

NERGY ND BIOMASS 395

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After a four-year first phase. Energy and Biomass Project has continued to develop the domestic renewable energy production and consumption market in Moldova, so as to ensure that the shift to bioenergy is irreversible and the number of consumers is rising. While in 2011-2014, Energy and Biomass Project financed and assisted the installation of biomass heating plants in 144 public institutions in the country, between 2015-2018, the emphasis was placed on small towns, but also on strengthening the initial outcomes. The second phase of the Project involved the extension of benefits to public institutions that installed biomass heating plants, in 70 of those, solar panels for hot water were installed as well. Thus, 40,000 children have continuous access to hot water produced by solar energy, and public authorities can be proud to provide quality services to the population at affordable cost.

Also, the Energy and Biomass Project has been concerned with the development of biofuel supply markets to ensure timely and optimal delivery of pellets and briquettes for heating public institutions. In addition to direct support to private sector, the Project has also boosted municipal businesses to enter the biofuel market, using waste from green spaces maintenance. The project has also equipped the Solid Biofuels Laboratory of the Agricultural University of Moldova, which since 2016 has been accredited to test biofuels for physical and chemical parameters and each batch of pellets or briquettes delivered to the market would be accompanied by quality certificates. At the legislative level, the introduction of reduced 8% VAT rate across the biofuel value chain, the development and mandatory introduction of quality standards and other measures have contributing to market development.

Energy and Biomass Project has also stimulated Public-Private Partnerships as a heat-supply mechanism for public institutions where private partners undertaking plant operation, biofuel and heat delivery, and the public partner paying for the amount of energy delivered according to the bill issued based on the readings of heat meters. In the second phase of the project, PPP models were piloted for energy services provided in Nisporeni and Ungheni districts, where 15 schools and kindergartens with a total of 3146 children benefit from this service.

The same logic includes the creation of Biomass Energy Association and Cluster, a biomass discussion and collaboration platform, which has more than 20 members: private companies, public authorities, research institutions, universities, associations active in the green energy sector etc. The Bioenergy Association, launched with the support of the Energy and Biomass Project, has already independently deployed a series of internationally funded activities for

INTRODUCTION

the development of the internal market and the competitiveness of biofuel producers. One of these is the planting of 26 hectares of energy willows, which will provide access to raw material to pellet and briquettes producers.

In addition to the installation of new heat pants and solar hot water systems in public institutions, the Project team also supported the training of renewable energy system operators as well as managers of public institutions responsible for public biofuel procurement and good maintenance of green technologies. An electronic database includes all solid biofuel fired plants in the country, tracking in real time the operation, the amount of energy generated, room temperature with data being delivered to the Energy Efficiency Agency, an institution responsible for the implementation of renewable energy policies, energy efficiency and sector development.

Not least, the Energy and Biomass Project has launched several mass-media initiatives that have brought public attention and promoted not only solid biomass but all renewable energy sources to potential consumers, businesses, etc. This is the optional course "Renewable Energy Sources" in schools, the Energel summer camp, the national competition and the "Moldova Eco-Energetics" Gala, organized in partnership with the Ministry of Economy and Infrastructure and Energy Efficiency Agency, as well as "Sun Dă-i Fest", powered by photovoltaic panels.

As a result, the project has had a significant and visible impact on the country's economy with a new industry started from scratch, with hundreds of biofuel producers and green technology producers and distributors, as well as thousands of consumers and beneficiaries, an industry with an annual turnover of several hundred million lei, money remaining in the country and no longer paid to foreign companies for imported fossil fuels.

VOICES OF THE PARTNERS

Moldova Energy and Biomass Project is a success story

The EU is the world leader in renewable energy. What are the lessons for the Republic of Moldova and your message for Moldovan authorities and the population?



As you may know, the EU's energy policies aim to ensure that citizens can access secure, affordable and sustainable energy supplies. The EU is working in a number of areas to make this happen, just to mention: ensuring energy security, improving energy efficiency, de-carbonising the economy, also by using more renewable energy. Together, these goals provide the EU with a stable policy framework on greenhouse gas emissions, renewables and energy efficiency, which gives investors more certainty and confirms the EU's lead in these fields on a global scale.

Peter Michalko Ambassador, Head of the European Union Delegation in the Republic of Moldova

With the Association Agreement the European Union and the Republic of Moldova committed to enhancing the cooperation in several fields including the use of renewable energy sources. I believe that this cooperation has already proved to be successful to bring concrete and tangible results to Moldovan people, therefore I am fully confident that in the future more and more citizens will engage to develop further the potential of renewable energy sources in the Republic of Moldova. Saving money on energy costs means becoming richer and having more resources available for investment and development.

How do you appreciate the results of the Energy and Biomass Project in Moldova and its impact on the economy?

Moldova Energy and Biomass Project is a success story which demonstrates once again how the support from the EU creates new opportunities and improves the quality of life of citizens. For more than 7 years now, the EU has been putting a lot of "Energy" in the development of the biomass sector in the Republic of Moldova. With this project an entirely new economic sector was developed in a very short time, with new jobs created, turning Moldovans from purely energy consumers into energy producers. Obviously this is a sector that still needs support, and

we hope to see a higher involvement of citizens and local authorities. In particular I refer to the sustainable production of local biomass, which is crucial to be effective at reducing greenhouse gas emissions. Biomass production involves a chain of activities ranging from the growing of feedstock to final energy conversion. Each step along the way can pose different sustainability challenges that need to be managed. I firmly believe that this is a major, but still untapped economic opportunity.

What's next? In terms of EU assistance in the field of renewable energy, on the one hand, but also on commitments of the Republic of Moldova under the Association Agreement? As part of its long-term energy strategy, the EU has set targets for 2020 and 2030. These cover emissions reduction, improved energy efficiency, and an increased share of renewables in the EU's energy mix. It has also created an Energy Roadmap for 2050, in order to achieve its goal of reducing greenhouse gas emissions by 80-95%, when compared to 1990 levels, by 2050. With the Association Agreement, the EU and the Republic of Moldova committed to enhancing the security of energy supply, facilitating the development of appropriate infrastructure, increasing market integration and regulatory approximation towards key elements of the EU acquis, as well as promoting energy efficiency and the use of renewable energy sources. In light of the above I am certain that both energy efficiency and renewable energy will remain a key pillar of EU assistance for the years to come.

Biofuel industry could play an instrumental role for sustainable rural development

Why UNDP puts such an accent on renewables?

How would you assess the results of the Moldova Energy and Biomass Project?





In September 2015 all 193 members of the United Nations unanimously endorsed the boldest manifesto for humanity- 2030 Agenda for Sustainable Development and its 17 SDGs. 2030 Agenda is normative and transformative roadmap, which gives us a sense of direction and an action plan for the protection of the people and the planet, and for the promotion of peace, prosperity and partnerships.

Curbing the negative impact of climate change through boosting the production and consumption of renewables and implementing climate change adaptation and mitigation measures is at the heart and at the center of the Global Goals. Goal #7 is explicitly dedicat- energy security. ed to Affordable and Clean Energy.

Dafina Gercheva, UN Resident Coordinator and UNDP Resident Representative

The Republic of Moldova is very vulnerable to the adverse effects of climate change and highly dependent from Russia on the import of gas and oil. Therefore, promoting renewable energy and investing in energy efficiency is a strategic national priority, which is high on the Government's agenda.

Biomass energy is one of the most accessible and affordable sources of green energy in Moldova. Biofuel industry brings multiple development gains. It creates wealth, reduces fuel poverty, generates employment and accelerates equitable rural development. It also contributes to strengthening national

The "Moldova Energy and Biomass" project, which is funded by the EU and implemented by UNDP, has yielded numerous and impactful results, which are instrumental for the achievement of national priorities, people's aspirations, and country's commitments vis-à-vis the 2030 Agenda and the EU Association Agreement.

Seven years ago, the country was almost totally dependent on fossil fuel imports, the heat comfort in public institutions and private homes in rural areas was very low, the use of modern biomass-based technologies was no existent, the knowledge of renewable energy and its multiple development benefits was poor.

Today, the share of the renewables in the energy mix has increased from 5% in 2011 to 14, 7% in 2018, against the national target of 17% to be reached by 2020.

More than 200,000 people have access to biomass heating systems and are enjoying improved working and living comfort. The heating costs and indoor pollution are lower in comparison to the baseline. More than 600 jobs were created by the new green businesses and the CO2 emissions are 70,000 tones less every year, etc.

The project has raised awareness amongst young people about the impact of renewables on country's prosperity and resilience. Today more than 25,000 students have renewables and have developed a pas- lot-testing innovative solutions to the comsion and dedication to further promote plex socio-economic and environmental the production and consumption of al- challenges that are present in Moldova. ternative energy sources by changing be- Many of these experiments have already havior patterns, mentalities and overall been scaled up. consumption and production practices.

deep and comprehensive knowledge of The project provided a safe space for pi-

How do you see the development of the renewables in Moldova?

ing sustainable development, promoting inclusive and green growth and reducing poverty and inequalities.

The Republic of Moldova has a huge and still untapped potential for producing and using renewable energy. Investments in biomass, photovoltaic and geothermal heat should be further promoted by establishing a conducive legal and regulatory framework, strengthening institutional capacity, sha-

Experience suggests that renewables are ring good business practices, innovative playing in an instrumental role in advanc- approaches and tools, and fostering public private partnership and intermunicipal cooperation, amongst others.

> Moldova's journey to low carbon economy has already started and should be further supported by the development partners, businesses and civil society.

We have set ambitious targets for the share of renewable energy in the energy mix

What are the main objectives of the state in the energy field?



Chiril Gaburici, Minister of Economy and Infrastructure

The Republic of Moldova does not have its own energy resources, for this reason we have set some major objectives in this field, related to the security of energy supply, regional development, integration of the energy markets and ensuring the sustainability of the energy sector.

To strengthen energy security, we use several tools – long-term import contracts, investments in the generation capacity and diversification of supply sources. I want to note just some of the recent significant progresses in the field of regional market integration. The Ungheni-Chisinau gas pipeline, which will transport gas from Romania, will be commissioned by the end of 2019. The year 2020 is

the deadline for connecting to the European Network of Transmission System Operators for Electricity (ENTSO-E) and we observe the synchronous connection commitments implementation schedule, with Ukraine. The financing agreements for the interconnection with Romania on electricity through the construction of a Back to Back station in Vulcanesti, a 400 kV transmission grid between Vulcanesti and Chisinau, as well as the extension of the 400 kV transformation stations in Chisinau and Vulcanesti were ratified. At the same time, particular emphasis is put on increasing energy efficiency in order to reduce energy consumption, and on the capitalization of renewable energy sources.

What role does renewable energy have in the country's energy Strategy?

Renewable energy sources contribute to supply diversification and to reducing dependence on imports, but also to tackling climate change. Given the crosscutting impact on policies in different areas, renewable energy has a very important role in the economic development of the Republic of Moldova.

We have set ambitious targets regarding the share of renewable energy in the energy mix and we have already overcome them on certain segments. For example, in case of biofuels, we have reached a share of 26%, this type of biofuel being largely used for heating households.

What role does the Ministry of Economy and Infrastructure attribute to solid biofuel in the energy mix? As is known, biomass is the most accessible renewable energy source in Moldova, and its multiple advantages are not only environmental, biofuel being neutral when it comes to CO2 emissions, but also economic, generating added value, as well as taxes and duties related to this industry, which remains in the country.

