The World Factbook, US CIA.*)

Moldova possesses a favourable combination of climatic and soil conditions for agriculture, especially cereals, grapes, tobacco, fruit and vegetables. Main industries are in food processing, agricultural machinery, foundry equipment, refrigerators and freezers, washing machines, hosiery, sugar, vegetable oil, shoes, textiles, construction materials.

The Republic of Moldova is an independent state since August 27, 1991. A new Constitution was adopted by its Parliament on July 29, 1994. The transition period has been characterized by chronic political instability, with ten Governments since independence. The last parliamentary and presidential elections took place in 2001. The Communist Party of Moldova won a majority in the Parliament, while only two other parties passed the 6% threshold and gained seats in it.

Moldova is situated in Southeast Europe, bordering with Ukraine to the North, East and South, and with Romania to the West. The country covers only 33.8 thousand square km, but with a population of 4.27 million it is relatively densely populated. Urban population comprises 47%. The city of Chisinau, the capital of the country, has a population of about 750 thousand. A decrease of the population during the last years was mainly due to emigration for economic reasons.

The country's relief is plain to hilly with highest elevation of 430 metres, and ranging from a steppe area in the North and South to forested and mountainous highlands in the centre of the country.

Moldova has moderate-continental climate with average annual temperatures in the range of 8-10°C. The country is characterised by a relatively high number of warm and sunny days, 160 to 190 annually. The warm season is 158 days long in the south, 166 days in the central part of the country (around Chisinau), and 177 days in the northern parts.

After the break-up of the Soviet Union, the Republic of Moldova has experienced very difficult years of transition to a market economy. Over the period from 1990 to 2000, GDP declined by 60-65%, industrial production by 68% and agricultural production by 49%. More than half of the population lives in absolute poverty<sup>1</sup> (below the poverty line). Living standards fell sharply from the early 1990s, and the quality of services deteriorated. The economy was also badly influenced by the regional financial crisis of the end of 1998. The country's traditional export markets collapsed, production declined and the national currency lost value. And there was a significant increase of its external indebtedness.

The territorial administrative division of the Republic of Moldova has been changed twice during the last 5 years. It comprised 36 districts until 1998, when they were reorganized into 10 regions. The latest territorial-administrative reform, which came into force in March 2003, introduced a new organisation of 32 regions, plus the autonomous territorial unit of Gagauzia, municipalities of Chisinau and Balti. There are 52 town municipalities and 847 village communes. The frequent changes in the structure of local authorities, combined with fragmentary fiscal decentralisation reform, have weakened them and slowed down their operation. The latest local elections took place in May 2003 and the administrations are still in a process of formation.

The Transnistrian region is not under the control of the Government of Moldova. The region is of high economic importance, and in particular for the energy sector, as it includes significant parts of the energy industry of Moldova.

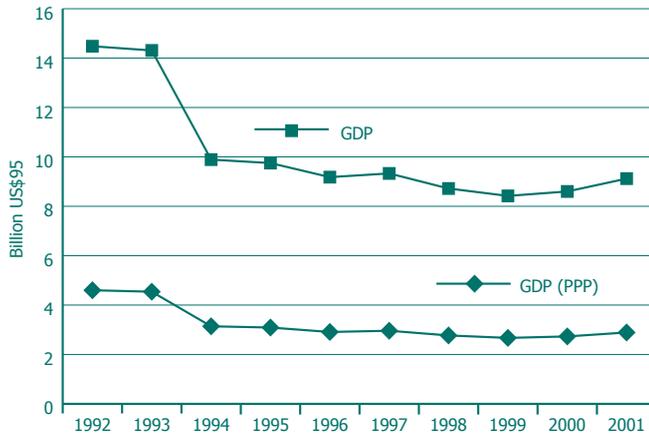
As a result of reforms carried out in recent years, there have been a number of positive developments in Moldova: the structure of ownership was reformed, the national currency (the Moldavian Lei) was put in circulation, a reform of the financial and banking system was undertaken and the legislative and institutional basis for assuring the functioning of a market economy was created. The decline in GDP stopped in 2000, the industrial production slightly increased, and a marked trend towards economic stabilization became apparent (Figure 2).<sup>2</sup>

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<sup>1</sup> *Moldova: Public Economic Management Review, World Bank, 2003; First National Communication of the Republic of Moldova under the UNFCCC, 2000.*

<sup>2</sup> *Moldova: Investment Climate and Market Structure in the Energy Sector, Energy Charter Secretariat, 2002.*

Figure 2: GDP of Moldova, 1992-2001<sup>3</sup>



Moldova was the first country of the former Soviet Union to be admitted as an associated member of the Council of Europe. In November 1994 Moldova signed a Partnership and Co-operation Agreement (PCA) with the European Union (EU), which entered into force in July 1998. Possible integration into EU structures is a priority of Moldova's foreign policy, reflected also in efforts for transposition of the EU *acquis* into national legislation.

## ENERGY BACKGROUND

Moldova has insignificant reserves of solid fuels, petroleum and gas, and a low hydroelectric potential. This leads to a fuel balance with a high dependence on energy imports (mainly from Russia and Ukraine) – with import levels reaching 98% of total consumption (Annex 1). This implies that 34% of Moldova's import budget is spent on energy resources.

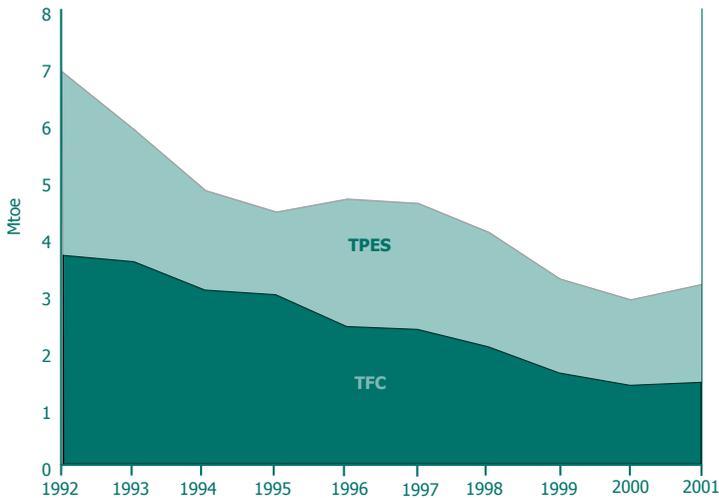
This almost complete dependence on external energy sources was one of the important reasons for the difficulties the country has met during its transition period. The abrupt introduction of world oil prices after the independence in 1991 meant a 40-fold increase in energy prices, resulting in a major shock for the economy<sup>4</sup>.

The transition period has been characterised by a significant decrease in energy use in the country – to less than half (Figure 3). This is explained primarily by the decrease in industrial production, but also by the insufficiency of financial means to acquire the necessary quantities of energy resources.

<sup>3</sup> The graphs in this paper, if not specifically indicated, are based on IEA Energy Statistics, 2003 Edition.

<sup>4</sup> Moldova: Investment Profile 2001, EBRD.

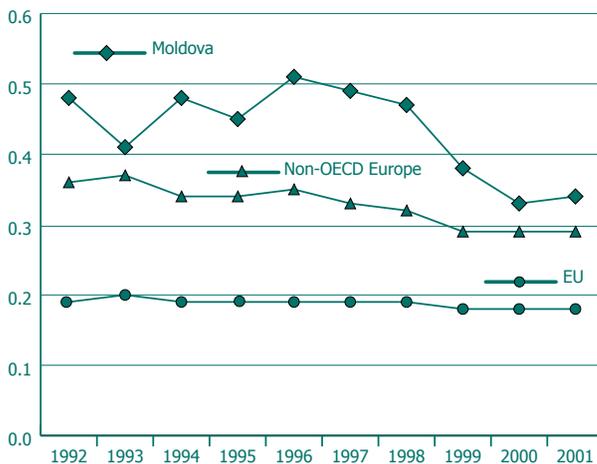
Figure 3: Trends in TPES and TFC in Moldova



However, the energy intensity (energy use compared to GDP), although it has been declining somewhat after 1996, still is relatively high compared to the average figure for non-OECD European countries, and is much higher than in the EU 15 (Figure 4).

The efficiency of energy transformation is low. Expressed with the ratio between TFC and TPES the overall efficiency has been decreasing after 1995, and is still about 50%. This low efficiency is mainly caused by the obsolete production technology and equipment in place and big system losses, reaching 34.8% of the electricity produced and 14.8% of the produced heat.

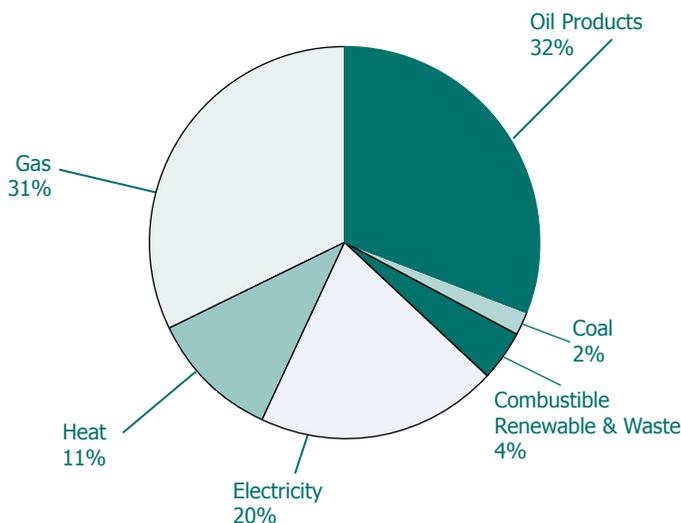
Figure 4: Energy Intensity Comparison TPES/GDP (PPP)



The years of transition brought about changes in the fuel mix of energy supply and consumption. Significant changes have occurred in the fuel balance of the power industry. Coal consumption has substantially decreased, while natural gas has become the main fuel for the power stations and boiler houses and has reached a share of 74% of TPES.

Oil products and natural gas, with shares of 32% and 31% respectively, are equally dominant in the current structure of the final energy consumption, followed by electricity (20%) and heat (11%) (Figure 5).

Figure 5: Total Final Energy Consumption in Moldova by Fuel in 2001



In the natural gas sector, the company Moldovagas is responsible for the import, transport and distribution. The company was privatized in 1999 with Gazprom (Russia) taking a majority stake of 50% plus 1 share. The Moldovan Government retained 36% and the administration of Trans-Dniestria held the remaining 14%. Gazprom assumed the responsibility for the operation of the company.

Local electricity supply is provided by six power stations with total installed capacity of 3,008 MW – 4 thermal and 2 hydro plants. 2,520 MW, or 84% of this capacity belong to the Moldova Thermal Power Plant (TPP), situated on the left bank of the river Dniestr (in Transnistria). The electricity supplied from Transnistria is considered import and is received at the same price as electricity imports from Ukraine and Russia. The remaining three thermal power plants are CHP plants and supply the municipalities of Chisinau and Balti with electricity and heat. The hydro power stations are small with capacities of 48 and 16 MW.

