Interreg
Danube Transnational Programme
ENERGY BARGE

ENERGY BARGE

Building a Green Energy and Logistics Belt

Project Code: DTP1-175-3.2

Deliverable 3.2.3

Regional case studies

for biomass and bioenergy production –

Case Study Romania:

Company Forest and Biomass Romania SRL

29 June 2018

Project co-funded by European Union funds (ERDF)

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I. About the ENERGY BARGE project

The Danube region offers a great potential for green energy in the form of biomass. The main objective of ENERGY BARGE is to exploit this potential in a sustainable way, considering the Renewable Energy Directive 2009/28/EC, thereby increasing energy security and efficiency in the Danube countries. The project brings together key actors along the entire value chain, biomass companies and Danube ports as well as relevant public authorities and policy stakeholders. The project maps value chains and facilitates the market uptake of biomass, supports better connected transport systems for green logistics and provides practical solutions and policy guidelines. The Agency for Renewable Resources (FNR) coordinates the ENERGY BARGE project consortium with fourteen partners from Austria, Bulgaria, Croatia, Germany, Hungary, Slovakia and Romania.

Project coordinator

Agency for Renewable Resources / Fachagentur Nachwachsende Rohstoffe e.V.	FNR	Germany

Project partners

BioCampus Straubing GmbH	BCG	Germany
Deggendorf Institute of Technology	DIT	Germany
Austrian Waterway Company	VIA	Austria
Port of Vienna	PoVi	Austria
Bioenergy2020+ GmbH	BE2020	Austria
International Centre of Applied Research and Sustainable Technology	ICARST	Slovakia
Slovak Shipping and Ports JSC	SPaP	Slovakia
National Agricultural Research and Innovation Center	NARIC	Hungary
MAHART-Freeport Co. Ltd.	MAHART	Hungary
International Centre for Sustainable Development of Energy, Water and Environment Systems	SDEWES Centre	Croatia
Public Institution Port Authority Vukovar	PoVu	Croatia
Technology Center Sofia Ltd.	TCS	Bulgaria
Romanian Association of Biomass and Biogas	ARBIO	Romania
Federation of owners of forests and grasslands in Romania	Nostra Silva	Romania

II. About this document

This report corresponds to "D.3.2.3. Regional case studies for biomass and bioenergy production" of the ENERGY BARGE project. It has been prepared by:

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Author(s)	Catalin Tobescu, Nostra Silva
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2.0	2018-06-29	Catalin Tobescu	Final document after QAM assessment	Completed

Background

ENERGY BARGE aims at exploiting the Danube macroregion's bioenergy potential to increase energy security and diversification of energy sources by establishing secure, efficient and sustainable bioenergy supply chains along the river. To this end, a holistic view on the bioenergy market and underlying value and supply chains is needed. Given national and regional disparities in theoretical, geographical and market potential for bioenergy, deployment, public support, and also cooperation between private and public actors, it is necessary to identify levers for tapping potentials and options for market actor cooperation, business development and market uptake.

A theoretical model designed to increase the market uptake of bio-based feedstock for both material and energetic (ideally cascading) use in the Danube region and thus to address the objectives also set out in the EU Strategy for the Danube Region (EUSDR) is a concept called "Green Energy and Chemistry Belt" (see Figure 1). It was developed by the BioCampus Straubing GmbH (Project Partner 1) and aims at using the Danube River as a natural biomass corridor and sustainable transport axis for biomass. The underlying principle follows the logic of "local harvesting – decentral processing into more transport-worthy states (e.g. oils, pellets, liquids) – central refinement or end use", so that added value creation can mainly remain in rural areas along the Danube. This concept forms the basic idea of the ENERGY BARGE project.

