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Entrepreneurial Discovery Workshop Report I
Topic: ENERGY

EDP workshop overview

On 18 June 2019, the Ministry of Education, Culture and Research, with the support of the Joint Research Center of the European Commission and in partnership with the Institute of Power Engineering, organized the first entrepreneurial discovery process (EDP) workshop in Energy priority domain.

The event was attended by 41 people, representatives of public authorities, universities, research institutes, private sector and civil society, distributed as follows:

Working group	<i>Energy efficient technologies</i>	<i>Alternative energy sources</i>	<i>Heating solutions</i>
Nr of representatives	<i>Facilitator: Dr. Mihail Tirsu</i>	<i>Facilitator: Mihail Lupu</i>	<i>Facilitator: Sveatoslav Postoronca</i>
Business	6	7	4
Academia	3	3	3
Civil society	1	2	2
Public authorities	4	3	3
Total:	14	15	12

The main goal of the EDP workshop was to identify sub-domains of the energy sector, that include smart specialization niches, relevant either for the whole country or for its regions.

The workshop aimed to validate the subdomains identified as being priorities for further smart specialization activities.

The 3 priority subdomains of the energy sector were identified before the event, considered to have potential for smart specialization and have been validated during the EDP workshop:

- *Energy efficient technologies*
- *Alternative energy sources*
- *Heating solutions*

The EDP workshop agenda included an introductory plenary session, where representatives of the relevant public authorities (dr. Tatiana Moraru from the Ministry of Education, Culture and Research, Mr. Nicolae Magdil from the Ministry of Economy and Infrastructure) stressed the importance of the entrepreneurial discovery process for the energy sector and expressed their support for the process. The Director of the Power Engineering Institute, dr. Mihail Tirsu briefly presented the workshop agenda and also stressed the importance of involving academia in increasing the competitiveness of the energy sector.

The presentations made by the invited national expert Ms Diana Russu from the Chamber of Commerce and Industry of the Republic of Moldova, focused on smart specialization in the Republic of Moldova, identified priority areas, the entrepreneurial discovery process as well as examples of good practices / success stories.

The presentations were followed by 2 participatory exercises, organized in 3 parallel working groups, moderated by facilitators:

- performing SWOT analysis of the identified subdomains and the priority domain as a whole,
- developing visions for the identified subdomains and then a common vision for the future for priority domain as a whole.

The participants were divided into 3 working groups, one per each subdomain, according to their interests. Each group was moderated by a facilitator, who has been trained in advance on methodology of participatory exercises.

Current status of the Energy sector

The energy sector in the Republic of Moldova is heavily dependent on external energy resources. About 80% of the country's energy resources are imported from a single source, making the country's energy security quite vulnerable. This requires diversification of energy sources, as well as efficient use of existing domestic potential, including renewable energy sources. On the other hand, the energy intensity of the country is 3-4 times higher than the European average, meaning that the implementation of energy efficient technologies along with renewable energy sources and smart heating system would both improve this indicator and increase the energy efficiency. It should be mentioned that around 50% of all energy is consumed by the residential sector. Over 220ktoe is used as heat supply by district heating (just for Chisinau and Balti), which constitutes 10% of total consumption in the country¹. Another important factor is the high level of heat losses in networks. It reaches 22%. The implementation of measures related to building insulation in combination with smart heating solutions can decrease energy losses by up to 40%. By the other hand most of population excluding Chisinau and Balti are using very inefficient heating solutions that represent a big potential for reducing energy consumption increasing at the same time standard of living.

The Republic of Moldova has just recently started exploiting the potential of renewable energy sources, thus opening the door for the implementation of the most efficient and innovative technologies for energy conversion. The country has a very good potential of renewable energy sources that should be involved as much as possible in general energy consumption of Moldova². The Government offers different support schemes for the development of renewable energy sources, with a target of at least 100MW to be installed by 2020.³ The Government also attracts external funding aimed to increase energy efficiency, e.g. the EBRD-funded MOSEFF project, which allocated 42 mln Euro to more than 300 projects⁴. These externally funded projects have contributed to the development of energy efficient technologies, especially for SMEs, as well as to the generation of new ideas focused on increasing energy efficiency.