Solid biofuel already has the largest share of renewable energy sources used in the country. The Ministry of Economy and Infrastructure will continue to promote this sector through multi-sectoral policies, ensuring that the market-based mechanisms started - work perfectly.

At the same time, the national legislation has been practically aligned with the acquis communautaire and puts at our disposal concrete tools for sector development, such as energy efficiency obligation schemes, requiring energy suppliers to purchase the full amount of locally produced energy from renewable sources, support schemes for producers of renewable energy through a feed-in tariff. established through auctions, applying the net metering principle to final energy users who have their own generation facilities, etc.



Tractors and shredders for high capacity hea-

Success story: The village that has become a

The development of local biomass boiler manu-

for not getting connected to gas, but now they

Inter-municipal cooperation model in collecting

40 | KEY ACTORS ON BIOENERGY MARKET **ASSOCIATE TO GROW TOGETHER**

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IN THE PUBLIC Hot water from solar energy Domoto monitoring system

community centres

are connected to modern biomass-based heating systems



have access to hot water produced by solar collectors



of green energy is annually produced in these institutions

Dersons

benefit from sustainable energy produced in Moldova

quare metres are heated with clean energy

is the absorption surface of solar panels

is the total investment in the biomass heating systems

Unlike the first implementation stage of the Project that covered only rural communities, green light was given to small towns in the second phase. In total, in 2015-2018, to supply biomass fuel in the necessary biofuel based heating systems were installed in 79 schools, kindergartens, community centers and hospitals. Likewise, to provide the local contribution of 15% for there were installed 59 solar collector systems for the production of domestic hot water. More than 100,000 people in 90 villages tution to benefit from heat produced from and 15 cities are experiencing the economic, social and environmental benefits of ship between the LPA and the main actors renewable energy. The capacity of boliers built in the second stage of the Project is meters in the beneficiary institutions. the Project, heat generation capacity from biomass in public institutions amounts to about 45 MW and 380 thousand square meters that are heated with green energy.

For the operation and servicing of biomass tribution for the construction of heating boilers installed in public institutions since the launch of Energy and Biomass II Project, 264 new jobs (including 165 new jobs for biomass plants operators) have been created.

380 000 m2 ≈ 3 parks in center of Chisinau

Beneficiary institutions of the Energy and Biomass Project have gone through a rigorous selection process. When selecting projects, the evaluators focussed their attention to a number of factors, including the existence of an adequate and energy





SCHOOLS, KINDERGARTENS, **COMMUNITY CENTERS** HEATED WITH CLEAN ENERGY, PRODUCED **IN OUR COUNTRY**

efficient public building, the possibility of installing solar panels, the existence of local and regional entrepreneurs willing quantities, the existence of suitable storage rooms the possibility of communities the villages and 20% for small towns, the motivation and acceptance of public instibiomass sources, existence of a partnerin the community.

about 15 MW and will ensure the heating of In all localities, project committees were a total area of over 100 thousand square set up, representing community leaders - mayors, local counselors, teachers, Thus, together with boilers from stage I of etc. who have been trained in the area of community mobilization techniques and have participated in representative community meetings to provide residents with information and ensure ownership of heating plants, as well as local conplants and the installation of solar panels.

> Since 15 small towns were also included in the project, other public buildings, such as hospitals or main offices of the General Inspectorate for Emergency Situations, have become eligible for heating plants. Since they have a high consumption, such boilers allowed the use of new technologies, such as automatic fuel loading at the raion hospital in the city of Soroca.

TRACTORS AND SHREDDERS

FOR HIGH CAPACITY **HEATING PLANTS**



Some of the public institutions in the first in the second stage of the project, as well phase of the Project are heated by plants as 10 wood splitters and shredders. Benthat operate by burning straw bales, briquettes or wood. In order to facilitate the the most part, public institutions with operators' activity, 23 mini-tractors with front loaders and trailers were purchased

Our school switched from gas to biomass in 2013. People from the village chose to install a straw bale based boiler, because we have an agricultural contractor in the neighborhood delivering straw bales at an attractive price. Although at first it seemed more difficult to load and clean the boiler, I also enjoyed, together with the students, the teachers, the heat produced by the biomass and the savings made. In the past we loaded the straw bales manually into the boiler. The school bought small bales (weighing 14-25 kg each) and to fill the boiler we had to throw from 10 to 15 bales. The traktor with trailer has saved us from this work. Now we only have to get behind the wheel, push the button and load the boiler. Ever since we have the new equipment, we are buying large bales.

Vladislav COSNEANU – Sarateni Vechi, biomass boiler operator, Telenesti district.

eficiaries of the new equipment were: for straw bales based boilers and bolilers with high capacity for producing heat (250-750 kW). New equipment facilitates the process of producing green energy and reduces the operator's workload.

Energy and Biomass Project has closely monitored the operation of heating boilers, aiming at their proper exploitation and the sustainability of the process. Thus, it has been agreed with several local public authorities, which did not operate biomass heating plants for various reasons, their uninstallation and transmission to other interested communities. Among the reasons invoked by the beneficiaries who did not put the biomass heating plants into operation were insufficient budgets for heating public institutions, the closure of educational institutions following the optimization process or the costs and difficulties related to the maintenance of biomass heating plants their own.

At the same time, representatives of several mayoralities in the country were impressed by the efficiency of biomass heating and applied for funding from both the Energy

and Biomass Project and other development institutions so that they could switch several institutions and buildings from the locality to green energy. It is the case of Carpineni village in Hancesti district, which has installed biomass heating in 6 public institutions: two schools, a kindergarten, the town hall building, the community cultural center and the health center.

As a result, the community saves about 30% of the year's previously spent on coal heating, resources that are reinvested in other local development projects. In addition, 82 families in Carpineni have installed biomass boilers in their households, while 3 private companies produce biofuel in the neighboring localities. Thus, about 200,000 lei per year stay with local companies in Carpineni alone instead of being paid to coal importers.



wood splitters and wood grinders

HOT WATER FROM SOLAR ENERGY



ter preparation system and having as safety parameters the maximum temperature of 95 degrees Celsius of the water both at the exit of the solar panel, as well as in the accumulation vessel, thus preventing the water from boiling and damaging the system. A meter and a magnetic filter are mounted for the water consumption monitoring as well as for the protection against limescale. Also, the solar panel controller has the additional function of preventing Legionella, a bacteria that multiplies especially in water heating and air conditioning systems.

To reduce energy consumption to a minimum, high-efficiency pumps are provided with integrated differential pressure control. Temperature control of the heat is performed according to the outdoor air temperature. outdoor temperature sensor, measuring and control devices and thermal insulation of the pipes are part of the process.

The second phase of the project has also extended the green technologies area, and solar water heating systems were also installed. Thus, 70 kindergartens and hospitals have access to hot water produced by solar collectors.

A priority of the Project was to ensure the continuity and irreversibility of the achievements of previous years as well as to extend the benefits to communities which switched to biomass heating. Thus, 27 of the public institutions that previously benefited from the Project support were also included in the second phase, receiving solar panels for domestic water heating. Also, 43 other kindergartens and hospitals in the second phase of the project have access to hot water produced by solar energy.

Solar water heating systems are designed to provide the necessary water for the beneficiary institutions, both during the warm and cold weather of the year. Thus, if solar panels do not generate enough heat to warm up the water, for example during winter, the system automatically connects to the biomass heating boiler. Also, the hot water storage tank is equipped with an electric heater with a night-time thermostat, when neither the solar panels receive light nor the central heating system works optimally to keep the water temperature in the system at 60 ° C.

Systems are equipped with multiple sensors that automatically control components and prevent overheating or excessive water cooling. A sensor is installed at the exit of the solar panels group, and another in the water storage vessels, thus managing the hot wa-



* Data covers the period 2015-2018

I wash with warm water more at the kindergarten than at home. The sun is generous because it has many rays and with it, it heats the solar panels on the roof of the kindergarten. And we have a lot of hot water and we enjoy it. I have already told my mother and dad to install solar panels at our home.

Gabriel – a boy at the "Povestea" kindergarten in the town of Nisporeni.



Also, with the financial support of the Energy and Biomass Project in Moldova, an application for online monitoring of the operating parameters of the heat boilers with the burning of solid biofuel was developed.

The application allows for the analysis of heat produced through the use of solid biofuel, remote monitoring of the heating system status and maximizing the accuracy of data by automatically collecting telemetric information from thermal energy recorders, external sensors, etc.

Thus, the Energy Efficiency Agency has real time access to information about the air temperature in three rooms of the biomass-heated building, the temperature of the water in

In the past, water was heated by electric boilers and the kindergarten was paying a lot of money for not water. To save money, we used boilers with moderation. Our hands were freezing when we had to wash the dishes in the winter. We were merely warming up the water. Now it's a pleasure to work arrond a sink.

Vera BULAS – cook, at the "Povestea" kindergarten in the town of Nisporeni

REMOTE MONITORING SYSTEM



the return circuits, the atmospheric air, the amount of energy produced during a period of time chosen by user, either one day, one week, one month or another time. All of these data can be generated either graphically or exported to Excell or CSV data files.

The monitoring system consists of measurement units, a server and the web interface for users. The measuring units are equipped with a "programmable logic component" that collects the data, stores them locally with sufficient memory for 6 months of activity, and transmits them to the central server for storage and analysis.

The data is transmitted to the server via a 3G USB modem provided by a mobile operator at a cost of 20 lei per 100 MB monthly traffic. The unit is powered by the national power grid, but it also comes with batteries that allow it to operate autonomously for 10 hours.

SUCCESS STORY **THE VILLAGE THAT HAS BECOME A "CHAMPION" OF CLEAN ENERGY**



Green energy overtook the village of Things have changed radically after the town Crasnoarmeiscoe, Hâncești district. In the won a European grant worth 51,802 Euros last six years, all of the institutions in this village - high school, kindergarten and town hall, gave up the stoves and old heating systems and switched to modern biomass heating boilers. The swhitch was made with the support of the European Union, within the "Energy and Biomass" project, implemented by the United Nations Development Program, but also financed by the Energy Efficiency Fund. Due to these investments, more than 4700 people - adults and children – are cur- Now in all kindergarten rooms there is a conrently benefiting from better conditions.

Stoves became an item of decoration

At the kindergarten in Crasnoarmeiscoe, the few stoves that have not yet been demolished have become items of decoration. Until 2012, when the pellet fired boiler has been built, all the activity of the institution was focused around them. Although the building had a generous space of more than 1800 m2, children and educators were forced to jam in just In the last period, the institution has repaired a few rooms. The group room was also the bathroooms, classrooms, bought teaching bedroom, the canteen, and playground. In the cold season, sports and music and dance

through the "Energy and Biomass" project. The money was used for the design and construction of a 256 kW power plant and the procurement and installation of two biomass heating boilers. The community contribution amounts to 42,598 Euros, the money with which the interior heating system has been changed, but also the doors and windows of the kindergarten.

stant temperature of 21-22 degrees, and educators, and parents are very satisfied. The conditions have improved even further since, at the end of last year with European financial support, six solar panels were installed in the institution, providing for all the hot water needs for the 120 children and 16 employees. The cost of the project amounts to 13,835 Euros from the EU, with the community contribution of 4,235 Euros.

materials, and toys.

