

# Technology Transfer in Renewable Energy (Moldovan Case)

Cooperation in development of bioenergy technology.  
Energy Charter Meeting, 10 May 2007, Chisinau



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# AGENCY FOR INNOVATION AND TECHNOLOGY TRANSFER OF THE ACADEMY OF SCIENCES OF MOLDOVA (AITT)

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**AITT** is a public institution acting in the field of innovation and technology transfer which was created in accordance with provisions of the Code on Science and Innovation nr. 259-XV of 15 July 2004 for the purpose of coordinating, stimulating and implementing the mechanisms of innovation and technology transfer activity in the Republic of Moldova.

## **AITT's mission:**

- Strategic substantiation at national level of the concept of innovation and technology transfer;
- Development of the interface between science and production;
- Coordination of activities by means of financial assistance, legal and ideological support, by creating the infrastructure and developing the scientific entrepreneurship, using local technologies and reducing the dependence on foreign market.

## □ **Background**

- Research on energy efficiency in agriculture and optimal use of energy in agri-biological systems were launched in Academy of Sciences of Moldova in 1983.
- 1. Energy analysis in agriculture. Afanasiev V.N., Zhuchenko A. A., Kazantsev E.F., 1983, Chisinau
- 2. Energy analysis in agriculture. (Methodological and methodical recommendations), Afanasiev V.N., Zhuchenko A. A., 1988, Chisinau

# INNOVATION AND TECHNOLOGY TRANSFER PROJECTS CONTEST AND LEGAL BASE

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The contest is announced yearly by the *Supreme Council for Science and Technology Development of the Academy of Sciences*

## Basic requirement:

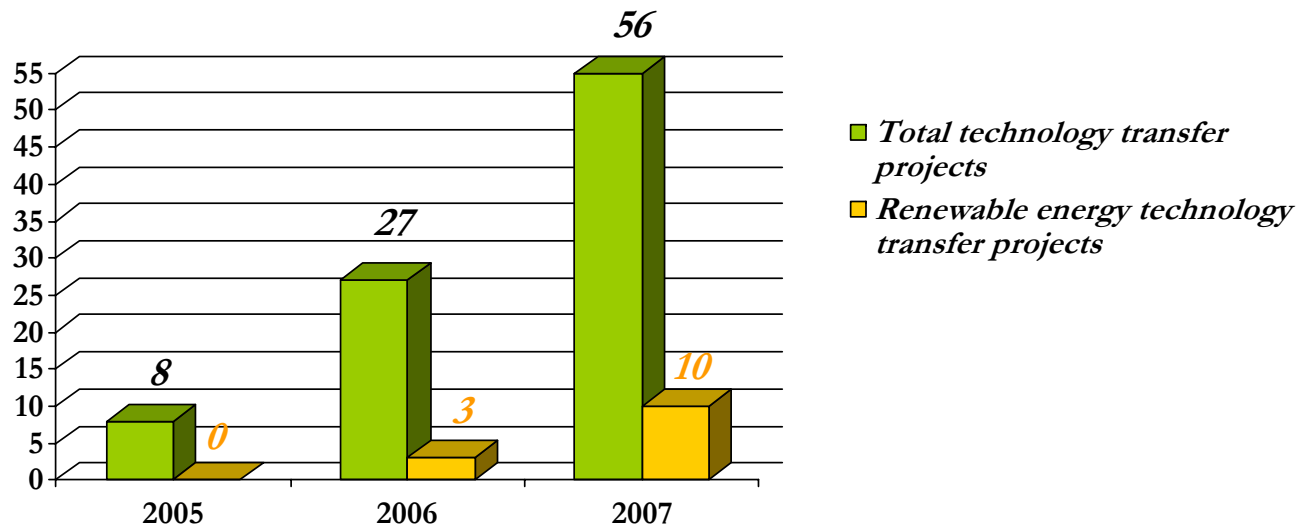
- ❑ **Co-financing** from outside the budget sources or business in the amount of not less than **40%** of the project cost. A letter of guarantee from the co-financier is required.

## Legal Base

- ❑ Law on the use of renewable energy sources. (Approved by Government Decision nr. 1385 of 11 December 2006)
- ❑ Law on science and technology parks and innovation incubators. (Approved by Government Decision nr. 407 of 13 April 2007)

# SUPERVISING AND MONITORING TECHNOLOGY TRANSFER PROJECTS

The Agency has been supervising and monitoring the implementation of **69** technology transfer projects with the total cost of **13.6 million lei** – financed from the state budget since 2005 and cofinanced by business



**Fig. 1** Evolution of renewable energy and energy efficiency technology transfer projects in 2005-2007

# IMPLEMENTATION OF SWEET SORGHUM CULTIVATION TECHNOLOGY FOR OBTAINING BIOMASS AS RAW MATERIAL FOR BIOETHANOL PRODUCTION

## □ **Project objective:**

Implementation of sweet sorghum cultivation technology in the pedoclimatic conditions of the Republic of Moldova with the purpose of obtaining biomass of high productivity as raw material for production of bioethanol and supplying biomass producers with high quality seeds.

