Contract number: ENPI/2014/354-896

Final Project Report

Project name: MOLDOVA ENERGY AND BIOMASS PROJECT (IInd Phase)

Project identification code: 00061146

Project identification codes:

Output 1: 00093336

Output 2: 00093797

Output 3: 00093812

Output 4: 00093813

Reporting period: 14 December 2014-

22 November 2018

Implementing agency: UNDP Moldova

Country: Republic of Moldova

Contents

List of abbreviations and acronyms:

2KR PIU	Project Implementing Unit of Grant Assistance for the Food Security Project for Underprivileged Farmers
AEE	Agency for Energy Efficiency
AEER	Alliance for Energy Efficiency and Renewables
AG	Advisory Group
ATU	Autonomous Territorial Unit
BHS	Biomass Heating System
CALM	Congress of Local Authorities from Moldova
CHPP	Combined heat and power plant
CO	Community organization
CPC	Community Project Committee
CSO	Civil Society Organization
D-C	Design - Construction
DR	Development Region
EC	European Commission
EE	Energy Efficiency
EEA	Energy Efficiency Agency
EoI	Expression of interest
EU	European Union
EUD	EU Delegation in the Republic of Moldova
FS	Feasibility Study
ICE	Institute for Continuous Education
LPA	Local Public Administration
M&E	Monitoring and Evaluation
MEBP	Moldova Energy and Biomass Project
MoARDE	Ministry of Agriculture, Regional Development and Environment
MoECR	Ministry of Education, Culture and Research
MoEI	Ministry of Economy and Infrastructure
MoU	Memorandum of Understanding
NGO	Non-Governmental Organisation
PC	Project Council
PMT	Project Management Team
PSC	Project Selection Committee
PSO	Procurement Support Office
QAC	Quality Assurance Center
QS	Qualification Statement
RDA	Regional Development Agency
RES	Renewable Energy Sources
RF	Revolving Fund
RM	Republic of Moldova
SAUM	State Agriculture University of Moldova
SDGs	Sustainable Development Goals
SHWS	Solar Hot Water Systems
SMEs	Small and medium-sized enterprises
TN	Transnistria

VET	Vocational Educational Training
UN	United Nations
UNDP	United Nations Development Program
UNRC	United Nations Resident Coordinator

I. BASIC INFORMATION / SUMMARY

Presentation date:	20 May 2019
Beneficial country and project venue:	Republic of Moldova, Eastern Europe
Project name:	Moldova Energy and Biomass Project (IInd phase)
Project duration:	22 December 2014 – 22 November 2018 (4 years)
Organization in charge of managing the project:	UNDP Moldova
National implementation partner:	Ministry of Economy and Infrastructure
UN implementation partners:	UNDP Moldova Dima Al-Khatib, Resident Representative Tel: +373-22-220-045, ext. 105 Email: dima.al-khatib@undp.org UN joint mailing address United Nations Office 131, 31 August Street MD-2012, Chisinau, Republic of Moldova
Total project cost:	Total resources: €9,629,425.50 EC €9,410,703.50
Reporting period:	22 December 2014 – 22 November 2018

II. BACKGROUND

As per the context of 2014 the Republic of Moldova did not have its own energy resources and was highly dependent on energy imports. Over 75% of Moldova's energy needs were covered by imports.

Dependence on external energy sources has led to a steady rise in energy prices and accumulation of large debt to external suppliers. The energy sector is a key sector for the Moldovan economy, having a vital importance for the successful implementation of the national economic development program. The Government has undertaken to reform the energy sector by increasing the country's energy security, attracting infrastructure investments and participating in the energy market based on the principles of equality and mutual benefit.

The Republic of Moldova has enormous potential for producing energy from renewable sources, which has not yet been capitalized. Studies had revealed that one of the safest and most accessible alternative energy sources is biomass.

There is also a consensus that the straw waste is the renewable energy source with the highest short-term and medium-term potential of the Republic of Moldova. Annually, the Republic of Moldova produces on average 700 thousand tons of straw, making it possible to generate approximately 700 million KWh of heat per year.

One of the objectives of the Government, stipulated in the Governance Program for 2016-2018, in numerous multilateral and bilateral agreements, laws and policies adopted (the Law No 10 of 26.02.2016 on Renewable Energy Sources, Law No 139 of 19 July 2018 on Efficiency Energy, Decision No 102 of 05.12.2013 on the Energy Strategy of the Republic of Moldova until 2020, etc.) is to diversify energy sources. Authorities aim at producing 20% of renewable energy in the country – target established in the Energy Strategy of the Republic of Moldova by 2030.

The Energy Strategy of the Republic of Moldova sets the objectives, measures and activities towards a more efficient, competitive and secure national energy industry, and towards ensuring the country’s energy security, modernizing the infrastructure related to the energy sector, increasing the energy efficiency and using renewable energy sources, as well as integrating it into the European energy market. Thus, the project was designed to contribute to the implementation of national strategic framework aligned with the European Union's energy objectives.

III. PROJECT-RELATED GENERAL INFORMATION

Since 2011, Moldova Energy and Biomass Project, funded by the European Commission and implemented by UNDP, had contributed to a safer, more competitive and sustainable energy production in the Republic of Moldova through support targeted to the most viable and available local renewable energy source, i.e. agricultural waste biomass.

The project consisted of the following 4 interconnected components: 1: Municipal markets for biomass heating and fuel supply technology; 2: Foundations for creating effective biomass heating markets and heat supply laid, and demand of the private sector promoted; 3: Capability to grow biomass markets at regional and local levels developed; and 4: Opportunities and benefits of biomass energy for Moldova well known, and the visibility of project results promoted.

By the end of 2014, after four years of MEBP Phase 1 implementation, based on the very satisfactory performance, lessons learned, clearly identified gaps and additional needs to support further market consolidation, the project entered the second phase, which was implemented during 14 December 2014 - 22 November 2018, including the extension of the project. The total cost of project implementation was EUR 9,63 million, out of which EUR 9.41 million have been allocated by the European Union under the Eastern Partnership Integration and Cooperation Program (EaPIC).

III. 1 Project objective

The overall objective, as well as the four interconnected components for the second phase of the project, remained the same: increasing significantly the use of renewable energy technologies through fuel change and increasing energy efficiency measures. This would lead to improved heating comfort levels in public sector buildings, including schools and community centers, by using readily available waste straw supplied from local agricultural enterprises.

While in 2011-2014, Energy and Biomass Project has focused on installation of biomass heating systems in public institutions, the emphasis of the second phase (2014-2018) was to scale up the successful activities related to improving heat comfort in public buildings and extend them into small towns and uncovered or poorly represented regions, specifically Transnistria, Gagauzia and Taraclia.

At the same time the focus of the project was to support further consolidation of the emerging biomass industry and market, including through increasing supply and ensuring reliable quality assurance mechanisms for biomass fuel biomass market.

III.2 Summary of project objectives and components

The second phase contributed to testing the uptake of biomass technologies in Transnistria Region, as well extension of renewable technologies in the Autonomous Territorial Unit (ATU) Gagauz Yeri and in Taraclia district, contributing to the socio-economic development of the regions as well as expertise exchanges and promotion of local entrepreneurship.

The Moldova Energy and Biomass Project includes the following interconnected components:

Component 1: Municipal markets for biomass heating and fuel supply technologies created;

Component 2: Foundations for creating effective biomass heating markets for households, supply of biomass heat and the demand for the private sector promoted;

Component 3: Capability to grow biomass markets at regional and local levels developed;

Component 4: Opportunities and benefits of biomass energy for Moldova well known at local level, and the visibility of project results promoted.

III.3 References on how the project aimed to achieve its components

Component 1: Municipal markets for biomass heating and fuel supply technologies created.

As part of the extended EaPIC Project, this component has focuses on the installation of at least 69 biomass heating systems, 45 solar water heating systems and the creation of related fuel supply markets (together with Component 2), thus contributing to the generation of sustainable income and the development of value-added chains at local level. A special emphasis was placed on the target regions ATU Gagauzia and Taraclia, the Transnistrian region, small towns, as well as on the application of the necessary mechanisms and services to ensure sustainability of investments.

This component had also addressed further development of the local biomass fuel market in order to ensure sustainable supply, improved competition between manufacturers, application and verification of quality standards, product certification and protection of final consumers. In order to help ensure market quality (i) the biomass heating systems data base, (ii) the remote monitoring system and (iii) the Solid Biomass Quality Certification Laboratory were established as part of Activity 1.3.

In addition to fuel supply, the project focused on further stimulating the local biomass boiler manufacturing / assembly market. An all-encompassing package was implemented to develop and strengthen the market.

The project had also closely monitored the activity of the Revolving Fund established during the 1st Phase of the project, in order to offer sufficient evidence that the allocated resources are used according to initially signed agreements and for the overall benefit of the local biomass market.

Component 2. Foundations for creating effective biomass heating markets for households, supply of biomass heat and the demand for the private sector promoted.

As part of its extended EaPIC activities, this component has stepped up Activity 2.1, promoting biomass technologies at the level of households and small-sized enterprises. Based on the results and lessons learned from the previous period, the project has targeted to support at least 300 individual households and small-sized enterprises to procure modern and efficient biomass boilers, under preferential conditions.

In order to promote PPPs in the creation of sustainable biomass heating services, the efficient operation and maintenance of BHSs installed under Activity 1.1, the project has provided technical and financial assistance to enhance Activity 2.2 by creating new PPPs in 2 districts throughout the country (Nisporeni and Ungheni,). It is expected that after project closure the successful PPP models will be replicated by attracting private sector investment in biomass technologies.

Activity 2.3 has stimulated both the private sector demand for local fuel and biomass combustion technologies, and has demonstrated the efficiency and cost-effectiveness of

biomass technologies in production processes. Pilots have been conducted in collaboration with agricultural technical vocational colleges and schools that have a production process with high replication potential. Subsequently, the unexplored potential of vegetal waste generated in households and municipal residues as a raw material for biofuel production will be demonstrated in a pilot inter-municipal cooperation project.

Component 3: Capacity built for growth of biomass markets at regional and local levels

Given the significant budget support and cooperation between the EC (and other donors) and national authorities in the energy sector (during 2011-2017), including for development of renewable energy policy and legal frameworks, this project did not address directly renewable energy policies and building capacities for policy development.

The Component 3 of the MEBP, Phase 2 was designed to build capacity and enhancing skills of actors of solid biomass market for further replication of successful biomass projects at local and regional level. It has targeted 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, community leaders and leaders of sector associations.

It had also aimed to demonstrate the benefits of biomass energy and building the capacities of local actors to ensure the use of biomass for community heating in the long run. As part of the second phase of the EaPIC project, this component aimed at developing and/or adapting and/or updating training materials, if needed, and delivering trainings tailored for each group of beneficiaries (e.g. municipal management, including mayors, civil servants and teachers; operators of biomass heat and power plants; fuel suppliers, and school students in beneficiary communities).

Based on these materials trainings were conducted to enhance capacities of various players of biomass and biofuel market in (i) resource mobilization, (ii) participatory monitoring and evaluation of biomass heating projects and (iii) management and implementation of biomass projects.

Thus, local public authorities and building managers in the target regions have benefited of technical training on efficient management of combined solar and biomass plants provided with MEBP support (Activity 3.1). Operators providing the functionality and maintenance of biomass plants and combined biomass and solar plants benefited from practical and technical training from installers/suppliers of the equipment and have participated in national study visits to successfully operated locations. In parallel, to ensure the continuity of services provided by biomass boiler operators (existing and new employees) during the second phase, an Educational Initiative on RES and EE of MEBP was launched, as well as an institutionalized (included in the National Register of Occupations) a new education training for biomass boilers operators (Activity 3.2). Private entrepreneurs were also trained in producing, storing and supplying solid biofuels in full compliance with new standards and technical regulations. A comprehensive training module on improving managerial capabilities and knowledge on the production of high-quality solid biofuels with the use of modern technologies was provided. After the creation of the Solid Biomass Quality Certification Laboratory, a manual entitled ‘Ensuring Quality of Solid Biofuels’ was developed and offered to biomass fuel suppliers for self-training / reference (Activity 3.3). School educational activities on renewable energy and energy efficiency, especially bioenergy Summer Camps, were extended to small towns in

Moldova, in Taraclia, ATU Gagauzia and wherever feasible in Transnistria. Educational materials were updated, translated into Russian and offered to all schools in selected localities during the second phase of the MEBP. Teachers have benefited from continuous training and mentoring for organizing educational and awareness-raising activities in schools (Activity 3.4). As part of the expanded MEBP, joint efforts to endow Moldovan workforce with skills that best meet the needs of emerging markets and technologies were addressed through the VET (Activity 3.5).

Component 4: Opportunities and benefits of biomass energy for Moldova well known at local level, and the visibility of project results promoted.