The district heating sector consists of centralized heat supply systems, decentralized systems (autonomous heat supply installations), and local systems. Heat is supplied in the large centralized heating systems from CHP and large heat-only plants. Municipal

systems of this type exist in Chisinau, Balti, and four other cities, while six other cities are supplied with heat from the CHPs of the sugar factories. Local heating systems provide heat from local or industrial thermal plants in small towns.

In total, about 75% of the urban dwellings in Moldova have district heating systems. In the early to mid-1990s heat supplies were still adequate although inefficient, while from the mid-1990s a progressive collapse of the heating networks throughout the country started. Degradation of the thermal networks, which have a non-rational structure, excessive losses in all the segments of the systems, reduced heat supplies, and increasing, and unaffordable costs for the consumers, have come together to produce a crisis in the heating sector. Currently, the utilization of the installed heat generation capacity is extremely low. Many boiler-houses, both industrial and communal ones, do not operate at all, and at the utilization factor is very low - about 0.40 for communal source, and between 0.1-0.7 for the industrial ones<sup>5</sup>. The Chisinau and Balti CHP plants generate more than 50% of the produced heat.

The heating infrastructure in the capital of Chisinau is in serious disrepair. Non-payment is chronic. The two biggest DH systems have very long distribution lines, which contributes to increased losses. In many parts of the city the district heating system is simply being dismantled, replaced by electric heaters or gas boilers in the buildings.

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<sup>5</sup> *Concept of the Republican Heat Supply System Renewal, 2003.*

### 3. MAIN ENERGY POLICY HIGHLIGHTS

#### ENERGY SECTOR REFORM

Under the pressure of the energy crisis in the mid 1990s, Moldova started in 1997 an ambitious set of reforms in the energy sector, whose main objective was full commercialization of energy supply, accompanied by social policies to protect the most vulnerable groups. The reform was supported by the international financial institutions, including the World Bank and EBRD.

The main elements of the reform comprised:

- Development of a new, market-oriented legal framework: a new set of energy laws on energy, on electricity and on gas were passed in 1998, introducing separation of regulatory, policy and ownership functions, allowing private ownership in the energy sector, unbundling of the industry, and liberalization of energy trading;
- Establishment of an independent energy regulatory agency (ANRE) in 1997;
- Restructuring: in 1997 the country's vertically integrated electricity monopoly was unbundled into 5 distribution companies, 4 generation companies, and a separate transmission and dispatch company, Moldelectrica. The country's district heating networks were transferred from the state to the municipal Governments.
- Changing electricity trading rules: in 1999 the single buyer model was displaced by bilateral contracts, and distribution companies were made solely responsible for contracting directly with importers and domestic generators. The state's involvement in electricity trading was significantly reduced.
- Debt restructuring: after the Parliament adopted the Law on the Debt Restructuring in the Energy Sector in April 1999, the existing debts of the electricity sector were transferred and consolidated on the books of a debt-holding company, which has no involvement in the sector's operations.
- Adjusting the level and the structure of tariffs: in 1997 tariffs were increased to the same level for all consumers. Until then non-residential tariffs for all types of energy were significantly higher than the residential (which implied significant cross-subsidies to residential consumers), and all tariffs were generally below costs. Further differentiation of tariffs to reflect costs for different categories of consumers was introduced in 2003 for electricity and in 2004 for natural gas<sup>6</sup>.
- Reducing subsidies for energy consumption: subsidies for electricity, heating, and gas have been substantially reduced in 2000 and directed to the most vulnerable groups only.
- Privatization of a substantial share of electricity distribution (about 70%): after an open international tender three of the five electricity distribution companies were sold in February 2000 to Union Fenosa, a Spanish international investor and electricity operator. The remaining generation and distribution companies were all announced for full privatisation at a later stage.

<sup>6</sup> More Information on the energy pricing reform is provided in Chapter 4.

The reform resulted in increased payment collections for electricity and improved reliability of energy supply, but still many issues remained unsolved and the energy sector crisis continued to deepen. The country continued to suffer from difficulties both in the domestic electricity market and in the international electricity trade, caused by the physical deterioration of electricity transmission and dispatch equipment and insufficient metering in the high voltage transmission network. The apparent losses in electricity distribution have remained high, half of them being technical, but half mainly due to illegal use. The historic debts of the energy sector continued to burden the sector with the risk of supply interruption. Major problems also remained in the heat sector, where heating services to both public and residential buildings deteriorated - in many cases to the point of non-existence.

## ENERGY STRATEGY

In 2000 Moldova developed and approved an Energy Strategy for the period until 2010 as a basis for a further development of the energy policy. The strategic objectives of the national energy policy for the period comprise:

- Finalization of the energy sector privatization process and creation of an energy market;
- Improving energy efficiency and energy conservation;
- Assuring the energy security of the country;
- Environmental protection.

The strategy attached substantial importance to the increase of the energy efficiency at energy generation, transmission, distribution and consumption, the implementation of efficient energy technologies, and utilization of local energy resources, including renewables.

The energy security was to be insured by diversification of the sources of electric energy and petroleum products imports, by increase of the local energy production capacity, as well as by creation of strategic fuel reserves.

International co-operation and regional and European integration are indispensable in the Strategy for solving the problems of the country's energy sector.

The Strategy also identified end-user energy conservation and utilization of RES as important elements of the energy policy of the country. It had several long-term objectives:

- Reduction of the energy intensity with 2% annually;
- Establishment of a national fund for energy conservation and utilization of RES;
- Elaboration and implementation of energy consumption standards for public dwellings, transportation and electric appliances.

These long-term objectives were to be achieved by a number of measures listed in the Strategy, among which: development and implementation of sector programmes for energy conservation; renovation and modernization of the electricity generating

facilities and equipment, including the implementation of CHP; improvement of the district heating systems, implementation of efficient heating systems, installation of heat regulating devices at public institutions; promotion of energy services companies (ESCOs); increase of the operational efficiency of the National Energy Conservation Agency and the State Energy Inspectorate; training of experts and public awareness raising. The Strategy prescribed that all these aspects were to be covered in a special national energy conservation programme.

## ENERGY POLICY INSTITUTIONS

The Ministry of Energy was established in 2001 with responsibility and executive authority for the development and implementation of the energy policy in Moldova. During the period 1991-2001 the Department of Energy and Fuel-and-Power Resources performed this function.

The National Agency for Energy Regulation (ANRE) was established in 1997 as an independent authority to support the introduction of market mechanisms in the energy sector, while protecting the interests of consumers and investors. It issues licenses, regulates fuel and power prices, establishes energy pricing principles and calculation methodology.

The State Energy Inspectorate has the technical oversight of all power and heat companies, irrespective of their ownership and production capacity, to assure reliable, efficient and safe power and heat supply. The Inspectorate is a separate entity within the structure of the Ministry of Energy, but receives its budget from the state electricity enterprise Moldelectrica.

The Department of Standardization and Metrology is providing the technical oversight for gas and petroleum products.

The National Energy Council, a self-financed non-governmental organisation comprising high-level experts from universities and research institutes, advises the Moldavian government on energy and energy efficiency policies.

## 4. ENERGY PRICING AND TAXATION

Until early 1990s the domestic energy prices in Moldova, based on the access to the cheap energy supplies in the former USSR, were much lower than the world prices. Under the influence of the changing political and economic environment, higher energy import prices and depreciation of the national currency, energy prices in the country subsequently sharply increased.

The Energy Law from 1998 introduced the principle of setting cost-reflective energy tariffs, which include all reasonable expenditures for the energy companies' maintenance and allowance for capital costs and profit. This, together with the setting up of the independent National Agency for Energy Regulation (ANRE) in 1997 and the approval of the Electricity and the Gas Laws in 1998, is an important prerequisite for establishing appropriate economic principles in the energy price regulation. Improvements in the energy sector tariff and pricing policies and elimination of cross subsidies are among the major elements of the Energy Strategy of Moldova.

The National Agency for Energy Regulation (ANRE) is a public administrative authority with legal entity status, and is not subordinate to any other public or private authority. ANRE has its own staff and budget, approved annually by the Government. Funding of ANRE's budget is secured by annual regulatory fees paid by licensees. ANRE began its activity in tariff policy following a Government Resolution in 1998, that vested the agency with the right to set electricity, heat and gas tariffs. Later in the same year this activity was facilitated by the adoption of the Electricity and Gas Laws.

ANRE's tariff policy is based on the principles of correctness and fairness in ensuring the stability of tariffs, coverage of actual and minimal necessary power costs, coverage of production, transmission, distribution and fixed assets maintenance costs, efficient use of energy, material and human resources, and a reasonable profit margin for electric utilities. However, it was difficult to comply with these principles.

On the background of heavy economic problems for the country, the ANRE tariff policy has been influenced by political and social factors. This resulted in the establishment of uniform electricity and gas tariffs for all consumers in 1997-1998, despite the fact that based on costs the residential consumers should pay higher tariffs for electricity and natural gas than industrial consumers. In this way industrial consumers indirectly subsidized residential consumers until 2003, when finally ANRE succeeded in approving a differentiated tariff for groups of consumers, reflecting actual costs, consumption and voltage level (Table 1. and Annex 3).

The new methodology for the electricity tariffs reflected the supply costs and eliminated cross-subsidies. It encompassed various groups of consumers, provided clear definition of the cost distribution factors corresponding to different voltage levels, and contained detailed evaluation of the technical losses in grids with different voltage levels. A similar methodology was developed for natural gas price calculation.

Table 1. Current Electricity Ceiling Tariffs (without VAT), Bani/kWh

Consumer categories	Supplied by the state distribution companies RED North and RED North-West	Supplied by RE Chisinau, RED Centre and RED South (Union Fenosa)
Consumers connected to 110 kV lines and equipped with meters of high performance at the delineation points	55.00	55.00
Residential consumers who leave in dwellings equipped (according to design) with electric stoves	53.00	60.00
Other consumer categories	70.00	78.00
Optional (social) tariffs		
Residential consumers with monthly consumption up to 50 kWh	55.00	Optional tariff not applied
Residential consumers with monthly consumption over 50 kWh	165.00	Optional tariff not applied

Source: ANRE.

\*100 bani = 1 Moldovan Lei (MDL); 1 MDL = 0.077 USD (30/04/2004)

The difference of about 10% in the price levels between the state owned and the private companies in the power market (Figure 6) are explained by the state electricity supply companies imports at lower prices, as well as by higher electricity losses in the distribution networks of Union Fenosa. According to ANRE it also reflects, that the company has not undertaken the necessary investments to increase the efficiency<sup>7</sup>.

The tariffs setting for heat supply was transferred from ANRE to municipalities in 1999. Currently, prices of centralised heating and hot water supply are set by the suppliers in coordination with the agencies of local Governments. In case of disagreement, prices are defined by the agencies for limited period. The heating tariffs vary substantially between cities, mainly depending on the fuel used. In Chisinau, where natural gas is used as a fuel, the tariff is 233 Lei/Gcal (USD 17.94), while in other cities, where diesel fuel is used, the tariff reaches 500 Lei/Gcal (USD 38.5). ANRE is setting tariffs for the steam and hot water supplied by the state owned CHP plants.

