ENERGY BARGE
Building a Green Energy and Logistics Belt
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SYNTHESIS REPORT

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ENERGY BARGE

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Content

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 has brought 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 facilitate the market uptake of biomass, support better connected transport systems for green logistics and provide practical solutions and policy guidelines. The Agency for Renewable Resources (FNR) has coordinated the project with its fourteen partners from Austria, Bulgaria, Croatia, Germany, Hungary, Slovakia and Romania. The project was implemented between 01.01.2017 – 30.06.2019. co-funded by European Union Funds (ERDF).

Five Danube ports (*MAHART-Freeport Budapest, Port of Straubing-Sand, Port of Vienna, Port of Vukovar, Slovak Shipping and Ports JSC*) were part of the project consortium. In the frame of the ENERGY BARGE project, the ports have elaborated feasibility studies to become biomass hubs as part of a transnational network along the Danube. Each port has defined specific investment projects taking into consideration market, technology and financial aspects. The MAHART-Freeport and the Port of Vienna have invested into small-scale pilots to demonstrate the effectiveness of biomass handling equipment. All pilot actions serve as best practice examples for other port locations in order to transfer them into hubs for processing, handling and storage of biomass for energy production in the Danube region.

Pre-feasibility pilot studies to prepare large scale investments to transform ports into biomass logistic hubs

Introduction of planned investments

Source: DTP Danube Transnational Programme

Freeport of Budapest

Implementing organization

MAHART-Freeport Co. Ltd. (MAHART) – as the representative of the Hungarian State and proprietor of owner rights in the Freeport of Budapest – is the forerunner of the planned biomass-based power plant project in cooperation with the port management organization Freeport of Budapest Logistics Ltd (FBL). The pre-feasibility phase of the development was implemented by MAHART. The implementation depends upon the final investment and operational structure.

Analysis of the current situation

Sustainable and cost-effective raw material supply is a key element for the long-term economical operation of the planned biomass power plant. In the region of Budapest, over 150,000 hectares of forests are cultivated mainly by state owned forestry companies and 250,000 -300,000 tons of biomass from wood extraction and processing is available which can provide the necessary solid biomass supply for the planned operation.[1]

Energy biomass is primarily used by households as firewood or utilized by former coal power plants in larger quantities. These power plants are mostly characterized with low efficiency and higher greenhouse gas emissions. National energy strategies, however, focus on biomass-based energy production in the frame of the modernization of district heating systems utilizing agricultural and forestry by-products.

An important and somewhat negative factor is that nowadays solid biomass raw material stocks for energy production are more and more limited, especially in regions where larger biomass power plants are in operation. Beside biomass power plant use households have increasing supply need as well. Because of the mounting demand prices have also increased in recent years..

Development needs

Basic infrastructure elements (e.g. electrical connection points, water, sewage and road network) are available for bioenergy production in the Freeport of Budapest, however, further developments (like the connection to the district heating network) are necessary, too. Future heat and electricity demands may come from two main sources: firstly, from the heat and electricity demands of the new real estate developments within the port and secondly from the City of Budapest's district heating network but a connecting pipeline to the network is necessary to build. For the estimation of future heat and electricity capacity demands, the following peak needs (with a utilization factor of 70%) were calculated based on present and planned tenant consumptions:

- electricity: 15 MWe;
- heat: 1.35 MWth (the total peak value of the area).

1. ENERGY BARGE Deliverable 5.1.3. MAHART-Freeport Co. Ltd. – Pre-feasibility Pilot Study

Figure 1.
Overview of the Freeport of Budapest (Freeport of Budapest Logistics)
Source: MAHART-Freeport, 2018

Aims of the development

The general objective of the development is to establish the background of new market opportunities by widening the profile of the Freeport of Budapest with energy supply and expand logistics services provided in the port via entering into the biomass industry.
Specific objectives in the short, middle and longer terms are:

- To complete a shift in terms of inner energy supply of the port by switching from traditional gas supply system to a renewable energy based one;
- Supply of heat and electric energy for the relevant networks and grids;
- To become a knowledge hub of the region concerning biomass utilization;
- To become a logistics hub of the region concerning biomass utilisation and value chains.

Location

The Freeport of Budapest is located approximately 10 km from the city center and it is the main trimodal logistic hubs of the region. The two locations of the planned biomass power plant and its related facilities and storages have multimodal connections including a direct waterway access.

Description

The Freeport is located at an ideal site for the implementation of the planned biomass-based energy production where necessary basic infrastructure is available, and a considerable number of energy consumers are already present. With the planned Galvani Bridge near the Freeport a key district heating pipeline connection will be built very close to the planned site of implementation. For the feed-in of green electricity, transformers are also available on the site as potential connection points.
During the pre-feasibility phase, three different plant sizes were analysed taking into consideration the following key factors:

- Demand for electricity and heat;
- Amount of energy biomass available;
- Site conditions (for technology and storage capacities);
- Grid connection options, voltage level;
- Regulatory restrictions.

Investment requirements, operation and management costs, and market price of energy to be sold.
The pre-feasibility study defined the key opportunities and development needs of the planned power plant. Key partners for further negotiations were also identified and already contacted. Based on the results of these negotiations and analyses of detailed data on the heat market conditions and possible feed-in tariffs for the produced electricity optimal plant size can be defined in a later stage, taking into consideration the sustainable and economical supply of energy biomass raw material.
The planned biomass power plant and the biomass logistics centre will be able to provide the following services:
Electricity: supply of renewable energy-based electricity through the National Grid based on feed-in tariff prices;
Heat supply: direct connection with the local consumers (tenants of the Freeport) through a heating centre, heat supply through the planned district heating network;

Figure 2.
The trimodal container terminal (Freeport of Budapest Logistics)
Source: MAHART-Freeport, 2018

Figure 3.
Biomass related equipment and capacities in the Freeport of Budapest
Source: MAHART-Freeport, illustration based on Google Maps, 2018

By-products: ash and other residues;
Local biomass trade and distribution: logistic services for energy biomass consumers, utilizing IWW infrastructure and storage capacities.

