RES POTENTIAL and DEVELOPMENTS Republic of Moldova

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LEGAL AND REGULATORY FRAMEWORK (1)

Law on Renewables passed in June 2007.

The key provisions:

- Mandatory purchase of energy and fuels produced from renewable energy sources by suppliers.
- Obligation of the national regulator to approve tariffs for a term of 15 years to stimulate investments. The tariffs shall be based on the approved methodologies, which will provide for return of investments, as the case might be, in construction, extension, modernization of installations, as well as in the lines for connection, transportation and distribution of energy and fuels.
- Creation of a revolving fund, entitled Energy Efficiency Fund, which is non-budgetary, i.e. financially independent. The fund will finance both renewable and EE projects. Preliminary estimates showed the ideal size of the FEE would be 20 mln Euro as to hit the 20% EE improvement target by 2020. The same law stipulates the Government commitment to contribute 10%.

LEGAL AND REGULATORY FRAMEWORK (2)

- Within 3 months, it shall develop and submit to the Parliament the draft Law on Amending the Law on Energy Conservation No. 1136-XIV of 13.07.2000;
- Within 3 months, it shall reorganize the National Agency for Energy Conservation into the Agency for Energy Efficiency (AEE);
- Within six months:
- Shall develop and submit to the Parliament draft laws for bringing into compliance the effective legislation with the provisions of this Law;
  - Shall adjust its laws to the provisions of this Law;
- Within a year:
- Shall draft and approve the legal framework necessary for integral regulation of the activities (technical regulations) related to the use of renewable energy sources in compliance with the corresponding directives of the European Union; RES PROGRAM IS UNDERWAY
- as of the year 2008, it shall make proposals to the draft state budget with regard to the stimulation and support of the use of the renewable energy sources.

Weight of RES in Primary Energy Supply

- In 2005 the share of renewables in energy consumption was 71,4 ktoe, just 3,6% of the total primary energy supply. Hydro energy and biomass have the largest share, while solar and wind energy as well as sources of reduced thermal potential are inadequately explored. Increased exploitation of the renewable energy potential will lessen dependence on imports of energy resources.

Energy Consumption in Residential Sector (2)

- Biomass, hydro energy, solar and wind energy and sources with reduced thermal potential (including geothermal energy) are renewable energy sources (RES) that are available on the territory of the Republic of Moldova.
- The potential for these renewable sources (excluding sources with reduced thermal potential) has been estimated at 2,7 mtoe

Total RES Potential for Moldova

Type of RES	Technical Potential		
	PJ		Ths.toe
Solar		50,4	1,2
Wind		29,4	0,7
Hydro		12,1	0,3
Biomass	Agricultural wastes	7,5	
	Fire wood	4,3	
	Wood processing wastes	4,7	
	Biogas	2,9	
	Biofuel	2,1	
	Total biomass	**21,5**	**0,5**
Total RES potential		**113,4**	**2,7**
Low thermal potential energy		*>80,0*	*> 1,9*

WIND ENERGY

- Regional statistical data show that between the two world wars there were a large number of wind installations. In 1923, 6208 wind flourmills were documented. During *1960s* there were 350 wind mechanical installations for animal husbandry needs. Between 1960 and 1965 all existing wind installations were replaced by electric.
- As of today, Moldova does not count any modern wind installations, and there is only some small power wind equipments (with capacity from 1 to 2.5 kW), designed and exploited by amateurs.

- Non-extensive studies developed at the beginning of the 1990s concluded that Moldovan geography is not favourable for the use of wind installations. Negative appraisals were based on meteorological data of the Chisinau Weather Station. These studies did not hold into account the poor geographic positioning of the Weather Station(obstacles and rugged terrain). In fact, other scientific research and measurements showed that Moldova has favourable zones for wind installation operations. Thus, measurements made between years 1990 and 1999 at a weather station located in the south of the country showed that, at 10m over ground, average wind currents are 3-7 m/s. This speed allows efficient operation of modern wind installations. Moreover, wind speed increases with height and would make more efficient the use of wind installations, at a typical construction height of 60-70 m over ground.

Wind Energy Potential

- As per Energy Strategy, it is necessary to install through 2010 between 26 and 34 MW of wind power stations.

Total wind stations new electrical installed capacity	26-34 MW
Annual electrical energy produced by wind	88.5-111.0 GWh
Use rate of installed capacity	39%
Investment[1)]	26-34 million euros
Annual fuel substituted	20-25 thousand toe
Annual energy substituted cost[2)]	4.4-5.7 million euros
Annual CO_2 emissions reducing	80-100 thousand tonnes
New jobs created	18-22

1) Currently specific cost is 1000 euro/kW;
2) 2) Currently price is 0.0517 euro/kWh

Solar Energy Potential

Solar /brightness period is 4450 h/year. (In fact, the real value is 2100-2300 h/year, approximately 50% of the maximum theoretical period).

The best solar season is from April to September, representing more that 75% of the total annual solar period.

Solar Energy Plans and Potential

In order to achieve the solar energy targets under the Energy Strategy, it will be necessary to install one million m2 solar installations for water heating and 80 thousand m2 solar installations for agricultural products drying.

