

# IMPLEMENTATION OF THE RENEWABLE ENERGY SOURCES IN THE REPUBLIC OF MOLDOVA

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## ABSTRACT:

The situation in the Republic of Moldova is considered in the field of use renewable energy sources (RES). Barriers on a way of development RES are formulated, the data on use RES in 2005 (70.7 thousand toe), tasks till 2010 (replacement of organic fuel of 6 % for account RES) and indicators till 2020 on biofuel (bioethanol and a biodiesel engine) are resulted. The information on a condition of legislative maintenance and privileges in area RES established is resulted by the law. The data on offered investment projects in area RES in Republic of Moldova and about realized by the current moment are resulted.

## 1. INTRODUCTION

The problem of effective use of renewable energy sources (RES) is very actual for the Republic Moldova. It is possible to specify some factors that define the acuteness of this problem:

- Practically the full absence of own traditional power resources.
- The cost for hydrocarbon resources is constantly increasing on the world market.
- Limited number of suppliers of power resources (hydrocarbon) and electrical energy.
- The deficiency of generating capacities on the right-bank of the Dniester River.
- Insufficient understanding from the population, and local public authority of prospects and the role of renewable sources of energy in formation of reliable power supply of the country.

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- Dissociation of scientific, technological and human potential which is available in the country.
- Insufficient level of development of the legislation and normative framework in the field of RES development.

## **2. PRODUCTION OF BIOFUELS IN THE REPUBLIC MOLDOVA**

Nowadays, the biofuel makes 3-4 % of energy balance of the country. The basic kind of biofuel used are fire wood and wood waste products of the forestry and agriculture. As biofuel material is used the straw of grain crops as well.

According to the statistical data of the Moldova, in year 2005 the country produced 70.7 thousand tone of oil equivalent (toe) as biofuel energy resources.

## **3. THE LEVEL OF BIOFUEL USAGE**

Within one year not all available on the account biofuel completely is used. The rest passes in balance of the next year. Therefore here there is a certain difference between quantity of the biofuel productions in the current year and full his taken into account quantity.

In total in 2005 in republic biofuel has made the taken into account quantity 71.7 toe. Distribution of consumption quotas of biofuel between different consumers and sectors of economy is as follows:

- Industry – 0.7 toe.
- Household – 52.5 toe.
- Services – 4/2 toe
- Others – 10.5 toe.

In years 2006-2007 were constructed and turned into operation 6 thermal power plants to supply thermal energy to public buildings of rural area (schools, kindergartens and sometimes local authorities) using as fuel the straw are. The straw is burned in bales as fuel. The total installed thermal capacity of these boilers is about 3000 MW.

Construction of these boiler-houses is carried out within the framework of the project „Renewable energy from waste products of an agriculture”. Financing of the project is carried out the Government of Republic Moldova and Global fund of an environment. The executor of this project was structure „Consolidated Agricultural Project Management Unit”. Financing of the project is carried out by the World Bank.

As a perspective energy source power cultures as sweet sorghum and rapes are considered. One ha sweet sorghum can give 2.5-3 tones of ethanol. One ha rapes – to one tone of oil. In conditions of Moldova the production potential of the

sweet sorghum (data of the in 2004-2005) has made 80-100 t/ha. Percent sweet sorghum in stalks about 17.2-17.4 %, and alcohol of 8.9-9.7 % from volume (data MECAGRO)

Since 2004 in Republic Moldova the mechanism of financing of scientific researches and scientific and technical and technological development through the mechanism of the state programs is used.

Now two State programs in which projects are carried out are available in the field of development of renewed energy sources: “Development of the “know-how” and uses of renewed energy sources on the basis of primary raw material and waste products of an agriculture” and “Maintenance of competitiveness on the basis of innovations of a machine engineering industry, Know-How, new materials and high technologies”.

In the period of 2006-2007 projects of documents have been developed in the field of use RES:

- Energy Strategy of Republic Moldova till 2020.
- Law on the renewable energy.
- Law on science and technology parks and innovation incubators.
- Strategy of development of renewable energy sources in Republic Moldova till 2010 and on the subsequent prospect.
- National Programs of renewable energy sources development till 2010.

The Parliament and the Government by present time have accepted the following major documents:

- Law on the renewable energy. (Approved by Government Decision nr. 1385 of 11 December 2006. Approved by Parliament Decision nr. 160-XVI of 11 Julie 2007.)
- Law on science and technology parks and innovation incubators. (Approved by Government Decision nr. 407 of 13 April 2007. Approved by Parliament Decision nr. 164-XVI of 13 Julie 2007).
- Energy Strategy of Republic Moldova till 2020 (Approved by Government Decision nr. 958 of 21 August 2007)

Very essential moment of the given documents is that in them privileges are stipulated. For example, the Law on science and technology parks and innovation incubators provides the following privileges:

- No value added tax on import of goods and services.
- No customs tax on import of goods and services.
- No value added tax on goods and services bought on the territory the Republic of Moldova.
- No profit tax.