We were spending a lot of money on The money we were spending in the past called in absent, mothers had to keep them kindergarten. All that we save is investsed in home, and for this reason they could not work. creating conditions for children.

heat and hot water, but we lacked the to warm up some rooms, are now used to right conditions. Children often got sick, heat all the three functional blocks of the

Svetlana GRUBLEAC – the kindergarten director

classes were canceled, because it was almost **Energy efficiency projects have become a** as cold in the festive hall as it was outside. The water was heated by five electric boilers. and it was never enough. Several generations of children from Crasnoarmeiscoe have grown in this environment.

priority for the town hall

The success of the first clean energy project implemented in the kindergarten has led the town hall to look for new opportunities

to give up the stoves and coal permanently. Thus, in 2014, a biomass heating plant was built at the "D. Cantemir" lyceum in the village, the financing was provided by the Energy Efficiency Fund.

Three years after, at the end of 2017, with support from the "Energy and Biomass" project, a biomass heating plant was built in the town hall, where several services from the village are located - post, police, social assistance etc. The EU's investment in this project amounted to 34,357 Euros. With the help of the grant, a 78 kW thermal power plant was designed and built and a biomass heating boiler was installed.

The community contribution of 8,568.78 Euros was used to design and install the indoor heating system. Until last year, people entering the city hall were freezing on the hallway, waiting in line to pay for their utilities, to enter social welfare office or the tax inspector.

Although the institution has an area of over 600 square meters, in winter employees could only use a few rooms. The old heating system was out of operation since 92-93s and the administration was forced to build stoves, one of which was located right in the mayor's lobby.

Simultaneously with the town hall project, a biomass heating boiler was installed at the kindergarten in Talaiesti village, which is part of Crasnoaermeisoe, the financing - amounting to 38.756 Euro, being provided by the EU within the project "Energy and Biomass". The community contribution amounts to 5,214 Euros. At present, local authorities are looking for opportunities to build a thermal plant based on pellets or briquettes and in the gymnasium in Talaiesti.

After the green energy came to all of Crasnoarmeiscoe institutions, the mayor's office has been buying the pellets centrally,

We used to buy wood and coal, and in rooms where there were no stoves, for example in the police station, electrical heating was always in operation. The expenses were very high. Now, with the same money, we warm the whole area of the city hall, it's warm in the corridor as well. Everyone is happy.

Alexandru TODOSICIUC - mayor



Alexandru TODOSICIUC - mayor

it can better plan the heating costs, and the savings are invested in creating new facilities for the village people.

The Crasnoarmeiscoe village is one of the eight localities in Hancesti district that benefited from European funding under the "Energy and Biomass" project. All public institutions in these villages have abandoned traditional heating systems and switched to biomass boilers.



LAUNCHING GREEN TECHNOLOGIES IN THE RESIDENTIAL SECTOR

Subsidies for the procurement and installation of boilers in homes and micro-enterprises

The development of local biomass boiler manufacturing and assembly companies

Success story: "Neighbors were criticizing me for not getting connected to gas, but now they are envious"







are heated with individual stoves on wood or coal

the size of the subsidy for boilers on solid biofuel (pellets) with a performance of over 85% autonomy of at least 36 hours and automated control panel

have installed biomass boilers



have a low energy efficiency of individual stoves and lack thermal insulation



the size of the subsidy for simpler boilers (only on brickets) with a 75% performance and with

a 6-hour working autonomy

Households switching to biomass based heating is of great importance if we take into account that over 56% of Moldovan homes are heated with individual wood or coal based stoves, according to a survey by the National Bureau of Statistics in 2016 at the request of the Energy and Biomass Project.¹

Thus, the residential sector represents a great potential for reducing the consumption of fossil fuel in Moldova and at the same time, it is also a potential market for local producers of solid biofuels.

According to the same survey, households spend annually for heating with wood and wood waste - about 2.4 million lei and consume annually 2.7 million m3 of firewood and 338 thousand m3 of wood waste is burned in stoves. And this is happening at a time when the surface of forests in Moldova is relatively small, about 11% of the territory, while in Romania, for example, it is 29% of the territory and in Austria - 50%.

It is worth noting that due to the low efficiency of individual stoves and the lack of insulation of buildings in the rural areas where 79.3% of the dwellings are built largely before 1990 - much of the heat is lost. To save money, households are heating only part of their homes in the cold season.

Thus, in order to push the residential sector to switch to briquettes and pellets, which re-introduces agricultural waste into the economic cycle and is CO2-neutral, the Energy and Biomass Project has stimulated the installation of biomass boilers in households and micro-enterprises.



As a result of the Energy and Biomass Project, Moldova has developed the biofuel market from scratch. Our company has had many orders for boilers burning solid biofuel, including during the subsidy program. People already know the benefits of biomass due to various promotional activities, and green technologies occupy more and more space at specialized exhibitions. The market is expanding, consumers become more informed and wish to switch to green technologies. Like any sector in development, there are challenges that we still have to address - there are importers or producers of less conscious boiler producers that supply low quality products and disappoint consumers. The biomass energy sector still needs attention and support from authorities in order to develop.

Mihai LEON — biomass boiler supplier com pany accredited under the subsidy program

For solid biofuel boilers (both briquettes and pellets) with a yield of over 85%, and an autonomy of at least 36 hours, and an automated control panel, the subsidy amount was up to 1300 euros. For simpler boilers with a 75% efficiency, which only use briguettes and have a 6-hour working autonomy, the subsidy was 500 euros.

Thus, besides 233 public institutions, which consume 33 thousand tons of biofuel per year. 1134 households and 50 micro-enterprises have received subsidies from European funds for the procurement of biomass boilers between 2012-2016. In total, Energy and Biomass project provided subsidies in the amount of 24.2 million lei, which covered about 30% of the cost of boiler procurement and installation. The total installed power of the thermal plants is 25 MW, supplied by 24 local companies certified by the Energy Efficiency Agency.





on average, consumed a year a household

the installed capacity

SUBSIDIES FOR THE PROCUREMENT AND **INSTALLATION OF BOILERS** IN HOMES AND MICRO-**ENTERPRISES**

These companies have a wide range of boilers produced in the Republic of Moldova or assembled locally, from renowned manufacturers in Europe such as Germany, Poland, Czech Republic, Romania, Latvia, Greece. One of the conditions to obtain the subsidy was the local production or assembling of boilers purchased under this program.

Through directly subsidizing the procurement of equipment on biomass and solid biofuel at household level, as well as micro and small enterprises, the Program aims to stimulate in a feasible way both the demand for biomass fuel and the capacity of local companies to produce or assemble the necessary equipment for this type of fuel. In addition, the Program has contributed to the substitution of firewood, natural gas and other fossil fuels, mostly imported and used for the production of heating energy for the heating of dwellings and the production of domestic hot water with alternative fuels, locally produced from agricultural residues.

Thus, in 2016, Moldovan households consumed more than 20,000 tons of solid biofuel, one household consuming nearly 715 kg of briquettes, according to the same research by the NBS.

SUCCESS STORY **VICTOR DUMINICA: NEIGHBORS WERE CRI-TICIZING ME FOR NOT GETTING CONNECTED TO GAS, BUT NOW THEY ARE ENVIOUS WHEN WE COMPARE THE HEATING EXPENSES**



Victor Duminica is one of the beneficiaries of the Subsidy Program for procurement and installation of biomass heating boilers in private households. He found out about the benefits of biomass heating when working in Moscow in the construction field and when he returned back home, while making his own home in Truseni, decided that a solid biomass heating boiler would be more efficient and less expensive. coal was not burning fully, but melting in the

He chose a boiler with the capacity of 15 kW, which is enough power to heat a house of about 150 square meters. While his neigh-

I have concluded that it is more problematic and more expensive to install a boiler on natural gas. I would have had to pay for the thermal boiler over one thousand euros, another thousand for the development of the design, while the installation and connection to the gas pipe that passes right in front of the door, would be additionally 700 Euros.

I have insisted and installed the biomass boiler, and after about 2 months I have received the subvention. I am very pleased with the boiler, keeping my house at a temperature of 27 – 30 degrees, especially since my little girls were little then, and they liked staying in a warmer environment

All neighbors were criticizing me for this decision, but now they are envious when we compare the monthly expenses for heating.

bors are paying about three thousands lei per month for natural gas, the Duminica family spends about three times less.

The installed boiler is a universal one and Victor has experimented with several types of solid biofuel, till he found the most optimal one. He tried coal as well, but the price is high, while the quality left him cold – the burning room of the boiler, producing stonelike ashes, which is difficult to evacuate.

He tried wood pellets and others of a diverse composition, but has opted for the pellets made of sunflower shells. "For starters, I was buying biofuel at the market, where sellers were not providing either a warranty or quality certificates. I have searched for pellets



For starters, I was buying biofuel at the market, where sellers were not providing either a warranty or quality certificates. I have searched for pellets at the market, in shops, on the internet. One could find pellets from different distributors, but the best option is to buy directly from the producer. Last year I bought 5,5 tons of pellets from Horesti with 1500 Lei per ton. I started the boiler on October 1st and turned it off after Easter. in the second half of April. I these 7 months I used only 4.2 tons of pellets, thus I still have some left for this year.

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The boiler has automatic filling, where 150 kg of pellets are fitting in, and can be autonomous for about a week. The pellets are deposited in a special room in the boiler room, thus being dried and closer to the boiler. Additionally, the man has made with his own hands a water heater out of stainless steel and now he has available at any time 250 liters hot water.

Working in the construction field, Victor Duminica has made some changes to the heating system and now this one is even less expensive than the one proposed by the producer. The man was invited to several specialized exhibitions, including in Romania, to present his own scheme of his own heating system.

Besides the special circuit of the thermal agent, a part of his house has floor heating, which is even more efficient than the heating through radiators. The walls of the house where properly isolated with 5 cm thick extruded polystyrene, while the windows are with 6 rooms.

All these measures for energetic efficiency have contributed to the reduced energy consumption. Now, Victor Duminica plans to install several solar panels to produce his own electric energy, including for the periods when the current provider ceases electric energy delivery and thermal boilers cannot work.





BIOMASS HEATING IS THREE TIME CHEAPER COMPARED TO THAT ON NATURAL GASES

CREATION OF A LOCAL Leasing on favorable terms for biofuel production sector **BIOFUEL MARKET** 8% VAT along the entire value chain of biomass fuel production

First testing laboratory of biofuel physical and chemical parameters

www.piata-biomasa.md - a place where the demand meets the offer

Success story: Solid biofuel market as a "Blue ocean"



LEASING ON FAVORABLE TERMS FOR BIOFUEL PRODUCTION SECTOR



Leasing on favorable terms for biofuel production sector Moldova Energy and Biomass Project contributed to the crystallization of the biofuel market. Currently there are 84 biofuel producers with a total estimated production capacity of about 87.720 t/year operating on this market. To stimulate the offer, the Project has established a leasing line of one million Euro to finance procurement of briguette and pellet equipment, straw baling equipment, and trailers for bale transportation. The leasing line was managed by the Energy Efficiency Agency, while the 2KR Project Implementation Unit managed a Revolving Fund for the procurement of straw baling equipment and trailers for their transportation.

The Energy Efficiency Agency has provided more than MDL 9.8 million to 17 companies to procure briquetting and pelleting lines at favorable conditions. The equipment was provided with the possibility of repayment during 3 years with 0% commission, 0% interest rate and 0% VAT.