The importance of energy subdomains is also confirmed by the statistical data for 2007-2016, which includes 141 publications, most of them in the capital Chisinau; 68 European projects implemented by 25 organizations with an overall budget of 6.2 mln EUR; 1204 national projects worth more than 106 mln EUR, carried out by 73 organizations; and also the large number of patents (over 2,800) registered by 893 organizations.⁵

The interactive discussions between the participants during the EDP workshop brought to light a series of findings on the current state of the energy sector:

- relevant regulatory framework in place
- bilateral agreements related to the mutual recognition of certification from Moldova at the European level
- lack of internal and external funding and support programs/ tools for R&I and technology transfer
- low consumer buying power
- obstacles set by sector monopolies
- lack of local heating systems in most regional centers
- low efficiency of energy production, transportation and distribution
- sufficient technical potential for alternative resources to meet the energy demand

¹ Balanța energetică a Republicii Moldova. <http://statistica.gov.md/pageview.php?!=ro&idc=263&id=2197>

² Renewable energy sector overview. http://invest.gov.md/sites/default/files/RES%20sector%20overview_Edition%202018-2019.pdf

³ Legea Nr. 10 din 26.02.2016 privind promovarea utilizării energiei din surse regenerabile. <http://lex.justice.md/md/363886/>

⁴ Moldovan Sustainable Energy Financing Facility - MoSEFF – Moldova. <http://www.buildup.eu/en/explore/links/moldovan-sustainable-energy-financing-facility-moseff-moldova>

⁵ Characterisation of preliminary priority areas for smart specialisation in Moldova, 2018, SIRIS Academic. <http://sirislabs.com/lab/ris3/moldova/#/network>

- innovative local experience on energy exploitation on the local market
- access to technologies and equipment.
- low energy security
- high energy intensity

The national energy sector faces a series of challenges, related to ensuring the energy security of the country, reducing the financial burden on consumers, increasing the competitiveness of innovative companies, including by fostering the emergence of new solutions and technologies, and increasing the availability of resources for business development. The challenges also include global trends such as diminishing environmental impact and increasing the quality of life.

SWOT analysis of the Energy sector

Strengths

- Energy sector is considered a priority for the Republic of Moldova⁶;
- Adoption of the legislative framework transposing the EU directives on renewable energy and energy efficiency;
- Government endeavors to increase energy efficiency by attracting dedicated externally funded projects;
- Establishment of relevant institutions aimed at implementing the state policies on energy efficiency;

Weaknesses

- Insufficient funding for technology transfer projects and implementation of innovations;
- Inadequate incentives for research institutions;
- Lack of testing and prototyping in the value chain;
- Poor cooperation between SMEs and research organizations;
- Absence of joint energy infrastructure with Romania;

Opportunities

- Developing local generation sources and expanding the share of renewable energy sources in the energy balance
- Electricity export or transit
- Creation of Smart Grids
- Enhanced and smart integration of renewable energy sources into the consumers' heat supply circuit

Threats

- Inability of developing attractive financing instruments for the energy sector in Moldova
- Increasing gap between the consumer buying power and the upward trend of energy prices
- Political instability, which often leads to prolonged pause of international projects in the sector
- Lack of mechanisms encouraging the adoption and use of new technologies by SMEs

The main development factors identified for the 3 subdomains, resulting from the participatory group exercise, are presented in Table 1

⁶ Government Decision nr.809 of 29.10.2015 on the approval of the Partnership Agreement between the Government and the Academy of Sciences of Moldova for 2015. Available at <http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=361816>