## □ **Total project cost:**

- State budget - 340 thousand lei
- Outside the budget sources, including business - 380 thousand lei

## □ **Implementation period:** 2006-2007

## □ **Outputs:**

- The harvest of sweet sorghum is 80 – 100 t. of biomass per hectare out of which 3-5 t. of bioethanol will be obtained, i.e. 2.5 – 3 times as much as the cereals, while the cost value of the bioethanol obtained from sweet sorghum is 2-3 times lower than the cost value of bioethanol obtained from cereals .
- On cultivation of sweet sorghum 50 – 55 t. of CO<sub>2</sub> ha/year are absorbed, while in the case of cereals – 3-10 t/ha/year



# IMPLEMENTATING THE TECHNOLOGY OF PRODUCING OIL FROM RAPESEED, WITH THE PURPOSE OF OBTAINING FOOD OILS, TECHNICAL OILS, BIOFUEL AND BY-PRODUCTS

## □ **Project objective:**

Implementing rapeseeds processing technologies with the purpose of obtaining different oil fractions with different properties and different fields of application: food oil, technical oils, biofuel, etc.

## □ **Total cost of the project:**

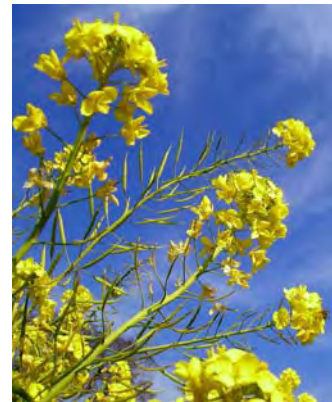
- State budget - 200 thousand lei
- Outside the budget sources, including business - 710 thousand lei
- **Implementation period:** 2006-2007

## □ **Planned indicators:**

Cost value of 1 ton of oil: 6,888 lei  
Selling price of 1 ton of oil: 10,660 lei  
□ Net profit: 3,772 lei  
Investment profitability: 35 %  
Social effect – 120 new jobs

## □ **Outputs:**

- - creating a closed complex cycle of processing the seeds;
- working out and implementing government regulations on processing oleaginous seeds;
- technical regulations for producing oils and biofuel from rapeseeds, using biofuel obtained from rapeseeds in internal-combustion engines and in Diesel engines;
- Biofuel Diesel engines.



# IMPLEMENTING FODDER GRAIN AND CORN PROCESSING TECHNOLOGIES, OBTAINING ETHANOL AND OTHER PRODUCTS AND THEIR RATIONAL USE

## □ **Project objective:**

Implementing complex without waste processing technologies for fodder grain and corn in order to obtain grain and corn seeds, gluten, tehnic ethanol with high octane coefficient used as additive to gasoline for internal-combustion engines, dregs used for obtaining nutritive forage.

## □ **Total project cost:**

□ State budget sources - 233 thousand lei

□ Outside the budget sources, including business - 167 thousand lei

□ **Implementation period:** 2006-2007

## □ **Planned indicators:**

Cost value of 1 ton of corn: \$ 140.5  
(without excise tax on bioethanol)

Profit: \$ 170/t

Profitability: about 30 %

□ Social effect – About 75 new jobs will be created

## □ **Outputs:**

- Obtaining bioethanol, gluten, seeds and forage from corn and grain will reduce the consumption of energy by 30%; - Using biofuel will reduce the emission of CO by 25%;

□ - Reduced greenhouse effect



**RENEWABLE ENERGY PROJECTS AND BUSINESS PLANS APPROVED  
BY THE COORDONATING COUNCIL FOR THE USE OF RENEWABLE  
ENERGY ESOURCES ESTABLISHED IN CONFORMITY WITH ORDER BY  
PRIME MINISTER NR. 0919-25 OF 04.01.2006**