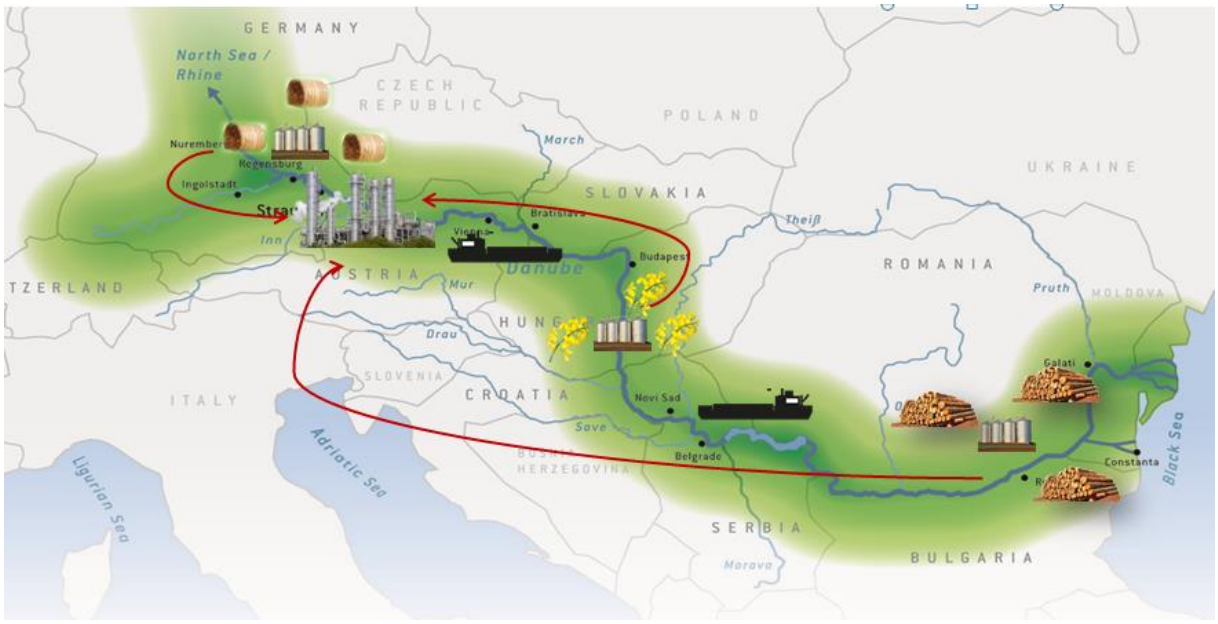

Figure 1: Green Energy and Chemistry Belt (Source: BioCampus Straubing GmbH, own visualisation).

In order to reach the targets as outlined above, Work Package 3 provides market-oriented mapping of the Danube region's value chains from biomass feedstock production and residues to energy generation from an integrated, transnational perspective, giving regional and transnational guidance for market development along the river (green bioenergy belt) and setting the stage for increased use of Danube logistics in the bioenergy sector. This will be achieved through a transnational market study compendium including biomass flows and sustainability aspects (macro-perspective, Activity 3.1), business landscape mapping, case studies and

identification of best practice locations for bioenergy value chain integration (micro-perspective, Activity 3.2).

Objective of the regional case studies

Deliverable "D 3.2.3 Regional case studies for biomass and bioenergy production" is based on the task as described in the latest approved version of the Application Form of the project ENERGY BARGE (Project Code: DTP1-175-3.2).

- *A3.2- Providing a systematic insight into the integrated bioenergy landscape along the Danube (lead: BCG)*

Activity 3.2 focusses on the biomass and bioenergy business sector, with the aim of mapping the state of the business landscape working along the bioenergy value and supply chain in the Danube region. This will mainly be achieved, in connection with a company inventory and a demand scenario analysis, via a set of regional case studies, focusing on exemplifying cases with already established (or currently being established) biomass and/or bioenergy markets/businesses, their future integration potential, and also covering their already existing as well as potential logistic connections with a focus on connections with nearby inland port terminals and inland waterway transport (IWT).

With D 3.2.3, the aim is to identify cases, i.e. specific real-life situations (businessdictionary, 2018), in each of the partner countries in which biomass production and/or utilisation in the bioenergy sector (as well as other utilisation sectors, e.g. chemical-material use) plays a dominant role in comparison to other cases. After identification via a standardized matrix, the objective is to coherently analyse these cases in case study reports. The focus here shall be on describing the status quo of these cases with respect to a set of characteristics and on subsequently analyzing the success factors (enablers & inhibitors) influencing this status quo. In addition to this qualitative analysis, each case shall be accompanied by a GIS-based (geographical information system) map depicting land use, as well as options for regional supply and logistics chains (roads, ports, business partners). Through the direct contact to responsible managers and other important people in charge at the cases, the project can be further disseminated. Moreover, discussions and considerations about challenges and chances of the bioenergy sector in the Danube region are spurred, contacts made and options for future integration of inland waterways and ports can be presented and discussed.