Table 1. Main development factors per subdomain

Heating solutions	Alternative energy sources	Energy efficient technologies
<ul style="list-style-type: none"> • Well-developed infrastructure of natural gas and electricity networks. • Research potential in the field (research papers and projects at the national level on solutions for heat supply, including trigeneration) • SMEs involved in development of heating solutions, potential for growth • Available market, mainly in regional centers • Low investment for development of innovative district heating systems • No diversification of gas supply sources in Moldova • High level of risk for foreign investors due to political instability • Qualified personnel available for district heating projects • Lack of decentralized demonstration projects (both cities and district centers didn't focus on hybrid district heating systems) 	<ul style="list-style-type: none"> • Specialised institutions in the field mandated to promote and support the development of renewable energy sources (Energy Efficiency Agency, etc.) • R&D potential (Institute of Power Engineering, Technical University of Moldova) of new energy sources (research papers and patents related to usage of alternative energy, including hydrogen production) • Available market, with guaranteed access • Low consumer buying power • Weak government support of innovation and technology transfer • Lack of government subsidies • Increasing energy security is a state priority, whilst the increase of energy from alternative sources is a necessity • Establishment of new companies specialized in development and implementation of alternative energy sources, as well as jobs creation • Research on new alternative generation sources is on the rise and their costs are steadily decreasing • Political instability in the country • Incorrect and non-transparent pricing of energy sources • Insufficient funding of research in the field. 	<ul style="list-style-type: none"> • Over 1.000 standards in the energy sector • R&D projects and research potential • Accessibility of energy efficiency technologies • Lack of funding programs / instruments • Lack of government incentives • Increasing the awareness on the importance of energy efficient technologies for business and LPA • Potential market available for implementing energy efficient technologies • Low consumer buying power • Obstacles set by sector monopolies in the field

Vision for the Energy sector

By 2029, intelligent heating solutions will be based on the latest technologies, developed in close collaboration with the R&D sector, will be developed feasible energy storage systems, hybrid energy production systems, smart grids for energy production, distribution and consumption, supported by the capacity building and continuous education of sector professionals.

The main objectives to achieve this vision

- Allocation of human and financial resources for implementation of energy efficient technologies
- Adopting programs focused on promoting energy efficient technologies
- Capacity building between research and private sector by means of various state programs
- Information campaigns aimed at awareness-raising of the private sector and general population
- Dedicated programs for mapping of territories and their sizes, depending on the type of heating solutions (simple, cogeneration or trigeneration).
- Attracting investments for development of new solutions and technology transfer support.
- Identification of funding opportunities for the implementation of pilot district heating projects in different localities / areas.
- Development of the legislative framework aimed at encouraging SMEs provision of heating services.
- Development of functional software for smart control of heating systems
- Increasing the level of training and continuous education of the exploitation and maintenance professionals.
- Research, development and technology transfer in the fields of energy storage, hybrid systems and smart grids.
- Synchronization of the primary and secondary legislation.
- Establishing a competitive power generation market.

Conclusions

The 3 subdomains validated during the EDP workshops could include a plethora of energy efficient technologies for various sectors of the national economy, innovative renewable energy conversion solutions, hybrid power generation solutions (including hydrogen-based), smart grids, innovative heating solutions based on the integration of renewable energy sources, cogeneration and trigeneration, etc.

Recommendations

The next entrepreneurial discovery events should focus on establishing the exact potential smart specialization niches for each subdomain. It is recommended to organise at least 3-4 events, at least one per subdomain, in order to validate 3 smart specialization niches initially identified in this workshop. In parallel, it is also necessary to set the measures and policies necessary for further promotion of smart specialization. One stakeholder meeting was insufficient to establish narrow smart specialization niches per each subdomain, as well as to cover discussions on the instruments to be developed. This will be covered during the next EDP meetings.

The following table lists the visions and objectives per subdomains, resulted from the participatory exercise.