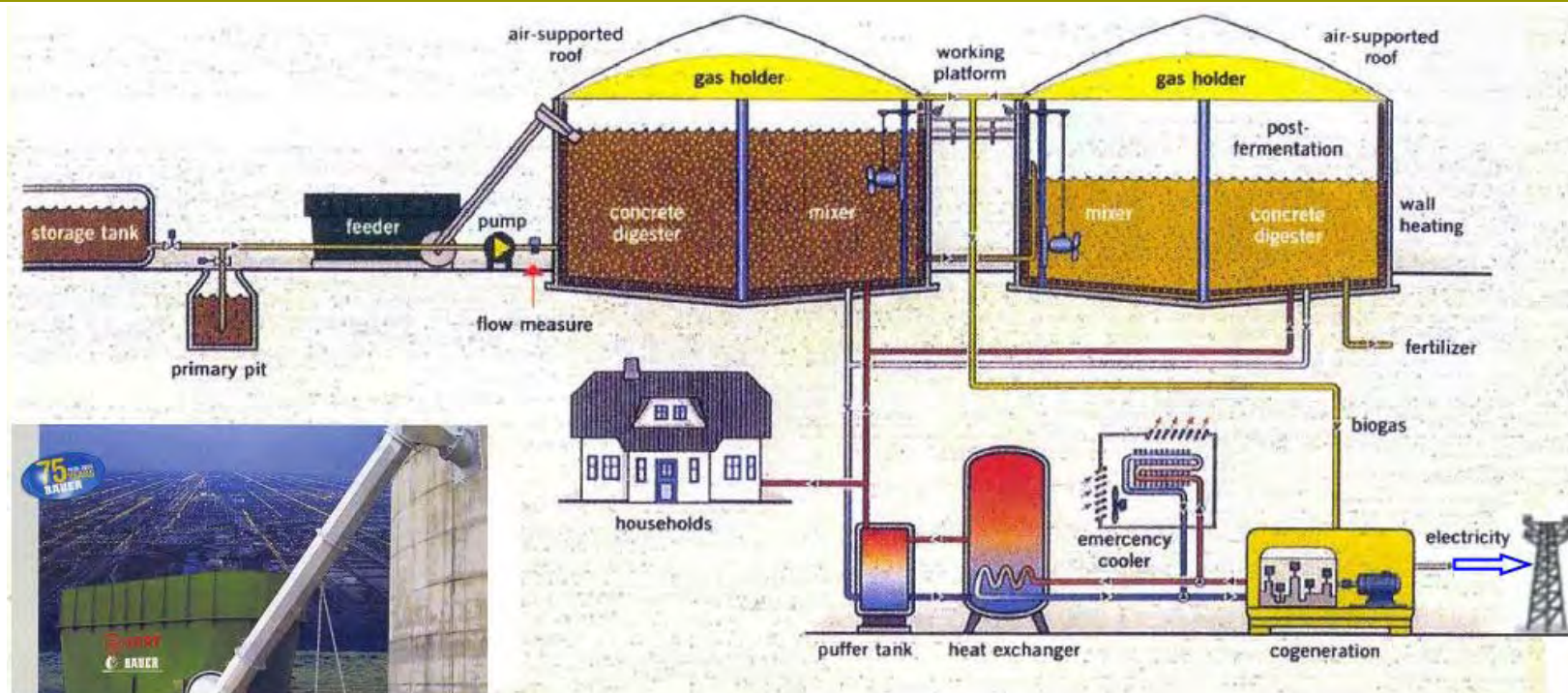
<b>Nr. d/o</b>	<b>Project title</b>	<b>Organization/ executing enterprise /responsible for the proiect</b>	<b>Project cost USD/EURO/Lei</b>	<b>Project implementation period</b>
<b>1</b>	Creation of a Base Center for production of alternative bioenergy carrier –ETHANOL in the Cahul region of the Republic of Moldova	Agency for Innovation and Technology Transfer of the Academy of Sciences of Moldova	15 million USD	1 year
<b>2</b>	Implementing technologies that use solar energy	„ANSTECMET” Ltd, Vasile Șelaru, Chișinău, Republic of Moldova	€ 75 040	1 year
<b>3</b>	Obtaining ETHANOL by processing wheat, corn, raw alcohol from sweet sorghum, ether-aldehyde wastes and diffusion oils	„Avante” Ltd, SA „La plopi”, Republic of Moldova	37.3 million lei	2 years
<b>4</b>	Production of biodiesel from rapeseed oil. The productivity 5000 t/year	„TRITAL – NORD” Ltd, Victor Țuțuc, Chișinău, Republic of Moldova	12 million lei	2 years
<b>5</b>	Manufacture of processing line for sweet sorghum	SA „ARTMET”, Chișinău, Republic of Moldova	540 thousand lei	3 years
<b>6</b>	Manufacture of wind power plant with the power of up to 10 kW	SA „ARTMET”, Chișinău, Republic of Moldova	363 thousand lei	1 year
<b>7</b>	Manufacture of installation for producing wood briquettes and granules vegetable wastes and manufacture a device for crumbling the raw material	SA „ARTMET”, Chișinău, Republic of Moldova	260 thousand lei	1 year
<b>8</b>	Manufacture of solar plant for heating water	SA „ARTMET”, Chișinău, Republic of Moldova	154 thousand lei	1 year