The steep energy tariff increase since 1997 in national currency was to a substantial extent a result of its depreciation. Whereas the electricity tariff, expressed in Moldavian bani, has increased 3.25 times since 1997 (see Figure 6), the changes are not substantial if the tariff is expressed in US cents (Figure 7). From another perspective, a level of electricity price above 5 US cents/kWh is comparable with the price in the OECD countries.

<sup>7</sup> ANRE resolution no. 103/July 15, 2003.

Figure 6: General Category Electricity Supply Tariffs



Source: ANRE.

Figure 7: Electricity Supply Tariffs in US Currency



Source: ANRE.

The average salary in the country is about USD 50 per month and because of this low level in average the energy bill of a household amounts to more than 50% of the salary.

The increase in energy price levels, combined with the low level of income, has resulted in low rates of payment collection. However, the payment of electricity bills has increased after the Energy Act allowed disconnection of non-paying consumers. Non-payment for heating continues to be high, e.g. about 40% of heating bills in 2002 were not paid.

With the view to support the poor population, ANRE in 2002 approved an optional tariff for electricity supplied to residential consumers by the state energy distribution companies. The tariff provides a reduced price for consumption up to 50 kWh per month. A lower tariff is developed also for residential consumers who live in dwellings equipped (according to design) with electric stoves. A similar social tariff for natural gas, supplied to residential consumers with a monthly consumption of up to 30 m<sup>3</sup>, was introduced in March 2004 (Annex 3, Table A3.4.). It is not clear how these social tariffs are compensated. In addition, schemes for direct subsidies exist for low-income households, for disabled people, for veterans, etc. The Ministry of Social Protection provides financial support to these groups in cash.

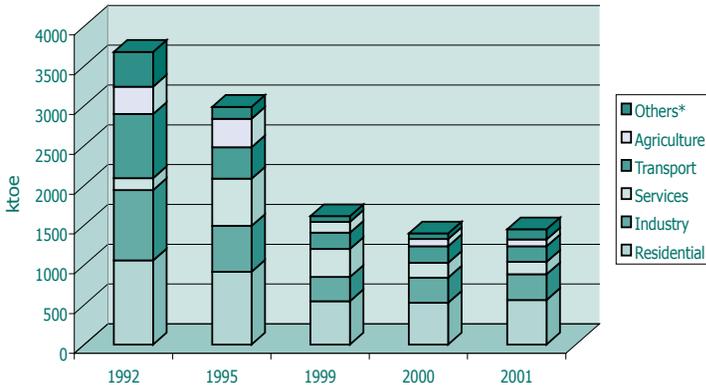
The methodologies for electricity pricing do not envisage any preferences for CHP production or RES, and there are no feed-in tariffs. There is no specific integration of energy efficiency and RES in the prices, but only purchasing obligations for the electricity produced by CHP plants and RES. The latest gas tariffs from March 2004 define a substantially reduced tariff for natural gas, supplied to CHPs.

There are no specific taxes on energy consumption, except transportation fuels, or on CO<sub>2</sub> emissions.

## 5. END-USE SECTORS

All end-use sectors, except services, have reduced substantially their energy consumption during the transition period. The greatest energy consumers remain the residential (38.6%), industry (22.3%) and transport (13.6%) sectors (Figure 8). Agriculture, although dominating in the economy of the country, has a small share in the final energy consumption – 5.9%.

Figure 8: Final Energy Consumption in Moldova by Sectors



The reduction in energy consumption is not a sign of improved energy efficiency, but is due to many other factors inherent to the transitional period, including production crisis, financial difficulties and irregular energy supply. All sectors have big energy efficiency potentials in the building stock, technologies and management.

Lack of financing is a general barrier for the implementation of energy efficiency measures by all types of consumers. There are also other important barriers, including:

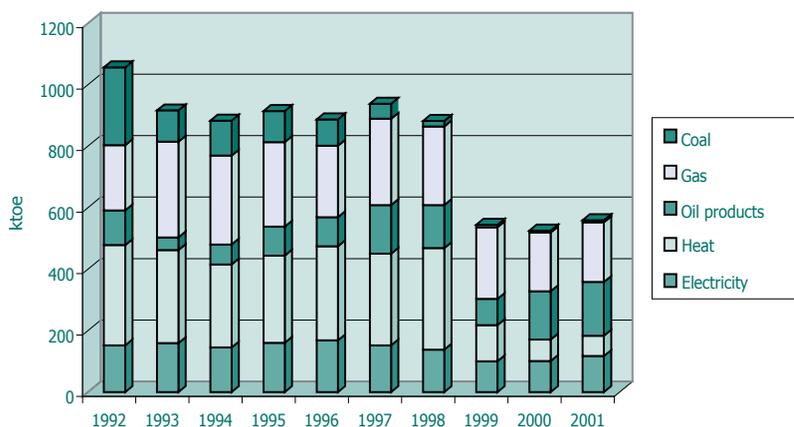
- Insufficient awareness of the consumers about the possible benefits and needed actions, resulting in lack of interest and motivation;
- Difficulties in estimating the energy saving potential because of the lack of precise data on energy consumption as buildings are without metering devices;
- Difficulties in reaching real savings in the actual conditions, where the energy comfort is much lower than the norm, combined with difficulties in defining and explaining the "baseline energy consumption";
- Lack of relevant documentation and skills for energy saving technology design;
- Insufficient consultancy services.

## RESIDENTIAL

The existing housing building stock in Moldova amounts to 75.9 million m<sup>2</sup> floor area, 37.4% of it is in urban areas. As a result of the privatization process during the last years 93.8% of it is private<sup>8</sup>.

The energy consumption of the sector has decreased to nearly half since 1992, including a substantial decrease after 1998 (Figure 9) mainly caused by the decrease in the heat consumption. Currently, the main energy products used are gas (35%), oil products (31%), and electricity (21%). The use of coal is reduced to negligible quantities. Electricity is used for heating in only 0.9% of the total floor area.

Figure 9: Final Energy Consumption of Residential Sector by Source



83.2% of the residential floor area (1093800 homes) is gasified. Gasification is high both in the cities (91.2%) and in the rural areas (78.9%). However, only 35.9% of the gasified homes, mainly in urban areas, are connected to the gas grid. The rest use liquefied petroleum gas (LPG) in containers. There is a trend of increase of network gasification and decrease in the houses using LPG. In 2003 natural gas was introduced in 130 localities, compared with only 6 in 1999. The state budget for this process is 21 million Lei.

A substantial, nearly 80% reduction has occurred in the consumption of heat from centralized DH systems – from around 300 ktoe annually during the period 1992-1998 to 66 ktoe in 2001. This sharp decline is explained by the crisis and inefficiency in the DH sector itself, the steep rise in prices, and the deterioration of heating services.

The serious financial crisis of the heat sector is due to the increase in prices of imported energy fuels, big system losses, and the chronic non-payment by the consumers. The costs of heat generation are in addition increased due to obsolete equipment.

<sup>8</sup> Annual Statistics of Republic of Moldova, 2002.

The worsening of heating services mainly results in insufficient temperature levels, frequent disconnections of hot water supply, and shortened heating seasons. There is no equipment for measuring the consumption on the customers' side and the customers are not in a position to regulate their heat consumption. Many customers have started refusing the heat supply.

The heat production by boiler houses in Moldova was managed by the state enterprise Termocomenergo until 2000, when the boiler houses and the distribution grids were transferred to public agencies of the local Governments. Heating organisations have typically been established as municipal enterprises, wholly owned by the local administration, and based on assets transferred to the municipality by Termocomenergo. The majority of these units did not have the necessary experience and financial means to redress the problems of the heating systems, or at least for reducing the crisis. In fact, many heat supply systems have stopped operation, whereas the efficiency of the remaining ones is very low. As a result, heating services both to public and residential buildings continue to deteriorate.

An important barrier for the implementation of energy efficiency improvements in multi-storey buildings of the residential sector is the lack of legal authority of the housing associations. As there is a high share of private ownership, the associations cannot oblige the individual owners or tenants to participate in the funding of energy efficiency measures. The privatization of apartments has left the apartment owners without any obligation regarding common facilities as heat supply, maintenance of the building shell, etc.

## INDUSTRY

Industrial production, together with construction provides 24.2% of the GDP of the country. More than half of this is due to the food, beverage and tobacco production (57.3%), which is a strategic sub-sector for Moldova. This is the sector with the highest energy consumption as well, amounting to 54.5% of the total industrial energy use in 2001. Second in energy consumption with 22.9% is the group of "other manufacturing", incorporating some for Moldova important sub-sectors: textiles, dressmaking and leather industry, and machinery. All other sub-sectors consume less than 10% of the total energy consumption of the industry sector (Figure 10).

The economic and structural reforms in the country resulted in substantial reduction of industrial production, which in turn resulted in reduced energy consumption (Figure 11). The energy efficiency of the sector is low. The specific energy consumption in processes is high and the energy losses are substantial. Both energy audits and implemented energy efficiency projects demonstrate high energy efficiency potential in all sub-sectors of industry. However, energy efficiency is still not a matter of great concern in industry.

Industrial energy consumption is dominated by natural gas (54%), followed by electricity (20%) (Figure 11).

Figure 10: Production and Final Energy Consumption by Industrial Sub-sectors, 2001

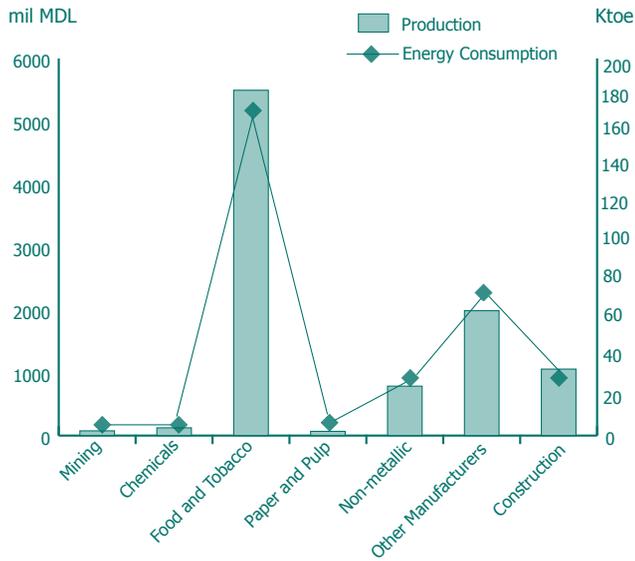
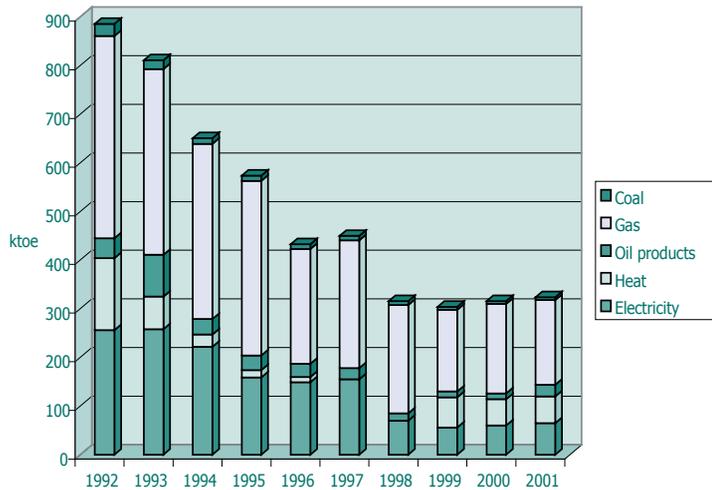


Figure 11: Industrial Final Energy Consumption by Fuel



As part of the structural reforms in the country a major share of industry has been privatized. 581 enterprises or 76% of the total number – accounting for half of the total production – were in 2001 private or private/public. Most of the enterprises are small and medium size. The number of foreign companies and joint ventures in the

country has increased and now accounts for 24.4% of the industrial production<sup>9</sup>. These structural changes could improve the possibilities for implementing energy efficiency initiatives, motivated by increased economic efficiency.