#### **4. FUND ON ENERGY EFFICIENCY**

- Destination of the Fund-financial support of works on the energy efficiency and development RES.
- Formation of means of Fund:
  - Assignments the Governments not less than 10 % of volume of Fund.
  - Financial receipts from sponsors.
  - Commission percent from contracts financed by Fund.
  - Credits.

#### **5. THE FUTURE PROSPECTS OF DEVELOPMENT OF BIOFUEL SECTOR**

The state of the art and main priorities for development of renewable energy sources for short-term period is specified in the Project of the National Programmer of renewable energy sources development till 2010. The target has been established to increase the share of renewable energy sources (RES) in the total energy balance of the country up to 6% in 2010, and up to 20% in 2020. The above mentioned objective is specified in the Energy Strategy of Moldova and in the Renewable Energy Law, approved by Government and Parliament in August 2007.

The law specifies the use of biofuels in the following established quantities, comparing to total liquid fuel consumption:

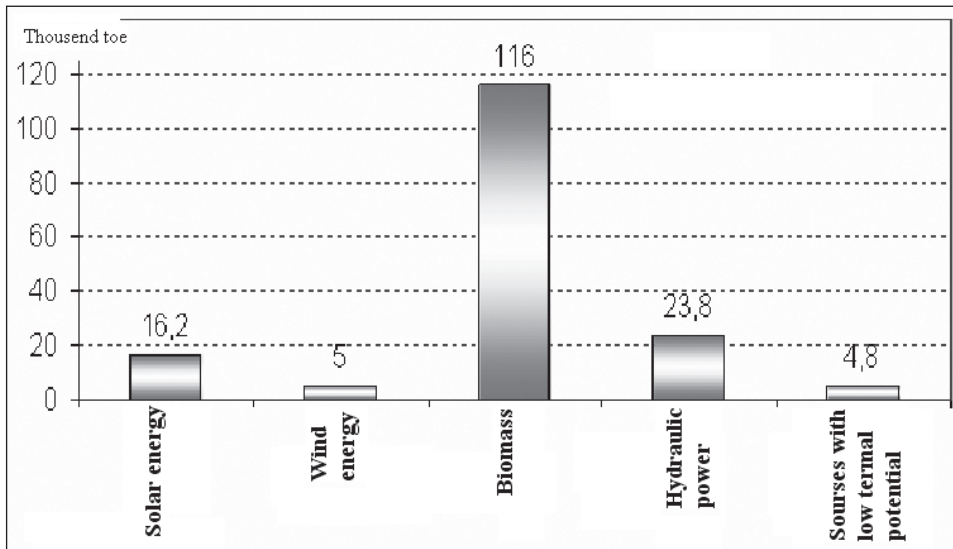
- 6 % – of ethanol in 2010 and 20 % in 2020.
- 5 % – of biodiesel in 2010 and 20 % in 2020.

The increasing use of the RES will provide environmental benefits. If above-stated parameters will be achieved, it will lead to annual reduction of CO<sub>2</sub> emissions of 167-210 thousands tons of CO<sub>2</sub> equivalent. A significant share of emissions decreasing can be transformed into monetary profit by Projects of Clean Development Mechanisms and/or trading of the reduction of Carbon emissions through emissions trading mechanism.

The National Programmer of renewable energy sources development till 2010 provides the background for development of energy potential of: biomass (production of biofuels from grain, sugar beet and olive cultures, oil seed rape, sunflower, grape bonelets of the wine industry, etc.); solar energy – with transformation in photovoltaic and thermal energy; wind power; hydraulic energy and the future new energy sources. In particular, using the biomass of both energy and agricultural plants, city wood waste products as raw material for production of liquid and solid biofuels, is treated as favorable decision to reduce the dependence of the country on import of power resources.

The priorities in the National Programmer of renewable energy sources development till 2010 are given to biomass, hydro-energy, solar and wind energy. All mentioned renewable energy sources account to 6% of total energy balance as follows:

- biomass – 70%;
- hydro – 14%;
- solar – 10%;
- wind – 1.5%;
- others – 4.4%;



Share of different types RES in power balance RM to 2010 (forecast)

## 6. THE SPECIFIC OBJECTIVES OF THE NATIONAL PROGRAMMER OF RENEWABLE ENERGY SOURCES DEVELOPMENT TILL 2010

The realization of the National Programmer goals is provided by achievement of the following specific objectives:

- Development and perfection of the legislation concerning using of renewable sources of energy, with creation of the transparent and effective national legislative background that includes stimulants, accepted by the international practice.
- Development of scientific, technical, economic, information, financial and industrial potential;
- Revealing and elimination of the barriers for introduction of RES.