Nr. d/o	Project title	Organization/ executing enterprise /responsible for the project	Project cost USD/EURO/Lei	Project implementation period
9	Creating and launching an enterprise producing biodiesel with the productivity 5000 tons a year.	SRL „Paciole”, Valeriu Manole, Drochia, Republic of Moldova	€ 2 million	2 years
10	Implementing new equipments and technologies for protection of metal structures from corrosion with energy conservation effects in natural gas systems	Experimental Implementation Studio (Workshop) “COVIPR”, Chişinău, Republic of Moldova	1,5 million lei	1 year
11	„Livestock complex for reproducing and breeding suina for meat in Ungheni region, with production of renewable energy”	S.C. „AGRODAVA GRUP” S.A., Republic of Moldova	13 million lei	2 years
12	Building a 20 MW windmill (pilot project)	„Infusion Company”, Portugal	€32 million	2 years
13	Pilot project for building a plant for the production of bioethanol from wheat and corn in the Republic of Moldova	„Semințe Nord” SA, Republic of Moldova, „VUCHZ”, Czeck Republic	€ 40 million	1 year
14	Building a high tech industrial complex for the use of solar energy using poli- and mono-crystals of silicium in Cahul region	„S.T.B. Advanced Technology Ltd”, Great Britain	€ 100 million	3 years
15	Production of biofuels in the Republic of Moldova	„Fuel Makers”, SUA	43 million USD	2 years
16	Obtaining electric and thermal energy by burning used tyres	„POLYCOMP”, Cehia	€ 25.7 million	1 year
17	Building plants for production of biodiesel from vegetable oils in the Republic of Moldova	„Moore și Asociații” SRL, Romania	€ 2.46 million	2 years

## PIG-BREEDING FARM AND PRODUCTION OF RENEWABLE ENERGY

The „AGRODAVA GROUP” Ltd. Is launching in Ungheni region of the Republic of Moldova a livestock complex for production of 1800 tons of meat a year. The bioenergy installation will allow to regenerate biogas from animal dejections (and generating electric and thermal energy)



The efficient use of **6,600 tons** of dejections accumulated yearly will make it possible to obtain:

- **230,000 m<sup>3</sup> of biogas** (CH<sub>4</sub>- 60%, CO<sub>2</sub>- 36%, H<sub>2</sub>S – 3%) and caloric power – 21,5 MJ/m<sup>3</sup>, the equivalent of:
- **137,000 m<sup>3</sup> saleable methane gas** (CH<sub>4</sub>- 99%) with caloric power – 35,0 MJ/m<sup>3</sup>.
- Generation of the mentioned biogas quantity makes it possible to obtain:

**370,000 KW·h** of electric power a year, while the livestock farm needs **55 – 60 thousand KW·h/year**, and **483 Gcal** of thermal energy a year, the livestock needs **20-25 Gcal/year**.

Total project cost - **13 million lei**

# BUILDING 220 MW WINDMILLS

## □ **Project objective:**

Financing, building and operating Windmills in the Republic of Moldova with the total power of 220 MW:

- **The first stage** will include financing, building and operating a 20 MW Windmill. Implementation period of the first stage: 1 year and 8 months, including building the windmill – 7 months.

- **Second stage**, will begin one year later, and includes financing, building and operating windmills in different zones of the country with the total power - 200 MW.

## □ **Financial Indicators:**

- Total project cost - €32,6 mln.;
- The cost of one installed MW – €1.63 mln;
- The cost of production of 1 kWh – 4.1 c€;
- The INFUSION company asks the tariff – 8,67 c€/kWh for 15 years;
- The investment will be justified in – 7.3 years

## □ **Social effect – 400 new jobs**



# PRODUCTION OF BIOFUEL IN THE REPUBLIC OF MOLDOVA „Fuel Makers”, SUA

## □ **Project objective:**

- Building a plant for production of biofuel in Drochia with the capacity **60 mln. litre/year**;
- Implementing a new **tehnology** for production biofuel from cellulose
- Creating a **new market** of **\$10 million** a year for local agricultural producers

## □ **Financial indicators:**

- Total project cost - **34 mln. USD**

## □ **Social effect – 200 new jobs**

- Average wages - **6,000 lei/month**



**THANK YOU FOR YOUR ATTENTION!**

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