In the following project steps, the aim is to use these case studies for Output 3.2 as a basis to identify good practice examples on how and in what ways biomass and bioenergy production and utilisation can be regionally and locally integrated, how supply chains can be improved or established and – ideally – how inland ports can contribute to this integration via their logistics services as biomass and bioenergy hubs.

Executive summary

The company chosen for the Romanian case study is Forest and Biomass Romania SRL, founded in 2008. The company invested over 15 Mio. Euros in purchasing and managing agricultural and forest land.

Currently, the company carries out activities as follows:

• An agricultural farm with 4,200 ha of arable land, of which 270 ha are cultivated with a poplar plantation (6-year rotation circle).

• 5,000 ha forest area, from which about 20,000 m^3 of wood are harvested annually.

The company has conducted feasibility studies for the use of agricultural and forest biomass for the supply of thermal energy in the residential sector, small-scale investments in cogeneration plants linked with residential heating systems, in order to use biomass resources from its own activities.

The company is located in the West of Romania, in Timis County (Figure 2). The land being managed by the company is located within the Foeni and Giulmaz localities, close to the Serbian border at a distance of about 100 km from the nearest ports on the Danube.

Figure 2: Location of the agricultural land owned by the company Forest and Biomass Romania SRL (Source: Google Maps).

1. Case study methodology

Overall, six partner countries present case studies: Austria, Germany, Hungary (2 studies), Croatia, Slovakia, and Romania. Each country's case study report is designed as additional information to the interactive ENERGY BARGE platform. A summarizing case study report is made available in order to get an overview to the whole case study area and the sites chosen.

In the map below, an overview of the Danube region and all cases covered (red dots) is presented. The map is an extract from the ENERGY BARGE modal shift platform (www.energy-barge.eu) and also depicts an abstracted level of bioenergy company locations in the macro region (green dots).

In order to select a company for the case study, the selection matrix was used to assess the companies. After this first pre-assessment, the company Forest and Biomass Romania SRL was contacted with the objective to receive better insights into the activities and objectives of the company.

In Table 1, the methodological steps taken during the compilation of the study are listed.

Table 1: Activities and steps taken during the case study.

No.	Activity	Date/period
1.	Selecting the companies for the case study – 4 companies analysed.	01.03.2018 - 30.03.2018
2.	Choosing the company Forest and Biomass Romania SRL; phone interview with the company's representative, Mr. Cosmin Casalean; analysing the data.	01.04.208 -10.04.2018
3.	Presentation of the project and of the case study methodology to the company - Mr. Cosmin Casalean, country manager.	15.04.2018
4.	Sending the questionnaire to the company (Mr. Cosmin Casalean) with the information required for the activity.	20.04.2018
5.	Receiving answer from the company. Completing the data via a phone interview.	30.04.2018
6.	Elaborating the study based on the information from the company, completed with general considerations and legislation about the analysed activities.	01.05.2018-15.05.2018