The leasing line with the Revolving Fund was launched back in 2012, and the 2015-2017 activities of Moldova Energy and Biomass Project focused on monitoring the leasing line activities and prepare the exit strategy and repayment of financial loans. Is the value of the leasing line that financed the purchase of:

- briquetting equipment
- pelleting equipment
- straw baling equipement
- trailers for transport

During this period, the 2KR Project Implementation Unit paid about MDL 2.9 million to processing and transportation equipment suppliers for 17 pieces of equipment - baling press, mincers, and trailers - a total number of 50 contracts being signed with companies for the delivery of 56 equipment units.





In addition, with the support of the Ministry of Economy and Infrastructure, Moldova Energy and Biomass Project promoted the introduc-We work with vegetal waste. This tion of a reduced VAT rate for the entire valwas considered garbage and ue chain of solid biomass production. The waste when spread or incinerated on fields Republic of Moldova applies the standard and along the roads and burned in open fire. 20% rate, reduced 8% rate and zero VAT rate. Once the biofuel producers started to collect The reduced VAT rate is applied on goods it, the waste became raw material and has considered strategic: bread, milk, medicines, been taxed since, although it is just vegetal natural and liquid gases and agricultural prowaste. The schools or state enterprises pay duce. Hence, biomass fuel producers were 20% more because of this VAT difference inmaking procurement of raw materials- agristead of being able to procure high quanticultural waste at the reduced 8% VAT rate, but ties of briquettes at a lower price. the supply was charged at the standard 20% VAT rate. The difference between the two VAT Ludmila ABRAMCIUC — a business woman rates brought additional tax pressure on the from Balti, who launched a briquette producproducers and led to price increase for contion line in 2009 sumers, who are mostly state institutions.

Consequently, the price for one ton of pellets or briquettes increased up to the price of one ton of imported coal, which placed the local producers in an unfair competition with the importers of fossil fuel, natural gas which was taxed at 8% VAT. An analytical study, commissioned by the Energy Efficiency Agency and conducted by Priminfo-grup Consulting, confirmed that the solid biofuel price has grown by 12% after the application of standard VAT. "We work with vegetal waste. This was considered garbage and waste when spread or incinerated on fields and along the roads and burned in open fire. Once the biofuel producers started to collect it, the waste became raw material and has been taxed since. although it is just vegetal waste. The schools or state enterprises pay 20% more because of this VAT difference instead of being able to procure high quantities of briquettes at a lower price", said Ludmila Abramciuc, a business woman from Balti, who launched a briquette production line in 2009.

A single VAT rate for the entire solid biofuel production value chain was introduced since 2017, from raw material to heating supplied to consumers. According to Article 96, (b)





of Law No. 281 of 16.12.2016, the reduced VAT rate was applied to "solid biofuel used to produce electricity, heating and hot water supplied on the territory of the Republic of Moldova, including raw material delivered to produce solid biofuel in the form of agricultural and forestry products, agricultural and forest vegetal residue, vegetal residues from food industry and

wood waste".

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FIRST TESTING LABORATORY OF BIOFUEL PHYSICAL AND CHEMICAL PARAMETERS



Companies that operate on a developed market cannot compete just based on the price and are forced to consider the quality of products. Hence, Moldova Energy and Biomass Project has supported the accreditation of the Solid Biomass Laboratory of the Moldova Agricultural University. The project funded the endowment of the Laboratory with modern equipment chemical analyser (CHNSCI), grinder, vibrating sieve - in the amount of USD 100 thousand. In 2015 the Laboratory was accredited to test physical parameters and in November 2016 - biofuel chemical parameters. It provides modern services, in accordance with EU standards and at competitive prices.

Moreover, the consumers of biofuel can be sure of the quality of the purchased product asking for the certificate of conformity in line with the national standards, which actually transpose the EBPlus European Standards. Moreover, public authorities that heat their premises with biofuel may request laboratory tests results, and the producers have the possibility to verify the parameters of biofuel. In the past, when the local producers of pellets or briguettes wanted to export their products, they had to test them in Romania or other countries and had to send samples for each exported batch.

"We used to export biofuel to some EU countries and we had to do the certification overseas. Today we go to Chisinau laboratory, where we can obtain quality certificates much easier from the logistical point of view and cheaper", said Nicolae Dragan, owner of a briquette production company. According to him,

We used to export biofuel to some EU countries and we had to do the certification overseas. Today we go to Chisinau laboratory, where we can obtain quality certificates much easier from the logistical point of view and cheaper.

Nicolae DRAGAN - owner of a briquette production company

laboratory testing allows him to improve the biofuel to meet the requirements of the buyer, and hence, have bigger sales. In 2017, 25 companies benefited of testing services of high and low calorific value, humidity content, ash and volatile materials, density, mechanic resistance and chemical content of biofuel.

Certification of biofuel quality has become compulsory since 25 March 2017, according to the Law on the Promotion of Renewable Energy, Ouality requirements of biofuel produced in the Republic of Moldova are contained in the Regulation on solid biofuel approved by the Government (Decision No. 1070) on 27 December 2013.

According to these documents, each batch of biofuel placed on the market shall contain information about country of origin, date of production, validity, size, calorific value, ash content, humidity, additives and nitrogen, chlorine and sulphur content, physical and mechanic features, such as mechanic durability, bulk density, geometric indicators and content of fine fractions. All these indicators mentioned on the label shall be confirmed by the seller/producer in the test report, i.e. a certificate with results of tests conducted by the Solid Biofuel Laboratory within the Agrarian University of Moldova. The authority overseeing the quality of biofuel placed on the market is the Agency for Consumer Protection and Market Surveillance (APCSP), which verify the observance of the Regulation on solid biofuel by the companies. Hence, the consumers who are not content with the biofuel quality can address the APCSP.

PIATA-BIOMASA.MD -PLACE WHERE THE DEMAND MEETS THE OFFER

> Launched in November 2016, the web portal piata-biomasa.md represents a platform where the demand meets the offer, solid biofuel boilers, raw materials and market-specific services. The portal provides structured information on green technologies available on Moldovan market depending on the type of beneficiary – household consumer, company or public authority, as well as legal database in force on energy sector, studies and research on market evolution.

> Biofuel producers or suppliers of raw material can find useful information about the available biomass potential by regions, biofuel characteristics, and steps to launch a business in the field. Consumers will be able to find out about the advantages of biomass heating, how to calculate the energy consumption of the apartment, including an automatic calculator of the necessary capacity of heating system depending on certain parameters of the apartment. Also, the consumers may find lists and contacts of solid biofuel suppliers, heating plants, authorized energy auditors, etc.

> Last but not least, the portal functions as a market of biomass products; its home page is actually a page for product sale and purchase announcement publication. The announcements are moderate to exclude those not related to the topic.





SUCCESS STORY **SOLID BIOFUEL MARKET AS A "BLUE OCEAN"**



We were initially distributing products, and we expanded our business. and then getting in touch with people who month, we now produce in one day. were interested, presenting our products and explaining the benefits of biofuel Ludmila ABRAMCIUC - company manager heating in relation to natural gas, wood or coal. Gradually, the ice broke, people became more and more interested in these

Instead of fighting on a market with many competitors, where the competition is fierce, and the profits are small, Ludmila Abramciuc, together with her husband Ivan Damaschin, decided to test the "blue ocean" theory, is to create a market for a new product, educate consumers and make profit. The young family dared to launch their first solid fuel production business in 2008, during the time when the National Gasification Program was in full swing, understanding that it will take a long time for the consumer in Moldova to accept heating with biomass.

leaflets to people about this new The amount of briquettes and pellets that possibility of heating their homes, we were producing at the beginning in one



The first equipment was imported from Italy and had a capacity of only 100 kg of pellets per day. Now, in one day Ecobricheta produces as much as it used to produce at first in a month. Ten years later, the company can produce 20 tons of biofuel a day, enough to heat 80 schools. However, public institutions represent only 20% of the company's sales market, 80% being sold to domestic consumers in the north.

Enterprise growth accelerated after having benefited from financing from the leasing line launched by the Energy and Biomass Project in Moldova and managed by the Energy Efficiency Agency.

Ecobricheta has installed new equipment worth 15,000 euros, with a three-year funding with both interest and VAT at zero rate.

Ecobricheta is one of the 35 beneficiaries of the European Union-funded leasing program. Even though it has substantially increased its production of biofuel, the company has a hard time fulfilling the orders, many of which come from household customers who replace their gas to biomass boilers. Every year, more and more people are convinced that biomass heating is more economical, more efficient and greener, and demand is increasing.

With the development of the biofuel market, agricultural producers started charging money for agricultural waste that they previously burned or left in the field. Thus, the costs of biofuel producers have increased significantly in recent years. To have their own raw materials and to reduce costs. Ludmila and Ivan s are leasing 65 hectares of agricultural land for a period of 30 years and have planted energy willows.

Willows grow up to 3.5 cm per day, and can be ready in the second year after planting, providing a yield of about 20 tons of wood per hectare with o% theoretical moisture content.



Our future plans include aligning to European standards in all areas of production, not just in terms of quality of manufacturing briquettes, which is the key to our success. We plan to turn this area into a green oasis, where sustainable energy is promoted.

Ludmila ABRAMCIUC - company manager

Recently, the couple purchased a building of 5000 square meters in an industrial area of Balti, allowing them to work comfortably and provide stable jobs for 30. The building allows them to make new plans - the installation of rooftop solar panels and wind turbines that would provide necessary electricity and possibly sufficient power to be delivered into the network.

A ton of briguettes costs about 2400 lei, enough to heat a house for several months, depending on the outside temperature. Thus, the monthly costs are much lower than in the case of gas, wood and coal.

Victor RUSU — from Belicenii Vechi village, Sangerei rayon, who came to Ecobricheta to buy briquettes for the next heating season



SECTOR

GREEN ENERGY DELIVERY MODEL WITHIN PUBLIC-PRIVATE PARTNERSHIPS



Moldova Energy and Biomass Project support- company will hire operators of heating sysed three pilot Public Private Partnerships on heating supply in 2013-2017 in Leova, Ungheni and Nisporeni Districts. By establishing these PPPs, public authorities have committed to provide a public service to supply heating to a number of public institutions in the target districts, and the heating service management, including the procurement and installation of biomass heating plants, solid biomass supply and management, operation of plants during heating season, technical maintenance of plants, etc. was vested with a private company that included the costs and profits in a single tariff for 1 Gcal, paid by public authorities.

The first Public-Private Partnership was launched in 2014 in Leova, where 25 public institutions benefit of heating supplied centrally by a private company. The company invested half a million Euro in the installation of 19 solid biomass heating plants and took over 6 biomass systems installed in the district with the support of the Moldova Energy and Biomass Project and other donors. During 11 years, the

At the beginning all changes are met with resistance, but during the first heating season, the institutions' managers got convinced of the benefits of the partnership. The 7 institutions received heating on time, in accordance with the contract terms and conditions, at a reasonable price, and the cost of a Gcal was MDL 750 compared to MDL 1400 for gas.

Victor VOROBIOV – private partner

tems and pay them salaries, will supply biofuel during the entire heating season and will ensure the maintenance of heating systems. In turn, the authority pays the tariff for one gigacalorie and after the expiry of the contract. will become the owner of the heating systems.