Investment costs

During the pre-feasibility phase, three different plant sizes were analysed (6, 12, and 15 MWe) and depending on actual capacity (electricity and heat output) and infrastructure development needs, investment costs were estimated between EUR 11- 29 million.
Depending on the result of a future detailed feasibility study and financial calculations, the planned investment can be financed via grants (EU Structural Funds), bank loans and with the involvement of financial investors.

Key success factors

The Freeport of Budapest has an ideal location – it is the closest logistics hub to the city centre in comparison to others in the agglomeration. The public utility infrastructure and connections and linkages are well developed, and the future Galvani Bridge will link possible end-users on the Buda and Pest sides with the power plant in the Freeport. The distance between possible raw material suppliers and the port is also favourable, and via the port, the necessary raw materials can be supplied through a waterway-based logistics network.
Power plant and energy network management experience is a key success factor of the future operation. Depending on the findings of the detailed feasibility study on the ideal operational structure, MAHART will involve professional partners and experienced staff.

Foreseen changes in natural gas prices will contribute to a wider range of utilization of green energy sources in the vicinity of the port, which may provide a unique position for the planned activity.
The planned cooperation with FŐTÁV (the District Heating Service Company of Budapest) which plans to invest into biomass-based power stations in Budapest is inevitable for the long-term success of the project.

Challenges

Availability and prices of raw material are key factors because of competing new investments based on solid biomass. The size and stability of the supplied heat market is also a determining factor in the economic sustainability of the project. The future heat needs of present and future tenants of the Freeport, and the possible connection to the planned new district-heating network of Galvani Bridge will define the optimal size of the power plant and influence the stability of the operation. The project's return highly depends on the feed-in tariff prices of green electricity to the grid and possible changes of related regulations.
Changes of energy policy priorities and regulatory regime may reduce attractiveness and hinder project viability.

Outlook

The port intends to utilize its opportunities in the field of environmentally friendly energy biomass transport, and as a provider of renewable energy-based heat and electricity during the next 5-10 years. The planned investment will attract a new cargo type, which will also increase the turnover of the Freeport.

BioCampus Straubing

Implementing organization

The Port of Straubing-Sand is owned and run by an intercommunal cooperation on municipal level – a so-called administrative union 'Zweckverband Hafen Straubing-Sand' (ZVH). The ZVH is the owner and landlord of the port area, its entire infrastructure and superstructure, including fixed and current assets as well as the industrial park surrounding the port. ZVH has the sovereign right of a landlord in terms of any development projects and investment activities to be executed within the port area.

Analysis of the current situation

The biggest unused domestic potential for bio-energy generation on federal level lies in forestry and agricultural residue material as well as waste streams.

The Danube Port Straubing-Sand is in an excellent position for the supply of bio-based raw materials. It is surrounded by two main natural/cultural areas: the Bavarian Forest and the Gäuboden. While the Bavarian Forest is a source of mainly coniferous wood, the Gäuboden is one of the most fertile agricultural areas in Germany. These areas are main suppliers for the Danube port Straubing-Sand and agricultural product -trading companies located here in terms of outbound logistics and for the producing companies in the port regarding their regional supply.

In the surrounding region, there are numerous, especially decentral bioenergy appliances, e.g. biomass heating plants supplying villages and public buildings with heat and sometimes also electricity as well as biogas plants. In the administrative district of Straubing-Bogen, there are 41 installed public biomass plants with an installed capacity of 12 MW and an electricity production of 75,200 MWh annually. 51% of electricity consumption of private households in the district originates from biomass installations.

As has been shown above, the regional biomass availability and demand side surrounding the port of Straubing-Sand are well-established and favourable for the development of a functioning bioeconomy, both in terms of energetic and material use of biomass.

Figure 4.
Overview of the Port of Straubing-Sand, including the port, industrial park, Business Start-Up Center and BioCampus
Source: BioCampus Straubing GmbH, 2017

Figure 5.
Overview of the port basin and major infrastructure, Port of Straubing-Sand
Source: BioCampus Straubing GmbH, 2018

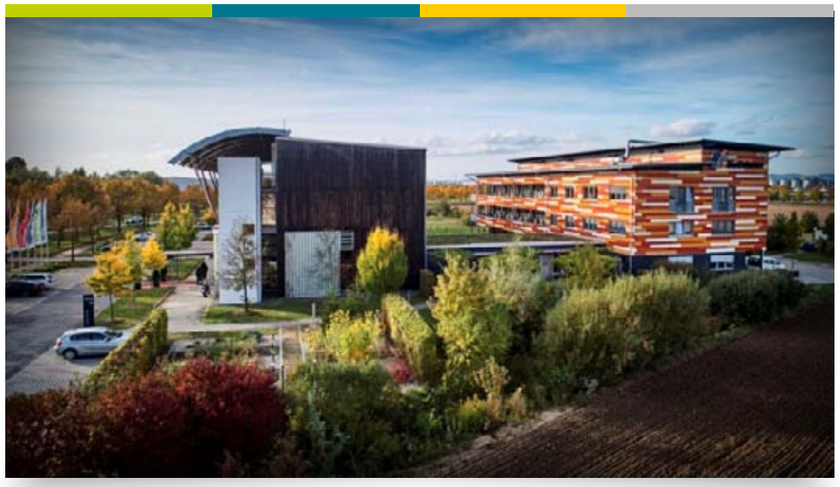
Development needs

Annually an average of 3.7 million tons of goods is handled in the trimodal port (water, road, rail). The majority thereof is still transshipped via road, as the modal split depicts (72% truck, 20% vessel, 8% rail) (own statistics Port of Straubing, 2017). As the Port of Straubing-Sand's basin has been designed with a technical capacity of 500,000 tons per year, it becomes apparent from these numbers that the port is running above its maximum bearing capacity, making a future development process towards potential expansion necessary. Looking at the cargo types handled on waterside, it becomes evident that there is a clear dominance of rapeseed. This situation depicts a clear dependence of the port's performance on the ADM oil mill as a key account. This situation needs to be improved via a diversification strategy.

The port management itself currently does not offer extensive and versatile storage options for biomass products (e.g. warehouses, silos, covered areas). There is some space available for short-term open storage directly at the quays (approx. 300 m² in total) with solid, concrete ground. Based on the needs addressed, new storage solutions for biomass need to be assessed according to their feasibility.