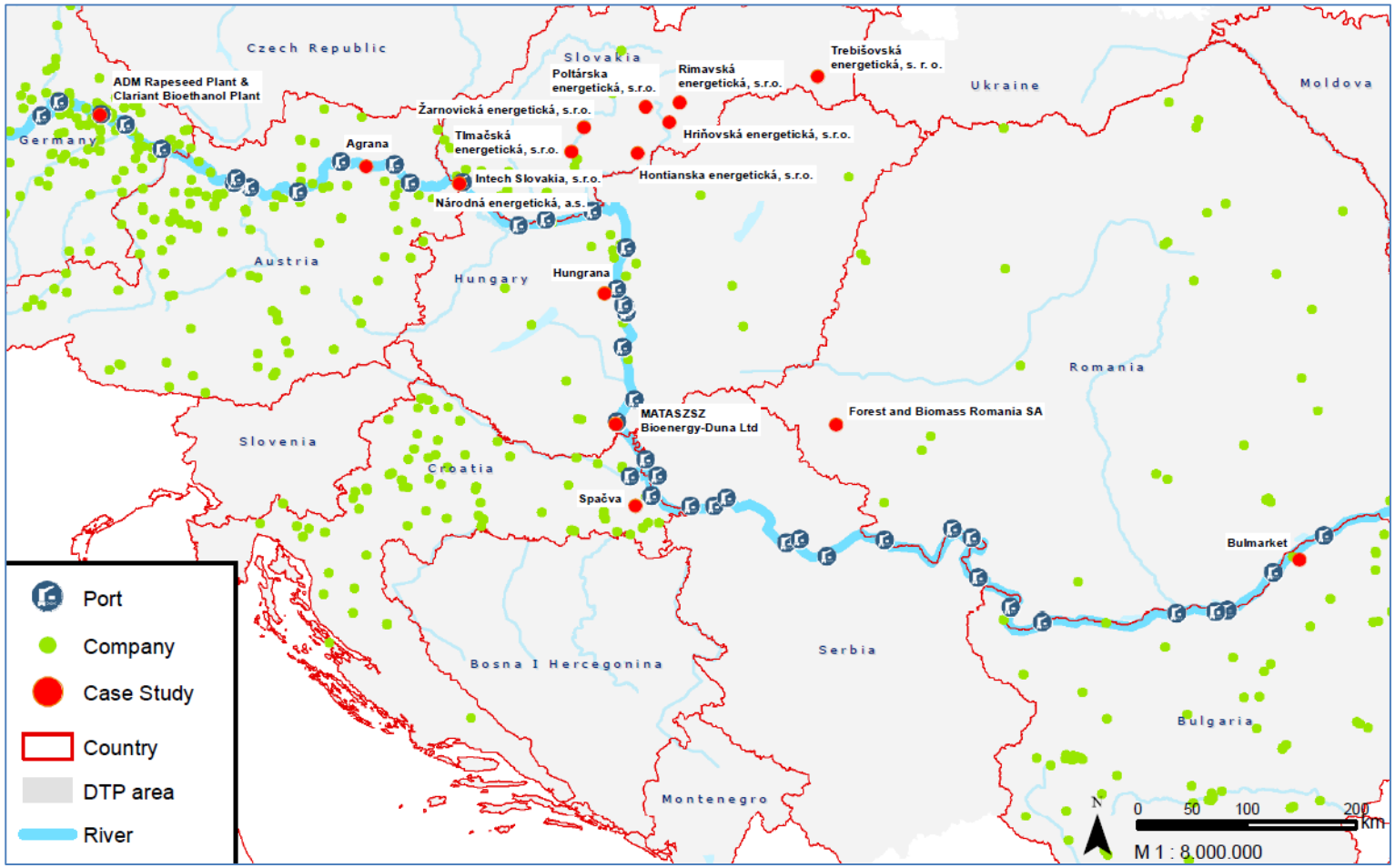

Figure 3: Overview of the location of the selected cases in the Danube region (DIT, 2018 source: open street map)

2. Case description

Forest and Biomass Romania SRL is a leading Romanian company in the field of management of agricultural and forestry terrains, with a special focus on the use of biomass for energy production.

The company is located in the West of Romania, in Timis County (Figure 2). The land being managed by the company is located within the Foeni and Giulmaz localities, close to the Serbian border at a distance of about 100 km from the nearest ports on the Danube.

Currently, the company carries out activities as follows:

• An agricultural farm with 4,200 ha of arable land, of which 270 ha are cultivated with a poplar plantation (6-year rotation circle).

• 5,000 ha forest area, from which about 20,000 m^3 of wood are harvested annually.

The company has conducted feasibility studies since 2008 for the use of agricultural and forest biomass for the supply of thermal energy in the residential sector, small-scale investments in cogeneration plants linked with residential heating systems, in order to use biomass resources from its own activities. These small-scale investments did not lead to investments on a larger scale, yet, due to identified difficulties, e.g. instability of support schemes, difficulties in building public private partnerships for the linkage with the heat distribution system, unclear system for issuing certificates of origin for the biomass and difficulties to ensure a constant biomass supply.

Since the company's establishment in 2008, it has been focused on agricultural and forestry management, with a permanent survey of the potential and opportunities of biomass use for obtaining electricity and heat.