Table 2. Visions per subdomains in Energy sector

1. What is the present situation of the priority subdomain?		
<i>Heating solutions</i>	<i>Alternative energy sources</i>	<i>Energy efficient technologies</i>
<ul style="list-style-type: none"> - Gas and electricity networks infrastructure is well developed all over the country, but only in capital Chisinau and Balti there is a centralized heating system. - There is no centralized or district heating system in district centers, as well as small towns. - Developing innovative heating solutions for different categories of consumers (districts, larger areas, separate companies), using the local renewable energy potential, could lead to more efficient energy consumption for heating, as well as reduce the financial burden on consumers. - Heating solutions based on the use of fossil fuels in combination with renewable energy sources could improve the national ecological situation. 	<ul style="list-style-type: none"> - About 80% of the energy is imported from a single source, while 80% of the electricity is being produced at a thermal power plant with an efficiency below 29%. - Sufficient technical potential for alternative resources to meet the demand for energy (electricity), which is not capitalized. - Primary and partially secondary legal frameworks have been adopted, there are competent institutions in the field. - Innovative solutions for the use of alternative energy sources are available, but funded to reach the market. - Access to technologies and equipment is free - Local market with potential to absorb locally produced energy. - Biogas-related opportunities are not exploited due to various obstacles. 	<ul style="list-style-type: none"> - Over 1.000 standards in the energy sector. - Bilateral agreements related to the mutual recognition of certification from Moldova at the European level - Lack of funding programs / funding instruments - Lack of government incentives - Low consumer buying power - Obstacles set by sector monopolies
2. What are the key challenges?		
<i>Heating solutions</i>	<i>Alternative energy sources</i>	<i>Energy efficient technologies</i>
<ul style="list-style-type: none"> - Efficient innovative hearings solutions focused on consumer types - Better quality of service in heat supply - Higher share of renewable energy sources integrated into the district heating system 	<ul style="list-style-type: none"> - Decrease of electricity tariffs - Ensuring the energy security of the country - Reduced environmental impact - The low buying power of consumers (for both electricity and heat). 	<ul style="list-style-type: none"> - Reducing CO2 emissions - Diminishing financial burden on consumers - Increasing the competitiveness of innovative companies - Availability of resources for business development

<ul style="list-style-type: none"> - Capacity building for development and implementation of innovative district heating systems - Increased competitiveness among thermal energy producers - Heat produced in cogeneration 	<ul style="list-style-type: none"> - Ability to manage the electricity balancing. 	<ul style="list-style-type: none"> - Fostering the emergence of new solutions and technologies - Improving the quality of life
3. What are the sectorial goals of the subdomain?		
<i>Heating solutions</i>	<i>Alternative energy sources</i>	<i>Energy efficient technologies</i>
<p>By 2029, to improve and develop smart heating solutions based on the latest technologies and having large collaboration with the R&D sector.</p>	<p>By 2029 to increase share of renewable energy sources use by developing energy storage systems, hybrid energy production systems, smart grids for energy production, distribution and consumption</p>	<p>By 2029, to accelerate penetration of energy efficient technologies in country's major economic sectors</p>
4. What are the main objectives to achieve sectorial goals?		
<i>Heating solutions</i>	<i>Alternative energy sources</i>	<i>Energy efficient technologies</i>
<ul style="list-style-type: none"> - Dedicated programs for mapping of territories and their sizes, depending on the type of heating solutions (simple, cogeneration or trigeneration). - Attracting investments for development of new solutions and technology transfer support. - Identification of funding opportunities for the implementation of pilot district heating projects in different localities / areas. - Development of the legislative framework aimed at encouraging SMEs provision of heating services. - Development of functional software for intelligent control of heating systems - Increasing the level of training and continuous education of the exploitation and maintenance professionals. 	<ul style="list-style-type: none"> - Research, development and technology transfer in the fields of energy storage, hybrid systems and smart grids. - Synchronization of the primary and secondary legislation. - support or researches in field of fuel cells and hydrogen use; - second fuel generation from biomass. 	<ul style="list-style-type: none"> - Allocation of human and financial resources for implementation of efficient technologies - Adopting programs focused on promoting efficient technologies - Capacity building between research and private sector by means of various state programs - Information campaigns aimed at awareness-raising of the private sector and general population.