Solar Energy Potential

Characteristics	Water Heating	Agricultural products drying
Solar installations	1 million m^2	80 thousand m^2
Investment	150 million euros	3.2 million euros
Annual fuel substituted	37 thousand toe	3 thousand toe
Annual energy substituted cost	9.25 million euros	0.75 million euros
Annual CO_2 emissions savings	190 thousand tonnes	15.2 thousand tonnes
New jobs created	1500	

PV Potential

An estimated 5850 isolated consumers should be supplied by PV solar energy.

Total installed PV number until 2010 year	5850
Total electrical installed power	6300 kW
Investment	19 million euros
Annual fuel substituted	0.75 thousand toe
Annual energy substituted cost	0.19 million euros
Annual CO_2 emissions savings	6.3 thousand tonnes
New jobs created	6500[1)]

[1)] 500 new jobs in PV exploitation and 6000 in agriculture, connected to the PV utilization

BIOMASS

Combustion of wood, agricultural and wooden wastes burned for heating and cooking needs.

- Annually, The Forestry State Agency provides 250-300 thousand m3 in combustion woods. One m3 combustion wood price, including transport, is approximately US $15. According to statistical available data, in 2001, a conventional family living in the rural sector used approximately 70 kg combustion wood. In reality, average family consumption is much more significant, but no coherent data are available because of the lack of detailed studies.
- In 1999, Moldova implemented it first experimental installation producing briquettes from agricultural wastes, like sunflower and corn stalk, straw, etc. Installation, financed by the Netherlands Government and managed by Agrobioenergia Company, produces 250 kg briquettes per hour, for US $20-25 per briquettes tonne operation cost;

BIOGAS

Zoocultural residues, which, by fermentation, produce biogas and organic fertilizer.

- Moldova has five exhaust water purification stations provided with anaerobic treatment installations and biogas collecting equipment. Other installations, built 20 years ago, are not in operation because of their degraded status, lack of use, reparation and maintenance. Limited financial resources and unrewarded competence and legislation in this field, also contribute.

Two projects were developed with Netherlands assistance:

- o In 2000, Dutch NGO Novib and Moldovan NGO Agroeco developed an individual anaerobic fermentation installation with 10 m3 installed capacity, for the Grigoras family farm, from the Soroca region;
- o In 2002, within the framework of the Netherlands Programme for cooperation with Central and Eastern Europe, an installation was put into service intended for the fermentation of 700 m3 of waste from a poultry farm, located in the Vadul-lui-Voda region, the installation produces biogas for a cogeneration engine with an installed capacity of 87 kWe and 116 kWth.

Wood Combustition

The potential of wood combustion and agricultural and wooden wastes in Moldova is estimated at 820 thousand toe, respectively 48.4% from the total gross energy resources consumption in 2001 year. According to data published in Energy Balance for year 2001, Moldova used 6.8% of available biomass (other sources indicate 23%).

Potential for Wood Combustition Agricultural and Wood Wastes

Characteristics	2002	2010
Annual biomass consumption	56 thousand toe	300 thousand toe
Biomass annual cost	2.8 million euros	15 million euros
Annual fuel substituted	56 thousand toe	300 thousand toe
Annual energy substituted cost	14 million euros	75 million euros
Annual CO_2 emissions savings	106 thousand tonnes	570 thousand tonnes

BIOGAS Potential

- The potential of biogas production in Moldova is estimate at 3700 thousand m3.
- In order to achieve the Energy Strategy's targets, it is necessary to increase the fermentation installation capacity up to 7100 m3.

BIOGAS Potential

Characteristics	2002	2010
Total fermentation installations' capacity	710 m^3	7100 m^3
Annual biogas produced	370 thousand m^3	3700 thousand m^3
Investment	0.35 million euros	3.5 million euros
Annual fuel substituted	0.2 thousand toe	2.0 thousand toe
Annual energy substituted cost	0.05 million euros	0.5 million euros
Annual CO_2 emissions savings	0.265 thousand tonnes	2.650 thousand tonnes

Hydro Energy

- Moldova has two small power hydro plants: in Dubasari, Transnistria (48 MW installed capacity) and other in Costesti (16 MW installed capacity).
- There were identified 6 small hydro-plants built by individuals or businesses. Their total installed power is 141 kW.
- Moldova's hydro potential is estimated at 3 billion kWh/year, including the potential of a large river (1.9 billions kWh/year) and small river (1.1 billions kWh/year).

Hydropower Potential

Characteristics	2002	2010
Electrical installed capacity: Big stations Small stations	16 MW 16 MW 0	60 MW 24 MW 36
Annual electricity produced	73 thousand MWh	315.4 GWh
Investment	0	66 million euros
Annual fuel substituted	17 thousand toe	71.3 thousand toe
Annual energy substituted cost	4.3 million euros	17.8 million euros
Annual CO_2 emissions savings	9.8 thousand tonnes	42.6 thousand tonnes

Geothermal Energy

- Geothermal energy resource potential is deemed to be poor. A few wells with the temperature ranged 30° C to 50° C were discovered in the southeast, near the town of Kahul, and in the west, at the foothill of the Carpathian Mountains, near the town of Ungheni.
- No wells with high temperature thermal water are available in Moldova.

Intitutional Framework

- Ministry of Economy
- Coordination Board for RES use created by the ordinance of Prime Minister, No. 0919 on 04.01.2006.

Incentives

- Fiscal incentives for technologies – 20% VAT exemption in the technological parks. 8 residents existing at the moment;
- Revolving Fund underway
- Ecological Funds, which can handle some of the waste management projects;
- Feed-in tariffs included in the RES Law.