The main types of biomass resulting from the company's activity are:

- Forestry biomass;
- Agricultural biomass;
- Short rotation coppice/energy crops.

Bioenergy facilities – importance of biomass in the region

The selected agricultural farm and its corresponding forest lands are located near the city of Timisoara (less than 100 km), a town with approx. 320,000 inhabitants. The city has two large thermal power plants (coal and gas) at comparatively high costs for the heat supplied, especially in case of the gas plant.

The thermal power plants have carried out, in 2016-2017, studies for the development of a biomass plant. The conclusion of the studies was that the available biomass resources are not sufficient and permanently available. Forest biomass was considered to be too expensive. The only feasible solution was supposed to be using household waste. Projects for the development of a biomass plant have been temporarily abandoned by the city (Tion.ro,2017).

In the absence of clients using biomass / wood chips in the proximity of the company Forest and Biomass Romania SLR, it delivers wood chips to a factory that generates electricity and heat in cogeneration. The investment facility is operated by Holzindustrie Schweighofer SRL, a large producer from the wood industry. The plant of Holzindustrie Schweighofer is located approx. 200 km away.

Local storage and distribution of the biomass (local storage for drying and distribution of wood chips to local consumers) is rather non-existent due to the lack of development of the biomass energy sector in the region. The only existing logistics component is the one for the main agricultural production consisting of rapeseed. This production chain employs specialised transport capacities, silos for storage and transport by rail.

Romania is a major producer of rapeseed with an annual production of about 1.3 Mio. t of which over 90% are exported. The logistics infrastructure comprises companies with storage silos and grain traders, which export.

Wood chips are delivered to Holzindustrie Schweighofer Romania, a company that operates a cogeneration power plant on its own primary woodworking platform. The company is the only customer in the area.

In the particular case of Romania, the specificity is due to the very large consumption of firewood of the population for heating the dwellings. More than half of the residential dwellings are heated by wood stoves, resulting in a huge national consumption of firewood.

According to official studies provided by the National Institute of Statistics, over four million households are heated with firewood, with an estimated consumption of 20 Mio. t of forest biomass in total (INS, 2009).

The huge consumption of firewood has led to very high prices of firewood with over 80-100 Euro/t, with a maximum of 140 Euro/t in certain areas as in the plain lands, in the South and Southeast of Romania with low coverages of forests. These very high prices and the shortage of firewood have led to legislative measures to discourage investments in the production of electricity from forest biomass, so that bioenergy producers will not compete with the population for the same resource. By legislation, the only category of forest biomass eligible under support schemes for the production of renewable energy from biomass is sawdust resulting from the primary processing of wood (Order 1534/2016).

These legislative provisions have led to a very poor development of biomass power generation capacities, with only small installed capacities (140 MW) which have been developed by large companies in the woodworking industry. These companies use the residues from primary wood processing industry in cogeneration plants, with the use of thermal energy to dry lumber on their own industrial platforms. The thermal energy is also used for pellet production processes.

The main stakeholders involved are:

Public actors:

- Ministry of Waters and Forests – to regulate the use of forest biomass;
- The Ministry of Agriculture and Rural Development – coordinating the National Rural Development Programme;
- Ministry of Energy – Ministry that promotes legislation on the production of energy from renewable resources;
- National Energy Regulatory Agency – an agency that manages support schemes for green energy production.

Companies:

- Grain traders, buyers of rapeseed, located in Timis;
- Holzindustrie Schweighofer – recipient for the chopping of biomass crops.

Research & Development (R&D) (public & private):

There is no specialised research institute regarding bioenergy in Romania. Practically, innovation and expertise is provided by technology companies and consulting companies. There are specialised technology fairs for the production of biomass for energetic purposes. At present, the focus is on management systems for the recycling and utilisation of household waste.

Logistic actors:

- Specialised agricultural transport companies;
- Specialised transport companies for container transportation;
- Railway transport companies: there is a National Railway Freight Exchange Company and private operators;
- Ports on the Danube: the nearest port would be Moldova Noua (potential stakeholder, currently not involved).

3. Socio-economic indicators

The company is located in the western part of Romania, in the county of Timis, close to the city of Timisoara. This is one of Romania's most developed agricultural regions, with many foreign investments. The city of Timisoara is the third largest city of Romania. Further, Timisoara is also a large university centre with over 60,000 students. The GDP of the region is the third highest in Romania with 10,802 Euro/inhabitant (Analizeeconomice.ro, 2017).