The Port of Straubing-Sand currently stands at a strategic and infrastructural crossroads. Given as the market develops in upward tendency as it has in recent years and the business development endeavours to settle new biomass-processing companies materialize, the port will have to be expanded.

Figure 6.
Start-up Center and BioCubator in the Port of Straubing-Sand
Source: BioCampus Straubing GmbH, 2018



Aims of the development

The main aim of the development project is to improve the port's overall attractiveness in terms of services and infra/superstructure provided. The port shall be equally appealing to currently existing clients from the biomass and bioenergy value chains (suppliers, traders, logistics service providers, processors, end users) as well as depict a site advantage for project developers/investors looking for a new site for a biorefinery project or a logistics option for shipping biomass on the Danube. A specific business development strategy and active customer acquisition are part of the port management and shall be further strengthened in the next years. The two main pillars of the development are: 1) encouraging and supporting companies processing biomass along the value chain and related value chains to settle in the port via active business development strategies, 2) measures to improve the port's suitability and attractiveness regarding these companies' needs, e.g. via installing central bioenergy generation facilities (steam) and circular systems in the port itself to demonstrate commitment to economic and ecological sustainability.

Location

The multimodal Danube Port of Straubing-Sand builds a geographical connection between the Rhine and the macro region of the Danube. The port is situated right between two areas predominated by agriculture on the Western side ("Gäuboden") and forestry on the Eastern side (coniferous "Bavarian forest") as well as a comparatively dense cluster of biomass-processing industries for both energetic and chemical-material use of biomass.

Description/technical parameters of the development

Based on the needs addressed, new storage solutions for biomass have been assessed according to their feasibility. The solution recommended in the study is a short-term/intermediary open-air storage at the new south quay expansion, the size and features of which being limited by the space available there. This storage solution can facilitate both loading and unloading logistics of log wood transshipment to serve customer requests better than currently possible, as well as serve as buffer storage for log wood and wooden residue material for potential large-scale biorefinery plants, creating a

Figure 7. **Areal view of port basin with parcels of settlers, available plots marked red**
Source: BioCampus Straubing GmbH, screenshot from the geo-tool Bayernatlas, 2018

Figure 8. **Current setting situation at the quay and quay expansion potential**
Source: Energy Barge: WP5 D5.1.2. Pre-Feasibility Study, BCG

site advantage currently not existing at the Port of Straubing-Sand. Options for mobile fencing and coverage via tarps and a silo bunker with mobile cover and walls fit for access via trucks and bobcats for buffer storage of woodchips to be rented to clients (processing industry/biorefineries as well as logistics companies) shall be available.
If realised, the development project shall offer a set of services. These are: short-term open air storage of log wood and wooden materials between pre-/post-haulage and shipping (max. one week); short-term tarp-covered storage of log wood; buffer storage of log wood (max. three weeks), optional coverage; short-term open-air storage of wood-chips (max. two weeks); short-term tarp- or fleece-covered storage of woodchips; storage in walled bunker with mobile cover for woodchips; optional security add-on via mobile fencing system; stack securing services, maintenance and cleaning works of storage area.

Investment costs

Given the circumstances described above, a realistic and reliable estimation of investment costs is not feasible at the current point as no data regarding the quay expansion are available. Major cost drivers will include extensive soil movements and works above and under water, statics enhancement works, establishing rail connection for logistics and positioning cranes in place, concrete works and contractor fees.

Key success factors

The trimodal (water, road, rail) Port of Straubing-Sand is easily accessible through its connection to the Danube waterway and to the railway tracks. Furthermore, the port is linked to the two highways A3 and A92 through the main road B20 as well as the state road SR12. Straubing, with its more than 45,000 inhabitants is equipped with a regional airport. Moreover, the international airport of Munich is accessible in less than 1 hour. The surrounding area has strong agricultural and forestry sectors (Bavarian Forest and Gäuboden), providing a base for feedstock for energetic and material utilization of biomass, as well as potential for export which can be easily handled by the port because the most common technical equipment for handling biomass is already available and 80% of waterside and 95% of rail transshipment is already biomass cargo. There is a strong producing industrial and research cluster settled directly in the port, including relevant players from the biomass and bioenergy sector. At the logistics side, several experienced logistic providers are located in the port and offer logistics and handling services for all kinds of biomass intermediaries and products.
The port has proactive strategies to encourage modal shift to inland waterway transport in place, and also strategies and staff to establish port and surrounding region as model region for energetic and material utilization and valorisation of biomass ("Straubing – region of renewable raw materials") including a strong corporate network.

Challenges

In the last ten years, the share of round wood handled in the Port of Straubing-Sand has decreased significantly, due to the installation of a big saw mill

in Ingolstadt/Kösching. Since then, the log wood streams from the Bavarian forest to Austrian saw mills facilitated via the Danube in the past have experienced a shift towards Ingolstadt, a route which is facilitated via road and truck transport. Moreover, the quay area has been built on quite extensively in the last ten years, decreasing open space for intermediary storage of any kind of cargo. Therefore, round wood currently has a rather limited share, although requests both for outbound and inbound transshipment of log wood are increasing again but cannot be served due to limited open space storage. The Port of Regensburg can also be a competitor with its well-equipped port.

Clearly, the generally known challenges the waterway transport branch faces are also applicable for the Port of Straubing-Sand and the companies handling and processing biomass there. Low tides especially have an influence on the mainly just-in-time processing structure of the rapeseed mill, for example. The plant only has very limited storage capacities and the port itself has no storage capacities for rapeseed. The availability of free industrial plots is limited, new land acquisition must take place but permitting procedures for extensive port expansion measures might take longer than expected, delaying the increase in capacity of the port. This upgrade, however, is needed as it is running above its waterside maximum capacity today. In case bioeconomy development picks up pace and the Port of Straubing-Sand is not able to expand performance and capacity in time, the site advantages might vanish quickly.