5. Which key stakeholders should be involved to achieve the sectorial goals?

<i>Heating solutions</i>	<i>Alternative energy sources</i>	<i>Energy efficient technologies</i>
<ul style="list-style-type: none"> • Ministry of Education, Culture and Sciences • Ministry of Economy and Infrastructure • Ministry of Agriculture, Regional Development and Environment • Agency for Energy Efficiency, • National Agency for Energy Regulation, State Agency on Intellectual Property • Research and Innovation organizations (Institute of Power Engineering, Technical University of Moldova, Institute of Electronic Engineering and Nanotechnologies, State Agrarian University etc.); • Organisation for development of SMEs (ODIMM); • Real sector companies and organizations: power engineering enterprises, companies, installation firms (S.A.Termoelectrica, CET Nord, RED Nord, Moldelectrica, GasNatural Fenosa, etc); • Central and local public authorities; • Local and foreign investors; • Civil society 		

VISION for the priority domain

ENERGY

1. What is the present situation of the priority domain?

- relevant regulatory framework in place
- bilateral agreements related to the mutual recognition of certification from Moldova at the European level
- lack of internal and external funding and support programs/ tools for R&I and technology transfer
- low consumer buying power
- obstacles set by sector monopolies
- lack of local heating systems in most regional centers
- low efficiency of energy production, transportation and distribution
- sufficient technical potential for alternative resources to meet the energy demand
- innovative local experience on energy exploitation on the local market
- access to technologies and equipment.
- low energy security
- high energy intensity

2. What are the key challenges?

- diminishing the environmental impact
- reducing the financial burden on consumers
- increasing the competitiveness of innovative companies
- availability of resources for business development
- fostering the emergence of new solutions and technologies
- increasing the quality of life
- ensuring the energy security of the country

3. What should the priority domain be like in 2029 in order to stay competitive, innovative and answer the societal challenges (VISION)?

By 2029, intelligent heating solutions will be based on the latest technologies, developed in close collaboration with the R&D sector, will be developed feasible energy storage systems, hybrid energy production systems, smart grids for energy production, distribution and consumption, supported by the capacity building and continuous education of sector professionals.

4. What are the main objectives to achieve this vision?

- Allocation of human and financial resources for implementation of energy efficient technologies
- Adopting programs focused on promoting energy efficient technologies
- Capacity building between research and private sector by means of various state programs
- Information campaigns aimed at awareness-raising of the private sector and general population
- Dedicated programs for mapping of territories and their sizes, depending on the type of heating solutions (simple, cogeneration or trigeneration).
- Attracting investments for development of new solutions and technology transfer support.
- Identification of funding opportunities for the implementation of pilot district heating projects in different localities / areas.

- Development of the legislative framework aimed at encouraging SMEs provision of heating services.
- Development of functional software for intelligent control of heating systems
- Increasing the level of training and continuous education of the exploitation and maintenance professionals.
- Research, development and technology transfer in the fields of energy storage, hybrid systems and smart grids.
- Synchronization of the primary and secondary legislation.
- Establishing a competitive power generation market.

5. Which key stakeholders should be involved to achieve this vision?

- Relevant central public authority (Ministry of Economy and Infrastructure);
- Research and Innovation organisations/ Institute of Power Engineering;
- Institutions implementing energy policies and projects (e.g. Agencies, NGOs, funds);
- Real sector companies and organizations: power engineering enterprises, companies, installation firms;
- Central and local public authorities;
- Local and foreign investors;
- Civil society.