This component has facilitated broad dissemination and awareness-raising of opportunities, benefits and information on positive impacts of biomass energy use in Moldova and has promoted the visibility of the Moldova partnership with EU and the impact of the project.

Under Activity 1.1 were implemented measures to raise awareness of the potential and benefits of renewable energy in Moldova, including among the beneficiaries of the Biomass Heating Systems or solar water heating systems. For this purpose, materials developed as part of Activity 3.1 and Activity 4.1 were put into use.

During the second phase of the project, this component has had a stronger focus on issues targeting biofuel production market development and biomass technologies. As channels of communication, special emphasis was placed on the media (TV, radio, press, public events and social communication web platforms), involvement of national and local opinion leaders and representatives of civil society with reputation and credibility among target groups, who have promoted social, economic and environmental benefits of biomass energy.

III.4 Project national partners

- Ministry of Economy and Infrastructure
- Energy Efficiency Agency
- Ministry of Education, Culture and Research
- Ministry of Finance
- Ministry of Agriculture, Regional Development and Environment
- Bureau of Reintegration
- District and community local public authorities in all country districts
- Regional Development Agencies (North, Center and South)
- Agricultural local entrepreneurs
- NGOs and community organizations
- Mass media
- Individual experts and consultancy companies
- Academia representatives

The project was implemented in continuous cooperation with local and district authorities, community organizations and other community leaders. During the first phase of the project, it has clearly been noticed that local authorities and stakeholders play a decisive role in mobilizing resources and local people, ensuring transparency, managing and monitoring the implementation of community initiatives and the sustainability of biomass projects. In the second phase of the project, this fact has been taken into consideration and local public

authorities were represented in the Project Management Board by the Executive Director of CALM (Congress of Local Authorities of Moldova).

The involvement of civil society, which is very active in community development, in the energy and biomass sector, was also considered for the successful implementation of the project. The establishment of the civil society representation in the Board of the MEBP has contributed to the development of this permanent collaboration. Moreover, one of the members of the Project Management Board was the representative of civil society (Chair of the Alliance for Energy Efficiency and Renewables NGO).

During the whole project implementation period, the productive collaboration with major national partners and international donor agencies active in the energy sector has been maintained. The project representative has participated in regular donor meetings organized by the Swedish Embassy - donor agency in the energy sector of the Republic of Moldova (2010-2018).

IV. SUMMARY OF THE PROJECT IMPLEMENTATION RESULTS

Component 1: Municipal markets for biomass heating and heat supply technologies created

Baseline:

- 140 biomass heating systems installed;
- 140 leased fuel supply chains established;
- More than 100 briquettes and pellets producers on the market;
- 37 standards and 1 technical regulation on biomass fuel quality adopted;
- 350 new jobs created in the sector with project support in 2011-2014.

Indicators

- 60 additional biomass heating systems will be installed in public buildings
- 45 solar water heating systems will be installed in public buildings.
- Total heat provided from BHS and SWHS is 180 TJ
- 144 new jobs created in target communities

Activity 1.1: 69 heating systems and 45 solar water heating systems installed in public buildings

Results:

Project outreach and selection of project communities' beneficiaries.

During the first years of project implementation the project outreach efforts have focused on small towns from all development regions of the country (South, Center and North) and target regions: Transnistria Region, ATU Gagauz Yeri and Taraclia district. These efforts translated into 78 seminars (out of which 20 in Transnistria) attended by over 800 people – representatives of district and local public administration authorities, managers of institutions, territorial state services, Regional Development Agencies, directors of public institutions from rural localities and small towns, non-government organizations, district and regional mass media. The participants were informed and trained about MEBP Phase II objectives and implementation procedures, as well as drafting Letters of Interest for to benefit of project at local level.

As results of organized seminars, a total of 215 Letters of Interest have been received from 175 communities. All Letters of Interest were screened according to the following criteria: availability of an adequate public building for the implementation of a biomass based heating project and possibility to install solar panels for water heating, availability of local and regional entrepreneurs willing to supply biomass fuel (briquettes and pallets) in necessary quantities, availability in the communities of appropriate facilities for storing biomass fuel, possibility of the community to ensure local contribution in proportion of 15% for rural communities, and 20% for small towns, motivation and acceptance expressed by the public institution to be provided with biomass heating system, existence of a partnership between the LPA and main stakeholders in the community, as well as immediate impact on project beneficiaries.

Based on screening criteria, the Project Selection Committee has selected 185 local initiatives that were proposed for next stage.

Analysis of needs and capacities of communities, selection of project proposals for the final evaluation phase

In each community approved for the evaluation phase, MEBP Community Mobilization Consultants and Engineers have organized meetings with local authorities and other community members, including: mayors, local council members, managers and staff of public institutions and social services, representatives of district administration and services, and other active persons from the communities. During these participants were informed about MEBP objectives, advantages and specifics of biomass energy, conditions for evaluation and implementation of local projects, and the need for involving community members in the decision-making process and insuring transparency at local level with regard to the institution to be connected to biomass based heating system. Along with this, representative meeting participants from each locality selected a Project Committee which would represent the community at all phases of local initiatives preparation and implementation. The selected Project Committees were crucial in developing a Project Application, which was further submitted to the MEBP for the final evaluation stage.

Energy performance and final evaluation of public buildings

The main scope of the final evaluation stage was to assess whether the public institutions premises are technically suitable for the installation of BHS and SWHS, as well as the energy performance of the building. Energy Performance assessment included estimation of the required boiler and solar pane capacity and recommended improvements of energy performance of selected premises.

During the final evaluation stage, the selected communities received also assistance in organization of trainings to mobilize the population of the community, as well as local resources. These activities helped strengthen local partnership, diversify ways to mobilize local resources and attract investments, to ensure community contribution to outreach and transparency of project evaluation and implementation stages.

According to the implementation procedures, the proposals for installation of biomass heating systems and solar water heaters in public institutions were evaluated in a participatory manner for further stage of approval for investment.

Approval of projects for the investment phase and implementation of local initiatives

To ensure efficient implementation of the projects approved for the investment phase, as well as proper following of obligations by the involved parties, 121 Memorandums of Understanding were signed between the communities approved by the Project Selection Committee and UNDP Moldova.

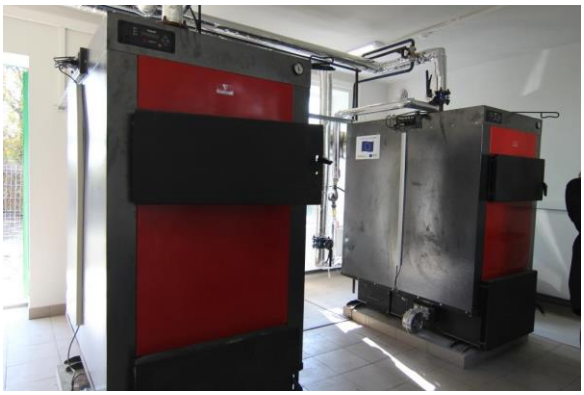

Biomass heating plants installed at the Kindergarten No 2 and at the Mayor's Office of Crasnoarmeiscoe village, Hincesti district

In total, **79 biomass heating systems** have been installed during project implementation period to supply heat to 105 institutions in 79 communities. A total of 70 SHWS have been installed throughout the project implementation period, out of which 27 beneficiary institutions are kindergartens that have installed BHS in Phase I and the rest of 43 SHWS installed in Phase II are combined with BHS.

About **108,401 people** (of which 13,400 children, 4,036 public institution employees, 90,938 parents and other population categories) in 121 institutions in 105 communities have benefited directly from both new biomass heating systems and improved thermal comfort, as well as improved sanitation by providing target institutions with domestic hot water from the solar energy. The capacity of the installed biomass heating systems is about 15 MW and it is ensuring the heating of 107,186.00 square meters of the beneficial institutions.

The list of final 121 local initiatives from 105 communities approved for investments of biomass based heating, and solar hot water projects in public institutions is reflected in the Annex 1.

For the operation and service of biomass heating plants installed in public institutions during the reported period, **264 new jobs** (including 165 new workplaces for biomass heating plant operators) have been created.

Biomass heating plant installed in the Middle School of Mosana village, Donduseni district

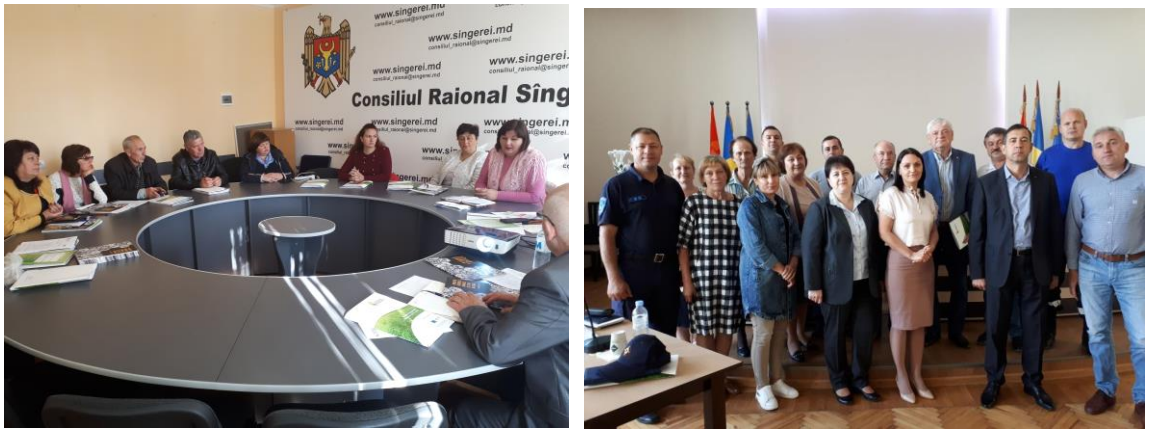
It has to be mentioned that although 9 Letters of Interest have been received from Transnistria Region, none of these initiatives had been materialized. It shall be noted that the approach of work with local authorities and institutions in Transnistria was the same as for other regions of

Moldova, hence the local authorities from Transnistria have accepted and implemented the UNDP requirements and procedures regarding participation of the population in appraisal of initiatives and decision-making process. Out of 9 initiatives submitted only 1 belonging to Ribnita district has been approved for investment phase by the Selection Committee of the MEBP. However, the authorities of Ribnita failed to sign the Memorandums of Collaboration and to meet the requirements for the next phases in selecting the Design Company and development of technical documents, activities that were planned from the contribution of communities. Although the administration and MEBP experts organized many meetings and discussion to overcome the situation, the representatives of Ribnita district authorities have not agreed to the provisions of collaboration documents and did not sign them.

This specific situation, as well as the following aspects of Transnistria participation in the project have been put into discussions with the Project Board members:

- the given communities had no clarity as to ensuring the local contribution to the project implementation and the necessary quantities of biomass fuel in the future;
- the evaluated institutions did not have in-house heating systems or they were in unsatisfactory condition;
- the evaluated institutions were connected to municipal heating systems;
- the cost of natural gas was and is kept artificially and the transparency of the cost of natural gas consumed by public institutions in Transnistria is not ensured, consequently this fact hinders the biofuel sector development, reduces the attractiveness of other alternative energy sources, and the efficiency of project investment in the region could not be calculated.

During the last year of activity, MEBP representatives organized meetings for the closure of the Project activity in each district in the country and for the ATU Gagauzia. The purpose of these meetings was to sum up the activities in each district and to transmit responsibilities to beneficiaries related to the sustainability of investments capitalized for the period after the closure of the MEBP. Handover meetings were organized with the District Councils, which undertook responsibility to monitor and get involved in ensuring the sustainability of investments provided by development partners.



Final meetings organised with MEBP beneficiaries in Sangerei and Causeni districts

Monitored the operation of biomass heating plants

In line with the project activity, a comprehensive monitoring scheme of the beneficiary communities in Phase 1 and Phase II of the MEBP was designed and implemented by monitoring experts to check the efficient operation of the biomass heating plants, the maintenance of the technical equipment and the provision of the required amount of fuel for the entire heating season.

The findings of the monitoring activities shown that most of the beneficiary institutions are supplied with quality biomass fuel, hired trained personnel to ensure operation of BHS, the heating boilers were technically ready for the heating season

At the same time, the monitoring efforts revealed institutions that were not using the BHS. Their number varied from year to year. Thus in 2017 23 BHS were not used out of total 214 and in the year of project closure only 12 have not been used out of 220, which accounted for 5% of the total of heating systems installed with the support MEBP Phase 1 and Phase 2.

The following reasons were identified after consultation with institutions not using BHS: the human factor, especially the unwillingness of local public authorities and institutional managers to use biomass due to higher operation costs of BHS compared to gas heating (1); insufficient budgets for heating public institutions (2); the official decrease of the gas price in 2018 that made the price for agro briquettes and pellets high in Moldova and no longer competitive with the gas price (3); technical problems regarding the operation of biomass heating plants: failure of the equipment, servicing on their own (4); the costs for the technical service of biomass heating plants offered by specialized companies, which cannot be covered by the beneficial institutions and municipalities (5); the flow of BHS operator staff due to low salaries (6); costs and quality of biofuel (7); reform in education system that lead to reorganization and liquidation of schools that have benefitted of BHS (8).