Outlook

The development goal of the port is not only to facilitate biomass transport, but also to become a production and value creation hub for the bio-based economy, with no specific focus on a certain type of biomass. The final scope and size of the additional storage will be significantly determined at this stage by limited available space at the quay. The realization timeframe depends on the actual final decision of expanding the south quay. If the south quay will be built, the additional storage area can be available in five years at the earliest – an estimated realization horizon for the entire planning can be given with 10-15 years (2030-2035). A more versatile storage service portfolio can be planned and integrated given the greater port expansion project for a second basin and surrounding terminal area is being followed up on.

Figure 9.
Southern quay, High and heavy handling with mobile crane in the front, log wood storage in the background
Source: BioCampus Straubing GmbH, 2013

Port Authority of Vukovar

Implementing organization

The Port Authority of Vukovar was established in 2001 by the Republic of Croatia's Ministry of Maritime Affairs, Transport and Infrastructure. The Port Authority of Vukovar is a non-profit legal organization.

Analysis of the current situation

Slavonia and Baranja is the richest area with regards to biomass in the Republic of Croatia, while being the economically least developed part of the country. This fertile area, which is significant for agriculture and forestry, is bordered by the Drava River from the north, the Sava River from the south and the Danube from the east. It includes five counties.[2] At the national level of Croatia, a steady increase in biomass exports has been recorded with an annual rate of 25%. Within the total energy exports of Croatia, biomass accounts for more than 10% and almost the total amount is forest biomass. At the same time, the trend of biomass imports – mainly wood pellets –increased by 32%. According to the annual energy review "Energy in Croatia" of the Ministry of Economy, the capacity utilization of pellets production in Croatia is about 65% and the total production in 2013 was 181,568 tons, while the pellets production in Slavonia and Baranja amounts to 79,040 tons per year.[3] On the whole, 88% of the total pellet production was exported to foreign markets and the rest was used on the domestic market.[4]

In the West-Balkan, 89 power plants are in operation or in the process of construction, 49 utilize or will use biomass, and 40 power plants use or will use biogas for the production of electricity and heat. The Croatian Government also encourages the use of renewable energy sources (including biomass) in family houses, residential buildings and public institutions.

2. Ivanović,M., Glavaš, H.,(2013) Potentials and possibilities of using biomass from plantation, fruits and vineyards for power purposes in the Slavonia and Baranja, Region, [online] Available at https://bib.irb.hr/datoteka/668144.131223_biomasa_studija_ETFOS.pdf
3. Republic of Croatia, Ministry of environment and energy, (2015), Energy in Croatia, Annual energy Report. [online] Available at http://www.eihp.hr/wp-content/uploads/2016/12/Energija2015.pdf
4. http://www.energetika-net.com/vijesti/obnovljivi-izvori-energije/crobiom-o-peletima-s-ministrom-coricem-27368

Figure 10.
Port of Vukovar, general overview
Source: Port Authority of Vukovar, 2016

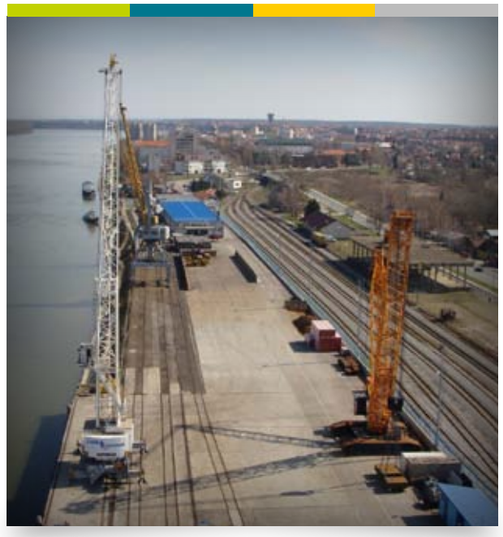


Figure 11. **Port of Vukovar, multimodal terminal**
Source: Port Authority of Vukovar, 2010

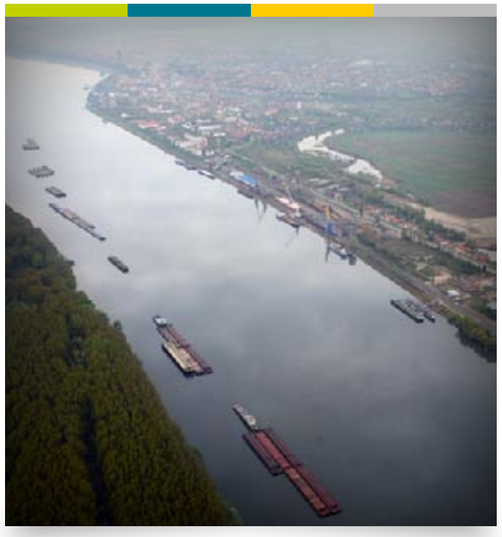


Figure 12. **Port of Vukovar, aerial view**
Source: Port Authority of Vukovar, 2013

Development needs

If the demand for energy from forest residues increases, new logistics solutions are needed to balance the periodical differences of supply and demand in the supply chain, as the need for a terminal is strongest during the seasons of heating and harvest. Therefore, a biomass terminal in combination with a biomass trade centre in the Port of Vukovar are required due to the lack of sufficient space to store or handle biomass in the region. However, the Port of Vukovar actually does not have business connections with plants and distributors operating in Slavonia and Baranja, as they mostly supply the raw material from domestic biomass sources.
Considering the potentials, the market for processed biomass products in the hinterland of the Port of Vukovar is still not sufficiently developed. The area of Slavonia and Baranja is the richest area in terms of biomass in Croatia, but currently there are not any collecting and logistics centres. As the Port of Vukovar is located at a very favourable traffic point, it is a good choice for establishing such a centre, although the biomass handling capacities must be developed in the port. In order to ensure the required conditions for biomass, biomass transport services and processed biomass products it is necessary to arrange the currently unregulated riverbank, too.

Aims of the development

The main goals of the planned investment would be::

- Establishment of a regional biomass-collecting and logistics centre that would cover the area of five counties that make up Slavonia and Baranja;
- The centre would offer fuel energy, forest wood chips, other biomass fuels;
- Continuity of supply, as well as suppliers of biomass of all kinds;
- Transshipment service for the use of river transports biomass;
- Ensure consistent quality standards (fuel quality, service delivery)..