Ungheni is the second district that launched a Public-Private Partnership in February 2017. where the schools in Bumbata, Zagarancea, Valea Mare, Sculeni and Harcesti villages and kindergartens in Floritoaia Veche and Condratesti villages, a total of 7 public institutions, have shifted to biomass heating. 5 heating plants were installed with the financial support of the European Union within Moldova Energy and Biomass Project and two other were installed by a private partner. Green Energo Company. It implemented other energy efficiency measures in the buildings connected to biomass heating. The total investment of the company accounted for MDL 1 million. The company will recover its investment and will manage the heating plants for 10 years, and transfer them in good state to the District Council.

The Nisporeni Public-Private Partnership is based on two types of contracts: 1. Design - Construction - Operation - Transfer and 2. Rehabilitation - Operation - Transfer. In other words, the company designed and installed four heating plants in schools of Marinici, Iurceni, Seliste and Balanesti, other three plants in Soltanesti, Bratuleni and Varzaresti villages are transferred for management and rehabilitation. At the end of a 10-year contract, the heating plants will be transferred to Nisporeni District Council.

As in other districts, Moldova Energy and Biomass Project financed rehabilitation works and installation of heating plants accounting for a total of Euro 100 thousand. The private partner invested MDL 1 million, and the Nisporeni District Council contributed with MDL 350 thousand. The tariff for one Gigacalorie in Nisporeni district is MDL 898 and is lower than the average tariff for one Gcal of centralised heating in the Republic of Moldova, which was MDL 1125/

Gcal in 2014. The tariff for heating supplied by the three PPPs is revised annually by District Councils depending on many indicators, including the inflation, price increase for biofuel, costs associated to electricity and salaries. "Such partnership cannot but make you ac-

countable. When we participated in tenders in the past, we would receive the certificate of quality, set a market price and did not care if the biofuel burns or not. Today, we are paid for supplied Gigacalorie. The better the biomass, the lower the consumption and it is a win-win situation", explained Victor Vorobiov, entrepre-

neur. The Ungheni and Nisporeni PPPs are success stories because the entrepreneur is a local biofuel producer. Almost half of the needs of beneficiaries can be met from own production. The economic operator has a stable market for at least 10 years and moreover, has extended the activity to heating plants management.

Before the installation of biomass system and implementation of public-private partnership in beneficiary public institutions, only 70% of necessary heating was delivered, and the employees had to come early morning to make fire and heat the buildings before the children could start the lessons. Now, the heating comfort is ensured 100%, and public institutions have committed on contract basis to ensure a certain level of temperature in its rooms, and are not tempted to 'save' money on the thermal comfort of children.

Moldova Energy and Biomass Project experts recommend to public institutions that installed solid biofuel heating plants to form groups of beneficiaries to be able to launch new Public-

Such partnership cannot but make you accountable. When we participated in tenders in the past, we would receive the certificate of quality, set a market price and did not care if the biofuel burns or not. Today, we are paid for supplied Gigacalorie. The better the biomass, the lower the consumption and it is a win-win situation.

Victor VOROBIOV – private partner

These works will result in more efficient energy consumption in respective buildings, and the cooperation of more public institutions in a public-private partnership will ensure the economic and financial viability of this model. At the same time, the use of this PPP will advance the implementation of legal energy efficiency requirements. According to Energy Strategy 2030, the Republic of Moldova has committed to reduce the energy consumption in buildings by 20% by 2020, and 10% of public buildings should be renovated by then.

To facilitate the replication of Public Private Partnerships in three districts, Moldova Energy and Biomass Project developed the Guide of Best Practices in Establishing and Managing a Public-Private Partnership in Biomass Energy Supply. It provides both theoretic information and practices such as, phases of PPP creation and detailed structure of documents necessary for each phase – examples of cost analysis – a benefit in making decisions to launch a PPP, feasibility study, technical specifications or PPP contract, etc., as well as a number of technical, legal and financial recommendations.

Private Partnerships. In this case, the investment of private partnership will be used to accomplish a number of energy efficiency increase measures in buildings, including the rehabilitation of heating points and distribution networks (pipe and radiator change or reparation), insulation of outer walls and building roofs, replacement of old doors and windows, etc.







LEOVA 2014

25 – public institutions 500 000 EUR – Private

Partner's investment

19 – thermal power stations installed

6 – biomass heating systems taken over

11 – years the company will provide jobs, fuel and maintenance

UNGHENI

2017

7 – public institutions

1000000 lei – private investment

5 – biomass heating systems installed within Energy and Biomass Proiect

2 – thermal power stations installed by Green Energo

750 lei / Gcal – the tariff in the Ungheni district

NISPORENI 2017

4 – biomass boilers designed and installed

3 – biomass boilers taken over and rehabilitated

100.000 euros - total investment in rehabilitation works and installation of biomass heating systems

1.000.000 lei – private partner`s investment

350.000 lei – Nisporeni Raional Council's contribution

898 lei / Gcal the tariff in the Nisporeni district

INTER-MUNICIPAL COOPERATION MODEL IN COLLECTING BIOMASS AND **BIOFUEL PRODUCTION**



Another innovative instrument in promoting biomass usage in heating is the inter-municipal cooperation mechanism (IMC), which implies the collection of vegetal waste from pared tender documents and contracted an city green spaces and use of other unused entrepreneur to procure and install producvegetal waste as raw materials. A foreign expert was hired to study the capacities of municipal sanitation companies in other districts, selecting Rezina and Cimislia as best options. Feasibility studies on solid biofuel production launching were developed for ers were adapted to transport wood mince. two districts. Based on benchmarking and SWOT analysis, it was decided to implement consists of one feeding bunker, solid object the IMC service in Cimislia district, which has separator, hammer mill, dryer on production available biomass, managerial skills, available infrastructure, etc.

Municipal enterprise "Public services Cimislia public services will deliver biofuel Cimislia" has three tractors of Soviet produc- to 8 public institutions in the district that tion and one New Holand, trailers, as well as one bulldozer and excavator used for sanitation activities, waste and branch evacuation, as well as snow clearance. These can be installed solid biomass heating boilers. involved 3 days a week in biofuel collection and production. The company has 61 employees in sanitation/auto park, water and sewage, who can be involved in biofuel production, especially collection and transpor-

According to the feasibility study, the theoretic biomass potential in the district is about 10 thousand ha of woods, forest belts, urban green spaces, agricultural land or individual households. Also, dried lakes were taken into account with an area of about 150 ha which can be used to plant energy willow in the future. Hence, the annual theoretic volume of biomass waste for Cimislia may account for about 16,813 tons, with an energy power of about 241,529 GJ. Branches of 12 cm diameter can serve as basic raw material. The collection of raw material shall be done following sanitary and cleaning works of green spaces in urban areas, forests and forest belts.

To prepare and launch the biofuel production, the UNDP Moldova signed a partnership agreement with Cimislia City Hall in November 2017, which renovated the production unit of municipal enterprise. In turn, Moldova Energy and Biomass Project pretion equipment.

The company was equipped with mobile mincer to mince the branches collected before transportation, front loader and the trail-The production line with 450 kg/h capacity line, cooling system for briquettes, press for briquetting, accessories for packing briquettes, and a general control panel.

moved to biomass heating with the support of Moldova Energy and Biomass Project, as well as about 3% of residential units that

According to the Sustainability Plan after the finalization of Moldova Energy and Biomass Project, the activity of the company will be monitored to receive relevant information tation of wood waste to its processing point. about the quality, quantity, supply calendar and price before, during and after heating season supported by documents, as well as other issues that may arise.

BENEFITS OF THE INTERMUNICIPAL PRODUCTION MODEL

REPLICATING THE BUSINESS MODEL AT LARGE SCALE BY FACILITATING THE TRANSFER OF TECHNOLOGY AND GOOD PRACTICE AT THE LEVEL OF OTHER LOCAL **OPERATORS** OF PUBLIC UTILITY SERVICES

CREATE VALUE ADDED **IOCALLY** (MONEY PAID FOR ENERGY REMAINS AT THE LOCAL LEVEL INSTEAD OF GOING OUTSIDE COUNTRY TO BUY FOSSIL FUELS) AND GIVING AN IMPLII SF TO ECONOMIC DEVELOPMENT

CREATING ALTERNATIVE INCOME SOURCES. BY DEVELOPING AN ADDITIONAL ACTIVITY. WITH A MARKET ASSURED. PROMOTION OF DEVELOPMENT OF NEW COMPETENCES AND CAPACITIES

> STIMILIATING THE MANAGEMENT OF FORESTRY ZONES AND GREEN MUNICIPAL SPACES

> > CREATING EMPLOYMENT OPPORTUNITIES. BY CREATING NEW JOBS

Hence, the Agricultural College of Taul that provides specialised training in forestry and public gardening received a grant of MDL 2.1 million from Moldova Energy and Biomass Project, European Funds to install a briquetting line and a solid biofuel heating plant.

The briquetting line Piny Kay, with a capacity of 250 kg/h, is located closely to own agricultural land and is fed fully with raw materials from processing waste. The agricultural college has more than 406 hectares of agriculturalland: 270 ha of agricultural land and 76 ha of orchards and one hectare of vine plantation.

Briquettes produced on spot feed the solid biofuel heating system with a capacity of 93 kW, which heats the tunnel-type greenhouse with an area of more than 700 square meters. Moreover, the hostel of the institution that can accommodate 287 students is also heated by biomass. During its first phase, Moldova Energy and Biomass Project installed a heating system based on burning baled straw collected from the land of the College. The heating of the hostel with solid biomass is twice cheaper compared to natural gas heating, according to the Director of the Agricultural College of Taul, Aurel Serdesniuc. Besides economic value, this

the amount of the grant to the College of Taul to install a briquetting plant and a biomass heating system



from Orhei

INTEGRATED BIOMASS ENERGY PRODUCTION MODEL

involved in providing labour force for biofuel industry working closely with some technical and professional schools and colleges. Some included a closed cycle of demonstrative biofuel production besides the newly established subjects – starting with cultivation, growing, collection, and production of solid biofuel to its use in heating a building.

Moldova Energy and Biomass Project has equipment will also be used in practice by the College students from such specialities as Agronomy, Horticulture and Viticulture, Forest and Public Gardening to expand their practical knowledge of biomass heating.

> The Orhei Professional School that provides specialised training to foresters procured and installed a briquetting line with the capacity of 150 - 300 kg/h. situated next to own agricultural land nearby Cucuruzeni locality. It will function based on agricultural waste from fruit trees, and the biofuel will heat the school canteen with an area of 745 square meters. The canteen will be heated by a heating system with the capacity of 80 kW based on biomass briquettes burning. The students of the professional school planted one hectare of energy willow and one hectare of acacia, which will serve as raw material for used ecologic fuel. At the same time, both energy crops and solid biomass production lines and heating plants serve as educational obiectives of the institution.

capacity of the Piny Kay briquetting line, Taul

capacity of the briquetting line

the capacity of the thermal power plant that heats the greenhouse with the surface over 700 m² and the boarding house of the institution

installed boiler capacity to heat the school canteen in Orhei, with an area of 745 m²



BIOENERGY MARKET ASSOCIATE TO Association of Solid Biofuel Producers **GROW TOGETHER**

KEYACTORS ON Association of Biofuel Producers and Bioenergy Cluster

Partnership with Czech and Romanian Clusters for circular economy model development

INTERVIEW: Vladimir Bragaru

ASSOCIATION OF BIOFUEL PRODUCERS AND BIOENERGY CLUSTER

The "cluster" phenomenon has been known for many decades. This form of association offers continuous benefits to its members and influences positively the economic development of the country, in general. International studies show that clusters increase the added value of products, create new jobs, generate additional taxes, and contribute to infrastructure development, and ultimately, economic growth and positive changes at macroeconomic level. Moreover, according to a study published in 2017 in the Scientific Annals of Economics and Business² the development of cluster activities contribute to the increase of energy security of the country.

supported the launching of first Cluster in the Republic of Moldova, which will ensure the cooperation between different actors involved on the biomass market and will boost Czech Republic and Romania. sector development. The Financial Agree-

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Green Energo LLC

Argon Sigma LLC

ment of the Cluster was signed in March 2017 and consists of 23 members – private companies, pubic authorities, research institutions, universities, active associations in green energy sector. Its mission is to develop a link between the business environment, research organisations, universities and public administration to improve cooperation, boost innovation and spread the information about beneficiaries and biomass opportunities.