MEBP has addressed the above reasons by tailored:

- Communication with superior administrative institutions of MEBP beneficiaries, national partners, especially with the Ministry of Economy and Infrastructure and the Energy Efficiency Agency;
- Peer to peer exchanges and study visits: institutions from ATU Gagauzia and Taraclia town had a study visit to successful beneficiary institutions to share the experience of efficient operation of similar biomass heating systems;
- Sending reminders to beneficiary institutions on preparation of BHS for new heating season;
- Providing telephone and on-site technical assistance to BHS beneficiary communities by monitoring consultants;
- Suggesting BHS beneficiaries in the process of biomass fuel procurement to check the fuel technical quality parameters and request the fuel suppliers a quality certificate and a test report issued by the specialized laboratories;
- Providing technical assistance and on-the-job trainings to operators of public institutions and other MEBP beneficiaries;
- Conducting regional trainings on public procurement processes for mayors, institutional managers and boiler operators;

- Providing to beneficiary institutions the list of national biomass fuel producers, in order to stimulate the local market.

Also, a technical evaluation has been commissioned by EUD in 2018 having as topic "Evaluation of the Functioning of the Sites Visited and Recommendations for Potential Improvement". This evaluation has proposed a series of recommendations on the above-mentioned reasons and which were taken into consideration while preparing for the next heating season 2018-2019.

Due to implementation of the above-mentioned activities and technical evaluation recommendations the situation has changed to the end of project. Thus, in the last year of project implementation (2018) there were registered only 12 non-used systems out of 220, which accounted for 5% of the total of heating systems installed with the support MEBP Phase 1 and Phase 2. It has to mentioned that 7 out of 12 communities were beneficiaries of Phase 2. It has been agreed with them the biomass heating system equipment dismantling and transfer to other interested communities. In 2018 these communities have submitted decisions of the local councils to allow the transfer of BHS. Out of these 7, in 2018 were transferred 2 BHS to new beneficiaries.

The detailed description table for communities non-using BHS in in the last year of the project is presented in Annex 2.

Provided logistic support in handling of BHS with capacities higher than 90kW for public buildings

Within this activity, selected BHS functioning on straw and with a capacity of 250-270kW, were equipped with small tractors and adequate loading/unloading equipment.

Based on a needs assessment exercise covering the beneficiary communities, 23 mini tractors with front loaders and trailers, as well as 10 wood splitters and shredders, were purchased and have been hand over to the communities for which operation of the heating systems was the most difficult.

This exercise has enabled the operation of 26 straw-bales biomass systems which over wise would have stagnated and has considerably facilitated the labor of BHS operators in 27 public institutions, mostly schools and kindergartens, in handling of the straw bales. With improving health and working conditions, the flow of trained and qualified operators had significantly improved.

Also, it has decreased institutional budget for BHS operation, dropping the budget line for renting fuel logistics equipment from the private sector and thus saving public money up to 1,000 USD per month. Finally, the purchased tractors have served as an incentive to the local authorities to invest further in the equipping their motorized vehicle fleet for use of agricultural and wood residue.

Activity 1.2: Fuel cycle facilitated by the leasing /engagement-procurement mechanism for local fuel suppliers

Results:

The leasing/hire purchase mechanism: Revolving Fund monitored

One of the activities that have been inherited from the MEBP Phase 1 is **Act 1.2 Fuel Cycle facilitated through leasing/hire -purchase mechanism for local suppliers**. This activity was designed to monitor the Revolving Fund operation to offer sufficient evidence that the allocated resources are used according to initially signed agreements and for overall benefits of the local biomass market. Also, this activity envisaged work with all partners to design and implement the Exit Strategy.

No new capital was added to the Revolving Fund during MEBP Phase 2.

The Revolving Fund accounted one million Euro investments to boost biofuel production and was implemented by AEE and 2KR PIU. A brief analysis of the Revolving Fund's impact, based on data received from AEE and 2KR managing the Revolving Fund since Phase 1, indicated that the Revolving Fund has contributed to increase of the biofuel production market. The Agency for Energy Efficiency market monitoring and analysis has showed a fivefold increase of the number of market players and implicitly of briquettes and pellets production over 2011-2016 period. According to the Responsible Parties (AEE and 2KR) 38.7 % of the Revolving Fund's seed capital managed by 2KR has been reinvested whereas AEE has reinvested 17% of the same.

The Energy Efficiency Agency has provided more than MDL 9.8 million to 17 companies to procure briquetting and pelleting equipment at favorable conditions.

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.

During the MEBP Phase II regular spot-checks and field visit were undertaken by the project staff jointly with AEE and 2KR. Also, two audits on 2015 expenditures and 2016-2017 expenditures of the Revolving Fund have been conducted. The conclusions of the audits were presented at Board meetings, which has approved decisions on follow up actions, including the need of Exit Strategy development and implementation.

The Exit Strategy to the Revolving Fund designed and implemented

The discussions over Revolving Fund's Exit Strategy has been addressed during numerous Project Board meetings and in July 2017 the Project Board meeting has decided on the closure of the Revolving Fund and agreeing on the Exit Strategy, with full reimbursement of seed money.

The Exit Strategy was signed by MEI, UNDP and EUD in February 2018 and setting as deadline for reimbursement of due amounts by AEE and 2KR by 22 November 2018. Please see Annex 3.

The Exit Strategy contained 3 categories of reimbursement payments:

- loans granted to be repaid based on a Disbursement Calendar.
- non-performing loans, asking the AEE to continue with their recovering from 17 beneficiary companies
- processing and transportation equipment value recovery from 2KR.

The overall accountability for the collection of the funds and the reimbursement to the EU rested with the Ministry of Economy and Infrastructure. UNDP has provided the necessary support in terms of collection of the funds at the request of MEI and the EU Delegation to Moldova.

Regarding the repayment of loans granted according to the Disbursement Calendar, both AEE and 2KR had an outstanding balance at the end of the project. During the last MEBP Board, both AEE and 2KR has acknowledged difficulties in meeting the obligations on loans granted reimbursement for various reasons and have requested and extension of the Exit Strategy for an undetermined period.

As for the non-performing loans, administered by AEE, by the end of project 3 out of 17 judicial cases have been fully resolved. In 2 cases, the equipment, which was later seized by the bailiff, was auctioned twice, but no economic agent was interested in buying it and, thus, making it impossible to recover their costs. In the remaining 12 cases, appropriate legal proceedings have been initiated and are at various stages of hearings in court. The prospects for money recovery depend to a large extent on the ability of the EEA to devote enough efforts to these processes.

As for the equipment held by 2KR: in 12/2017 they had registered at the balance 3 bailing systems and 7 trailers with the total cost of 2,003,329.00 MDL. By 10.05.18 2kR has transferred to the beneficiaries 1 bailing system of about 355,894 and 2 trailers of about 199,000 MDL, in total 554,894 MDL. The amount was transferred to UNDP based on Exit Strategy provisions.

The rest of the equipment (2 bailing systems and 5 trailers) were transferred to private entities which supply straw to public institutions which operate a biomass boiler based on straw installed within MEBP Phase 1. The transfer was done based on a *Concept of equipment transfer,* which was agreed with the EUD representatives. In line with the concept an expression of interest procedure was conducted in July 2018 and based on evaluation criteria the Special Committee has taken transfer decision 7 units of equipment. The members of the Committee were representatives of UNDP Moldova, EU Delegation to the Republic of Moldova, Ministry of Economy and Infrastructure, Energy Efficiency Agency and 2KR PIU.

As per the AEE request, an Addendum to the Exit Strategy has been proposed at the Board Meeting, to follow up on the recovery after project closure period of the remaining amounts. The addendum foresees EEA and 2KR PIU to report monthly on progress achieved, as well as organize joint meetings at least once in 6 months for monitoring and verification purposes.

The total amount paid by beneficiaries of the Revolving Fund by the end of the reporting period was MDL 5,362,335 (EUR 474,893) which were transferred to EUD.

Amounts subject of transfer in a new Addendum to the Exit Strategy:

Outstanding balance at 22.11.2018 (in MDL)	EEA	2KR
Granted loans	969,400	535,710
Non-performing loans	3,639,415	-
Equipment	-	0
TOTAL	*4,608,815*	*535,710*

Activity 1.3: Market environment enforced to support quality, efficiency, efficacy and ongoing strengthening the market supported

Results:

Biomass heating plants database and remote monitoring system established

The need of installation of the remote monitoring system which will provide information on the operation of BHS in the heating season and thus will ensure the control over MEBP investments after project closure was signaled by national project partners.

The remote monitoring system was implemented in cooperation with the National Energy Efficiency Agency partner, which, after the closure of the MEBP has taken over the monitoring of the BHS installed under the MEBP Phase 1 and Phase 2 and is administering the system. In order to facilitate the administration of the system an User Guide was developed and presented to AEE.

The system provides real time access to Energy Efficiency Agency to information about the air temperature in three rooms of the biomass-heated building, the temperature of the water in the return circuits, the atmospheric air, the amount of energy produced during a period chosen by user, either one day, one week, one month or another time. All these data can be generated either graphically or exported to Excel or CSV data files.

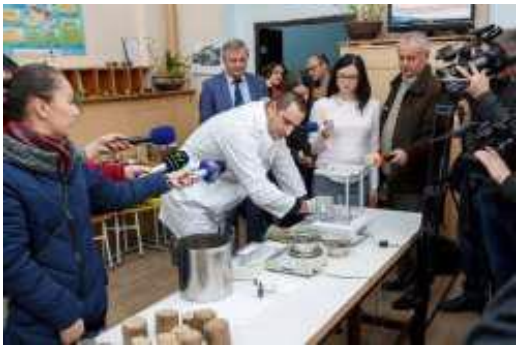
The monitoring system consists of measurement units, a server and the web interface for users. The measuring units are equipped with a "programmable logic component" that collects the data, stores them locally with enough memory for 6 months of activity, and transmits them to the central server for storage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

The data is transmitted to the server via a 3G USB modem provided by a mobile operator. The unit is powered by the national power grid, but it also comes with batteries that allow it to operate autonomously for 10 hours.

In total, 209 information transmission modules were installed for all functioning BHSs, including 2 modules for the BHS transferred to new beneficiaries.

The solid biofuel Quality Assurance Center (QAC) operates and provides services to biofuel producers.

The solid biofuel Quality Assurance Center (QAC) was created under the Laboratory of the State Agrarian University of Moldova (SAUM). The project funded the endowment of the Laboratory with modern equipment chemical analyzer (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.



Launch of the Biomass Quality Laboratory

At present, the SAUM Laboratory offers testing services to biomass fuel producers in the Republic of Moldova. s. 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.

Also, a study visit for the QAC staff was organized in 2018 to the Biomass Centre for Energy (Centro da Biomassa para a Energia) in Portugal. The scope of the visit was to exchange on how to organize and operate an international accredited laboratory ILAC1 - MRA2, learn on innovative testing methods, as well as to establish a cross check of the QAC results with an EU laboratory accredited according to similar parameters.

Certification of biofuel quality has become compulsory since 25 March 2017, according to the Law on the Promotion of Renewable Energy. Quality 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 SAUM. 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.

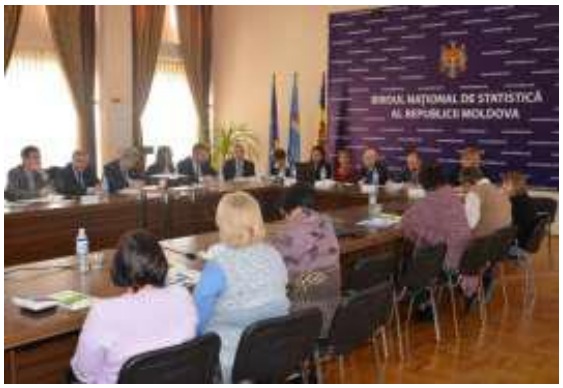
Biomass market development ensured through access to information

Launched in November 2016, the web portal www.piata-biomasa.md represents a platform where the demand meets the offer, solid biofuel boilers, raw materials and market-specific services. The portal provides modular 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 are able to find out information 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 a page for product sale and purchase announcement publication. The announcements are moderated to exclude those not related to the topic. The B2B and B2C biomass web platform is operational and regularly updated by Bioenergy Cluster.

The project has supported the National Bureau of Statistics to establish a national biomass statistical system through developing of the statistical methodology, questionnaires and the supporting IT software.



Launch of the statistical methodology on energy consumption in households, NBS

In parallel, with project support was piloted application of statistical methodology for private households, as selected statistic group. The results of the pilot survey were presented in a conference with the participation of international experts, organized in November 2016.