Based on current market data, it is considered to be a small or medium terminal in the beginning with a possible expansion to enlarge one in the future.

Location

The Port of Vukovar is situated on the main channel of Danube. Based on the spatial-technological features of the Port of Vukovar, three locations for the specialized biomass terminal have been identified. The project also includes the hinterlands of the Port of Vukovar in a radius of 100 km on Croatian territory.

Description/technical parameters of the development

The potential specialization of the Port of Vukovar for handling biomass, considering transshipment and storage in a biomass trade centre, is defined as one of the outputs of this project. Creating the necessary conditions for the restructuring of the port to a biomass hub should be realized in three phases:
The first phase is the construction of a riverbank structure which includes the design and construction of the riverbank as well as the establishment of the necessary infrastructure.
The second phase is the issuance of a concession for the establishment of a biomass trade centre and the selection of concessionaires.
The third phase is the establishment of a biomass trade centre.
The minimum elements of a biomass trade centre are the following: warehouse, minimum energy wood storage area, paved area for manipulation, regular moisture measurement equipment for quality assurance, roadside billboards, and information boards. A weighbridge should be available to calculate the available fuel quantity and it is also important for determining the energy value (e.g. water content) of the fuel. The biomass trade centre would have two functions: it is a terminal port specialized for transshipment and storage of biomass and processed products; it is a place of sale for customers from the wider hinterland.

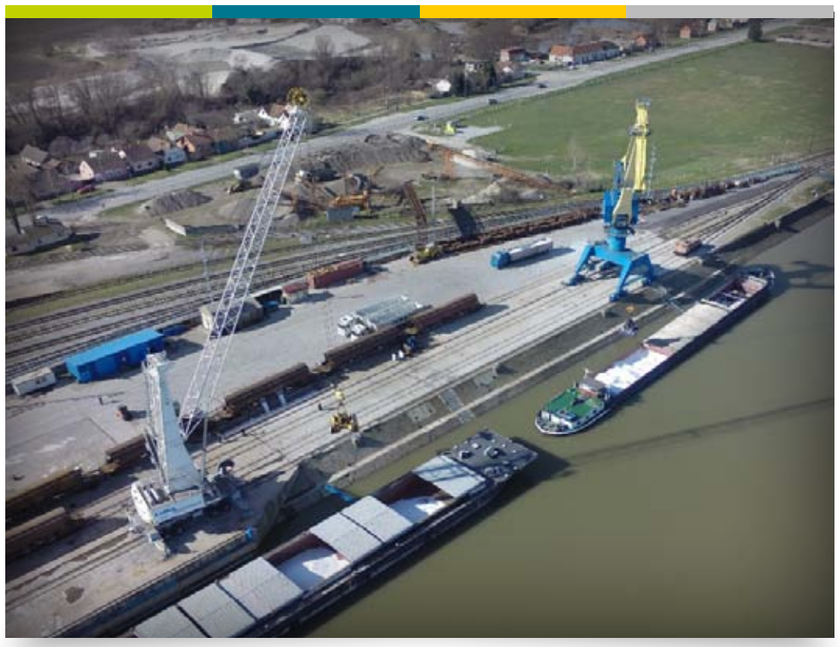
Investment costs

Investments should be considered in two separate ways: at first within the Port Authority of Vukovar's competence and the future concessionaire's investments. The total planned investment of the Port Authority of Vukovar is EUR 7,16 million. The estimate of investment costs for the future concessionaire is EUR 1,64 million plus EUR 2,04 million at two different locations.

Key success factors

The Port of Vukovar is in a very favourable traffic location and represents a good choice for the establishment of the centre. The port (and the broader region) has decent infrastructural connections. Danube is part of the VII. Pan-European transport corridors and the Sava river is also a conditionally navigable international waterway. There are main trade routes between Croatia and Bosnia and Herzegovina, Hungary, Serbia and Romania in the area and it has connection by rail and road to the Adriatic Sea as well as four A3 highways and the D2 state road. The Mediterranean corridor

Figure 13.
Aerial view of the port of the area of the concessionaire Luka Vukovar d.o.o
Source: Port Authority of Vukovar, 2016



(branch of the nr. V Pan-European corridor) also located near and connects Rijeka-Zagreb-Budapest on road and rail. While there is a transit port in Osijek too, due to weak navigability of the river Drava, cargos usually have to use the Port of Vukovar. Therefore, there is not any other significant rival inland waterway port in Croatia.

The port is already well equipped, mobile facilities, transport vehicles and transshipment facilities are available. Since the port has lot of experience and facility at handling agricultural products and wood, it is an opportunity to enter the biomass market by becoming a logistics centre.

On the supply side of the biomass industry, there are also numerous positive aspects. The market, just as the demand for plants fuelled by pellets, is continuously growing. Croatia is a large exporter of pellets (produces 1% of the world's total pellet production and exports 85% of it) and the growing trend of forest biomass trade exchange with neighbouring Danube countries seems to be continuous. The planning of a specialized terminal for biomass in the Port of Vukovar considers the following factors that are significant for the biomass supply:

- Balance factors: direct supply of biomass fluctuates significantly and is incapable to meet the more regular demand at the same time;
- Resource/capacity factors: the supply chain can perform with less resources (e.g. vehicles, machines, workforce) than a supply chain without a terminal;
- Quality factors: the terminal improves the quality of supply chain of biomass based on direct deliveries;
- Synergetic factors: the terminal can be used for other business purposes during the low season of biomass storages;
- Legislative factors: storing at roadside is periodically prohibited due to environmental reasons or availability, therefore a specialized terminal for biomass is prerequisite for obtaining permission to build a new power plant.

Challenges

All the three possible locations would require some establishment of the infrastructure for a biomass trade centre. On the other hand, while the present concessionaires can carry out the transshipment and storage of biomass and biomass products, there is no current interest in it because the local transport can be carried out by trucks and the export volumes are actually too small to consider inland waterway transport solutions. If biomass traffic increases, both concessionaires shall strengthen their capacities and acquire additional equipment.