To continuously support further development of the Association and Cluster. Moldova Energy and Biomass Project mobilised resources to create external partnerships. The Bioenergy Cluster succeeded Hence, Moldova Energy and Biomass Project to obtain funds from the Czech Trust Fund and Eastern Partnership funded by the European Union to develop bilateral cooperation with specialised institutions from the

During the cooperation with Czech Biomass Association, a number of trainings for members of the Cluster and Biomass Association of Moldova, study visits, a BioForum with the participation of biomass producers, importers, and biomass equipment manufactures were conducted.

During the training organised in Chisinau, a mapping of stakeholders interested in biomass market development and existing relations as well as cooperation opportunities was carried out. Also, the biomass was examined as an example of circular economy, including by collecting solid waste. The training was followed by a documentation visit to the Czech Republic, where 15 members of the Biomass Cluster of Moldova found information about the business models of local Cluster and link between the corporative sector and biofuel market development methods.

According to Jan Habart, Chairperson, CZ Biom, the main objective of the Cluster is to create partnerships between all stakeholders – private companies, public authorities and research institutions. "Cluster performance has been defined to generate a value tomorrow. Hence, the Cluster should change the accent from simple trade to innovation", Furthermore, the procedures for sector study said Jan Habart.

The second seminar on Cluster capacity development took place in February 2018. The seminar was organised by t he Czech Trust Fund in partnership with represen- Republic of Moldova signed a partnership tatives of Biomass Association from the

According to the Roadmap, a Secretariat was planned to be established in 2018 and the analysis of Cluster members structure to develop a differentiated contribution system depending on financial capacities of each member, as well as key advocacy objectives to enhance national legislation were drafted. The Roadmap stipulates promotional and educational activities for 2019-2020. development were planned to be launched to support the long-term strategy of the Cluster for a 15-year period. In addition, the Biomass Cluster from the

ASSOCIATION OF SOLID BIOFUEL PRODUCERS

Cluster management is provided by a sector Association was to obtain funding from the Association that represents and promotes Global Environment Fund to plant 26 hectthe interests of solid biofuel producers.

The Association of solid biofuel producers was created in 2017 with the support of Moldova Energy and Biomass Project. ers focused initially on agricultural waste velop new business of biofuel in the region Currently, many solid biofuel producers have gained market experience and understand the need to cooperate to develop the inter- to 45 tons of wood mass per hectare, and in prices", said Vladimir Bragaru, Chairperson nal biofuel market and dedicate time to this objective.

7 most active producers created the Association of Solid Biofuel Producers. 9.000 m2 during the entire heating season. Later their number reached 17. It organised many activities, including national bioen- In March 2018, a contest to select benefiergy forums, study visits for its members, ciaries of subsidies to plant between 5 and business and training forums, and biofuel 8 hectares of energy willow ensuing own quality assurance.

State Agrarian University of Moldova "Alecu Russo" State University of Bălti Institute of Genetics, Physiology and Plant Protection under the Academy of Sciences of Moldova

ASSOCIATION OF SOLID BIOFUEL PRODUCERS IN MOLDOVA:

Botanical Garden Institute under the Academy of Sciences in Moldova

Construction Centre of Excellence

Technical University of Moldova

- Agricultural Theoretical Lycee of Chisinau
- Vocational School of Cuhurestii de Sus
- Vocational School of no. 3. Chisinau
- Vocational School of Orhei
- North Regional Development Agency Centre Regional Development Agency South Regional Development Agency Ungheni District Council Leova District Council Organisation for SME Sector Development (ODIMM) The Network of Business Incubators in Moldova Chamber of Trade and Industry National Environment Centre Balti Free Economic Zone Business Incubator of Cimislia The organization of Young Managers

Energy Efficiency Agency

PARTNERSHIP WITH CZECH AND ROMANIAN CLUSTERS FOR CIRCULAR ECONOMY MODEL DEVELOPMENT

Roadmap for 2018-2020 were developed during the seminar. Members of the Cluster approved the documents on the second day of the workshop.

Hence, with the support of partners from the Czech Republic, a local market assessment has been conducted that included key challenges and current advantages, as well as interests of all involved parties that have to be satisfied through market development.

agreement with the Green Energy Cluster Czech Republic. The Strategy on biomass from Romania to share experience be-

resources and their mobilisation and the tween the two institutions. The goal of the Memorandum is to promote biomass energy and enhance the efforts in combating climate changes. The document was developed with the assistance provided by EaPlus Programme.

> "The biomass subject is very important for the Eastern European countries including for the Republic of Moldova. The cooperation between clusters opens new doors to harness new inter-regional projects such as InterReg Danube, which would stimulate biomass energy sector development", said Lajos Vajda, Chairperson of Green Energy Cluster from Romania.

> Hence, a two day documentation visit was organised to Romania jointly with the Green Energy Cluster, during which the members of Biomass Cluster from Moldova visited biomass energy projects: flower greenhouses heated with green energy, integrated waste collection models, and energy crop plantation. Moreover, the participants talked to members of Romanian Cluster about international cooperation in bioenergy sector.

ares of energy willow by the members of the organisation. Growing about 3 cm a day, the willow solves the issue of raw material for biofuel production. In Moldova the producgood conditions, may produce about 60 tons per hectare. Twenty-six hectares of energy willow cover the need to heat a total area of

According to international best practice, the One of the earliest successes of the contribution of USD 1100/ha that covers the land preparation works and plantation maintenance was organised. "The financing programme will boost the development of solid biofuel sector in the South where there is a smaller number of briquette and pellet producers. An energy crop plantation will dethat has become more expensive and less and will enhance the access of the consumaccessible. The energy willow generates up ers to biofuel or wood mass at favourable of Bioenergy Association of the Republic of Moldova.

INTERVIEW **VLADIMIR BRAGARU**

CHAIRPERSON OF THE ASSOCIATION OF BIOFUEL PRODUCERS AND OF BIOMASS ENERGY CLUSTER

MANY OF THESE ARE MEMBERS OF THE ASSOCIATION? IS THE BIOFUEL SECTOR READY TO ASSOCIATE TO ACHIEVE COMMON OBJECTIVES OR DO THE PRODUCERS SEE THEMSELVES AS COMPETITORS?

IN MOLDOVA THERE ARE 84 BIOFUEL Initially we were 7 companies, but we have more than 20 members of the Association at this moment, both individuals and legal entities from this sector. Our members are large companies that produce at large scale and small producers, who understood the advantages of being a member of a sector Association.

> Irrespective of the number of members, the Association represents the interests of the entire biofuel production sector and we represent the voice of each producer in its relation with public authorities and other partners.

HOW DO YOU CONVINCE THE COMPANIES TO ADHERE? WHAT BENEFITS DO THE PRODUCERS RECEIVE WHEN THEY ADHERE TO THE ASSOCIATION?

PRODUCTION COMPANIES. HOW

The Association organises periodic trainings for its members, especially on topics related to the quality of products because it has to focus on the fight to get clients and not on the price. During periodic meetings of the Association we discuss sector situation and decide if interventions are necessary; we try to find solutions together. The members benefit of consultancy from the staff of the Association and support in dealing with the State or certain state institutions.

Another line of activity is the identification of financing resources for sector's benefits. For instance, we benefited from a grant awarded by the Global Environment Fund (GEF) to plant 26 hectares of land with energy willow and create platforms for agricultural waste collection for further solid biofuel production. The project started in September 2018 and has the goal to create three platforms for agricultural waste collection and planting of three energy willow plantation on 8 to 10 hectares.

The Association has more projects for financing which we will announce in due time.

WHICH ARE THE MAIN ISSUES FACED BY THE SECTOR?

The notion of biomass reminds some consumers from Moldova of archaic methods of heating and not necessarily associated to modern advanced technologies, although the perception has changed essentially in the last years.

As we have mentioned before, the raw material and its price is another issue in the sector. Taking into account that the forest area is limited in Moldova, the raw material comes from agriculture. It increases the prices of solid biofuel and in parallel, with recent reduction of nat-

HOW DO YOU APPRECIATE THE DEVELOPMENT OF THE AGENCY? WHAT IS THE STAFE? WHAT ARE THE MEDIUM-AND LONG TERM OBJECTIVES OF THE ASSOCIATION?

ficient.

THE ASSOCIATION IS THE MANAGEMENT ENTITY OF THE BIOENERGY CLUSTER FROM MOLDOVA, WHAT HAS THE CLUSTER DONE UNTIL NOW?

> With the support of partners, we succeeded to organise many training courses and study visits to learn about cluster functionality models, for instance in Romania. We tried to help our colleagues to understand each other's role in a cluster, who are their potential partners and what activities they can develop together.





ural gas prices, it is to the detriment of the biomass producers. One of the main problems of the sector is the quality of the biofuel. At the beginning of 2010, it used to be a modern business started by many random people who do not respect the technological production process, so the consumer gets a non-compliant product - biofuel without necessary density and calorific power.

If a producer stops his/her activity because people do not buy his/her products of poor quality – this is his/her problem, but if the entire idea of biofuel disappoints a client, then all sector producers have a problem. Hence, the Association's challenge is to encourage the biofuel producers to deliver a qualitative product.

Currently, our staff consists of three persons: Chairperson, financial expert and project manager. Taking into account the workload and activities we have now, it is suf-

The Association's objectives are to promote solid biofuel and its consumption; address the deficit of raw materials in the sector; raw material price, which actually determines greatly the viability of the field in general influencing directly the price of final product. Also, we would like to initiate discussions with public authorities to eliminate Value Added Tax. once we have succeeded to reduce it to 8%. If we want to promote renewable energy sources, the sector should be supported by tax incentives. The State has to send such signals to business environment.

Currently, we operate without certain contractual obligations. It is a social commitment of all member institutions to contribute to sector development. Strategic documents of the Cluster were developed - Rules of Procedure, constraint analysis, resource mobilisation plan, and medium term roadmap.





DEVELOPMENT

Training Centre for green energy system operators

from beneficiary communities know how to mobilize local funds

contribution of communities to renewable energy systems installation







TRAINING FOR TARGET **GROUPS:**

OPERATORS, MANAGERS, PROCUREMENT SPECIALISTS, AND CENTRES OF EXCELLENCE

Being a relatively new area in the Republic of Moldova, practically all involved actors on solid biofuel market need to continue to enhance their skills. Moldova Energy and Biomass Project was designed to provide support from the very beginning for capacity development of actors along the entire value chain of biomass fuel, from workers with basic qualifications, assemblers, boiler installers and operators, to managers of beneficiary institutions, leaders of sector associations.

In the case of beneficiary communities, Moldova Energy and Biomass Project had an inclusive and participative approach, and people from the community became part of the process of shifting to biomass heating from planning to communityfinancialresourcesmobilizationfornewecoprojects.