The National Bureau of Statistics is using the new biomass data collection and accounting methodology developed with MEBP assistance.

A support mechanism for biomass market development designed

This activity envisaged development of a comprehensive study analyzing the status of biomass market and a financial, fiscal, economic, legislative roadmap for biomass market stimulation in Moldova. Also, the project had to come with recommendations for MoEI and other governmental agencies in charge of renewables and energy efficiency on the necessary steps to stimulate the biomass market sector.

Although identified at the initial stage of MEBP Phase 2 as a necessary instrument to boost solid biomass sector development, the activity has been recast, based on project implementation circumstances and national context.

Thus, it has to be mentioned the political and financial risks during 2014-2017 that have driven to uncertainties of practical matter. The 2017 was also marked by a Public Administration Reform which had posed a certain delay in Government communication with development partner institutions. The MoEI and AEE reform process had also delayed coordination of Study development issue. At the stage when the activity was retaken, reaching the deliverables was no longer possible given very ambitious scope of assignment and very limited timeline for implementation. Moreover, some of the study related chapters were fragmentedly covered by

other project activities (e.g. Local Market Assessment Study conducted by Biomass Cluster) and international initiatives (e.g. IRENA Renewable Readiness Assessment).

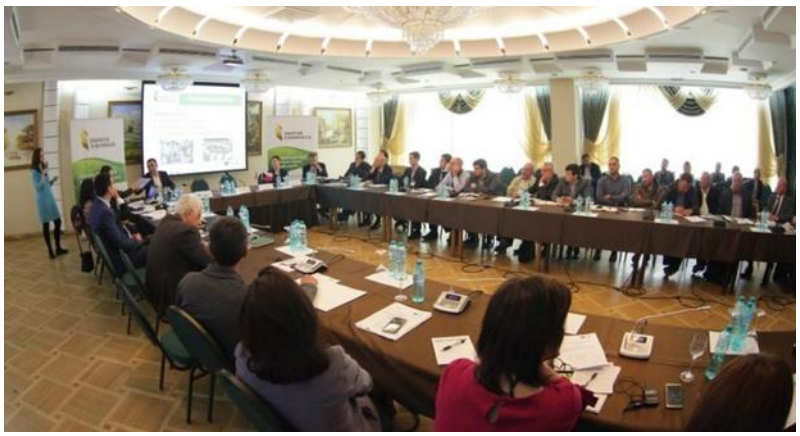
Nevertheless, the project has stimulated the biomass market growth by promoting introduction since 2017 of single VAT rate for the entire solid biofuel production value chain, from raw material to heating supplied to consumers. According to Article 96, (b) of Law No. 281 of 16.12.2016, the reduced VAT 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".

Also, the project has focused on developing the Post Project Sustainability Plan, that has been identified and agreed as more relevant. The document has described the status of biomass sector as of 2018, analyzed the sustainability risks and proposed recommendations to responsible institutions in biomass sector.

The plan determines a list of priority actions, both immediate and long term, for national partners such as the Government, sector associations, LPAs, academia, and other stakeholders, to sustain the MEBP investments in the sector after project closure and to further consolidate and develop the solid biomass market.

Supported Local Biomass market consolidation through trade missions, study tours

The Moldova Energy and Biomass Project supported the launching of first *Bioenergy Cluster* in the Republic of Moldova, which aims at ensuring cooperation between different actors involved on the biomass market and boosting sector development. The Bioenergy Cluster was launched in April 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 organizations, universities and public administration to improve cooperation, boost innovation and spread the information about beneficiaries and biomass opportunities.



The project has also supported creation of the *Association of Solid Biofuel Producers.* Currently the association accounts 17 members – the most active biofuel producers. As per the international best practice, the Association was designated to ensure Bioenergy Cluster management.

Czech-Moldovan Bioenergy Forum, April 2018

Although quite recently established, the Association has managed to mobilize resources to build capacities of its members through study visits for its members, business and training forums, and biofuel quality assurance. One of the last successes of the Association was to

obtain funding from the Small Grants Programme of the Global Environment Fund to plant 26 hectares of energy willow by the members of the organization. It will diversify the issue of raw material for biofuel production as well as cover the need to heat a total area of 9.000 m2 during the entire heating season.

To support further development of the biomass market Moldova Energy and Biomass Project has helped the Association and Cluster, to mobilize resources to create external partnerships. The Bioenergy Cluster succeeded to obtain funds from EaP Plus and the Czech Trust Fund to develop bilateral cooperation with specialized institutions from the Czechia and Romania.

In the framework of Partnership Agreement with the Green Energy Cluster of Romania a two-day documentation visit was organized to Romania (2018) for members of Biomass Cluster from Moldova to improve knowledge on biomass energy projects: flower greenhouses heated with green energy, integrated waste collection models, and energy crop plantation. Moreover, the participants discussed with Romanian Cluster about international cooperation in bioenergy sector.

During the cooperation with Czech Biomass Association, a number of trainings for members of the Cluster and Biomass Association of Moldova, a Bioenergy Forum with the participation of biomass producers, importers, and biomass equipment manufactures were conducted. During the seminar the Cluster capacity development needs were discussed and a Strategy on biomass resources and their mobilization and the Roadmap for 2018-2020 were developed and approved.

The trainings were followed by a documentation visit to the Czechia (2018), 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.

At the earlier stage of Association and Cluster creation, MEBP together with Moldovan Chamber of Commerce and Industry (CCI) has organized:

- Trade mission to Germany (2015) and Czechia (2015) for biomass boiler producers and dealers;
- Study visit to Austria (2016) for a group of public authorities participating in Public Private Partnership component 2.2;
- Trade mission to Poland (2016) for biomass producers;
- Denmark (2015) - study tour for Moldovan journalists on best practices in using biomass based energy in private and public sectors.

Component 2: Conditions necessary to efficiently supply heat to households and energy market created, and the demand in the private sector promoted

Baseline:

- No improved heating systems locally produced
- 29 assemblers of biomass boilers
- 600 households heating systems installed through the incentive mechanisms implemented by MEBP
- 1 active PPP established to provide heating and maintenance services

- Limited number of examples of biomass use in private sector/production processes for heat production, o examples of systematic use of vegetal waste from households

Output targets:

- 2 additional PPPs established
- 300 new biomass boilers purchased by domestic /microenterprise use
- 3 pilot projects finalized
- 6 jobs created in the selected partner companies.

Activity 2.1: Market solutions for highly efficient and affordable heat supplied to rural households identified and piloted

Results:

This activity aimed at stimulating the installation of biomass boilers in households and micro-enterprises and thus creating a potential request for local producers of solid biofuels. In addition, the Program has contributed to substitution of the firewood, natural gas and other fossil fuels, mostly imported.

Under this activity a Subsidy Program (further in the text “Program”) for residential and micro-enterprise sectors was implemented by EEA.

The subsidy scheme focused on providing fixed subsidy of 1,300 Euro for pellets heating systems and 500 Euro for briquettes according to the first came first served principle. All funds from were distributed to the beneficiaries.

The main document that set requirements for the Program was the regulation on the implementation of the “The Subsidy Programme for purchasing and installation of solid biofuel based equipment”.

Due to the high number of applicants, EEA set up a partnership with Energy Efficiency Fund who co-financed a part of the subsidies and that showed Government high support for the Program.

During the first 2 years of MEBP Phase 2 implementation, the project succeeded to reach the targets of this activity - providing grants from project funds for the purchase of biomass boilers to 250 householders and 47 small/medium-sized enterprises.

Around 60% of applications came from Central Moldova, 22% - North and 18% - South. Only 2 applications were received from Transnistria region. A total of 47 applications were received from SMEs representing different service and production sectors: bakeries, greenhouses, fruit drying, car repairs, etc. All SMEs application have been approved.

Year	No. of beneficiaries		Total beneficiaries
	Households	SMEs	
2015	265	35	300
2016	211	12	223
Total	476	47	523

Activity 2.2: Market solutions for biomass heating supply services developed in public buildings

Results:

Based on the positive experience of Public Private Partnerships implemented in Leova district during MEBP Phase 1, the project has worked to upscale the pilot on PPPs in other regions of Moldova.

A total of 9 districts have expressed their interest in developing PPPs for biomass heating systems, including 1 from Transnistria region, and have received the necessary support from the project to PPPs initiation. For all districts Feasibility Studies have been developed, which showed a high economic potential and attractiveness for private sector.

Nevertheless, it was challenging to secure the participation of companies with appropriate professional profile in the PPP competitions due to nascent biomass sector and fuel market in Moldova. As result of project's efforts two additional PPPs in Ungheni and Nisporeni districts have successfully materialized during Phase 2.

In Ungheni district a total of 7 public institutions from 7 villages, have shifted to biomass heating. Five biomass heating plants were installed with the financial support of the project and two others installed by a private partner, Green Energo Company. The private company has implemented other energy efficiency measures in the buildings connected to biomass heating. The total investment of the company accounted for MDL 1 million. It is expected that the company will recover its investment and will manage the biomass heating plants for the next 10 years, and finally will transfer them in good state to the District Council.

In Nisporeni district the Green Energo Company has designed and installed biomass heating plants in four public institutions from different localities, while another three public institutions have transferred to the private company their BHSs for management and rehabilitation. At the end of a 10-year contract, the BHSs will be transferred to District Council.

To facilitate the uptake of the positive experience on Public Private Partnerships in the supply of biomass energy in other districts, MEBP has 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. The guide was distributed by e-mail to all interested parties of the project and published on electronic platforms www.biomasa.md and www.piata-biomasa.md.

Activity 2.3: Efficient and sustainable technologies for biomass use in production processes piloted and the potential of household level residues explored

Results:

Moldova Energy and Biomass Project has worked closely with some technical and professional schools and colleges, selected as a result of national contest. The aim of this cooperation was to implement a small scale, full cycle, vertically integrated system from production to consumption of solid biomass fuel. Besides demonstrating the application of

biomass technologies in production processes, this activity had an indirect result of generating labor force for biofuel industry.

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

The briquetting line, with a capacity of 250 kg/h, is located closely to college owned agricultural land (270 ha of agricultural land, 76 ha of orchards and 1 ha of vineyards) and is supplied fully with raw materials from land processing waste.

Briquettes produced on spot supply 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. As per the feedback of the institution manager, the heating of the hostel with solid biomass is twice cheaper compared to natural gas heating. Besides economic value, this equipment is also being used in practice by the College students from such specialties as Agronomy, Horticulture and Viticulture, Forest and Public Gardening to expand their practical knowledge of biomass heating.

The Orhei Professional School that provides specialized training to foresters had procured and installed (i) a 75 kW biomass heating plant and (ii) briquetting line with the capacity of 150 - 300 kg/h, situated next to institution owned 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 objectives of the institution.

Based on the Feasibility Study on Solid Biofuel Production, as well as available infrastructure and managerial skills of local authorities, an Inter-municipal cooperation (IMC) service has been launched in Cimislia district. It implies collection of vegetal waste from Cimislia city and suburbs green spaces and other unused vegetal waste as raw materials for solid biofuel production. According to the Feasibility Study, the biomass potential in the district is about 16,813 tons which in energy power represents about 241,529 GJ.

According to this innovative instrument, the Cimislia City Hall has renovated the production unit of Municipal Enterprise “Public Services Cimislia”, while the project has prepared tender documents and contracted an entrepreneur to make a market research, procure and install the necessary production equipment.

The municipal company has been equipped with mobile wood mass mincer and front loader, while the trailers were adapted to transport minced wood.

The briquette production line installed at the municipal company has 450 kg/h capacity and consists of one feeding bunker, solid object separator, hammer mill, dryer on production line, cooling system for briquettes, press for briquetting, accessories for packing briquettes, and a general control panel.

Cimislia public services aim at delivering biofuel to 8 public institutions in the district that moved to biomass heating with the support of Moldova Energy and Biomass Project, as well as about 3% of residential units that installed solid biomass heating boilers.

In order to document positive practices and to facilitate the replication of the Inter-municipal Cooperation Instrument, a Guide on the launch of an IMC for the production of biofuels has been developed and disseminated to all stakeholders in the project. It was also published on the electronic platforms www.biomasa.md and www.piata-biomasa.md.