- Development of the effective and constant mechanism for realization of the present Programmer, including research and development, renewable energy sources potential evaluation, starting of pilot projects and introduction of this potential in a business cycle.
- Creation of conditions for sustainable development of power generation on the base of RES and increase of the share of RES national economy.
- Increasing of the professional standard of experts in the this area;
- Increasing on a comprehension level the importance of the problem of using RES for steady development of the country.
- Creation of national fund for promotion of renewable energy.
- Creation of the legislative framework that is necessary for application in transport and agriculture of biological fuel and its mixes, considering the purposes and objectives of the European Union.
- Utilization of liquid and solid biofuels (ethanol and biodiesel), obtained from renewable sources, in order to decrease the dependence on imported energy resources.

## **7. MEASURES FOR ACHIEVEMENT OF THE SPECIFIC PURPOSES IN THE FIELD OF RENEWABLE ENERGY SOURCES**

Introducing in the national legislation of the requirement to the Directive 2001/77/EC, concerning promotion on the national market of the electric energy produced by renewable energy sources, Directive 2003/30/EC, and promotion of utilization of biological and other renewable fuel in transport sector.

Research and development of new energy sources with assimilation of their potential for development of power is a priority problem of the state policy. The special attention will be given to the development of energy sources from the biomass, transformation of the sun and wind energy, using the energy potential of heat sources with low potential. Taking into account a direction of research in global practice, measures for researches and development will be accepted in the field of hydrogen energy and using the results of this development for decision making and problem solving for maintenance with a increased net energy efficiency. Mean time will continue the construction of new sources of thermal energy proceeding within the framework of the Project „Renewable energy from agricultural waste products”. It will be constructed the villages Trebuzhen of the area Orhei, financed by a credit given by the Government of Poland – hydro power station of 1,2 MW on the river Reut.

The Energy Efficiency Agency and Fund on Energy Efficiency will be created. The main task of Agency and Fund will consist in promotion and financing of projects in the field of the energy efficiency and RES development according the state policy in this area.

Approved by Parliament and by Government of the Energy strategy, laws on renewable energy and on science and technology parks and innovation incubators has allowed in to create very perspective the list of projects in area RES in the Republic of Moldova. Some from these projects are resulted below.

The list of investment projects selected for implementation  
in the Republic of Moldova

<i>Nr/o</i>	<i>Project title</i>	<i>Organization/ executing enterprise/ responsible for the project</i>	<i>Project cost, USD/EURO/lei</i>	<i>Project implemen- tation period</i>
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1	Creation of a Base Center for production of alternative bioenergy carrier/ ETANOL in the Cahul region of the Republic of Moldova	Agency for Inovation and technology Transfer of the Academy of Sciences of Moldova	15 million USD	1 year
2	Obtaining ETANOL by processing wheat, corn, rawalcohol from sweet sorghum, ether aldehyde wastes and diffusion oils	Avante SRL, SA La Plopi; Republic of Moldova	37,3 million lei	1 year
3	Production of biodisel from rapseed oil.	TRITAL-NORD SRL, Victor TUȚUC; Republic of Moldova	12,0 million lei. The productivity 5000 t/year	2 year
4	Manufacture of instalation for producing wood briquettes and granules vegetabile wastes and manufacture a device for crumbling the raw material	SA ARTMET, Republic of Moldova	260 thousand lei	1 year
5	Creating and launching an enterprise producing biodisel with the productuvity 5000 tones a year	SRL PACICOLE, Drochia, Republi of Moldova	2 millon EURO. The productivity 5000 t/year	2 year

<i>Nr/o</i>	<i>Project title</i>	<i>Organization/ executing enterprise/ responsible for the project</i>	<i>Project cost, USD/EURO/lei</i>	<i>Project implemen- tation period</i>
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
6	Livestock complex for reproducing and breeding suina for meat in Ungheni region, with production of renewable energi	S. C. AGRODAVA GRUP SA, Republic of Moldova	13 million lei	2 year
7	Pilot project for building a plant for the production of bioethanol from wheat and corn in the Republic of Moldova	SEMINȚE NORD, Republica Moldova; VUCHZ; Czeck Republic	40,0 million EURO	2 year
9	Production of biofuels in the Republic of Moldova	FUEL MAKERS, SUA	43 million USD	2 year
10	Building plants for production of biodisel from vegetable oils inthe Republic of moldova	„Moore și Asociații” SRL, Romania	2,46 million euro	2 year
11	Obtainig electric and thermal energy by burning used types	„POLYCOMP”, Cehia	25,7 million Euro	2 year

## 8. CONCLUSIONS

The portfolio of national program of RES development includes now 22 projects on the field of biomass (biofuel). These projects have been chosen during years 2006-2007 after their all-round analysis. The realization only of the number chosen projects within indicated terms will provide replacement of more than 120 thousand tone of fuel in oil equivalent.

Estimated cost of investments in biomass projects is about 2 billion lei. Investments specified in projects are distributed as follows: 70.1 million EURO, 58 million USD and 120 million lei.