4. Biomass availability and utilisation

Forest and Biomass Romania SRL harvests annually a volume of about 20,000 m^3 of wood from its own forests, mainly sold as standing timber but also through exploitation with service providers. The harvested resources are used as wood for industry applications and as firewood for households.

The high prices for the firewood for the population and a lack of local distribution for wooden chips have led to the circumstance that wood in the form of wood chips is not commonly used yet.

Regarding biomass from agriculture, Forest and Biomass Romania SRL grows rapeseed annually on approx. 20% of its agricultural area. Rapeseed is considered to be among the most profitable agricultural crops. It is sold to grain traders, almost the entire harvest yields are exported.

For the logistics, the company uses truck transports to collection centres (silos), followed by railway transports for export.

Residues from agricultural activities are not collected (grain straw), as they are believed to be essential for maintaining soil fertility, to allow the humus to regenerate (Permacultura,2017).

The company cultivates about 270 ha of short rotation coppice (poplar) with a short production circle of up to six years. The amount harvested annually is 12-15 t/ha, resulting in a significant amount of biomass (15 * 270 = 4,050 t of biomass). The biomass is delivered as wood chips to a cogeneration power plant, which has a factory located in Sebes, about 200 km away. The high transport distance greatly reduces the profitability of the biomass utilisation.

Attempts to develop local biomass partnerships to use the resource locally have failed.

There is a national cluster -Green Energy Innovative Biomass Cluster - founded with the aim to raise the interest toward the production and utilization of the solid biomass, the most important renewable energy source in Romania (GreenCluster,2018).

Feasibility studies for investments in boilers and cogeneration plants for the residential sector have been attempted.

5. Bioenergy production and utilisation

The areas in which Forest and Biomass Romania SRL operates are the key areas for providing the biomass resource for biomass energy production, in the context of the overall objectives of increasing energy efficiency, renewable energy targets and reducing greenhouse gas emissions.

The huge consumption of firewood has led to a shortage of resources on this market segment, to very high prices of the wood resource and to legislative measures to limit the use of wood resources in the production of renewable energy from biomass. Practically, for the production of energy from wood biomass, it does not qualify for support schemes except for the use of waste from primary wood processing (only sawdust being used). In this way, the available biomass

resources are very limited. The legislative and administrative framework for obtaining certificates of proof of origin for biomass is extremely cumbersome and restrictive (Lege5, 2016).

In the biomass production sector, the use of agricultural crops has been prioritized through the amount of subsidies for direct surface support. Thus, biomass crops receive only 1/3 of the surface support for classical agricultural crops. At the same time, in order to receive subsidies, biomass crops should be set up only on marginal quality land, which combined with the intensity of much reduced support for classical agricultural use, leads to a low profitability of biomass crops. As a result, under the support schemes registered by APIA, only 5,000 ha of specialised biomass crops (short rotation coppice) are registered at national level (Agrointel, 2016).

Due to all these particularities, the segment of biomass and thermal energy production is clearly underdeveloped in Romania, although there is a very high potential for mobilisation of raw material stocks, both for the agricultural and forest biomass. The potential is evaluated at 6 million tones for forestry biomass and 12 million tones for agricultural biomass (Minind, 2010). Local public-private partnerships that support the resource mobilisation and investment are non-existent.

Practically, the use of conventional agricultural crops is encouraged, without the mobilisation of agricultural land waste, and forest biomass is prioritized to provide the necessary firewood for the population.

6. Infrastructure, logistics & integration of supply chain and logistics

Firewood is directly sold to the population in the local area. The main feedstocks of biomass available for transport are rapeseed (2,000-3,000 t/year) and wood chips from harvesting in specialised plantations (3,000-4,000 t/year).

Wood chips are transported directly from the place of harvesting by specialised truck containers directly to the beneficiary at a distance up to 200 km, the main beneficiary being the cogeneration plant own by Holzindustrie Schweighofer. Transport services are provided by specialised companies.