Component 3: Capability to grow biomass markets developed at regional and local levels

Baseline:

Trainings and education materials and approaches developed and applied during MEBP Phase 1

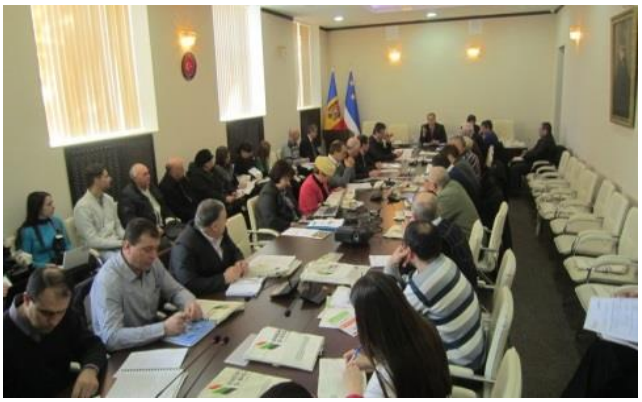
Outputs targets*:*

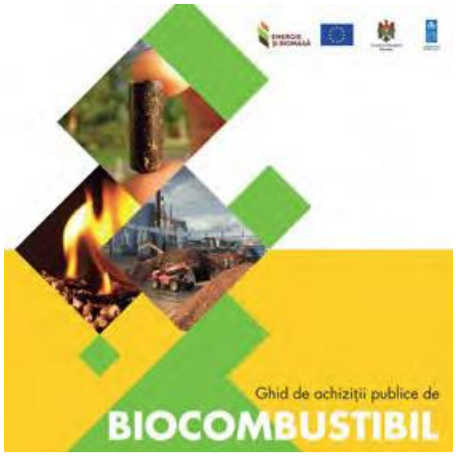
- 80 of municipal leaders trained
- 45 of fuels suppliers trained
- 20 BHSs dealer companies on the market
- 200 children participating in awareness activities
- 3 specialized VET Trainings Programs on RES and EE piloted
- Quality Assurance Lab established

Activity 3.1: Capacity of municipal leaders to manage biomass heating systems enhanced

Results:

Increasing the capability of local leaders (e.g. mayors, local councilors and public institutions managers) to initiate biomass heating projects and to manage correctly biomass heating plants, was a centerpiece activity of this component. During the implementation of the Phase II of the project, comprehensive training modules were developed, and project staff and expert teams provided assistance and advice to key community leaders throughout the biomass heating project initiation cycle - starting with (i) the participatory identification of public buildings, which would be heated by biomass and (ii) mobilization of the population and resources in target communities, (iii) conducting energy audits of proposed public buildings, (iv) preparing of project proposals and budgets, and (v) assurance of adequate day-to-day operation and long-term sustainability of biomass heating systems installed. All activities provided to municipal administrators and managers of public institutions were coordinated with priorities identified in Components 1 and 2.





During the reported period, a total number of 125 *Trainings on community and local resources mobilization* were organized with an overall participation of 1460 persons, including 1163 women and 297 men. During these trainings 77 municipal leaders and managers from left bank of the Dniester River extended their knowledge about heating systems running on alternative biofuel sources. Due to the fund-raising skills and local partnerships, the 105 project beneficiary communities managed to mobilize and efficiently raise 325 415 USD as the community contributions to the EU investments in biomass heating projects and the installation of solar panels for domestic hot water.

Other 113 trainings were conducted on the *Management and implementation of the biomass heating projects.* MEBP staff and experts have helped local leaders, managers of public institutions, and their staff to identify in a participatory manner the specific steps that communities need to take in the project implementation phase (e.g. identifying the source of biomass fuel purchase and ensuring adequate storage, hiring additional staff), jointly set performance indicators, shared tasks and exchanged best practices in the management of community projects. A total of 1701 people attended these seminars, including 1374 women and 303 men.

Training on sustainability and participatory M&E of biomass heating projects - the purpose of the training was to provide municipal leaders, managers of public institutions and their staff with in-depth knowledge and familiarize them with the concepts of biomass energy production technologies and the principles of correct management of biomass heating systems. Among the most important topics included in the training modules can be mentioned the following: energy efficiency measures in public institutions, biomass boiler typology, necessary maintenance and operation procedures, security and anti-fire rules, establishing effective relationships with local suppliers of fuel, biomass biofuel planning and procurement, key quality parameters for solid biofuels, legal and institutional framework on renewable energy and energy efficiency in Moldova.

During the reporting period, 45 trainings were organized. A total of 312 persons, including women - 248, men - 64, participated in the training. Representatives of local authorities, beneficial institutions, project committees, heating plants operators, etc., took part in the training.

Additionally, based on the sensitivity of the biofuel quality issue there have been conducted a total of 14 *Regional training sessions for the municipal leaders in the field of solid biofuel public procurements.*

Regional training of solid biofuel public procurements

In this respect, an informative handbook "Guidelines for Solid Biofuel Public Procurements" was developed and used as the main tool during the trainings.

The training activities were attended by 124 mayors, directors of kindergartens, gymnasia and high schools, who were informed about the provisions of national legislation on public procurement, as well as about issues related to biofuel quality assurance and contract management.

The handbook provides practical information for LPA representatives, including a set of standard documents related to the procurement of solid biomass, based on the requirements of the Law on Public Procurements. It covers issues related to the verification and assurance of the solid biofuel quality, developed in partnership with the specialists of the Solid Biofuel Laboratory. All the participants were provided a copy of the Guidelines and a memory stick with the standard documentation tailored for the solid biofuel procurement process. Leaders of municipalities were taught new methods for bid evaluation based on the quality/price ratio.

The participation of solid biofuel producers, alongside with the representatives of LPA was an innovation of these seminars. This format made it possible to have discussions about the most critical aspects of biomass purchase and to establish closer contacts between the buyers and sellers.

Besides the above-mentioned trainings, under this activity were organized several peer to peer field visits to the communities where biomass heating systems were installed and are successfully used. Such exchanges of experience organized upon requests and as result improved the confidence of future beneficiaries of biomass boilers regarding the benefits of biomass-based heating, by learning from first hand sources, from the existing users, information about the operating procedure, eventual problems and how these can be solved. Such exchange of experience also contributed to the creation of networks with local authorities from different regions, as well as with biomass fuel suppliers.

Activity 3.2: Capacity for sound operation of biomass heating systems developed

Results:

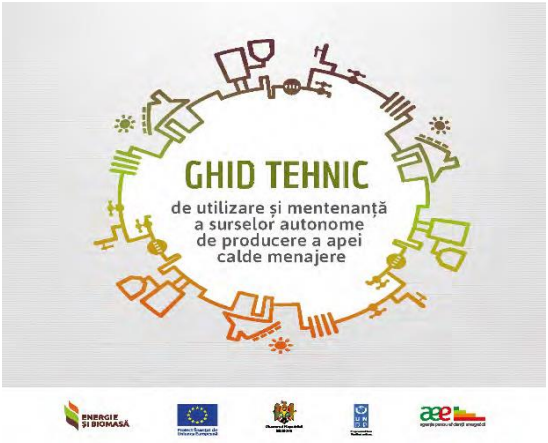
In order to ensure the sustainability of the training provided to operators of the solid biofuel plants after the end of the project, a *Training Centre for the Operators* of biomass and mixed heating plants was set up in 2016. In the reported period it had conducted 9 training courses for about 138 operators from 57 communities.

The Training Centre of Operators was placed within the Centre of Excellence in Constructions based on a selection process. It provides training modules approved and endorsed by the Continuing Vocational Education Directorate of the Ministry of Education, Research and Youth. Operators are enrolled in the 40-hour academic course (both theory and practice), being accommodated in the Training Centre's hostel. After the training course, the certificates of professional skills are being awarded to operators who have passed the exam.

During the reporting period, the Energy and Biomass Project, with the financial support of the EU Delegation, launched a contest for the purchase of the equipment for the installation of solar panels at the Operator's Training Centre (that is now equipped with a biomass boiler, a boiler, desks and other educational equipment). The solar panels have been installed in 2017, therefore all trainings are focused not only on biomass systems but also on combined systems - biomass and hot water production.

At the same time, a large media information campaign (radio, targeted letters to beneficiaries, information aids, etc.) about the establishment of the Operator's Training Centre and the opportunities provided by it was broadcasted in 2017. Additional to this, all beneficiary communities had received informative letters on the services provided by the Training Centre and detailed guidance on how to enroll their operators for the courses.

The Centre also trained students within a similar specialty (Operators and Installers of Heating and Ventilation Systems) recently opened in the Centre of Excellence. This could be considered a result of the multiplying effect: with a long-term impact on the development of the biomass sector.



Moreover, a *Technical Guideline on the use and the maintenance of the combined heating plants* [1]was developed for the operators of the combined heating plants. The guideline and was disseminated to the operators within the training activities and to the beneficiaries of solar panels - at the final acceptance of works. The Guideline will also be disseminated in the Vocational Schools that train operators of biomass heating plants, such as Vocational School No. 3 of Chisinau.

Activity 3.3: Comprehensive training modules for fuel suppliers provided

Results:

During the second phase of the project was developed and implemented the *Training and Technical Assistance Programme* for the solid biofuel suppliers. Within this program a series of regional training courses for biomass producers and Solid Biofuel Laboratories took place within the Programme.

The first set of the training course focused on "Briquettes and Pellets Production", including such topics as: sub-process technologies; heat production, dryers, pelletizing / briquetting plants, conveyor belts, silos; characteristics and properties of the final product; standard and personalized products; safety management in the production process. These trainings were provided by Norwegian experts who also conducted 7 technical assistance visits to the project's beneficiaries, providing on-site consultancy. All producers have received a post-training report of the experts that includes helpful recommendations, addresses, useful research and answers to the issues raised during the training. This training was delivered in the three regions (Chisinau, Balti and Cimislia) and was attended by 42 producers and businessmen from the sector.

The "*Biomass Fuel Quality Handbook*" has been developed and presented/distributed during targeted workshops with solid biofuel suppliers organized under Training and Technical Assistance Programme. The handbook defines all the terms and technical parameters in solid biomass production, the solid biofuel quality requirements, and will describes the quality assurance parameters that allow for putting in place a proper system to convince consumers

[1] http://biomasa.md/wp-content/uploads/2017/03/Ghid_2017.pdf

about the fuel quality. The handbook also addressed Technical Regulation on biomass fuel quality, which defines the mandatory physical and chemical parameters of briquettes and pellets to be supplied to public and private consumers in Moldova. Therefore, the handbook analyses the legal framework regarding the technology and economic issues related to production of biomass fuel.

The second set of training courses conducted within the Technical Assistance Programme has focused on "Business Management in the Field of Pellet and Briquette Production". The training agenda covered the following topics: the solid biomass value chain and its main elements (ref. agricultural biomass, blends and a few words about wood biomass); technology and equipment for the collection, storage and processing of biomass (waste from orchards / vineyards, other types of biomass); the main elements of business planning (market analysis, investment analysis, engineering, authorizations, feasibility studies / BP); optimizing the location of biofuel production facilities; human resources requirements; requirements for the storage area and for the estimation of the optimal stocks of raw biomass and biofuels; the equipment dimensioning; the cost of biofuel production: deduction of the cost of each production stage; the total cost of the business. This training was delivered in the three regions (Chisinau, Balti and Cimislia) and was attended by 37 producers and businessmen from the sector.

Additionally, regional trainings on implementing the (i) EU quality standards, certification procedures and QA for biofuel (pellets and briquettes), (ii) biomass boiler facilities specifications (types, design, schemes, etc.) and (iii) Strengthening the cooperation between the key-stakeholders(cooperatives, associations, clusters) have been conducted.

The last regional training out of above listed was dedicated to topics related to the establishment of the Biomass Cluster and Association. These trainings were provided at the regional level: Chisinau, Balti, Ungheni and Cimislia. Within them, a series of bi-lateral meetings with biofuel producers, PPP operators, district councils, development agencies, NGOs and universities, the Ministry of Economy and the Energy Efficiency Agency took place.

These efforts resulted in the establishment of the first Solid Biofuel Cluster in Moldova which brings together 26 key stakeholders whose main goal is to develop and strengthen the sector.

The Cluster's capacity building efforts were pursued after its establishment through drafting its Regulations, setting the working groups and their leaders. A special training course on Cluster capacity development was conducted within the partnership with Czech Trust Fund. The agenda of the training envisaged subjects dedicated to lobby and advocacy, resource mobilization and development of the Cluster internal framework, such: Annual Action Plan for 2018-2020, Lobby and Resource Mobilization Strategy and Communication Strategy.

A study visit has been also conducted in Czech Republic with the participation of 15 Cluster members. The agenda had been focused on establishment business relation and cooperation framework with Moldovan and Czech public and private institutions. Consequently, a joint Moldo-Czech BioForum has been conducted in Chisinau in 2018.

It is to be mentioned that the Biomass Association, created and consolidated with project support, has a leading role within the Biomass Cluster and in coordination the activities with the biomass producers. In 2018, it has undertaken organization of a series of trainings with the Association and Quality Laboratory.

Activity 3.4: Community understanding, and acceptance of the biomass energy enhanced through school educational Programme

Results:

Knowing and accepting the biomass as local energy source was promoted in beneficiary communities not just by the Project Committees, resource mobilization activities or while installing solid biofuel heating plants, but also by the introduction of optional educational course on Renewable Energy Sources in beneficiary schools (Grade VI to IX pupils).