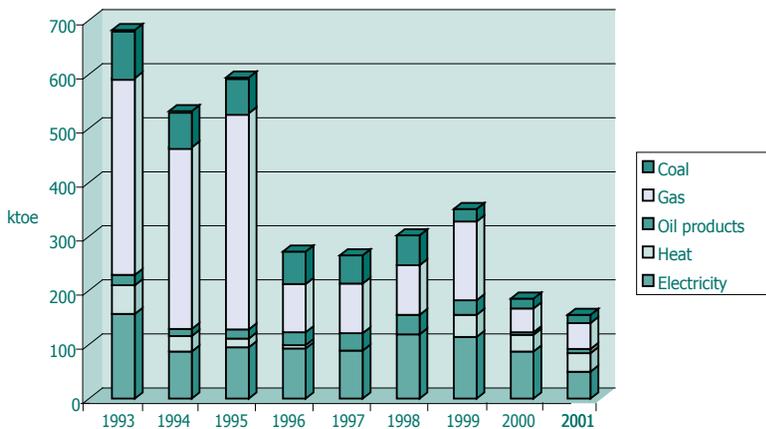
## SERVICES

The transition to market economy in Moldova is accompanied by rapid development of the services sector with a substantial, more than 5 times increase in the amount of services provided.

Gas and electricity are the most used energy forms, but the sector, mainly in public services, is still dependent on district heating.

This sector suffered as other sectors from the country's energy crisis in the mid 90s, and the energy consumption went down (Figure 12). Public energy services, and especially those on municipal level, deteriorated due to budget constraints. Together with the deterioration of the district heating services, this has resulted in great difficulties for assuring enough heat for the public institutions such as schools, kindergartens, hospitals, etc.

Figure 12: Final Energy Consumption of Services



## TRANSPORT

The transport sector is one of the least developed sectors in Moldova mainly due to lack of sufficient funding for maintenance and investments. In 2001 it provided 11.1% of the GDP added value. The efficient operation of the transport sector is important to support Moldova's economic recovery and growth the country's geographical position, including its future closeness to the European Union, the transport sector can have a significant impact on the country's development.

<sup>9</sup> Annual Statistics of Republic of Moldova, 2002.

The energy consumption of the transport sector has been reduced substantially since 1992 – more than 4 times (Table 2.)

Table 2. Energy Consumption of the Transport Sector by Mode (ktoe)

	1992	1995	1999	2000	2001
	576	283	126	137	144
Rail	114	30	13	10	11
International Civil aviation	35	12	13	21	18
Pipeline transport	-	59	45	32	16
Non-specified	80	11	8	9	8
	805	395	205	209	197

Source: IEA Energy Statistics, Energy Balances of OECD and NON-OECD Countries, 2003 Edition

The road sub-sector carries over 80% of all domestic traffic. The road network is extensive in relation to the country's size. However, during the last ten years, due to lack of resources, the state has not been able to invest into road rehabilitation and adequate maintenance, and, as a result, the road network has significantly deteriorated.

The road vehicles amount to 45.8 thousand trucks, 14.7 thousand buses, and 265.5 thousand cars. Although the number of private cars is growing, it is still relatively low (69 cars/1000 people) and dominated by old and low efficient vehicles. More than 85% of the road vehicles and the railway transport are running on diesel oil (Table A2.4. in Annex 2).

Freight transport is provided by truck and rail, with shares of 62% and 38% respectively. Urban transport is operating on trolleybuses and buses.

The concept for the transport sector development until 2010, developed by the Ministry of Transport in 1997, envisages increases in the efficiency of the sector by:

- Renewal of the road vehicle park;
- Transfer of transport to rail by purchasing high-tonnage trains, electrification of the railway transport, and increase the train traffic speed.
- Expansion of the electricity transport lines in urban areas.

## 6. ENERGY EFFICIENCY POLICIES AND PROGRAMMES

### STRATEGIC AND LEGAL BASIS

Energy efficiency is a high priority issue in the Republic of Moldova. Strategic policy goals for energy conservation are set in various important documents of the Government of Moldova: the National Sustainable Development Strategy, the Economic Development Strategy, the Energy Strategy, and the Governmental Programme of Activities for the period 2002-2005.

The Energy Strategy stipulates an annual 2-3% decrease in energy intensity and includes a number of actions directly pertaining to energy efficiency: increase of the energy efficiency and conservation, implementation of efficient energy technologies with minimal impact on the environment, introduction of RES in the consumption balance in case they prove economically competitive, promotion of an active energy conservation policy with the consumer.

The Law on Energy Conservation was passed in December 2000. The Law aimed at establishing the main principles of and conditions for organisation and regulation of the activities in the sphere of energy conservation and efficient utilization of energy resources in the process of extraction, production, processing, preservation, transportation, distribution and consumption. The Law also considers the utilization of renewable sources of energy.

The main provisions of the Law include:

- Development of a national energy conservation policy and implementing it through national programmes, containing energy conservation measures mandatory for all legal entities;
- Establishment of an authority (within the Ministry of Energy), responsible for energy conservation, including state control and supervision;
- Introduction of standardization, certification and metrological supervision in the area of energy conservation;
- Introduction of mandatory state energy efficiency expertise and audits and follow-up energy conservation programmes;
- Information programmes on energy conservation policy and activities, incl. training and awareness raising;
- Creation of a National Energy Conservation Fund;
- Fiscal privileges to some economic entities implementing energy conservation measures;
- International collaboration.

In August 2002 a governmental Decision on Measures for Reducing Energy Costs in the National Economy during the period 2002-2005 was taken. The decision sets reduction of energy consumption as one of the priority tasks of the national economy and adopts indicative targets for the annual reduction of energy costs to be achieved by sectoral

ministries and local public authorities, as well as basic energy conservation measures. The responsibility for the implementation of the decision was put to the Ministry of Economy.

The national Energy Conservation Programme for 2003-2010, defining priority areas of action, was developed by the Ministry of Energy in accordance with the prescriptions of the Law on Energy Conservation and approved by the Government in September 2003. The programme aims at increased energy efficiency, with the target of a 2-3% annual decrease of the energy intensity (in line with the Energy Strategy), and also at utilization of local and RES to substitute about 5% of the current primary energy imports.

## PRIORITIES AND PLANNED ACTIONS

The National Energy Conservation Programme sets the priority areas for energy conservation and the main activities in reaching the strategic objectives. It confirms the leading coordination role of the Ministry of Energy in the area of energy conservation and involves the sectoral ministries, the National Agency for Energy Regulation (ANRE), the State Energy Inspectorate, the National Agency for Energy Conservation (ANCE), science and research institutes, Moldova Energy Consumers' Association, etc. in the implementation of the planned actions.

The Programme envisages specific sets of technical, organisational, and economic measures to be implemented in the various parts of the energy chain: energy sector, industry, construction, agriculture, electric transportation, commerce and services, as well as public and residential consumers. The Programme also provides these groups of consumers with annual indicators for energy conservation (annual volume of energy to be saved), the highest being for the energy sector (21-28 thousand tones of coal equivalent, tce), industry (10-13 thousand tce), and agriculture (8-10 thousand tce). The annual indicator for public services is 2.5-3.0 thousand toe, and for the budgetary sector 2-2.5 thousand toe.

General actions envisaged by the Programme for all these sectors are:

- Elaboration of sectoral programmes for energy efficiency;
- Establishment of sectoral centres for information, consulting and training;
- Creation of sectoral funds for energy conservation;
- Elaboration of normative acts and sectoral norms for energy consumption;
- Creation of pilot energy efficiency zones (enterprises);
- Elaboration of sectoral regulations regarding the import of energy efficient technologies and equipment.

The financial sources for the investments needed for the implementation of the National Energy Conservation Programme are foreseen to be provided by specially established funds: the National Fund for Energy Conservation, the Consumers' Fund for Energy Efficiency (a non-governmental organisation to be created with the support of the Energy Consumers' Association), a revolving fund (to be created with the support of external financial institutions). Another possible source for financing is the Energy

Service Companies (ESCOs), expected to be created in 2003-2004. At the same time, the Programme marks the need of establishing a favourable investment climate in the country in general, and in the area of energy efficiency specifically, in order to attract both local and foreign investments.

In the area of RES, the National Programme on Energy Conservation prescribes research activities for more precise assessment of the potential of the country for the utilization of wind, solar, small hydro and biomass energy, and development of the necessary equipment. The elaboration of a special National Programme of Utilization of Renewable Energy Sources by the year 2010 is envisaged.

The implementation of the National Programme on Energy Conservation has not yet started, although it is considered to be a major problem by the Government.

## MEASURES

The energy efficiency measures already accomplished in Moldova are directed to the district heating sector, to residential, public and industrial buildings, and a few to some other areas.

### District Heating

For renovation and improving the efficiency of the heating sector, a package of Government documents has been developed: Concept of the Heat Supply System Renewal, Programme of Heating System Renovation and Decentralisation, and Draft Heat Law.

The Concept, combined with an action plan was approved in 2003. The Concept puts great importance on the issue of supplying the population with heat and points out the necessity to adopt strict measures of legislative, economic, and financial character, in order to create conditions for efficient activity of thermal power enterprises. The Concept also stresses the urgent short-term need to preserve at the current stage the system's ability to supply the majority of consumers with heat by targeted application of efficient solutions, while at the same time to develop, approve, and financially support the national programmes for energy saving and implementation of advanced energy saving technologies.