Figure 14.
Cranes within the area of the concessionaire Luka Vukovar d.o.o.
Source: Port Authority of Vukovar, 2010

Several other risks could occur during the operation unintentionally, however, proper prevention measures could lower the probabilities of them:

- Lack of interest of potential concessionaires to build and manage a biomass trade centre, which can be handled by making a biomass trade centre feasibility study before publishing a tender for a concessionaire;
- Delays of concession contracting, which can be handled by timely submission of a tender for concessionaires and definition of partnership conditions;
- The delay in building a biomass trade centre, can also be handled by timely submission of a tender for concessionaires and definition of partnership conditions;
- Oscillations in supply and demand for biomass can be handled by concluding annual supply contracts with biomass products.

Outlook

The need for the establishment of the biomass trade centre is shown by the increasing number of power plants and cogeneration plants that use or plan to use biomass or biogas. The investment is foreseen to be conducted in five years period. Currently, Ministry of the sea, transport and infrastructure is preparing national framework for the future development of the ports and inland navigation for the period after the 2020 year. Within the new perspective, it is expected to have better legislation framework which will support development of the ports and inland navigation in line with upcoming trends especially in attracting more versatile cargo. By setting up a biomass centre, a free biomass market can emerge as an additional incentive for the use of renewable energy sources. With the increase of the amounts of shipped energy biomass the benefits from the less expensive shipping appear and at the same time it can stimulate a further development of a biomass market in the wider area around the port.

While the specialized biomass terminal at the Port of Vukovar will generate additional costs in the supply chain of biomass, this will certainly generate positive environmental, organizational and financial effects. These effects will be directly visible in the hinterland of the port within 100 km. Regarding as there is a wider range of importance of the future biomass trade centre in the Port of Vukovar, it can be emphasized as a collecting point in this part of the Danube region.

Figure 15.
Cranes within the area of loading and unloading ships Luka Vukovar d.o.o.
Source: Port Authority of Vukovar, 2010

Project co-funded by European Union funds (ERDF)

Project co-funded by European Union funds (ERDF)

Slovak Shipping and Ports JSC

Implementing organization

Slovakia has got two cargo ports with real transshipment performance, the port in Bratislava and the port in Komárno. Slovak Shipping and Ports joint stock company (SPaP JSC) is the operator of both ports. This means that the company is the only operator in the country with access to water transport and is in control of the situation of transshipment of cargo with regards to inland waterway transport. SPaP has a long-term leasing contract for the port area with Public Ports, while the infrastructure, machinery equipment, barges and buildings are owned by SPaP.

Analysis of the current situation

In Slovakia, the demand for renewable energy sources and alternative fuels for heat plants, domestic or industrial use is growing. The biomass potential in Slovakia has more than 60% of the total renewable potential of renewable energy sources. Forestry is currently the largest supplier of wood used for energy purposes, along with the wood-processing industry and timber stocks on non-forested land. In recent years, the demand for wood biomass has continued to grow, particularly in the form of wood chips and firewood. The main reasons are rising and unpredictable prices of conventional fuels and the fact that biomass usage is sustainable, cheaper than natural gas and continuously available, while gas and coal are imported, affected by the geopolitical situation and the usage of these conventional fuels is considered to be less environmentally friendly. Compared to other renewable sources in Slovakia, biomass, after solar and geothermal energy, is the source with the third most viable potential in the country.[5]

5. https://biom.cz/cz/odborne-clanky/ucelne-a-efektivne-vyuzivanie-biomasy-na-slovensku ; https://www.mhsr.sk/uploads/files/MuZlb3Ut.pdf

Figure 16.
Handling agricultural products in the Port of Bratislava, discharging trucks and trains and loading of a barge with covered cargo area
Source: Slovak Shipping and Ports JSC, 2018

Biomass trade has been established in the Bratislava region, mainly consisting of supply and demand of wood-based biomass, used for heating on many levels, from households to bigger buildings and the whole areas of cities, to power plants that use biomass mixed with coal to generate electricity. Largely grown agricultural products such as corn, rapeseed, etc. are being processed into biomass products such as rapeseed oil, bioethanol and biodiesel. So far, producers and users in Slovakia have been using road transport to supply wood-based biomass products.

Development needs

The envisaged investment shall enable producers and customers to transport their products to Bratislava in large quantities by barges, then further distribute them by road transport with a storage option in the port. Alternatively, they can even export their products to other countries in the Danube region.

The object of development in this case is a storage and transshipment facility. The ideal way for storing wood chips and wood pellets in bulk is supposed to be a clean and dry covered storage. It is possible to meet these requirements partly by the company's existing storage. With some additional work, the building will be suitable for storing such products. The storage shall have fire doors and has to undergo a fire protection revision.

Aims of the development

By transforming the Port of Bratislava into a port that handles biomass, there would be options provided for companies to handle their biomass products in a more efficient way. By switching from road to water transport, a contribution could be made to cut greenhouse gas emissions and help fulfil strategic goals of the Europe 2020 strategy. By providing a new service in the Port of Bratislava, the usage of biomass could be increased not only in the area around the port, but in the whole country. SPaP has a positive attitude to establish new technological solutions in the port. By investing in new technologies and services, the company could become more competitive and could offer more services to its customers. By innovation, SPaP is entering a new market and can attract customers that it might not have been able to reach with current offers and services. The biomass industry, especially the industry of wood-based biofuels is continuously developing and is expected to grow in the coming years. By development, new people and companies can be attracted. New sustainable business relationships

Figure 17.
Location of storage no.18 (highlighted red) in the Port of Bratislava
Source: Slovak Shipping and Ports JSC, 2018