After the approval by the Ministry of Education, Culture and Research of the *Curricula for optional educational course "Renewable Energy Sources"* schools from the Republic of Moldova, have benefited of a series of support activities framed under the *Educational Initiative on Renewable Energy Sources and Energy Efficiency.*

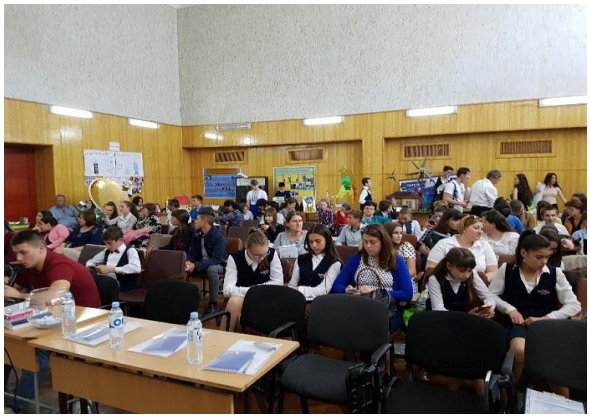
Hence, school professors and managers from project beneficiary communities were trained in teaching such subjects as energy efficiency, biomass production and use, waste recycling and use. Webinars were organized with the participation of pupils. Children have organized awareness campaigns in their communities 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.

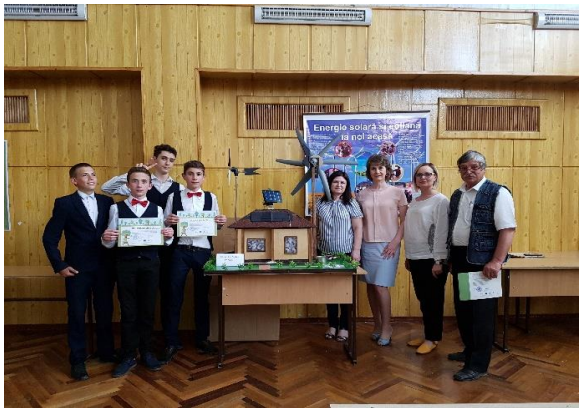
A new *Professor's Guide* was developed that includes examples of lessons for each topic and subjects addressed in RES and EE. At the same time, scientific conferences for professors were organized to analyze teaching methods of the optional course, lessons learnt and proposals to ensure the continuity of the course after the end of Energy and Biomass Project.

Under this activity 456 schools took part in the Educational Initiative on Renewable Energy Sources and Energy Efficiency, with a total of 25.000 pupils which have studied RES course over the 4 years of project implementation.

Within MEBP Phase 2, two editions of the *National Contest on Renewable Energy Sources* have been conducted in partnership and co-financed by the Ministry of Education, Culture and Research. Students from over 30 communities and schools have participated in the contest. Accompanied by teachers they had presented practical studies, research and models demonstrating the applicability of the knowledge accumulated during the school year. In two years, the contest has 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.

The winners of the contest were granted diplomas and prizes by the Ministry of Education, Culture and Research and were invited by several media sources to present their inventions.





National Contest on Renewable Energy Sources, 2018

A similar contest “Energy and Ecology” was launched in 2016 on the left bank of the Dniester River. The winners of both, National Contest on RES and “Energy and Ecology” contest were invited to participate in the Summer School ENERGEL.

A long-term achievement of the educational initiative is the volunteer network in green energy. Young people who are promoting alternative energy use, have participated actively in the organization of Sun Da-i Fest Festival, Summer School ENERGEL, Energy Week and Environment Day. Project volunteers continued training activities in educational institutions from their communities and are considered promoters of educational initiatives launched by the project.

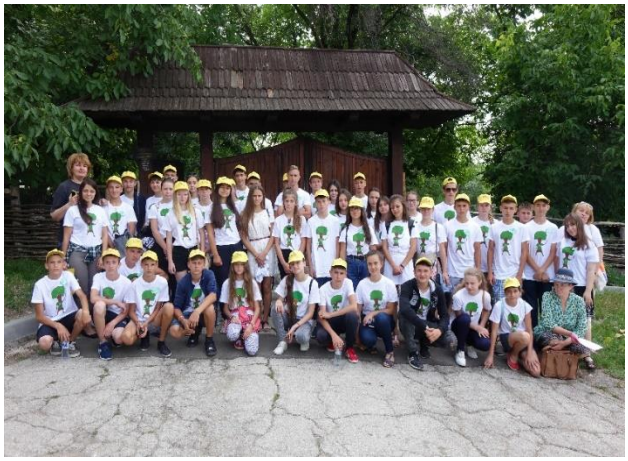
An important activity within the Educational Initiative on RES was the *ENERGEL Summer School* were participated students in 7th, 8th, 9th grades from all over the country, including left bank of Dniester River and ATU Gagauzia. A total of 438 students from over 25 communities, including beneficiaries of MEBP, have been registered.

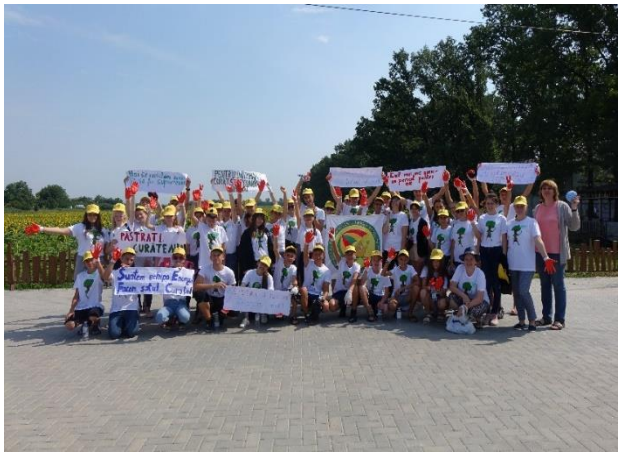
The activity has been carried out in partnership with NGO Gutta Club, which has extensive experience in environmental and energy education of teachers, and children throughout Moldova and well-trained Russian speaking educational specialists focused on RES and EE.

The ENERGEL Summer School was designed as a premium activity for pupils who study renewable energy course. The selection of participants in the Summer School was done based on National Contest on Renewable Energy Sources and local contests in each school.

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 specialized training courses on different topics, such as "organization 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 organized sanitation actions in the locality that hosted the summer school. Another activity of the Summer School was educational activity with peers from the community.





ENERGEL Summer Camp, 2018

The sustainability of the Educational Initiative was ensured by the fruitful collaboration with Institute for Continuous Education (ICE). Starting with September 2017, the ICE is implementing from its own resources the teacher's trainings and webinars on RES and EE optional educational course. The ICE in partnership with Ministry of Education, Culture and Research will up-take the ENERGEL Summer Camp and the National Contest on RES.

Besides education of pupils, within the Educational Initiative a *Student Conference* on the subject of energy plants as a renewable energy source has been conducted in 2017. It was attended by about 25 students from 2 vocational schools where the courses on the energy plants was piloted (the vocational schools of Cuhurestii de Sus and Orhei) and the students from the Agricultural Highschool of Chisinau. The students presented at the conference their research papers in this field and made proposals for the sector's development.

Activity 3.5: Technical and vocational education (VET) for experts in renewable energy sector introduced

Results:

Aiming at strengthening the Moldovan labour force and supporting the emerging biomass market and technologies, VET has become one of the most significant activities within the Educational Initiative implemented by the MEBP, Phase 2. Based on Memorandum of Partnership with the Ministry of Education, Culture and Research the project has promoted the new renewable energy professions in the VET sector.

Hence, Moldova Energy and Biomass Project initiated pilots programs of 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 National Nomenclature of Crafts, and in consultation with MoECR it was decided to introduce 2 key changes to existing profession set-up: "Biomass Boiler "module for the occupation "Boiler Room Operator" and "Energy Plants" for the occupation "Forester".

Respective documentation, justifications, as well as module description, content, selected institutions for piloting, training Programme for teaching staff, and endowment of laboratories for practical training were submitted to the Ministry of Education, Culture and Research.

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

At the same time, it is worth being noted that the Vocational School of Orhei was awarded a grant of 100,000 EUR under Output 2 to implement a closed cycle of biomass growth - production - use. The 2 ha plantation of energy plants will serve as one of the sources for biomass production. The Vocational School of Cuhurestii de Sus also applied for a biomass heating system under Output 1.

The students within Forester profession, who study the energy plants module, can enjoy the first Manual developed in the Republic of Moldova “Energy Plants – Renewable Energy Source”, which will serve as guidelines for students studying this profession. Also, the Student’s Notebook was developed – a practical instrument to assess the knowledge. A set of training materials ‘Practical Notebook of Works’ was developed for students from the Biomass Boiler Operator profession. A series of info-graphics explaining the technological processes related to boiler operation and the use of energy plants to produce the solid biomass were developed for both professions. All training materials were developed in working groups made up of representatives of the project, of vocational schools and of the Ministry of Education. This synergy of stakeholders made it possible to develop quality materials.

In May 2017, the first graduates of these new occupations were awarded their diplomas. All schools covered by the pilot Programme will continue to budget these occupations and ensure graduation of new students.

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.

During implementation of pilot programmes some extra-curricular activities were organised for the students, such as (i) visit to the Solid Biofuel Laboratory and participation in a university lecture at SUAM on the biomass fuel quality, (ii) visit to a biomass-heated greenhouse where students had the opportunity to observe the functioning of the biomass heating system and to practice some of the skills learned during the training courses, (iii) visit to a solid biofuel producer and (iv) training activities provided by national experts, university professors, biomass manufacturers and boiler assemblers. At the project’s initiative, the professionals presented, during the practical lessons, their experience in the field of renewable energy and informed the students about new professional development opportunities.

Component 4: Opportunities and benefits of biomass energy for Moldova well known, visibility of project results promoted

Baseline:

- 300 media materials about the benefits and advantages of biomass energy in Moldova and the results / activities of the project;
- 300 requests for information on project activities during 2014;
- Moldova Eco-Energetica is "appreciated" and "highly appreciated" to 90%.

Output targets:

- +20 % increase of the positive references to the project in the media
- + 20% requests addressed by Project Management Team

Activity 4.1: Mass media campaign

Results:

During the project implementation the principles of “communication for behavior change” was pursued. Thus, alongside the classical communication tools (producing and distributing video (spot, video stories, videography, audio, print), the project used interpersonal communication, direct contact with target groups, community mobilization and partnerships, as well as support from decision-makers in promoting biomass energy sources, and increasing the number of supporters and promoters of green energy and informing about the initiatives and achievements of the project.

The Project carried out its communication activities based on the Communication Strategy developed in the inception phase and reviewed periodically. All communication & visibility materials followed the requirements of the Joint Visibility Guidelines for EC-UN Actions in the Field.

As result of complex and intensive communication activities, 1 million people have been reached nationally and project has become visible outside the boundaries of the Republic of Moldova.

Video communication: to promote the project's achievements in an attractive and memorable way 35 video products (spots, testimonies and photographic stories) were developed. They have been widely broadcasted on TV, Radio, online communication and social media. In most cases, video communication has supplemented and improved communication actions of the project as events, press releases and successful stories.

Printed communication: It was rather used as a support tool for project communication actions than an independent communication product. During the reporting period, the project republished and disseminated previously developed publications (a list of all the printed materials produced by the project can be found at http://biomasa.md/en/communication-category/communication-materials/. Materials were distributed during the project activities, as well as during the public events with the participation of the project.

In order to promote the results of the Energy and Biomass Project achieved in the second phase, as well as to ensure the transparency of the project activity, the final publication was printed in Romanian, Russian and English languages.

In order to ensure the proper maintenance of biomass heating systems installed under the project, an Informative Sheet was developed describing the key steps in the efficient operation of biomass boilers and disseminated to project beneficiaries. The publication was produced in Romanian[2] and Russian[3] . The Informative Sheet was distributed at meetings held in each district. The purpose of these meetings was to promote project outcomes (at country and district level), to exchange experiences among beneficiaries, to discuss lessons learned, to inform project beneficiaries about the closure of the project and to recall steps to be taken to ensure the sustainable use of biomass energy after completion of the project.

Public events, with few exceptions, were organized in the territory or in pilot localities to demonstrate biomass energy technologies. The project has organized and participated **in over 170 public events** aimed at promoting biomass energy, as well as informing on the mandate and on-going activities of the Energy and Biomass Project, phase 2.

Each public event was conducted in a comprehensive manner, supplemented by various communication tools, such as photo galleries, media products, success stories, press releases, video graphics and info graphics. The events have been widely promoted in the media, social media and web sites.

In total over 100 press releases and successful stories were produced and distributed to promote project achievements, on-going programs and transparency of project activities.

All communication activities resulted in about 700 media materials distributed on TV, radio, newspapers and web portals.