As a basic step towards implementation of the heat concept, the Draft Heat Law was developed with the involvement of foreign experts from Germany and Poland and is currently under consideration by the Government. The Draft Law introduces a liberalised heat market and establishes the competences of and relations between the participants in this market. The law stimulates private initiative in the heat supply sector and diversification of heating systems types under tariff and licence regulation of the independent National Agency for Energy Regulation. Contracting of heat supply between providers and consumers, including authorised representatives of the multifamily buildings, and metering on building level are introduced. The draft law also provides incentives for CHP production by small capacity units.

A Programme of Heating System Renovation and Decentralisation was adopted in 2003. Under this programme, designed with assistance from USAID, the retrofit of the local heating systems in 36 cities of the republic is planned. On the basis of technical and economical assessment, an option for the development of the heating system of each city is selected, ranging from reduced centralization, through mixed systems, to complete decentralization and transfer to individual heating systems. The programme proposes measures for the improvement of the management of the heating systems, including the legal establishment of housing associations to represent multifamily consumers for contracting issues. An important measure with specific focus in the programme is the reconstruction of in-house heating systems on horizontal principle, to allow for the introduction of metering and billing based on individual consumption, as well as for individual control and regulation.

Some projects under agreements with international and foreign financing institutions and donors were developed and implemented in support of the reform in the district heating sector.

An EBRD energy efficiency project, signed in 1995, was designed to increase the efficiency of the Chisinau district heating network. In addition to its impact on energy consumption, the project was also designed to support the improved financial performance of the utility. In May 1995 the EBRD made a loan of around Euro 8.7 million to S.A. Termocom, the district heating company in Chisinau. The loan was to finance the first energy efficiency initiative in Moldova to reduce heat transfer losses in the district heating network. The project consists of providing equipment to correct existing deficiencies in the network and strengthening Termocom's financial management and performance so that it can operate as a corporate entity. The project has been completed, but it was only partially successful, because of institutional weaknesses, management inefficiencies, regulatory issues and state budgetary constraints<sup>10</sup>.

The World Bank Energy II Project, funded by a credit of USD 35 million, where one of its components (of USD 10 million) supports the improvements in the energy efficiency of both the heating sector and buildings in Moldova. This component includes improvements in supply and distribution of heat and demand side measures for heat and hot water consumption in selected public buildings (schools, hospitals, and residential buildings for disabled and other vulnerable groups). The heating component is planned to be a demonstration project for efficient use of energy in public buildings, inducing similar measures for other buildings, both public and residential. The project will be implemented in 90 buildings, among which 50 schools and 25 hospitals. The Ministry of Energy is acting as an executive agency for the project and is chairing the Project Supervisory Board, while the implementation is managed by a specially created independent Project Implementation Unit. A feasibility study "Strategic Heating Options for Moldova" and a pilot project in Ungheni were completed with Swedish (SIDA) support.

USAID is providing support for the development of legal, institutional and regulatory framework for reforming the district heating sector. The first step was the National Heat Law. The further steps, which have recently been undertaken, include the necessary legislation adjustments in order to put the heat law into practice. Another USAID project in the sector is the regional MUNEE Project, standing for Municipal Network for Energy Efficiency. Under this project capacity building activities were implemented,

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*10 EBRD Strategy for Moldova, as approved by the Board of Directors on 1 July 2003.*

directed to municipal authorities and aiming at increasing their capacity to develop and implement energy efficiency programme and projects. Three demonstration projects were implemented in Chisinau to show how small energy efficiency investments can reduce costs, improve comfort and have other benefits.

## Buildings

Energy efficiency in buildings has a high priority for the Moldavian Government, and especially the energy efficiency improvements in the residential sector. This is one of the sectors where ambitious measures have been launched.

A programme for rehabilitation of the thermal conditions of residential buildings was developed by the Ministry of Construction and Territorial Development. It was adopted by governmental decision, together with an action plan for its implementation. The necessary documentation for energy audits of buildings was prepared.

An Energy Certificate of Buildings (Energy Passport) for new and existing buildings under reconstruction was designed, accompanied by a label (Figure 13). The first two sections of the label contain general and construction data about the building and information about the energy expert who undertakes the audit. The second section indicates the reason for issuing the certificate (informative, insurance, selling, other) and the total annual heat and hot water consumption of the building. The main section shows the classification of the building in energy efficiency scales from A (most efficient) to J (least efficient), different for heating and hot water.

The Energy Certificate was approved as mandatory in 2002, and implementation for new buildings has started. However, there are problems with the organisation and the available administrative capacity for the practical implementation of the programme for existing buildings, where the programme's practical introduction is planned for 2004. Only a very limited number of audits are planned for the year. External experts will be hired to complete the audits, but this activity will cause both organisational and financial problems in its wider implementation, and will require additional capacity building. Currently, only few organisations have the specific knowledge, skills and equipment for energy auditing, and their capacity is insufficient. The National Energy Conservation Agency itself has completed only few audits in public buildings.

Figure 13: Energy Certificate of Buildings

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**ANEXA A**

**CERTIFICAT ENERGETIC** Nr. \_\_\_\_\_ din \_\_\_\_\_ 200

Destinația clădirii \_\_\_\_\_

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**Date identificare clădire:** Proprietar: \_\_\_\_\_ Adresa: \_\_\_\_\_ Oraș, județ: \_\_\_\_\_ Cod poștal: \_\_\_\_\_ Telefon: \_\_\_\_\_

**Date identificare expert energetic:** Nume, prenume: \_\_\_\_\_ Firma-organizație: \_\_\_\_\_ Telefon: \_\_\_\_\_ Nr. certificat expert: \_\_\_\_\_

Anul (perioada construirii): \_\_\_\_\_ Indicator de necesar  $q_{nr} =$  \_\_\_\_\_

Aria încălzită [m<sup>2</sup>]: \_\_\_\_\_ de căldură pentru încălzirea clădirii de referință, [kW·h/(m<sup>2</sup>·an)]

Volumul clădirii [m<sup>3</sup>]: \_\_\_\_\_

Motivul eliberării certificatului energetic: <ul style="list-style-type: none"> <li><input type="checkbox"/> informativ</li> <li><input type="checkbox"/> asigurare</li> <li><input type="checkbox"/> vânzare/cumpărare</li> <li><input type="checkbox"/> alt motiv: _____</li> </ul>	Consum de căldură: (încălzire + a.c.m.) [kW h/(m <sup>2</sup> ·an)]
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**Clasificarea energetică**

INCĂLZIREA SPAȚIILOR			APĂ CALDĂ/MENAJERĂ			
Clădire foarte eficientă energetic	kW·h m <sup>2</sup> ·an	clasificare	Clădire foarte eficientă energetic	kW·h m <sup>2</sup> ·an	clasificare	total un. termice
A	80		A	25		105
B	121		B	43		164
C	166		C	63		229
D	217		D	86		303
E	277		E	112		389
F	347		F	143		490
G	433		G	182		615
H	544		H	231		775
I	700		I	300		1000
J	>		J	>		>

Clădire cu eficiență energetică foarte redusă (consumul anual evaluat)

Clădire cu eficiență energetică foarte redusă (consumul anual evaluat)

Eliberat de \_\_\_\_\_ Data \_\_\_\_\_  
 Responsabil \_\_\_\_\_ Nr. dosar expertiză energetică \_\_\_\_\_  
 Ștampila și semnătura \_\_\_\_\_ Ștampila și semnătura expert energetic \_\_\_\_\_

A successful Moldova Weatherisation Programme to increase the energy efficiency in eight institutions and one residential complex was implemented in 1999-2000. The programme was funded by USAID and was designed to help the most vulnerable segments of the population, who suffered from chronic energy shortages. The project illustrated how improvements in selected buildings (e.g. schools, hospitals, orphanages, etc.) will reduce the amount of fuel used and improve comfort. According to temperature measurements recorded at five of the nine sites, there was an increase in indoor temperature of 5-10°C resulting from the weatherisation. Energy and cost savings from the weatherisation ranged from 22% to 42% annually. The positive results were extended to a larger pool of institutions during 2000-2001. As of September 2001, weatherisation work has been completed at 53 institutions in Moldova: hospitals, clinics, orphanages and boarding schools.

A number of energy audits and energy efficiency projects in public and industrial buildings have been completed under a programme, funded by the Norwegian Government, and implemented jointly by Energy Saving International, Norway and the Moldavian Cleaner Production and Energy Efficiency Centre. The projects were developed within a capacity building interactive training programme. The large number of projects implemented (187 out of 332 developed) provided the possibility to identify examples of most energy and cost effective measures in buildings in the conditions of Moldova: sealing of windows, doors, inter-panel joints; heat insulation of floors and roofs; elimination of leaks; insulation of heating pipes and valves; balancing of the heating system; installation of thermostatic valves; automatic heating control; replacement of electricity-consuming equipment with gas using ones; installation of individual gas heating; installation of water-saving sanitary and technical equipment; implementation of energy metering; implementation of energy monitoring.

An education and awareness campaign for consumers was completed through the joint efforts of the National Agency for Energy Conservation, the Alliance to Save Energy, and the National Association of Housing and Real Estate Services. An energy efficiency advice booklet for condominium residents, covering energy saving tips in the kitchen and the use of household appliances was published. Another booklet addressed condominium managers and covered energy saving measures for the building as a whole.

## Financing Issues

Moldova has substantial investment and rehabilitation needs both in the public and in the private sector, and at the same time limited access to capital. This again leads to limited possibilities of solving the financing issues of the energy efficiency policy and hampers the practical implementation of the adopted programmes.

The National Fund for Energy Conservation (NFEC) was established in November 2002. Pursuant to the Law on Energy Conservation, the Fund is financed by a 0.2% allocation from the state budget and by a 20% allocation from fines for violations against the provisions of the Law on Energy Conservation, and from voluntary donations. A Supervising Council supervises the use of the Fund's resources. The Council consists of 6 deputy-ministers: of energy, industry, finance, economy, ecology, and education. The Fund is managed by the National Energy Conservation Agency in accordance with the Regulation of the Fund, approved by the Government.

Organisations and physical persons can apply for funding from the National Fund for Energy Conservation. Applications are presented at the beginning of the year. The applications are evaluated by the National Energy Conservation Agency and the decisions are taken by the Council. The Agency also applies for funding of its own projects by the NFEC.

The Fund started operation in 2003 when a budget allocation of 280,000 Lei (about USD 18,000). The first year it was mainly spent for paying the salaries of the staff of the Energy Conservation Agency, which were not paid for 3 years, preventing practically the Fund from working.

In order to start the implementation of the planned energy conservation measures, the government has planned that 20% of the income of the national and of the local budgets will go to investments in the energy area, including in energy efficiency measures.

A small Revolving Fund for energy conservation is established by the Cleaner Production and Energy Efficiency Centre aimed to guarantee performance of the projects developed during the capacity building programme of the Centre. The Fund has capital of USD 15,000, provided from the funding by the Norwegian programme for energy efficiency in buildings. The monthly interest rate on provided loans is 1%. The Revolving Fund might be further developed as a basis for ESCO activities by the Centre.