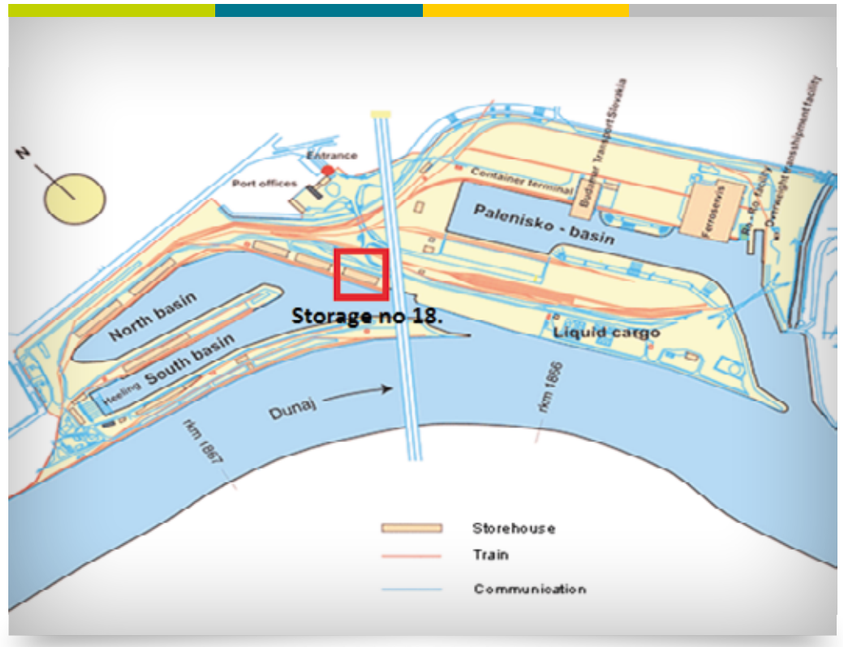


Figure 18. **Cranes ready for loading/discharging of train/barges** *Source: Slovak Shipping and Ports JSC, 2018*

can be established, including the possibilities for further development and new investments.

An important aim of the investment is economic and financial growth. For further development, SPaP must secure financial stability. With new products and services and proper management of the facility, SPaP could increase the company's income in the long run and make more investments and ensure economic stability and growth.

Location

The Port of Bratislava is strategically the most important public port in Slovakia on the Danube. At present, it serves as a universal cargo and passenger port. Its potential is based on its advantageous geographic location at the Rhine-Danube and Baltic-Adriatic Corridor of the Trans-European Transport Network TEN-T.

Description/technical parameters of the development

The project can be divided in two major parts. The first part is the physical realization of new technological solutions in the Port of Bratislava. The plan is to refurbish a storage building in the port, which then will be suitable for storing wood pellets and wood chips in bulk. The new machinery and equipment to secure the stocking, removing and reloading of the cargo will be supplied by an external company. Their production line will add the ability to discharge barges, stock the products, distribute them around the storage, and load the cargo into trucks in the port. The second part is the marketing strategy that SPaP is intending to follow. SPaP wants to avoid competing with companies producing and selling wood-based biomass, as in the region around Bratislava as well as in Slovakia in general, an established market of wood-based raw products does already exist. SPaP wants to focus more on the opportunity that it is the only company with access to inland waterway transport. With storage and transshipment capacities, the port could become a hub for wood-based biomass, with loaded barges coming from other ports of the Danube region to tranship their cargo into trucks and supply it further to companies that demand wood chips and wood pellets in bulk.

Technical description: It is an existing building that was originally built for storage. For the purpose of the project, it requires a renovation of gates, parts of the roof and ramps. The construction of the warehouse allows storage up to 4 m, with a particular storage height depending on the type of goods, the packaging and the weight. It has a concrete floor; steel windows are firmly integrated, and the storage can be ventilated if needed. The storage has an opening in its roof which allows transshipment of goods from the top of the building.

Investment costs

The overall costs for the investment in this project were evaluated with EUR 247,900. After an internal financial analysis, SPaP concluded that this project could be financed from the company's own financial reserves, without the need for grants or loans. The elaborated cash flow and cost benefit analysis suggest that this project in the Port of Bratislava is feasible and will have a positive effect not only on the company's economic situation but will also have positive effects on the region due to possible cooperation with other countries of the Danube region.

Key success factors

- Hinterland areas of the Port of Bratislava can deliver large amounts from multiple sources of raw products;
- Urban areas are located relatively close to rural areas which reduces logistical problems for domestic and small-scale biomass supply;
- Region readily accessible by road, rail, water and trimodal Port in Bratislava (road, rail, water) and cooperation is possible with the Port of Komárno if needed;
- The area is attractive for international investments;
- SPaP a.s. is experienced in the field of logistics, transshipment and storage services;
- Strategy Europe 2020 pushes EU-countries to reduce greenhouse gas emissions, increase the share of renewable energy and achieve an increase in energy efficiency;
- EU member states recognizing the need for a strong bio-energy sector.

Challenges

Currently, SPaP is not handling or processing biomass products as it is not involved, and it is not part of any kind of existing value chains in the field of biomass. The company has certain technical capacities to handle biomass products, however, it is not completely equipped to provide comprehensive services. Large areas are needed for some biomass crops to be produced and the product requires large storage areas before being converted into energy.

Figure 19. **Hopper for loose bulk materials in the Port of Bratislava** *Source: Slovak Shipping and Ports JSC, 2018*

So far there is not too much interest about inland waterway transport (IWT) from major biomass companies in Slovakia due to the limited reach of IWT compared to road and rail transport in Slovakia. The lack of large wood fuel users in the region could be another reason of the disinterest in IWT.

Outlook

The Danube provides an opportunity to import and export large quantities of cargo to and from other countries of the Danube region. Companies handling wood chips and wood pellets located in proximity to the Port of Bratislava would be able to import and store their products in the port and distribute them to their operations. Inland waterway transport gives companies an opportunity to transport bigger volumes in one shipment, usually for competitive prices and with less emissions and pollution than by road or rail transport. By providing a transshipment position for wood-based biomass in the Port of Bratislava, SPaP could fill the gap in the regional but also the national market, in the next 3 years.

INTRODUCTION OF PLANNED INVESTMENTS

Project co-funded by European Union funds (ERDF)

Port of Vienna

Implementing organization

The Wiener Hafen group is a part of the Wien Holding Group and with its subsidiaries it operates three large cargo terminals in the Port of Vienna – including the corresponding infrastructure: Freudenau harbour, Albern harbour and Lobau oil terminal.

Figure 20. **Port of Vienna, aerial view** *Source: Port of Vienna, 2015*

Analysis of the current situation

Hinterland of the Port of Vienna is mostly related to the so-called Vienna Region - including the three federal states Vienna, Lower Austria and Burgenland. The central geographical location is one of the EU's foremost economic areas. Austria is well provided with agricultural and forestry goods: the Alpine regions have high biomass potential forestry areas; the Viennese Forest covers 135,000 ha and the Biosphere park Wienerwald is one of the largest (67,000 ha) contiguous beech forest areas in Europe. Region of Vienna is rich in sugar beets and oil seed fields and almost a full coverage of grain cereal cultivation.