Hence, training modules were developed; the Project representatives provided assistance to key actors at different phases of project implementation – both in participative identification of public buildings that have to shift to biomass heating, mobilization of population and community resources, joint energy audit of public buildings, preparation of project and budget proposals, as well as ensure daily operation and long-term maintenance of installed biomass heating systems.

COMMUNITY MOBILIZATION

Since the lunching of the second phase of At the same time, the representatives of pub-Moldova Energy and Biomass Project, 125 seminars were organised in community mobilization with the participation of 1,460 persons, of which 1,163 women. Other 113 seminars with the participation of 1,701 persons, including 1,374 women were organised with a focus on biomass heating project management. 27 seminars were dedicated exclusive-

ly to hot water production by solar panels.

After the approval of investment phase, each community developed detailed plans for biomass heating project implementation. Local leaders, directors and staff of public institutions identified specific steps of project implementation, such as identification of procurement source for biomass fuel, ensure proper storage, hiring additional staff, performance indicators, setting A central focus of training courses was the responsibilities and exchange of best prac-

tices in community project management.

At the final phase, seminars were organised for community representatives that had to transfer the heating plants from the communities that did not use them, according to a decision of May 2018 on the approval of investments. All selected communities for investment phase to install the biomass heating plants and solar panels succeeded to collect thanks to training and assistance from Moldova Energy and Biomass Project over USD 1,25 million as own contribution additionally to European Union financing to install solid biomass heating plants and solar panels for heating hot water.

Data covers the period 2011-2018

lic institutions have benefited of training in sustainability, monitoring and evaluation of biomass heating projects. These obtained knowledge in diverse biomass energy production technologies and principles of correct administration of biomass heating systems.

The most important subjects included in training modules referred to energy efficiency measures in public institutions, typology of biomass boilers, procedures necessary to maintain and operate, safety and fire rules, setting efficient relations with local fuel suppliers, biomass fuel planning and procurement, key quality parameters for solid biofuel, legal and institutional framework for renewable energy and energy efficiency in Moldova.

quality of biofuel as well as timely procure ment and proper storage. Such seminars were organised for about 1600 persons in 113 beneficiary communities.

TRAINING CENTRE

FOR GREEN ENERGY SYSTEM OPERATORS

At the same time, biomass heating plant operators were trained in subjects related to system management, maintenance and conservation. The training was organised by the Training Centre of Operators, opened under the Centre of Excellence in Constructions. Nine training courses were organised for about 138 operators from 57 communities.

The Training Centre of operators within the Centre of Excellence in Constructions has the purpose to ensure sustainability of training activity after the closure of Moldova Energy and Biomass Project by organising 40 academic hours of training (theoretical and practical), 90 hours and 150 hours to train future operators. Training modules were approved and endorsed by the Ministry of Education, Culture and Research for the good functioning of the Training Centre. For the operators of combined heat and power plants, a Technical Guide was developed to use and maintain combined heat and power plants.

The Guide was disseminated during training activities to the operators and beneficiaries during the acceptance of solar panels as well as vocational schools that train biomass heating system operators, such as Vocational School No. 3 of Chisinau.

EDUCATION New specialities/professions in vocational schools

Renewable energy course in schools

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50

National Contest -Renewable Energy Sources

Summer school "ENERGEL"

Success story: Chiscareni – home of green energy



NEW SPECIALITIES/PROFESSIONS IN VOCATIONAL SCHOOLS

The labour market in the Republic of Moldova is competitive and, is increasingly based on knowledge, professional and academic skills. This is confirmed by the questionnaire addressed to companies³ in biofuel sector that 100% understand the need for initial training of Works' was developed for students from in educational institutions for their employees and 70% need and organise the participation of their employees in short-term inter- In May 2017, first graduates of this specialnal or external training.

The requirements of labour market are in continuous evolution, and professional development system has to be adapted to provide the employees with new opportunities, and the employers – qualified labour force that meets the expectations of a qualification certificate holder.

Hence, Moldova Energy and Biomass Project initiated pilot educational modules in several vocational schools within existing professions to cover the needs of bioenergy sector. After studying the Classifier of Occupations of the Republic of Moldova and Nomenclature of Crafts of the Republic of Moldova, documents have been developed to introduce Biomass Boiler modules for the occupation Boiler Operator and Energy Plants – Renewable Energy Source within Forester profession.

Addresses with explanatory note and justification as well as module description, content, selected institutions for piloting, training of teaching staff, and endowment of laboratories for practical training were submitted to the Ministry of Education. A new occupation 'Boiler Handler' was introduced in the Nomenclature of crafts/professions.

The vocational schools from Orhei and Cuhurestii de Sus, Florești District piloted the course Energy Crops within the Forester profession. The Vocational School No. 3 from Chisinau was selected to pilot Biomass Boiler Operators course. The modules include 40 hours of classes and focus on the entire production cycle - from planting, harvesting, and production of biofuel as well as maintenance works.

The pupils within Forester profession, who study the energy crops module, can enjoy the first Manual developed in the Republic of Moldova - Energy Crops - Renewable Ener-

gy Source, which will serve as guidelines to children studying this profession. Also, the Student's Notebook was developed – a practical instrument to assess the knowledge. A set of training materials 'Practical Notebook the Biomass Boiler Operator profession.

ity received their diplomas, and all schools integrated in the pilot programme will continue to provide budget seats for these specialities to institutionalise and include in the national education system. It is notable that these vocational schools were equipped for proper operation in a closed cycle, energy crops such as willow and acacia, biofuel production lines, biomass boilers that heat the schools, and students have the possibility to apply their theoretical knowledge in practice. Moreover, Vocational School No. 3 from Chisinau was equipped with a practical laboratory with 2 functional biomass boilers based on different biomass types: pellets and briquettes and a sectional boiler that demonstrates the construction and technical specifications of the boilers.

RENEWABLE **ENERGY COURSE IN SCHOOLS**

Knowing and accepting the biomass as local energy source was promoted in beneficiary communities not just by the Project Committees and participatory collection of local resources when installing solid biofuel heating plants, but also by the introduction of optional courses on Renewable Energy Sources for pupils from Grade VI and VII in beneficiary schools.

After the approval of the Curricula for optional subject Renewable Energy Sources by Order of the Ministry of Education, Culture and Research, schools from the South region of the Republic of Moldova, which implemented different activities dedicated to renewable energy sources, were selected.

Hence, school professors and managers from project beneficiary communities were trained in teaching such subjects as energy efficiency, biomass production and use, waste recycling and use. Webinars were organised with the participation of pupils. Children organised awareness campaigns in their communities such as Biomass Day, flash mobs, eco festivals, public debates dedicated to environment and renewable energy subjects. Also, each participating school within webinars was encouraged to develop an invention – model of renewable energy sources such as passive energy city prototype, functional wind turbine model, water mill, biomass boiler model, etc.

A new Professor's Guide was developed that includes examples of lessons for each topic and subjects addressed to pupils from involved grades. At the same time, scientific conferences for professors were organised that analysed teaching methods of the optional course, lessons learnt and proposals to ensure the continuity of the course after the conclusion of Moldova Energy and Biomass Project.



of Summer School ENERGEL were organised

participated in Summer School ENERGEL

by pupils teamed with professors

of National Contest Renewable Energy Sources

piloted new training courses requested by green energy market

NATIONAL CONTEST - RENEWABLE ENERGY SOURCES



Best pupils from the schools –part of the educational initiative - took part in the National Contest Renewable Energy Sources. The contest started in 2017. In two years, the contest collected innovations of more than 120 pupils from the schools that taught Renewable Energy Sources course. Pupils presented studies, researches and models that show their knowledge obtained during the academic year. For instance, the pupils from Costesti Lyceum in alloven presented a house prototype that A long-term achievement of the educationis 100% ecological. The house is connected to two wind turbines and several solar panels. The authors said that people who choose to live in such a house would forget the bills and could even earn money by selling extra energy. The entire construction is made from recyclable materials - plastic, wood, metal and construction waste.

Although the energy produced by the toy house is sufficient to recharge their phones, the pupils are sure that in the future their invention will be used at larger scale. Ion Mereacre, pupil in Grade 8, hopes that gradually the entire village will use renewable energy sources to heat the houses and generate electricity.

Other two children from Costesti, Ialoveni, siblings Mariana and Maxim Mereacre, showed that banana peels, beer and water tins can generate heating in a house, if connected to solar energy. The construction has the form of a solar panel and is conceived to capture sunrays and heat the air in one room. The winners of the contest received diplomas

and money awards up to MDL 1400 provided by the Ministry of Education, Culture and Research and were invited by many mass media outlets to show off their inventions.

Also, the pupils who got to the republican phase of the contest Renewable Energy Sources received tickets to participate in the Summer School Energel, where they could exchange ideas with other fellows interested in renewable energy. A similar contest Energy and Ecology was launched in 2016 on the left bank of the River Nistru, and the winners were invited to participate in the Summer School Energel.

al initiative is the volunteer network in green energy. About 50 young people who promote alternative energy participated actively in the organisation of Sun Da-i Fest Festival, summer school Energel, and Environment Day. Project volunteers continued training activities in educational institutions from their communities and promoted educational initiatives launched by the project.

SUMMER SCHOO "ENERGEL"

Summer school Energel is seen as a premium activity for pupils who study renewable energy course. The selection of participants in the Summer School was done based on Renewable Energy Sources contest, and local contests in each school. Every year, the summer school hosts about 50 pupils. All in all, about 200 children participated in the summer school in the period 2015-2018.

The Summer School Agenda included practical workshops dedicated to energy efficiency and renewable energy; meetings with experts and officials; recycling workshops; thematic discussions and other informative sessions. At the same time, the pupils benefited of specialised training courses on different topics, such as "organisation of mass actions and campaigns"; "Social media training"; "Energy Efficiency and Life Safety", team-building activities conducted as eco-competitions on unknown tourist route. Also, the young people organised sanitation actions in the locality that hosted the summer school. Another activity of the Summer School was educational activity with peers from the community.





around 200 participants in 4 years

SUCCESS STORY **CHISCARENI – HOME OF GREEN ENERGY**



A single locality and many eco initiatives, ent awards, including Moldova Eco-Energetwhich are being implemented by several generations of pupils from the Lyceum "Nicolae Casso" of Chiscareni, Sangerei District. and now he supplies quail meat to shops, Inspired by the Geography and Ecology professor, Nicolae Spanu, the young people won many national contests with their inventions plant from a barrel, one bicycle wheel and and apply them in launched businesses. a car belt. Because his father, who owns a

Dorin Prisacaru, for instance, built with own money an installation to produce alternative energy from organic mass, which can be transformed in biogas and then, into electric energy.

Initially, the young man built a small installation of 0.2 square meters and participated

I was concerned about ecologic issues even earlier, but for the first time, I felt that I could do something to solve the number one issue in the world. The landfills are formed from 80% organic mass that can be transformed into biogas or bio-humus. Hence, the process of extending the landfills can be stopped and gradually, a large part of existing ones can be liquidated and used in the fermentation processes.

