

MOVBIO - Mobilization of Biomass for Energy Recovery Towards a Sustainable Development

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ABSTRACT

The MOVBIO project - Mobilization of pruning biomass for its energy recovery aims at the recovery of existing biomass which, due to its special characteristics, currently does not have a defined use circuit and has no energy use. In particular, by means of the evaluation of the technical and economic feasibility of adaptations in the processes of pretreatment and thermal utilization, it will be facilitated the energetic valorization of pruning biomass of agricultural origin (vines, olive trees, fruit trees) and urban biomass pruning of parks and gardens). The project aims to strengthen the economic model, making it more sustainable through the efficient use of residual biomass and the promotion of business innovation. In order to do so, it is essential to evaluate the real potential for energy recovery of the residual biomass, to make its extraction from the field technically efficient, to characterize as fuel and to adapt the combustion technologies, making them efficient for their final thermal and electrical use. Developing a new management model for this type of biomass will have an impact on companies providing agricultural services, thermal energy consumers, farmers and local governments. The innovative nature of the proposed approach is based on the assessment of the entire value chain, analyzing in detail the characteristics of the selected biomass

Keywords: Cross-border Cooperation, Biomass, Energetic Valorization, Spain, Portugal

1. Rational and challenges of the project

The need to carry out the MOVBIO project is justified due to the existence of a series of challenges, some of them specific to the Cooperation Area, which require further development of actions that may contribute to its overcoming. Associated with these challenges, there are opportunities for both the direct beneficiaries of the project and the other stakeholders (agricultural service companies, farmers, municipalities, municipal cleaning services, etc.). The challenges identified, and their opportunities are the following:

2. Intelligent growth through the development of an economy based on knowledge and innovation.

Innovation is a key element both for business competitiveness and for the competitiveness of the territories, occupying a preferential place in the policies of the European Union. The regions that make up the cross-border space are in the position of Moderate Innovators according to the index of regional innovation of the European

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Union. The challenge is to reach the European average that is situated in Innovative Followers. The project's approach focuses on innovation in three areas: (a) in the new way of using a typology of biomass with energy value; (B) in the suitability of systems for their collection; (C) in the adaptation of energy recovery technologies used.

3. Promotion of cooperation between actors of the innovation system

One of the major problems of the cross-border region is the low articulation between the agents of the innovation system. Between the business environment and the public sector, represented by public research organizations and universities. This low tradition of cooperation between the agents that generate knowledge and the companies in charge of their commercial exploitation, causes companies to find no solutions to their technical problems, or find them, but with a very scarce supply and little adjusted to their real needs. The approach of the project proves to be an opportunity for cooperation during the implementation of the technical actions, as well as along the communication actions envisaged in it. Throughout the project, high coordination will be maintained so as to achieve the greatest cooperation between the beneficiary research centers, as well as with the companies that the Project intends to involve. The result of these exchanges in the cross-border area, will also help to overcome other challenges such as the mobility of scientific staff, the joint use of infrastructure and the joint publication of scientific documents.

4. Specialization of small and medium-sized enterprises

The Cooperation Space presents as a significant weakness a low density of the population, linked to predominant rural territories that are characterized by a dispersion of users of services. Consequently, local companies reflect this reality and are characterized by family ownership and / or small size, with limited capacity for innovation and adaptation to a constant technological evolution. They reach a very diverse set of technical requests that they cannot respond to, since it is very difficult to have the necessary expertise as there is not enough market in the large cross-border region with low population density where they are located. In territorial contexts with a dense network of small and medium-sized companies, the role of technology centers as agents of innovation, can be especially efficient in order to bring innovation closer to companies, by their ability to influence broad groups of SMEs with heterogeneous characteristics. In this project, technology centers will serve as a link with small businesses in the agricultural services sector that may benefit from innovation in biomass collection tools and because there are new types of biomass to be used for energy purposes in a systematized form.

5. Promote the use and Technologies of Information and Communication (TIC)

The TIC sector in the Cooperation Area has not acquired sufficient relevance either in terms of added value or employment. In addition, the peripheral and predominantly rural nature of the Transboundary Space increases the importance of TIC

in it, as a tool that helps overcome these problems of geographical location. The project will favor the use of TIC through the creation of a biomass management tool that allows connecting lines between biomass owners and / or agricultural service companies and applicants for the types of biomass analyzed in the project.

6. Loss of population and aging

One of the great problems of space is the loss of population, a structural problem of the Transboundary Space as a whole reflecting low birth rates and emigration to more economically prosperous territories. Its aging rate is far from 1 (1.56), in equilibrium, and above the EU27 average (1.14), Spain (1.14) and Portugal (1.31). The project will contribute to the stability of the cross-border area for researchers, while promoting the competitiveness of agricultural services companies, favoring the economic development of the area of influence and increasing employment opportunities, which will help to settle working age population.

7. Energy

Faced with the planned exhaustion of fossil energy, its cost and impacts on global climate change, the development of new forms of energy, ecological and renewable, is a commitment of all countries signatories to international agreements. Although the position of the cross-border area in relation to this objective is above the European average, the project represents a way of maintaining a sustainable increase in biomass available for energy purposes, allowing for further progress in the use of renewable energies.