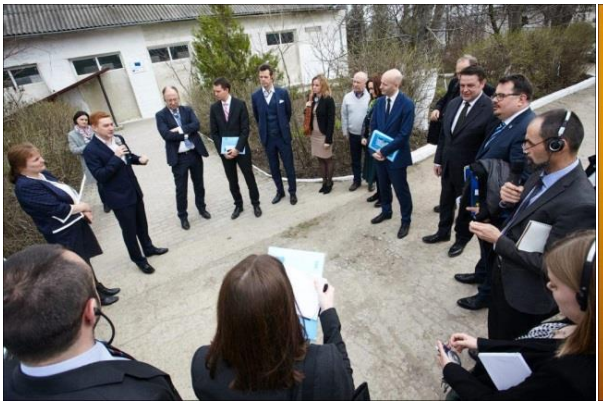
The project communication efforts for the following events need to be stressed:

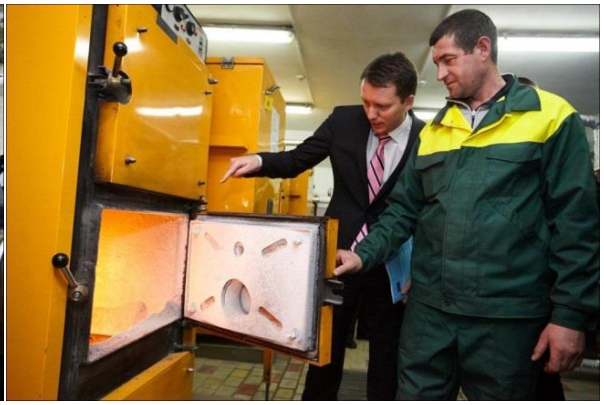
MoldEnergy Exhibition (2015-2018): The project had a common stand with the Energy Efficiency Agency, where visitors could find information on activities to promote renewable energy sources and energy efficiency, business opportunities and public policies in this area. Experts, companies and public institutions in the renewable energy sector participated in an information workshop, where they became acquainted with the new legislation and investment projects implemented in the field of green energy. Participants learned about modern energy efficiency standards and solutions and the solid biofuel test procedure in the Republic of Moldova.

Peer to peer visits (2015-2018): the beneficiaries of project Phase 2 visited selected school, which switched from natural gas to biomass in Phase 1. The purpose of the visits was to observe the successful use of biomass technologies, encourage use of BHSs, exchange of similar experiences, lessons learned with beneficiaries and project partners, and to discuss constraints in the case of non-use of biomass heat.

[2] http://biomasa.md/wp-content/uploads/2018/07/EB_factsheetA4_RO3mm-bleed.pdf
[3] http://biomasa.md/wp-content/uploads/2018/07/EB_factsheetA4_RU3mm-bleed.pdf

Visit of the European Parliament Delegation (2018): members of the European Parliament, who were on an official visit to the Republic of Moldova, visited the school in Carpineni, which has been heated for 6 years with biomass-based energy. Members of Parliament have seen how EU investments lead to community development and improve the quality of life and learning.

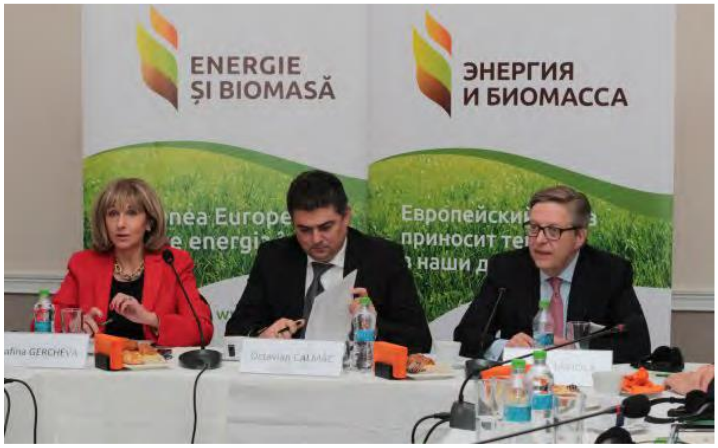




Europe Day (2015-2018): Project staff participated with a stand in "Europe Village" and provided information on its achievements and on-going programs, competitions with renewable energy awards were organized, and green energy technologies were presented. The event was promoted on social networks, the web page and the electronic bulletin of the project.

Press visit of Eastern Partnership journalists in Moldova (2018): 12 journalists from the Eastern Partnership countries (Armenia, Georgia, Azerbaijan, Belarus and Ukraine) visited the Republic of Moldova to document the results of the Energy and Biomass Project. The visit took place under the EU4Energy initiative. For two days, the team of journalists had meetings with the EUD team, the project team / UNDP, and visited the most relevant localities for the project to demonstrate the integrated approach of the project in the development of the biomass energy sector: public institutions that switched to solar and biomass energy, biofuel production plants, PPPs in the supply of biomass energy services, educational initiatives on RES.

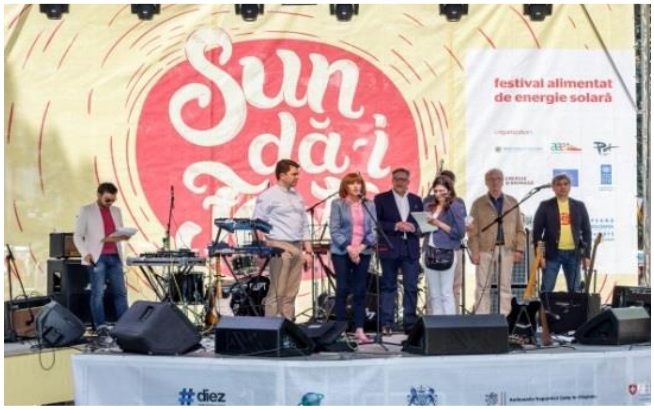
Press trips to project beneficiaries (2015-2018): a series of media field visits were conducted during the projects. The journalists, including training participants, visited various project locations which showcased project intervention in different sectors: public institutions and households heated with biomass energy, biofuel producers, Public Private Partnerships in green energy delivery, schools part of the Renewable energy educational initiative, pilot learning modules on biomass launched by VET schools, etc.



Press clubs: the events covered complex subjects related to biomass sector development: biomass market evolution, project activities and their impact on renewable energy sector development, steps to be done in transforming the energy system & safeguard against a potential supply crisis, biofuel quality assurance, etc.

International Environment Day (2015-2018): the project staff has co-participated in the event. Project experts provided information on on-going projects and answered visitors' questions. Visitors could admire the biofuel exhibition in Moldova, learned how to determine the quality of biofuel and test their knowledge on green energy issues.

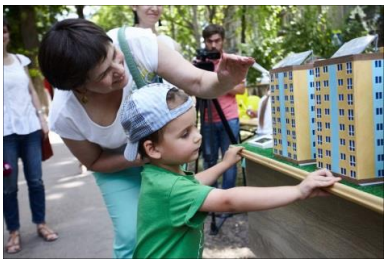
EU SEW (2014-2018): the project joined the EU Sustainable Energy Week initiative with an information item, where citizens could communicate with the project's experts, participated in interactive activities, and learned more about the development of the green energy sector in the country

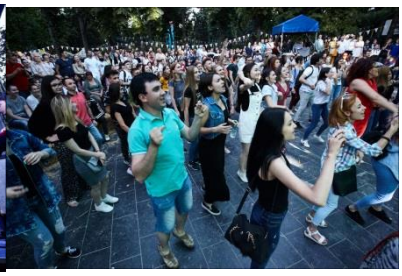


SUN Da-I Fest (2015-2018): organized in partnership with AEE in Public spaces for the citizens to get acquainted with RES and EE technologies, test renewable energy technologies and enjoy the music powered by solar batteries. Visitors had the chance to observe everything in real life: biomass boilers that produce heat, the photovoltaic panel that generates clean electricity, and solar collectors for hot water production. They had the opportunity to test cars, scooters and electric bicycles and get informed from the first source about the advantages of clean technologies in the country, as well as to hear the success stories of people who have switched from fossil energy to clean energy produced in Moldova. Visitors have discovered the green innovations created by young people in schools and universities. Hydraulic mini-plants, wind turbines built from waste, solar parabolic antennas, solar furnaces, robots, remote energy monitoring systems, homes that use only renewable energy are just a few of the inventions exposed at SUN Da-i Fest. The centerpiece of th Fest was the live music concert, partially fueled by solar energy. The event has been usually preceded by an extensive promotion campaign on its dedicated **Facebook page**, an extensive media campaign in the national press (TV, radio, print, web portals, and blogs). For this

purpose, SUN Da-I Fest video spots, web banners, press releases, promotional stories of participants were produced, young innovation competitions were launched, etc.







ENERGEL Summer School (2015-2018): Representatives of the European Union Delegation to the Republic of Moldova, the United Nations Development Program, the Ministry of Economy and Infrastructure spent a day at the ENERGEL Summer School to see the inventions of children built from recycled objects, participate in waste recycling workshops, and in other clean energy promotion activities.

Final event of Energy and Biomass Project (2018): about 200 project beneficiaries and partners gathered to celebrate the results, discuss the challenges of the green energy sector to gain access to safe, clean energy produced in our country.

Activity 4.2: Annual national awards

Results:

In 2011, under the first phase, Moldova Energy and Biomass Project launched the Annual National Competition "Moldova Eco-Energetica", which aims to reward successful initiatives in the field of energy efficiency and renewable energy. Since its first edition, Moldova Eco-Energetica has been organized in partnership with the Ministry of Economy and the Energy Efficiency Agency, which assumed the ownership and took over the organization of the competition (both logistical and financial responsibility) and the national award ceremony from 2015.

Phase 2 of the project has had the mandate to provide assistance for strengthening the capacity of the Energy Efficiency Agency to properly organize and conduct the “Moldova Eco-Energetica” Competition and Award Ceremony.

In order to ensure the gradual and smooth transfer of responsibilities to national partners and to support the strengthening of the capacity of the EEA's communication experts to organize the competition and the award ceremony, a communication adviser was contracted between 2015-2017 to provide assistance to the Energy Efficiency Agency to organize the competition and award ceremony of Moldova Eco-Energetica. The project also hired a team of experts, for

the evaluation of dossiers of participants for annual contest and awards and which recommended the winners of Moldova Eco-Energetica to the Competition Coordination Council.

Since 2012 when Moldova EcoEnergetica was launched and until 2018, 329 projects were submitted for the contest into three categories (i) eco-responsible stories; (ii) eco-responsible technologies and (iii) the best energy efficiency project. 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 approved by the Steering Committee of Moldova EcoEnergetica.

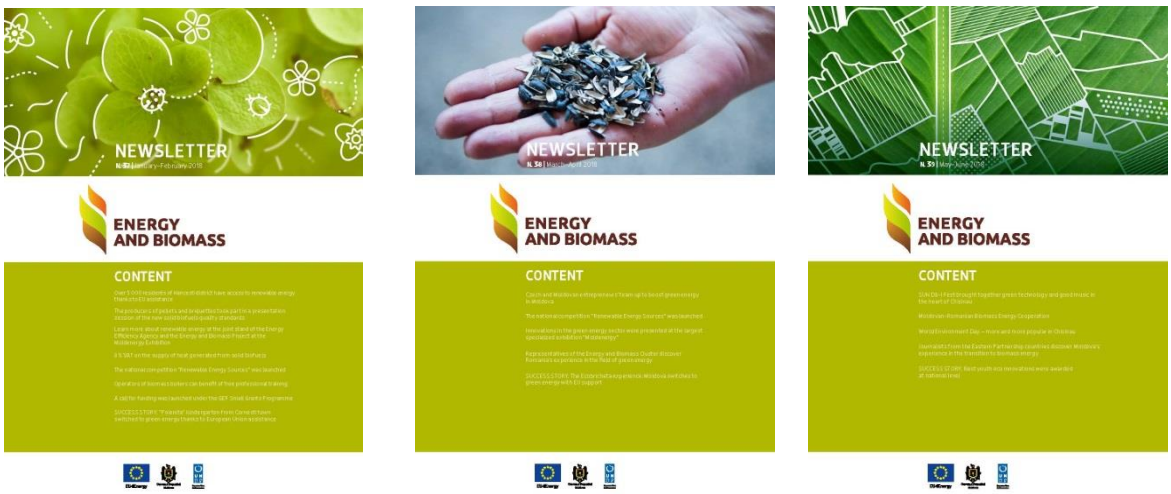
The events take place in localities with maximum visibility and capacity to host sufficient participants, including National Theatre "Mihai Eminescu", Opera and Ballet Theatre "Maria Biesu", and Expo Centre "MoldExpo".

Activity 4.3: Communication and visibility of project's results

Results:

Web communication: The transparency of the Project's activity and the visibility of its results are provided through the dedicated web page - www.biomasa.md – developed on the EEA web page and conceived as a unique communication web platform dedicated to biomass energy in the Republic of Moldova. During the reporting period, over 200 news items have been placed on the web page in 3 languages: Romanian, Russian, and English.