Dorin PRISACARU

in many national contests. Later, he extended his prototype to a 10 times bigger reactor equipped with a mincer and heater for organic mass. The energy obtained from biogas is used for the internal consumption of quail farm launched by his family when he was about 16 years old. The money from differ-

ica, National Contest of Business Plans and other, he invested to extend his business, sells cages and nurseries for quails to other businesses. Catalin Betivu built a mini wind lake, needed electricity, the boy decided to use his knowledge. The light produced by

My father had to illuminate the barrack for employees who took care of the lake. Connection to the electricity grid of RED-Nord was MDL 150 thousand, so my dad bought a torch that consumed 5 litres of Diesel every week. The decision was not favourable because a lot of CO2 was eliminated. And since the lake is in an area with strong winds, I thought to practice my knowledge obtained from Renewable Energy Sources course.

I built a vertical wind plant. When the wind has a speed of 3.5 meters per second, the pallets start a generator of 12 V. The obtained energy is stored in an accumulator of 75A that connects a 2 m LED string with a total power of 21W. The light produced by these lamps is sufficient to illuminate the entire room during the night. Hence, with an investment of less than MDL 5000.

Catalin BETIVU

these lamps is sufficient to illuminate the entire room during the night. Hence, with an investment of less than MDL 5000, the young man helped his father to solve a business problem. The wind turbines can be used at sheep farms, orchard guard's houses, as illumination of intersections outside the city

One of the houses will have a wind turbine, and another – a solar panel. The scheme is similar to that of ecologic household that uses renewable energy. I built it exactly as I think a guesthouse should look like.

Catalin BETIVU

and remote neighbourhoods. Another idea of Catalin Betivu is to build an eco-house. This idea came to his mind after his father developed a guesthouse project for tourists that would be built by the lake in his native village. His model has all types of clean energy, declared the young inventor. The biggest joy of the child is that his project will be part of his father's.

The school in Chiscareni village is the first public institution in the Republic of Moldova that started to use biomass heating. Back in 2005 with the support of a project funded by the World Bank, the school received a biomass plant that uses straw bales. The institution continues to benefit from clean energy. In the meantime, the community connected other public institutions to green energy. The village kindergarten receives electricity from photovoltaic panels and hot water from solar collectors, Town Hall and other institutions replaced the fireplaces with biomass heating systems installed from European funds of Moldova Energy and Biomass Project.



COMMUNICATION

Behaviour Change Communication Moldova Eco-Energetica SUN Da-i Fest



covered by Moldova Energy and Biomass Project communication

about the benefits of bio-energy distributed in the country

that promote biomass energy were broadcasted on TV, Radio, and online communication networks

of the electronic newsletter in RO, RU, EN languages distributed

organised



presented

participated in the competition



under the Eco-responsible technologies category

6 editions
of SUN Da-i Fest organised

BEHAVIOUR CHANGE COMMUNICATION

Moldova Energy and Biomass Project aimed at increasing renewable energy consumption. especially from solid biofuel in the Republic of Moldova. Although social, economic and environment advantages of biomass are obvious, transit to a new energy source implies changes of some habits that may result in resistance of different target groups.

Communication tools such as TV and radio spots, shows and press articles, public events or visibility materials are important and efficient when the communication objective is to inform the target group. The communication in fields that imply changes of attitude and habits and reaches the expected objective only when the interventions are planned from the perspective of integrated communication and not just the remote information or awareness of the target public.

The information itself does not establish desired behaviour. Although knowledge is necessary, this is not sufficient to produce a change. Social spots, TV/Radio shows, press as project programs for the public, residential articles, public events, posters, leaflets, etc., communication materials provide wide visibility of the initiative/project, inform, raise public awareness about the issue but are not sufficient to reach the expected objective. This requires the integrated communication approach that besides remote communication implies inter-personal communication, direct contact with target groups, community mobilization to promote desired actions, partnership and support of decision-making factors at local and national level.

Hence, communication, interactive and participative activities were included at all phases of the project starting with the involvement of the community in identifying the institution in the locality that should shift to biomass heating and community mobilisation to co-fund this activity, training and events with the participation of different stakeholders on solid biomass market - households, managers of institutions, boiler operators, agricultural producers that supply raw materials for biofuel,

pellet and briquette producers, central public authorities and last but not least, pupils from beneficiary communities who can become future promoters of renewable energy.

At the same time, the project achievements had to be made known to the general public together with the benefits for solid biofuel consumers. Information and awareness campaigns being organised for this purpose. The project used different instruments to reach the target group – press releases, success stories, electronic newsletters, training and press clubs, press visits, info graphics and social media cards, video and audio spots, and integrated communication model PESO (Payed, Earned, Shared, Owned Media). The messages were sent to the target public using TV channels as well as written and online press, sites of partner institutions and social networks.

Communication activities, as well as the achievements of the project increased the population interest towards bioenergy, as well and private sectors. Annually, more than 500 persons, mostly agricultural entrepreneurs, local public authorities, managers of public institutions from rural areas, NGOs requested information on project activities from the project team via emails, phone calls, letters, visits to the project office and received detailed and timely answers.

MOLDOVA ECO-ENERGETICA

Moldova Energy and Biomass Project has the Infrastructure and Energy Efficiency Agency. aim to promote besides solid biomass fuel other renewable energy sources in general, sponsibility for the organisation of these so the citizens of Moldova understand the wider context and accept easier the change. sources, the Moldova Eco-Energetica Gala was organised to award winners of the contest with the same title.

The Contest and Gala were launched during the first phase of the Project in partnership with the Ministry of Economy and



which assumed logistical and financial reevents in 2015.

To encourage the institutions, companies 35-70 projects were presented to the annual and individuals to adapt renewable energy contest being divided into three categories - eco-responsible stories; eco-responsible technologies and the best energy efficiency project. Since 2012 when Moldova Eco-Energetica was launched and until 2018, 329 projects were submitted for the contest. 92 of these received the award of eco-responsible stories, 13 were winners under the eco-responsible technologies category and 21 eco-responsible ideas were submitted to potential donors.

> The projects were assessed by a group of 18 experts grouped into 5 evaluation panels. The expert team consisting of well-known specialists in the field of renewable energy and energy efficiency was approved by the Steering Committee of Moldova Eco-Energetica and remunerated from the funds of the Moldova Energy and Biomass Project.

> In 2015 the Energy Efficiency Agency decided to extend the award event to a number of public activities conducted during Moldova Eco-Energetica Week. It included an exhibition of Eco-Responsible Technologies, a Forum with the topic 'Renewable Energy and Energy Efficiency in the Republic of Moldova' and Moldova Eco-Energetica Gala.

> The events take place in localities with maximum visibility and capacity to host sufficient participants, including National Theatre "Mihai Eminescu", Opera and Ballet Theatre "Maria Biesu", and Expo Centre "MoldExpo".



TECHNOLOGIES

SUN DA-I FEST

Another instrument to promote renewable energy sources dedicated to general public was the festival of eco-technologies powered by solar energy, SUN Da-i Fest. The event takes place in June and concludes as a rule the European Sustainable Energy Week (EUSEW), organised by the European Union Delegation in Chisinau in partnership with other international institutions and national public authorities.

The festival was designed to provide direct possibility to admire, touch and test renewable energy based technologies to a large number of people in the centre of Chisinau - Public Garden "Stefan cel Mare si Sfant". Hence, the alleys of public garden host biomass heating plants that generate heat, photovoltaic panels and wind turbines that generate clean electricity, and solar collectors for hot water.

The visitors have the possibility to test electric cars, scooters and bicycles and inform themselves from the first source about the advantages of clean technologies in the country, as well as hear success stories of people who moved from fossil to clean energy produced in Moldova. Furthermore, they discover ecological innovations created by young people from schools and universities. Mini hydraulic plants, wind turbines constructed from waste, solar parabolic aerials, solar ovens, robots, remote monitoring systems of energy consumption, apartments that use exclusively renewable energy.



The event includes fairs selling natural products, master classes on waste recycling and eco food products, interactive competitions on green energy topics.

The Festival ends with a live concert partly powered partly by solar energy supported by Moldovan and international bands, such as Delta pe Obraz, The Glimpse, Flash Blood and Alex Calancea Band, Flat Foot (Sweden), Domino (Romania), Hi Mum, Sillaje, Via Daca, Ambertraps and others.

SUN Da-i Fest is accompanied every time by awareness campaigns to attract more visitors and suggests video and radio spots, broadcast news and gives interviews in the press, online and blogs and has its own Facebook page.



SUSTAINABILITY! WHAT DO WE LEAVE BEHIND? **NEXT STEPS**

A sustainability plan was developed to ensure tain the qualification of boiler operators, it is duced 8% VAT instead of 20% applied in

conclude maintenance contracts with com- in maintenance and reparations, etc. panies specialised in managing green energy production systems.

of biomass heating plants installed in pub- of current accreditation in 2020. lic institutions that was transferred to the Energy Efficiency Agency.

maintenance of solid biofuel heating plants. biofuel producers. Over 9000 managers of institutions and boiler operators were trained in renewable At the same time, the project promoted

the continuity of activities launched during recommended to train them at least once a the economy of the Republic of Moldova. the two phases of the Moldova Energy and year, especially before the heating season at The Moldova Energy and Biomass Project Biomass Project. It includes a number of ac- the Training Centre for Boiler Operators es- recommends continuous support to biotions and recommendations for local partners tablished within the Centre of Excellence in mass market development either in the and key stakeholders for each component. Constructions. The Training Centre may be- form of o% VAT or subventions or other ascome a place for collecting existing problems sistance taking into account that this is still Hence, as for good functioning of solid bio- related to the operation of biomass heating a young sector in the economy of Moldova. mass heating plants and solar collectors for systems and hot water generation by solar hot water generation, the beneficiary com- energy systems as well as provision of possi- Taking into account that there are regions munities were encouraged and assisted to ble solutions, lists of authorised specialists without any interest in biomass or renewable

To ensure the quality of biofuel on Moldovan and RES in general as national priority, supmarket, the Moldova Energy and Biomass port this decision by excluding the taxes or At the same time, the Energy Efficiency Project invested in the endowment of Solid setting a specific share of renewable/bio-Agency will be the institution responsible Biofuel Laboratory within the Agrarian mass energy used in the region. This would for the collection of statistics from users and University of Moldova. It has the role to be- increase the interest towards the use of reproducers to monitor market trends and not come a link between the market and local newable energy sources instead of petrol/ to allow the reduction of the number of biofu- authorities and it is important to budget natural gas/coals. el users and producers, hence, implementing correctly the activity of the Laboratory unthe commitment assumed in the European til the market conditions allow independent Union - Republic of Moldova Association financing. It is recommended to apply spe-Agreement regarding the renewable energy cific requirements towards local producers share in the total energy mix of the coun- (easier and cheaper) and compulsory quality try and correct reporting on Sustainable verification of imported biofuel. A special at-Development Goals. In this regard, the proj-tention is paid to the re-accreditation of the ect developed a remote monitoring software Laboratory for 2021 – 2025, after the expiry

As for market development, Moldova Energy and Biomass Project supported the creation To ensure the preparation for heating season of the Association of Biofuel Producers and in public institutions, the Energy Efficiency Biomass Energy Cluster that unites currently Agency was advised to inform via official let- 20 members and recommends maintaining ters the local public authorities about the im- a continuous open dialogue between the portance of annual budget planning for fuel Government and associative sector to idenprocurement, technical support, repairs and tify and overcome challenges met by local

sources and efficient operation of biomass o% VAT on the entire value chain of solheating systems during the project. To main- id biofuel succeeding to introduce the re-

energy sources because of the gasification agenda, it is opportune to declare biomass



NOTES

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