### Other measures and projects

A sectoral energy conservation programme for the energy sector was developed, which includes technical measures for increasing the efficiency of the energy production, introduction of efficient burning technologies, reduction of the own consumption, optimisation of load and capacity, replacement of the worn out grids, and also organisational measures and measures to stop the theft of electricity.

A National Gasification Programme was approved by the Government in December 2002. The programme envisages further development and completion of the gasification of the country. Wider introduction of natural gas is a priority for the next 20 years. New gas lines, gas distribution stations and distribution networks are planned to be constructed.

Control over the specific energy consumption in different sectors of the economy is carried out by the State Energy Inspectorate. As no energy efficiency norms exist in the country, the control is realized by comparing the real specific energy consumption with the technical specification of the installations. Each big consumer is analysed once per year and a plan for actions is agreed for improving the energy efficiency. This has proved to be an effective tool, as 85 to 90% of the big industrial consumers have energy managers. At the end of each year the energy managers are asked to develop reports on energy consumption and recommendations for improvement are provided.

More than 80 audits in industry, mainly in the sectors connected with processing agricultural products, have been completed by the National Energy Conservation Agency. About 60% of the prescribed measures were implemented by the enterprises, but the real results in energy saved have not been monitored and assessed. The audits were supported by the EU TACIS programme at the beginning, and by the enterprises themselves later on.

A number of audits and projects in industry have been completed with support provided by the Norwegian Government. The audits were combined with training of the staff of the enterprises and ended with implementation of about 60% of the projects.

Only a very limited number of organisations do energy audits. In many cases the employees of the company under audit are contracted to do it. Independent consultants are few.

As an effective way to increase the energy efficiency of buildings, the production of energy efficient construction materials was accepted as highly important by the Government. Several project proposals for modernization of enterprises and introduction of modern technologies for the production of energy efficient construction materials were developed and presented to potential investors for the establishment of joint ventures. The technical and institutional background for testing and certificating insulation materials was developed.

In 1998 an energy savings project was launched in Edineti, funded by Danish grant assistance to the Government. The project aimed at energy savings in the water production facilities through improving the general performance and efficiency of the pumping stations. The project included supply of new pumps, fittings, valves and flow metering equipment for pumping stations. The estimated energy savings were more than 25%.

### Renewable Energy Sources

The strong dependence of Moldova on imported energy resources makes the use of local sources, including renewables, a priority. This is reflected in the principles of the energy conservation legislation and programmes. Some studies have been completed to assess the potential of RES in the country and the feasibility of its utilization. A Decision of the Government from October 2000 on RES utilization was passed, accompanied by an action plan listing a big number of projects related to RES, but without real funding assured.

A draft strategy for RES has recently been developed.

## 7. ORGANISATION OF ENERGY EFFICIENCY ACTIVITIES

Since 2002 the Ministry of Energy has the overall coordination of energy efficiency activities. It is responsible for the development and implementation of the Law on Energy Conservation and the energy conservation programme and has the authority to engage other ministries and agencies in this process. The Ministry shall also organise and supervise the activities of the national authority empowered in the sphere of energy conservation. However, the Ministry has limited staff of 54 employees and no specific department or unit to deal with energy conservation and efficiency. There is only one position for energy efficiency, which is currently not occupied. The work in the area so far is carried out by the Investment & Technical Development Department.

Figure 14: Organisational Chart of the Ministry of Energy of the Republic of Moldova



Source: Ministry of Energy of the Republic of Moldova.

Until 2002, the National Agency for Energy Conservation and the power industry enterprises initiated the main activities in the energy efficiency field. The National Agency for Energy Conservation was established in 1994, within the framework of the TACIS programme. It had a staff of 5 and worked mainly on projects for industrial enterprises on a contract basis.

In November 2002 the Government changed the status of the National Agency for Energy Conservation from a state company into a governmental authority and made it responsible for the administration of the National Fund for Energy Conservation<sup>11</sup>. The main tasks of the Agency include:

- to elaborate national programmes for energy conservation and RES;
- to provide technical assistance for development and implementation of sectoral and local energy conservation programmes;
- to secure the implementation of the Law on Energy Conservation;
- to collect relevant statistical information;
- to co-operate with other national and foreign institutions to attract investments in energy efficiency;
- to execute state control and energy audits.

The Agency was authorised to represent the Government in the activities under the Energy Charter Treaty.

The activities of the Agency are financed by funds collected for services provided and by the National Fund for Energy Conservation. Currently, it has a permanent staff of 3.

The State Energy Inspectorate, in parallel with its control over the implementation of the technical and security standards and norms, controls the specific energy consumption in the various parts of the economy. This is normally done when new installations are commissioned, or when existing ones are renovated or reconstructed. New installations cannot be commissioned without the approval of the Inspectorate. The Inspectorate has a staff of 70, out of which 8 are in the headquarters in Chisinau. To be able to fulfill their tasks connected with energy efficiency, the inspectors pass 2-weeks training every year, provided to them by the National Energy Conservation Agency.

Other governmental and non-governmental organisations are also involved in energy efficiency activities, e.g.:

- The Ministry of Construction and Territorial Development is responsible for the regulations in the area of territorial development, construction and construction materials, and public utilities, and as such it is the institution dealing with norms and standards for the building sector. This Ministry is driving the activities for raising the energy efficiency of buildings and has initiated the programme for rehabilitation of the thermal conditions of residential buildings. The ministry was established as an autonomous governmental authority in 2004. Before that it was a part of the Ministry of Ecology, Construction and Territorial Development.
- The Department of Statistics and Sociology collects and processes information for the energy balance of the country. It also collects information on energy consumption and carries out specific statistical research under request of the Ministry of Energy. The energy related information provided in the annual statistics

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<sup>11</sup> *Hotarirea Guvernului Republicii Moldova cu privire la crearea Agentiei Nationale pentru Conservarea Energiei, LexInfoSys - GTZ-Project Information System on Legal Development in Transition States.*

covers the period since 1995, including the previous year. The Department provides information to the IEA annually. Currently, the Department is adapting the format of statistical information to the EUROSTAT requirements.

- The Technical University in Chisinau, and especially its Energy Faculty has done an important job for the development of the background of the national energy conservation policy and has participated in the elaboration of the National Energy Conservation Programme. It is also promoting energy efficiency and the utilization of RES through the process of teaching by introducing specific subjects, focused research and training. Special promotional seminars for decision makers were organised. The Technical University also provides expertise to the international and foreign projects in the area of energy, energy efficiency and RES.
- The Institute of Power Engineering at the Academy of Sciences with a number of specified laboratories has a high capacity in science and applied research in the energy and energy efficiency issues. It has participated in the elaboration of the National Energy Conservation Programme and provides expert advice to the Government.
- The Alliance to Save Energy Regional Office – Moldova is working on the Municipal Network for Energy Efficiency Project funded by USAID, providing support to the central Government and local authorities to design and implement innovative energy efficiency policies and identify barriers to their successful implementation. The Alliance carries out education and awareness campaigns, develops and implements demonstration projects, and conducts training on energy planning and management for municipalities. Within its policy support activities, ASE in collaboration with the Ministry of Energy drafted the Heat Law.
- CPEE – the Moldavian Cleaner Production and Energy Efficiency Centre - was established in 1999 as a non-governmental non-commercial organisation. First area of interest was industry. The Centre is working under a 5-year Norwegian programme on energy efficiency of buildings, within which a combination of capacity building and practical activities are accomplished, including the operation of a small revolving fund. The Centre has a small staff, but its capacity is well developed.
- The Association of Energy Consumers in Moldova involves consumers of electricity, especially industrial firms, represents and defends their interests in the regulatory process and in practical issues. USAID is assisting the association.

## 8. ENERGY EFFICIENCY AND THE ENVIRONMENT

The environmental policy of the Republic of Moldova is developed and implemented by the Ministry of Environment and Natural Resources. The Ministry is one of the successors of the Ministry of Ecology, Construction and Territorial Development, established in 1998. The Ministry has set up Environmental Protection Units at local level.

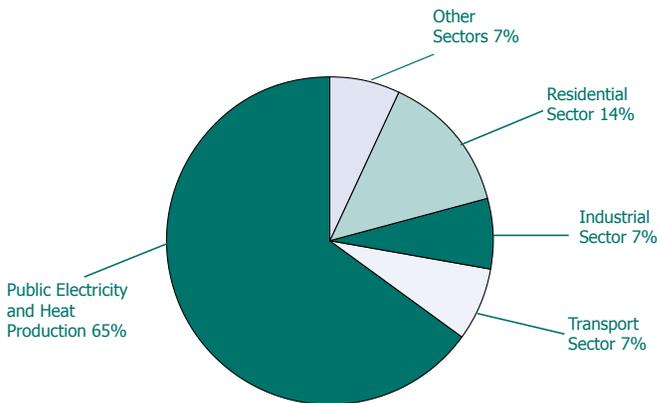
The country's first National Environmental Action Plan (NEAP) was adopted in 1996, prioritizing water quality issues, especially water supply and wastewater treatment in urban areas. A new Environmental Policy Concept was adopted by the Parliament in 2001, which included special provisions for the energy sector and energy efficiency.

A Law on the Protection of the Atmosphere was adopted in 1997. This law specified norms for admissible pollution levels and for air quality. A special law introduced air pollution taxes in 1998.

The Government aims to harmonize its environmental legislation with EU environmental directives. Moldova has ratified 17 environmental conventions, including the United Nations Framework Convention on Climate Change as Non-Annex I Party (June 1995) and acceded the Kyoto Protocol in April 2003.

The First National Communication under UNFCCC was elaborated in 2000. The main source of CO<sub>2</sub> emissions in Moldova is the fossil fuel combustion, which amounted to 91% of the total anthropogenic CO<sub>2</sub> emissions in 1990, 94% in 1994, and 85% in 1998. In 2001 the CO<sub>2</sub> emissions amounted to 6.96 Mt, public electricity and heat production having the greatest share of them (65%) (Figure 15).

Figure 15: CO<sub>2</sub> Emissions in Moldova by Source, 2001



The country is interested in implementing projects under the Clean Development Mechanism (CDM), and a national authority for CDM was established in December 2003 with a staff of 14. The Climate Change Office at the Ministry of Environment and Natural

Resources has a staff of 4. All emission reduction activities are covered by the office, including energy efficiency. However, among the projects developed so far, there is very few related to energy efficiency.

Under the UNDP/GEF supported project "Climate Change: Enabling Activity", the Ministry coordinated the development in 2002 of two reports with relevance for energy conservation and energy efficiency:

- Technology Needs and Development Priorities - a national report on the technology needs for reduction of GHG emissions, focused on the emission reduction potential of the energy and transport sectors and the utilization of RES in the country;
- Renewable Energy Feasibility Study, assessing the technological, economic and environmental needs regarding the implementation of RES in Moldova.

In the view of the Ministry of Environment and Natural Resources, the country possesses some potential for solar and wind energy, but its utilization is considered expensive. Some small projects for utilization of waste and biomass were implemented.