Rapeseed is transported by trucks to silos and from there by railway to the beneficiaries. All transports are bulk cargo transports. There are no Danube ports in the proximity of the company. On the Romanian side of the Danube, in Timis county, no specialised ports for biomass transport are existent. The closest port – Moldova Noua – at about 100 km distance has no specialised logistics for grain. It is a small port in a poorly developed economic area, quite isolated. On the other side of the Danube, the existence of a port in Serbia suitable for the transport of cereals needs to be prospected, but seems not feasible as being on the other side of the Danube.

7. GIS-map

For the case study, a map visualising geographical conditions and context based on a geo-information system (GIS) was designed (Figure 3). It is a set of aspects defining the case and its surrounding area with a particular focus on the proximity to the Danube and relevant ports. For the case, a catchment area with a radius of 50 km has been defined in order to allow for theoretically economically viable pre- and post-haulage logistics. Within this area, also the companies along the biomass and bioenergy value chain as well as the port locations as identified in the course of the ENERGY BARGE project are depicted via icons.

The following information is provided on the map:

- Location of the case;
- Land cover categories on NUTS 3 level (CORINE land cover data, Eurostat, 2012);
- Land use data on NUTS 2 level for selected biomass feedstock (Eurostat, 2017);
- Market actors in the biomass and bioenergy sector in the region (ENERGY BARGE project, company landscape, 2017);
- Danube port locations with equipment for biomass handling (ENERGY BARGE project, inventory of logistics service providers, 2018).