Table 1. Consortium ~

<i>PARTNER</i>	<i>VISUAL ID</i>	<i>ACRONIM</i>	<i>COUNTRY</i>
Fundación CIDAUT		CIDAUT	
Ayuntamiento de Valladolid - Agencia de Energía Municipal		AEMVA	
Instituto Tecnológico Agrario de Castilla y León		ITACYL	
Centro para a Valorização de Resíduos		CVR	
Agência de Energia do Ave		AEdoAVE	

8. Need for Transboundary Cooperation

The problem that the project addresses is common and characteristic of the territories on both sides of the border between Spain and Portugal. Specifically, in the North of Portugal and Castilla y Leon, have two unique characteristics of these territories, as the dispersion of the population and its aging

The common characteristics of the territory are associated with a common approach when facing the technological challenges that the MOV BIO project aims to address. Providing an answer to this challenge requires, on the one hand, to ensure that the problem that arises faithfully represents the reality of both sides of the territory, which although they have common characteristics, will have to consider their singularities. On the other hand, it requires the participation of different areas of knowledge (agriculture, mechanics, thermochemical processes and energy production, characterization of biomass as fuel, emission measurement, etc.).

The representativeness of the solution to be provided will be achieved with the participation of entities belonging to both sides of the border as shown in Table 1. As for the areas of knowledge, experts from different areas are located on both sides of the border. CIDAUT Foundation is an expert in biomass thermal recovery and has a gasification patent. CVR is an expert in the characterization of waste and emissions, as well as in the provision of advisory services to various industrial projects in the field of waste treatment. The participation of the Energy Agency from municipalities of Ave Region and Valladolid will facilitate the collection of municipal samples, the use of pruning biomass and, above all, the communication with other public entities and business associations.

Beyond the concrete solution of energy use of pruning biomass, the project provides an opportunity for the research centers that compose it to join their extensive experience in the different areas of work that the project addresses (in particular in the thermal valorization and characterization), seeking synergies that favor the development of new waste energy recovery projects, establishing a coordinated line of work through which both centers can exchange knowledge, personnel, enhance the use of their facilities and improve their position in the sector of energy recovery of waste.

9. Diagnosis of biomass potential

In Portugal, biomass valorization has increased due mainly to the change in government energy policies. This change was visible mainly since 2005, where several dedicated plants and cogeneration plants were licensed. The objective was to reach the 250 MW of power generated by the biomass plants. However, the implementation fell short of expectations. Up to 2009, only five more power stations were in operation, totaling a potential of 78 MW. Some of the reasons for the failure of the implementation of these plants were, among others, the poor location of some of the plants, high biomass costs, problems in logistics, transport and availability of biomass [1].

The increasing interest in the densification of biomass for commercialization (e.g. pellet industry) has aggravated some of these difficulties, namely the price and availability of

biomass. It has become fundamental to find solutions to facilitate the implementation of technologies for energy recovery of biomass, as such some solutions can be studied, on the one hand find biomass with lower price and greater availability that has as main disadvantage its dispersion in the region being important to define the best management model to harness its potential. In general, and according to their origin, it is possible to classify three types of biomass [2]:

1. Energy crops, the purpose of which is the production of energy;
2. Agricultural and forestry waste, which comes from the agricultural and forestry holding during the harvesting, pruning, cleaning, among others;
3. Urban green waste from the maintenance operations of park gardens and roadsides.

Although these biomasses exist in the northern regions of Portugal and Castile and Leon, the biomasses of agricultural and urban origin are not properly valued and require studies that allow economic validation of energy (thermal and electric) from these residues. For this purpose, a deep characterization of this type of biomass is being carried out, specifically in terms of its characteristics, location and collection methodologies, leading to its massive utilization, improving its valorization.

Through the indicators provided by the statistical data, it is possible to estimate the existing potential in biomass generated in the northern region of Portugal, which is mostly not valued in the exploration units. In the table below (Table 2) it is possible to see some statistics of surface hectares and tons of production for the most expressive crops in terms of biomass residues generated in the North.

Table 2. Production of main cultures for region NUTS II in Portugal [3].

Culture	Apple	Kiwi	Almond	Chestnut	Olive(Olive oil Production)	Grape (Wine Production)
NUTS II Region	Surface (ha)					
Mainland	13 698	2 244	28 871	35 193	343 557	174 976
North	<u>5 810</u>	<u>1 672</u>	<u>19 331</u>	<u>31 103</u>	<u>77 309</u>	<u>83 015</u>
Centre	7 345	564	1 168	3 549	79 668	50 698
Lisbon	173	2	5	5	596	8 165
Alentejo	348	4	970	520	177 404	31 898
Algarve	21	3	7 396	16	8 580	1 199

In the northern region of Portugal the main crops are apple, wine grape, olive, actinides (kiwi), almond and chestnut, representing 42%, 47%; 23%; 75%; 66% and 88% of the planting area in mainland Portugal. This distribution of crop importance does not represent the region of the AVE (NUTs III) where there is a great energetic potential contained in the biomass generated by the agricultural sector, with the main crops being

grapes for wine and actinides (kiwi). Generally, the biomass is collected and stored outdoors, in other cases it is left in the soil, or, for the most part, burned open air.

In this sense it is urgent to find socially and economically viable management solutions that include the collection, pretreatment and recovery of this waste. That is, these solutions should integrate all sectors of the value chain, namely to promote contact between biomass producers, service providers, technological centers and final valuers. The MOV BIO project thus aims to comprehensively characterize the project areas at the level of biomass potential and valuers, as well as to create a management tool that helps the region's value chain.

Aknowlegments

This work has been co-financed by the Cooperation Program Interreg V-A Spain-Portugal (POCTEP) 2014-2020 and the European Union through the European Regional Development Fund - FEDER within the scope of the project « MOV BIO - Mobilization of Pruning Biomass For Energetic Valorization» (0390_MOVBIO_2_E).

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