Electronic bulletins of the project, developed quarterly, represent a platform for informing the beneficiaries, partners and institutions active in the sector about the activities and results of the project. During the reporting period, 15 editions of the project electronic bulletin were prepared in RO, RU and EN (No.22- 37). Electronic bulletins are available at http://biomasa.md/en/buletin-electronic/ .



Social media communication:

Also, the achievements and activities of the project are promoted on social networks, and for this purpose a communication platform was created on Facebook https://www.facebook.com/biomasa.md/, where news and information on the development of biomass energy sector in Moldova are placed, interactive contests announced, etc. Over the reported period, over 130,000 people read the Facebook page's posts.

The communication actions, as well as the achievements of the project in the territory, increased the interest of the population towards the bioenergetics field, as well as to the projects for the public, residential and private sector. During the reported period, over 500 people, mostly agricultural entrepreneurs, local public authorities, managers of rural public institutions, NGOs, requested information from the project team by e-mail, telephone, letters, visits to the project bureau on project activities and interventions next year. The project team responded questions in a detailed and timely manner.

V. RISKS IDENTIFIED AND MEASURES APPLIED. LESSONS LEARNED

The table below presents the risks identified and managed during the action implementation period. It also considers the risks of sustainability of project results after its completion which have been analyzed and described per components in the **Post Project Sustainability Plan**, approved by the MEBP Board in August 2018 (please see Annex 6)

Description of the risk	Type and category	Risk management actions
Due to insufficient budgets, local authorities and public institutions couldn't prepare enough amounts of biomass fuel for heating seasons, or the fuel is of low quality, which cannot provide the appropriate comfort and / or thermal use.	Economic / average	MEBP consultants in project monitoring provided consultancy and training on biofuel procurement. During community visits, they provided information to public authorities and managers of beneficial public institutions about biofuel producers, in particular about suppliers offering competitive prices. The information has also been permanently updated on the official project website www.biomasa.md and www.piata-biomasa.md
The population migration from rural communities, where biomass plants are installed, creates prerequisites for the reorganization of educational institutions and jeopardizes the project investments made.	Social / average	Collaborating with public authorities of level I and II in order to transfer the heating plants from the reorganized / optimized public institutions to functional institutions, ensuring their continued operation. In 2018 3 BHSs were transferred from such institutions. Deep analysis on the implementation of education reforms of new institutions requesting the installation of biomass boilers. Communicating with institutions responsible for BHSs in a continuous format, not just before the start and at end of the heating season, allows for early identification of the difficult situations that might require the

		intervention of the BHS monitoring institution.
Reducing the price for natural gas, officially approved as of 16 March 2018, might decrease the interest of potential and existing beneficiaries in starting / continuing to use biomass, and may also affect the number of biofuel producers, which will increase the price of solid biomass fuel.	Economic / average	The MEBP team met with the beneficiaries during the monitoring visits, transfer seminars and workshops of completion, and provided support, knowledge and experience on the benefits and advantages of biomass systems and solar water heating systems. Communicating with the institutions in charge of the BHS in a continuous format, not just before the start and at end of the heating season, allows for early identification of difficult situations that may require the intervention of the institution responsible for monitoring BHSs, in particular with reference to the need to promote renewable energy from biomass. Peer to peer visits organized for communities leaders and manager of institutions that were not using BHSs, in order to share successful cases and encourage re-use of BHSs.
The development of the biofuel market is compromised by high prices and low accessibility for raw material, which can lead to low quality promotion of affordable quality products for the final consumer.	Economic / Average	Support consumers and solid biofuel producers through state subsidies. State support by prioritizing energy efficiency with increased emphasis on local products (biomass). Continuous monitoring of the biofuel market and collaboration with their producers (e.g. through the Association of Biofuel Producers).
Insufficient knowledge and staff turnover, which ultimately exploit biomass boilers, increase the risk of inappropriate use and must be	Operational / Average	The Training Center for Boiler Operators provided and provides training to existing operators as well as future operators for newly installed heating plants. All the

addressed by providing regular institutional training for operators.		experience, knowledge and educational materials developed under MEBP were made available to the Training Center as well as to the beneficiaries of the Project. Organizing training courses for BHS operators at least twice a year can ensure that an adequate level of knowledge is maintained. Verifying the presence of trained operators as well as the need to update the operational knowledge of BHSs is also a way of ensuring the appropriate level of operator training.
Local authorities may have difficulties in identifying operators with a reasonable level of qualification in selected communities, given low wages, working conditions, population aging and migration.	Operational / Average	Local authorities will be provided with the full set of training and guidance materials necessary to hire and train future boiler operators. These will help LPAs better explain the responsibilities and roles of biomass boiler operators as well as the benefits of using biomass boilers in terms of better and healthier working conditions as compared to burning furnaces and stoves based on coal. In the long run, with the implementation of VET programs focusing on renewable energy technologies, the prestige of 'pure energy' jobs (including boiler operator work) would increase and thus attract younger professionals and give them more employment opportunities, especially at rural level.
Strengthening actors on the local biomass market is an uncoordinated process.	Operational / Average	The Association of Biomass Producers and the Biomass Energy Cluster can ensure the coordination of capacity development activities. Both structures have benefited from assistance for the development of the operational framework as well

		as the development of internal capacities for accessing new funds and sources for sector development. Supplementary State assistance would be beneficial.
The Inter-municipal Cooperation (Cimislia) in the field of solid biofuel production might start with delay.	Operational / Average	A dialogue with the Cimislia Town Hall, the entrepreneur, with the support of the Project, has accelerated the involvement and quicker response to honor the contractual obligations assumed by the Town Hall. A more stringent monitoring of the Town Hall involvement and observance of requirements was necessary, with more meetings being held to negotiate and coordinate the process.
Reduced capacity of the BioEnergetica Association (the Biomass Energy Cluster Management Unit) to ensure the sustainability of the project results assigned by Project Sustainability Plan.	Operational / High Economic / Average	Providing support by the Ministry of Economy and Infrastructure to the Association. Considering the transfer of www.biomass.md to the strategic partner of the EEA / new Agency at the end of the MEBP, in order to ensure a continuous management of the page, an agreement could be signed between the Association and the Agency through which the Association would assume some management responsibilities of the page on behalf of the Agency. The branding package could be offered to the Association to ensure the sustainability of MEBP's work. Supporting the Association to attract new projects, to ensure the development of the domain and the continuity of the results obtained under the project.
The completion of the MEBP Phase 2 in November 2018 will	Operational / Average	A more active involvement of the state authority to inherit the results

not allow for adequate implementation of sustainability measures and adequate monitoring / preparation for the 2018-2019 heating season		of the project to ensure adequate monitoring and preparation for the 2018-2019 heating season.
Public institutions that are part of PPPs do not document issues related to PPPs operations. Lack of documentation and information of decision makers jeopardizes the sustainable operation of PPPs	Operational / High Economic / Average	Promoting the Guidance on the establishment and operation of PPPs produced under the MEBP. The Guidance is available electronically on the project website. Continuous and transparent monitoring by AEE and MoEI
SUN Da-I Fest – a successful awareness-raising initiative that has proven to be very attractive and generated positive answers from key actors in the energy arena (state-owned institutions, academia and civil society), the media and the general public, risks to no longer be produced in the years to come	Operational/ Average	The AEE and MoEI as leading authorities in the development of the energy sector shall ensure sustainability of results

VI. CHANGES INCLUDED IN THE IMPLEMENTATION

During the project implementation there were encountered several challenges that lead to modification of initial project action.

The challenges encountered were related to:

1. Installation of new biomass heating systems and new solar hot water systems, given high demand of LPAs;
2. Improve the monitoring of the BHSs, through installation and commissioning at AEE of the Remote Monitoring System for all BHSs in use.
3. The need of additional outreach activities in localities which have benefited of MEBP Phase 1 investments and which were not used /partially used.
4. The Revolving Fund closure: funds collection from AEE and 2KR and returning of the collected funds to EUD
5. Provision of additional supporting measures in the form of logistic equipment for labor intensive biomass boiler systems operation (Activity 1.1) and transferring of the ownership of the equipment.
6. Resource intense process of establishment of an Association of Solid Biofuel Producers and Bioenergy Cluster, including additional investments in trainings for biofuel producers.

The two requests of changing the action were made with the aim of maximizing the programmatic benefits and to provide an additional timeframe to reach out to more communities and monitor all heating systems installed. In this sense the Project was approved for no-cost extension of implementation period from 35 to 47 months and increase of overall budget of the action by 218,722 EUR, that were covered by UNDP. The changes of action to face the above-mentioned challenges were agreed by the EUD and the Board meetings.

Please see annex Annex 7 for details.

VII. LESSONS LEARNED

1. Over 95% of project beneficiaries are successfully using biomass heating systems and solar panels for hot water. This was largely influenced by the high level of responsibility of local authorities and public institution administrations, as well as the support provided by project team to efficiently plan, budget and procure solid biofuel.
2. Training for BHSs operators, or at least to ensure that the BHS operating manuals are in place and operators understand the elementary system operating issues (how to turn it on, how to turn it off, why it should not be disconnected from the electricity, etc.) is particularly important.
3. In some cases, human factor- especially the unwillingness of local public authorities and institutional managers to use biomass due to higher operation costs of BHS compared to gas heating, the insufficient qualification and salaries of operators, the costs of servicing biomass boilers, insufficient public budgets are the reasons that have led to the non-use of some biomass heating plants by some beneficiaries. One radical solution applied in 2 cases was to dismantle and transfer biomass boilers to interested institutions, despite the fact that the costs of the transfer were equivalent to those of installing new boilers.
4. Continuous communication with beneficiaries helps re-identify the benefits of using biomass energy and raising awareness of these benefits, which makes some beneficiaries re-start using biomass heating systems.
5. Project champions and local resource mobilization were vital to project success.
6. Operators of biomass heating plants are unmotivated, their salary being equivalent to that of natural gas heating plant operators, while the effort to ensure an efficient and correct operation of a biomass heating plant is much higher, taking into account the special technical features. Ensuring the beneficiaries with logistics equipment has contributed significantly to making the physical effort of operators easier, and to motivate them stay in the workplace, but also to increase the trust of the local public authorities and their motivation to make the most use of biomass heating plants.
7. The economic instability in the country causes the private partners' low interest in long-term investments in the development of public-private partnerships for the supply of biomass heating to public buildings in districts. Out of initially planned 9 PPPs, it was possible to implement 2, despite all project efforts. It was challenging to secure the participation of companies with appropriate professional profile in the PPP competitions.
8. The Revolving Fund has been a pilot initiative and it did not come without challenges regarding the financial soundness of the selected companies/beneficiaries. In the case of AEE 17 beneficiary companies of Leasing Programme are still being locked in court cases for non-payment or frequent delays in repayment of the loans. The challenge which has lead to this situation was the constant rise in raw material price (which is a phenomenon present on emergent markets) which led many beneficiaries to the impossibility of sticking to repayment schedule, with their files eventually submitted to court. The prospects for money recovery depend to a large extent on the ability of the EEA to devote enough efforts to these processes.
9. Sanitary standards provide a certain temperature for cold periods so as to ensure adequate thermal comfort in public institutions, especially in schools and kindergartens. Public institutions that are part of PPPs have received and receive heat that ensure these thermal comfort conditions when compared to times when heating

was made with gas or coal, and the institution could reduce energy consumption to the detriment of the required thermal comfort (heating was closed or minimized) to save money.

10. Establishment of Quality Assurance Center (QAC) under the Laboratory of the State Agrarian University of Moldova (SAUM) has greatly contributed to quality improvement of nationally produced solid biofuel and made the process of procurement of biomass more safe for public institutions.
11. Ensuring continuous communication and involvement of state bodies is critical for successful implementation and assurance of responsibility for sustainability of project outcomes. Moldova Eco-Energetica, launched by the Project and implemented in agreement with the Ministry of Economy and Infrastructure and the Energy Efficiency Agency from the beginning, was fully taken over by national partners, who assumed 100% responsibility at national level. This is an example of excellent collaboration with state bodies.
12. The Educational Initiative on Renewable Energy Sources and Energy Efficiency launched by the Energy and Biomass Project in beneficiary communities has produced a strong social impact by growing a new generation of young people, which are committed and passionate for green energy. Over 25.000 young people have studied and gained deep knowledge on renewable energy and its benefits.

Annexes:

1. The list of biomass heating systems and solar hot water systems installed during MEBP Phase 2
2. The list of non-used biomass heating systems installed during MEBP Phase 1 and 2
3. Exit Strategy to the Revolving Fund
4. List of Transferred assets to final beneficiaries
5. Post Project Sustainability Plan
6. Final Financial Report (2014-2018)
7. Addendums to EU contribution agreement