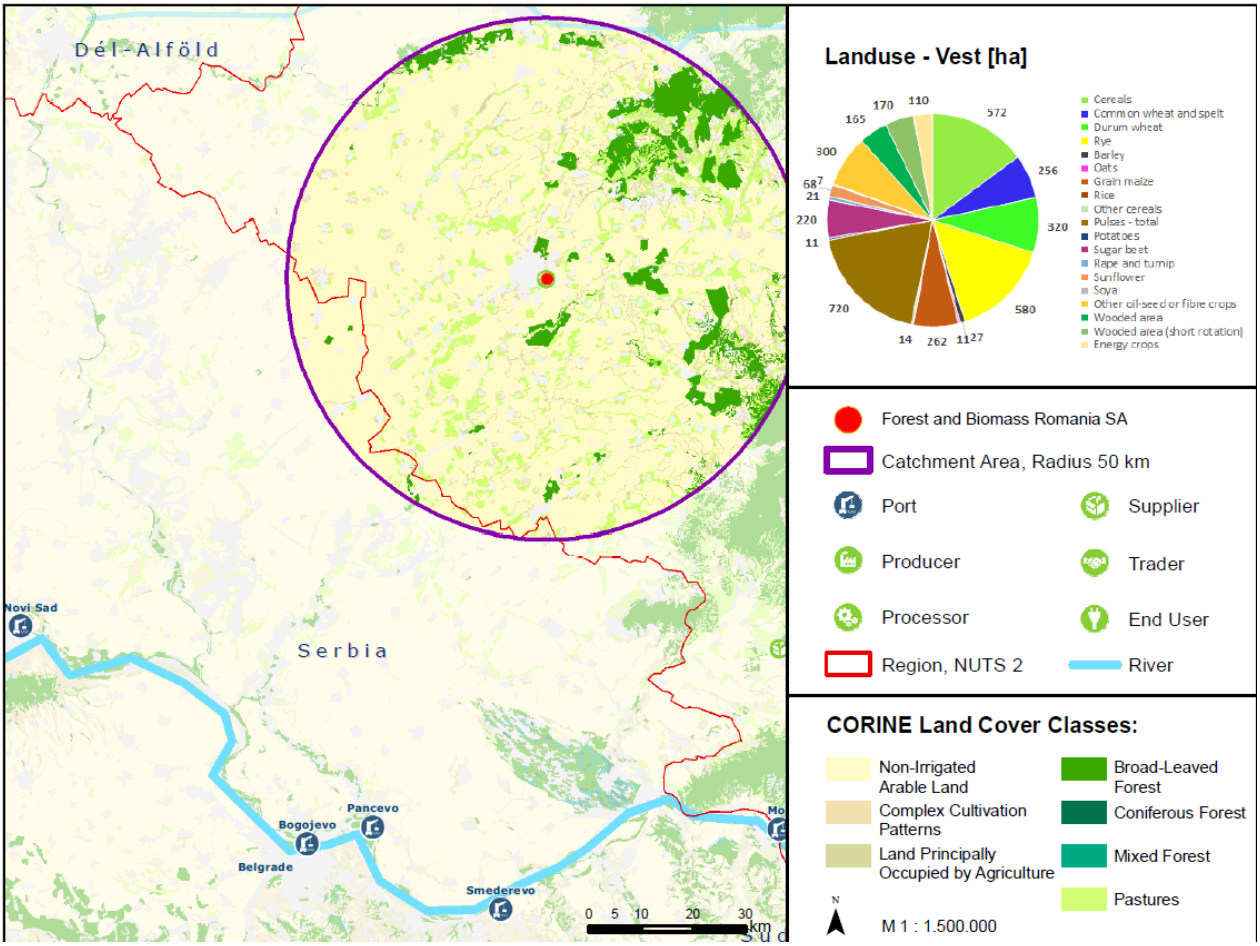

Figure 4: GIS analysis of the case location (visualisation: DIT for ENERGY BARGE project; sources: ENERGY BARGE, 2017/2018; EUROSTAT land use data, 2017; CORINE landcover data, EUROSTAT, 2012).

8. Analysis of success factors & lessons to be learnt: enablers and barriers

Table 2: Success factors Romanian case

	Enablers	Barriers	Lessons learnt
Biomass availability	Important quantities of biomass are available, mainly rapeseed, forestry biomass and chips resulted by harvesting of specialised crops of	High price of the fire wood and the deficit of this resource on the market. Missing processing capacities for biodiesel from rapeseed.	There is a need of small-scale investments for using the domestic biomass resources locally. There is a need of alternatives for the population, so that forestry biomass to be

	poplar for biomass production.		used in modern cogeneration plants, with higher energetic efficiency.
Biomass utilisation/processing	There are available technologies and projects to put the resources of biomass in value.	Investments have to be done mainly by local public administration, co-financing is difficult, and there is a need of integration with distribution systems. The project in Timisoara might be an example.	There is a need of public-private partnerships, long-term investments for producing thermal energy. For investing in biodiesel plants, the market has to be secured.
Bioenergy production/utilisation	There are success examples in Romania, specially linked by the investments of the companies activating on the field of the first transformation industry of wood.	Limitations of the use of bioenergy production just to the residues from the first transformation of wood limit the biomass availability for such projects.	There is need of debates on which categories of forestry biomass to be allowed to be used for bioenergy production.
Existence of a strategy or concept	n/a	n/a	n/a
Stakeholders	n/a	Because Romania reached the targets for renewable energies established for 2020, there is no pressure for public authorities to change the policies.	The targets for renewable energies are by Romania due to the huge quantity of firewood used by the population. There is a need of better strategies to increase the value of the resources.
Socio-economic factors	n/a	Missing energetic alternatives for the population, which is	Using specialised plantations for biomass is a feasible

		using firewood for heating.	economic solution as this investment proofs.
Integration of supply chain	n/a	n/a	n/a
Role of logistics infrastructure	Forest and Biomass Romania SRL is mainly using road transport for its products and raw materials.	The customers of the wood chips are at long distance, which affects the profitability of the activity.	The use of the wood biomass should be preferably at local level to avoid long transport distances. For rapeseed, export opportunities by using the Danube for transport are feasible.

9. Recommendations & suggestions for future development

1. There is potential for using forestry biomass for bioenergy production, partnerships and investments need to be developed.
2. There is potential for using residues from agriculture, if there it is an investment in Timisoara to use this resource for cogeneration of energy.
3. There is potential for direct exports of rapeseed using Danube logistics – the logistic of the existing ports can be developed for this.
4. Most valuable „lessons learnt“ from this case study:
    a. There is no development of biomass production, if there are not stakeholders /end users, which are convinced that bioenergy is profitable in a sustainable, long-term way.
    b. Specialised plantations for biomass production such as short rotation coppice are economically feasible and can ameliorate the current deficit of classic forestry resources.
    c. The success depends on the existence of stability and predictability of the policies and support schemes.

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Contact

Federation of owners of forests and grasslands in Romania

E-mail: catalin.tobescu@fordaq.com

http://www.interreg-danube.eu/energy-barge