The Ministry of Environment and Natural Resources manages a small Environmental Fund with funding capacity of USD 1 million/year. The priorities of the fund are in other environmental protection areas, and it can provide limited support to energy saving related projects to no more than 10% of the Fund. In principle, funding for environmental projects in the country is strongly needed and the Ministry is looking for increasing the co-operation with foreign and international financial institutions.

The co-operation between the Ministry of Environment and Natural Resources and the Ministry of Energy is good.

## 9. ASSESSMENT OF PROGRESS

### OVERALL ASSESSMENT

Energy efficiency is a priority issue in the Republic of Moldova, and strategic policy objectives for energy conservation are defined. A set of sectoral legal documents, supporting the achievement of these objectives is in place: starting with the Energy, Electricity and Gas Laws in 1998, and making an important step forward with the adoption of the Energy Conservation Law in 2000. The governmental Decision on Measures for Reducing Energy Losses in the National Economy during the period 2002-2005, transformed later into the National Energy Conservation Programme for 2003-2010, marks the dedication of the Government to implement the energy efficiency policy.

The national objective of an annual 2-3% decrease in the energy intensity of GDP, stipulated by the Energy Strategy and developed into planned activities with the National Energy Conservation Programme, is a very ambitious task. Theoretically this means doubling of GDP without increasing the consumption of energy<sup>12</sup>. This target might be unrealistic and it is considered as such by some experts in the country.

In its policy for energy conservation the Government puts the strongest emphasis on the supply side, considering it a sector of structural importance for the development of the country and where the energy efficiency potential is very high. Energy efficiency in buildings is a second priority.

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

### LEGAL INSTRUMENTS TO PROMOTE ENERGY EFFICIENCY

The development and approval of the Energy Conservation Law is a very important achievement, as it confirms the importance of energy conservation for the country and provides the legal background for the activities to be carried out. At the same time the Law contains only general provisions and not enough practical guidance, which should be provided by regulations. Coordination between the Energy Conservation Law and the corresponding existing legislation is still not completed.

The Energy Conservation Law does not provide any incentives for the end-users to use energy efficient technologies. Neither are any incentives provided for the energy companies. The Law stipulates incentives for local producers of energy efficient technologies, but their number is very limited. The consumers are not addressed by the Law. This is also the case of public authorities, as neither the Energy Conservation Law, nor the specific legislation for local public administration provide incentives for them to implement energy efficiency measures.

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<sup>12</sup> *National Energy Conservation Programme.*

## ENERGY EFFICIENCY PROGRAMMES AND FUNDING

The National Energy Conservation Programme developed and approved in 2003 is still not being implemented. The financial resources for the implementation of the programme are not secured, and the fiscal incentive mechanisms are not in place either, e.g. VAT and other tax exemptions. Some preliminary drafts of the Energy Conservation Law included profit tax exemptions for ESCOs, but they were not included in the final adopted version, because the financial legislation of the country does not allow such measures.

The National Fund for Energy Conservation is very small and therefore is still not properly functioning; there are also some concerns about the efficiency of its management rules. The National Energy Conservation Agency is managing the Fund, evaluating the applications for funding, and at the same is an applicant for funding of its own projects; this may raise concern regarding possible conflict of interests.

The Government was successful to attract donors' financing for a number of energy and energy efficiency projects, and has committed to repayment of loans for the sake of achieving its policy objectives in these areas. However, to base the further development on expected financial support grants cannot be considered a sustainable approach.

There is clear need to develop sectoral focused energy efficiency programmes in areas such as buildings, industry and transport. For the time being only programmes related to local CHP/district heating and gasification have energy efficiency components.

## ORGANISATION, INSTITUTIONAL ARRANGEMENTS

The Ministry of Energy has the task to play a leading coordination role in the national energy conservation policy. However, the limited number of staff and budget of the Ministry does not allow for developing the necessary institutional capacity for this role.

The National Energy Conservation Agency is empowered with important functions in the development and implementation of the national, sectoral and local energy conservation policies and programmes. The Agency is in fact designed to be the driving force for the energy efficiency in the country. But the institutional capacity of the Agency, including regulations, personnel and funding, is rather far from what would allow it to be functional.

The involvement of other institutions in the development of energy efficiency policies is limited to some governmental organisations mainly. Local authorities appear not to be involved in the decision making process, although the energy efficiency legislation and programmes speak of increasing their role and responsibilities. The private and non-governmental sectors working in the field of energy efficiency are still underdeveloped, but some expertise and capacity are in place. Co-operation between them and the responsible governmental authorities could support the achievement of the national objectives.

## ENERGY PRICING AND TAXATION

In terms of reforming energy prices, Moldova has made an important effort. The policy of cost reflective price differentiation and elimination of subsidies and cross-subsidies has advanced with the latest changes in electricity and gas tariffs. The mechanism for consumer support to the most vulnerable groups is a positive approach, although there are some doubts about the efficiency of the implementation of the mechanism. Some concerns may be raised about the approach to defining prices of electricity provided by different types of suppliers – state and private.

Problem remains with bill collection, as for example 40% of the customers do not pay heating bills, despite of the support provided by the Ministry of Social Protection.

## ENERGY EFFICIENCY AND THE ENVIRONMENT

The environmental policy of Moldova considers energy efficiency to be important for the protecting of the environment by reducing harmful emissions, and also for fulfilling the commitments of the country to a number of ratified international conventions, especially the UNFCCC and the Kyoto Protocol. The co-operation between the Ministry of Environment and Natural Resources and the Ministry of Energy on policy level is good. However, in terms of real implementation, energy efficiency and renewable energy projects are not among the priorities for the environmental protection activities, even for the CDM national authority, and the environmental protection potential is not sufficiently exploited. Little funding is provided for energy conservation projects from the national environmental fund.

## 10. RECOMMENDATIONS

### GENERAL

- The Government should secure a better balance between the supply and the demand-side energy efficiency policies and activities to exploit the high potential existing in both areas.
- The Government should develop a long-term energy efficiency strategy in order to reflect potential scenarios regarding economic development, security of supply and environmental protection; this strategy will require firm commitment from the Government, including financial resources, in order to secure the implementation and achievement of the quantitative targets.
- The Government should secure an increased role of the local authorities and civil society in the process of preparation and implementation of energy efficiency policy.

### ENERGY EFFICIENCY LEGISLATION, POLICIES, AND PROGRAMMES

- The Government should continue to develop legislation in the area of energy efficiency, paying due attention to recent international developments, including the EU *acquis communautaire* in this area.
- The implementation of the National Energy Conservation Programme should be started without delay; further, in the process of implementation various measures may need to be adapted to reflect the changing circumstances.
- Sectoral programmes should be developed to achieve the targets adopted by the governmental decision from 2002 regarding the reduction of costs of energy in the national economy.
- In order to increase the effectiveness of the Government policy for energy conservation, mechanisms for implementation should be developed and needed resources should be secured.
- The Government should elaborate new legislation allowing housing associations to enforce decisions related to investments for improvement of energy efficiency in the residential sector.

### INSTITUTIONAL FRAMEWORK

- The Government should strengthen the institutional capacity of the Ministry of Energy for playing a more active role in policy formulation and coordination in the area of energy efficiency and RES.
- The implementation functions of the Ministry of Energy in the field of energy efficiency and renewable energy should be delegated to mandated agencies.

- The National Energy Conservation Agency should be strengthened and entrusted the necessary human and financial resources to carry out the tasks set out in the National Energy Conservation Programme.
- The Government should take advantage of the existing expertise and human resources in various institutions/organisations such as universities, energy efficiency centres, the State Energy Inspectorate, etc., in developing and implementing energy efficiency measures in the various sectors of the economy.
- The Government should involve local and regional actors, such as NGOs, municipalities and energy distributing companies in preparing and implementing energy efficiency programmes.

## ENERGY PRICING

- The National Energy Regulatory Agency of the Republic of Moldova (ANRE) is encouraged to continue promotion of price differentiation between the various categories of consumers in order to best reflect the costs of supply.
- The regulatory mechanism for establishing energy prices should take into account energy efficiency activities of the energy companies on both the supply and demand side, at the same time providing for improved penetration of RES and co-generation.

## ENERGY EFFICIENCY FUNDING AND FISCAL POLICIES

- Action programmes included in the National Energy Conservation Strategy should be accompanied by appropriate public funding to secure implementation.
- The funding mechanisms established by the National Energy Efficiency Fund need further consideration in order to create sufficient financial resources to cover the implementation of the Energy Conservation Law. The involvement of external financing in the fund should be considered.
- In general, financial mechanisms and funds should be designed as to avoid any conflict of interests.
- There should be created incentives for public entities to invest in energy efficiency by benefiting from the realized energy costs reduction over the depreciation period of investments.
- The Government should promote third party financing/performance contracting as an important financial instrument for energy efficiency.
- The taxation of energy use should be considered with a view of stimulating energy efficiency initiatives and rational energy use.

## ENERGY EFFICIENCY, ENVIRONMENT AND OTHER ECONOMIC ACTIVITIES

- Energy efficiency should be better integrated into the various economic activities and be subject of continuous co-operation between ministries, including the Ministry of Energy, Ministry of Ecology and Natural Resources, Ministry of Economy and the Ministry of Industry.
- The Clean Development Mechanism (CDM) under the Kyoto Protocol should be more actively used as a tool for promoting both energy efficiency and RES
- The Government should secure that various fiscal and taxation measures, as well as the Environmental Fund, established under the Ministry of Ecology and Natural Resources should target energy efficiency improvements as an important way of achieving environmental objectives and sustainable development.

## IMPLEMENTATION OF SPECIFIC ENERGY EFFICIENCY MEASURES

- The Government should assess and decide on the maintenance and modernization of district heating systems based on cost-effectiveness criteria.
- The Government should exploit the opportunities created by the new Heat Law to consolidate the remaining district heating on a decentralised basis, also introducing small-scale co-generation. This should include securing a high connection rate in the heat market, combined with demand-side measures and modernisation.
- The Government should continue its present activities in energy metering and should analyze the opportunity for a long-term programme for individual metering of heat, electricity and gas at the consumer.
- The building regulations should be continuously improved to secure penetration of most efficient technologies and practices, reflecting progress made in this area internationally, e.g. by the EU Directive on Energy Performance of Buildings.
- The Government is encouraged to continue its effort to introduce energy certificates for new buildings and to analyze the feasibility of expanding such a system in the reconstruction/modernization of existing buildings.
- Measures on the demand-side should be further developed and implemented, incl. awareness campaigns, audits, appliance standards and labeling, etc.

## PROMOTION OF RENEWABLE ENERGY AND CO-GENERATION

- Both in the field of renewable energy and co-generation, there is a significant potential in Moldova that could be utilised in long-term programmes. The Government is encouraged to make better use of this potential.
- In the specific energy situation of Moldova, the utilization of RES should be further recognized as a way to secure the population with the necessary energy. This should be based on focused practical research of the RES potential and feasibility.

## DATA COLLECTION, MONITORING AND FORECASTING

- Databases with real and reliable end-use data must be developed in order to harvest the benefits of energy efficiency and support both monitoring improvement in this area and the orientation of energy efficiency policies.

# ANNEXES

## ANNEX 1: ENERGY SITUATION IN MOLDOVA

Table A1.1. Energy Balance for Moldova

Indicators	Unit	1992	1995	1997	1999	2000	2001
Total Primary Energy Production	Mtoe	0.058	0.054	0.100	0.063	0.060	0.062
Net imports	Mtoe	6.751	4.412	4.562	3.056	2.811	3.091
Total Primary Energy Supply (TPES)	Mtoe	6.884	4.411	4.563	3.237	2.871	3.140
Total Final Consumption (TFC)	Mtoe	3.676	2.985	2.377	1.612	1.395	1.447
Total Electricity Consumption	Mtoe	0.706	0.500	0.451	0.294	0.265	0.288
	TWh	8.211	5.815	5.245	3.419	3.082	3.349

Source: IEA Energy Statistics, Energy Balances of NON-OECD Countries, 2003 Edition.

Table A1.2. Basic Indicators

Indicators	1992	1995	1997	1999	2000	2001
Population (million)	4.351	4.339	4.312	4.288	4.278	4.270
GDP (billion 1995 USD)	4.595	3.093	2.959	2.672	2.729	2.894
Primary Energy Intensity (TPES/GDP)	1.498	1.426	1.542	1.211	1.052	1.085
Final Energy Intensity (TFC/GDP)	0.799	0.966	0.803	0.604	0.511	0.501
Electricity Intensity (kWh/GDP)	2.020	2.081	1.951	1.653	1.323	1.386
Energy related CO <sub>2</sub> Emissions (Mt)	4.150	2.300	1.070	0.420	0.340	0.270

Source: IEA Energy Statistics, 2003 Edition.

Table A1.3. Total Primary Energy Supply (TPES) (Mtoe)

	1992	1995	1997	1999	2000	2001
Petroleum products	2.897	1.046	0.899	0.477	0.455	0.497
Gas	2.926	2.558	3.127	2.433	2.112	2.326
Coal	1.069	0.592	0.275	0.107	0.086	0.068
Nuclear	-	-	-	-	-	-
Hydro	0.022	0.028	0.033	0.008	0.005	0.006
Combustible Renewables & Waste	0.036	0.026	0.061	0.059	0.059	0.059
Electricity	-0.066	0.161	0.168	0.153	0.154	0.183
Total supply	6.884	4.411	4.563	3.237	2.871	3.140
Energy production/TPES	0.009	0.013	0.022	0.020	0.021	0.020
TPES/capita (toe/capita)	1.582	1.017	1.058	0.755	0.671	0.735

Source: IEA Energy Statistics, Energy Balances of NON-OECD Countries, 2003 Edition.

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

Sectors	1992	1995	1999	2000	2001
Residential	1056	914	544	525	559
Industry	885	575	304	316	323
Services	149	594	351	185	155
Transport	805	395	205	209	197
Agriculture	344	358	136	89	85
Others*	437	149	72	71	128
Total (TFC)	3676	2985	1612	1395	1447

Source: IEA Energy Statistics, Energy Balances of OECD and NON-OECD Countries, 2003 Edition.

\* Others include Non-specified other sectors and Non-energy use

## ANNEX 2: SELECTED END-USE DATA TABLES

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

	1992	1995	1999	2000	2001
Total Final Consumption	1056	914	544	525	559
a. Electricity	152	160	100	101	117
b. Heat	326	284	118	70	66
c. Oil products	113	94	85	157	175
d. Gas	212	275	233	191	194
e. Coal	253	101	8	6	7
f. Combust. Renew. & Waste	0	0	0	0	0
g. Others	-	-	-	-	-

Source: IEA Energy Statistics, Energy Balances of OECD and NON-OECD Countries, 2003 Edition.

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

	1992	1995	1999	2000	2001
Total Final Consumption	149	594	351	185	155
a. Electricity	81	94	114	87	50
b. Heat	67	16	41	31	34
c. Oil products	0	17	27	5	8
d. Gas	1	400	146	43	48
e. Coal	0	66	23	18	15
f. Combust. Renew. & Waste	0	0	0	0	0
g. Others	0	0	0	0	0

Source: IEA Energy Statistics, Energy Balances of OECD and NON-OECD Countries, 2003 Edition.

Table A2.3. Final Energy Consumption of the Industry Sectors by Energy Source (2001) (ktoe)

Indicators Industrial Sector	Manufacturing									Total (Ktoe)
	Mining	Iron and Steel	Chemical and Petrochemical	Non-ferrous metals	Food and Tobacco	Paper Pulp and print	Non metallic minerals	Other	Construction	
Coal					6					6
Petroleum Products	1				8		14		1	24
Gas					81	3		60	30	174
Electricity	2		2		32	1	15	11	1	64
Heat			1		49	1	1	3		55
Combust. Renew & waste										0
Total	3		3		176	5	30	74	32	323

Source: IEA Energy Statistics, Energy Balances of OECD and NON-OECD Countries, 2003 Edition.

Table A2.4. Transport Indicators (2001)

Dynamics of the fuel consumption in transportation (automobile, railway, fluvial and aerial), 1990-2000 ('000 t)

	1992	1995	1997	1999	2000
Gasoline	363.90	283.00	273.00	117.10	121.20
Diesel oil	684.40	365.00	338.00	187.30	200.30
Liquefied associated gas	10.40	2.80	2.60	2.40	1.50
Liquefied natural gas	5.70	7.60	9.50	7.80	9.20
Fluvial transport - diesel fuel consumption	0.065	0.057	0.067	0.053	0.046
Aerial gasoline	30.54	13.30	20.40	15.00	17.10

Source: Republic of Moldova, Regular Review under PEEREA, 2003.

## ANNEX 3: ENERGY PRICES

Table A3.1. Development in Electricity Tariffs, Bani/kWh (without VAT)<sup>13</sup>

Starting day of tariff application	Industry	Urban electricity transport	Urban population	Rural population	Consolidated tariff	Union Fenosa	Northern EDN*, North-Western EDN
10.11.1993	0.08	0.03	0.04	0.03	-	-	-
10.03.1994	23.11	9.00	10.00	8.00	-	-	-
01.03.1995	18.50	9.00	10.00	8.00	-	-	-
01.05.1996	21.00	10.00	15.00	12.00	-	-	-
01.03.1997	23.00	15.00	20.00	16.00	-	-	-
01.06.1997	-	-	-	-	24.00	-	-
01.10.1998	-	-	-	-	25.50	-	-
24.12.1998	-	-	-	-	42.00	-	-
01.07.1999	-	-	-	-	-	50.00	50.00
01.04.2000	-	-	-	-	-	65.00	57.00
01.10.2001	-	-	-	-	-	68.00	65.00
01.08.2002	-	-	-	-	-	72.00	63.00
01.07.2003	-	-	-	-	-	78.00**	70.00**

\* EDN – electricity distribution networks.

\*\* Tariff for "other consumer categories."

(100 bani = 1 MDL)

<sup>13</sup> The information provided in the tables of this section is based on: Republic of Moldova, Regular Review under PEEREA, 2003 and ANRE website.

Table A3.2. Development in Heat Tariffs, MDL/Gcal (without VAT)

Starting day for tariff application	Hot water	Steam
15.01.1993	9.29	7.04
01.03.1993	12.08	13.53
10.07.1993	25.91	29.00
10.11.1993	99.16	111.06
10.03.1994	301.00	337.20
01.03.1995	271.55	309.60
01.05.1996	271.55	309.60
01.03.1997	271.55	309.60
01.06.1997	165.00	190.00
01.11.1998	126.00	150.00
24.12.1998	189.00	225.00
01.07.1999	233.00	260.00
21.12.2002	233.00	330.00

Table A3.3. Development in Natural Gas Tariffs, MDL/1000m<sup>3</sup> (without VAT)

Starting day of tariff application	Population	Budgetary organisations	Termocom-energo*	Rural economy	Other consumers
02.01.1992	0.428	-	0.46	0.46	0.46
01.03.1992	0.428	-	1.566	1.566	1.566
01.06.1992	1.712	3.55	3.55	3.55	2.663
01.12.1992	3.24	3.74	3.74	3.74	4.126
01.02.1993	18.30	21.055	21.055	21.055	28.957
01.05.1993	27.20	37.98	37.98	37.98	52.246
01.11.1993	124.00	130.44	130.44	130.44	176.016
01.12.1993	124.00	148.01	148.01	148.01	203.80
01.01.1994	320.88	337.76	337.76	337.76	465.08
01.04.1994	320.88	435.47	452.45	452.45	571.08
01.08.1994	281.47	402.98	416.48	416.48	433.61
01.03.1995	281.47	-	-	-	346.21
01.03.1997	324.00	-	-	-	398.00
01.06.1997	454.00	-	-	-	454.00
01.10.1998	370.00	-	-	-	370.00
24.12.1998	638.00	-	-	-	638.00
01.07.1999	926.00	-	-	-	926.00
01.01.2003	926.00	-	-	-	926.00

\*State District Heating Company.

Table A3.4. Current Prices and Tariffs for Natural Gas, MDL/1000m<sup>3</sup>

Starting day of tariff application		Tariff without VAT
01.03.2004	1. Natural gas supplied from gas distribution stations	913.49
01.03.2004	2. Natural gas supplied by Moldovagaz JSC from the distribution pipelines to enterprises not belonging to Moldovagaz and supplying natural gas to final consumers: - Distribution enterprises connected to high pressure pipelines - Distribution enterprises connected to medium pressure pipelines	968.30 987.15
01.03.2004	3. Natural gas supplied to CHPs	846.00
01.03.2004	4. Natural gas supplied to specialized enterprises for generation and centralized heat supply	1000.00
01.03.2004	5. Natural gas supplied to residential consumers with a monthly consumption of up to 30 m <sup>3</sup> (included) per apartment (house)	1080.00
01.03.2004	6. Natural gas supplied to residential consumers with a monthly consumption exceeding 30 m <sup>3</sup> , other final consumers	1360.00
01.03.2004	7. Natural gas transportation through mains	60.45
01.03.2004	8. Natural gas distribution and supply through distribution pipelines	130.37

Source: ANRE.

## **ANNEX 4: ORGANISATIONS CONTACTED BY THE REVIEW TEAM**

Ministry of Energy

Ministry of Ecology and Natural Resources

Ministry of Construction and Territorial Development

Department of Statistics and Sociology of the Republic of Moldova

National Agency for Energy Conservation

National Energy Regulatory Agency of the Republic of Moldova (ANRE)

State Energy Inspectorate

Institute of Power Engineering to the Academy of Sciences of the Republic of Moldova

Technical University of Moldova

Alliance to Save Energy – Moldova

Cleaner Production and Energy Efficiency Centre

World Bank Moldova Energy Project Implementation Unit

Energy Consumers Association

National Confederation of Employers of the Republic of Moldova

## ANNEX 5: INFORMATION SOURCES

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