The projections show that round wood availability will not increase when comparing 2020 and 2030, but the reduction will not be significant. Biomass use, however, has increased by 44% since 2005. By 2020, biomass use in Austria could once again be increased by 25%. Wood is and will remain the most important resource for the bioenergy market. 79% of the total biomass used in Austria in 2011 were wood in various forms. With a share of 27%, logs (firewood) are the most important biogenic energy carriers. The final energy consumption of bioenergy has increased by almost 43% in Austria from 2005 to 2011. With a share of 80.8%, the thermal market is the central market for biomass[6], followed by biofuels with a market share of 11% and green electricity generation from biomass and biogas with an 8.2% share. By 2020, the final energy consumption of bioenergy could be increased by about 25%. In the year 2020 the thermal market with an expected market share of around 77% will still be the dominant area of application for biomass.[7]

Development needs

Developing additional machinery for wooden biomass at this stage mainly serves as an intermediary solution to serve existing demands for wood transshipment and to cater potential new settlers looking for additional machinery solutions to reach the Viennese region. One result out of the market observation is to constantly invest in port infrastructure. The best practice analysis shows the necessity of a high quality infra- and supra-structure. Therefore, to increase the supply chain efficiency it is highly recommended to purchase a conveyor belt, which is not present yet in the Port of Vienna. The conveyor systems are necessary to be able to unload modern/next generation wagons.

6. iC consulenten Ziviltechniker GesmbH, Pre-Feasibility Study on availability of log wood and waste wood in selected Danube ports and its inland waterway transport potential, (Accessed in 2018)
7. Österreichische Bundesforste, BIOSPHÄRENPARK WIENERWALD MANAGEMENT, (2016): NACHHALTIGES WALDBIOMASSEN-MANAGEMENT IM BIOSPHÄRENPARK WIENERWALD, available at: https://www.bpww.at/sites/default/files/download_files/MaB_BiomasseWienerwald_Endbericht_18122006%5B1%5D.pdf, (Accessed 3.10.2017)

Figure 21. **Crane unloading bulk cargo** *Source: Port of Vienna, 2018*

The following needs have to be addressed by the development project:

- Suitability for break bulk, residues material & wood chips;
- Location at quay to facilitate loading and unloading of vessels;
- Accessibility by road and rail for multimodal transshipment;
- Availability of mobile coverage solutions;
- Accessibility/Usability for multiple users;
- Availability of suitable handling equipment;
- Training of the employees who operate the device.

Aims of the development

The aim of the Port of Vienna in the field of City Logistics is to act as a business accelerator, contributing to efficient and sustainable land use and to support the sector's e-mobility as well as urban logistics. Overall, the main aim of the development project under review is to improve the port's overall attractiveness in terms of services and infra/supra-structure provided. The port shall be equally appealing to currently existing clients from the biomass and bioenergy value chains (suppliers, traders, logistics service providers, processors, end users) as well as functioning as a site advantage for project developers.

This main aim can be specified as follows into a set of sub-objectives:

- Serving currently unmet demand of current and potential clients with additional service offers in a restricted manner in the short to medium-term as long as greater port expansion has not taken place;
- Providing input for the greater port development plan and the Vision 2020;
- Widening the currently restricted client and cargo portfolio towards wood-based supply- and value chains;
- Re-attracting wood-based cargo into the port;
- Encouraging a modal shift in favour of IWT;
- Further improving the port's and region's profile as a model region for the energetic and material use of biomass;
- Establishing a broader set of infra- and supra-structural site advantages in the competition for bio economy investment projects;
- Re-attracting the Viennese Region for industrial branches.

Figure 22. **Location of the Conveyor Belt in the Port of Vienna** *Source: Port of Vienna, based on Google Maps, 2018*

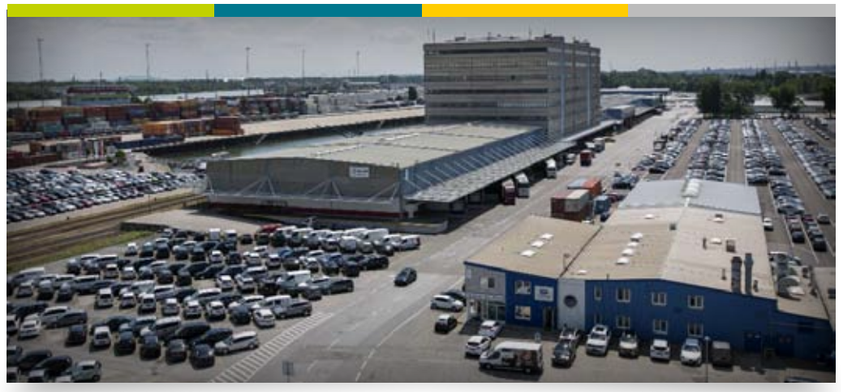


Figure 23.
Central warehouse in the Port of Vienna
Source: Port of Vienna, 2018

Location

The port is located on the Danube River which is part of the Rhine-Danube Core Network Corridor. The Danube is used for the transport in particular of oil products, road salt, building materials such as cement, sand or steel products, and agricultural products such as grain and fertilizers. There are modern warehouses and well trained and equipped staff for the storage and handling of customs and domestic goods as well as a customs office for rapid clearance. The three ports on the Danube in Vienna are notable for their modern handling facilities, excellent infrastructure and dependable, well trained workers, ensuring the reliable and rapid handling of all goods, whether they are building materials, containers, general cargo or bulk goods.

Description/technical parameters of the development

Due to the market demands the Port of Vienna decided to buy a conveyor belt. Certainly, this investment will increase the demand for the port's core services. In addition, the Port of Vienna was forced to make this investment, as the wagon fleets are converted to the new generation and they have not been able to serve them till the end of the development in question.

The conveyor belt system is necessary to be able to unload and load modern/next generation wagons and be capable to load/unload approximately one complete train per day while moving along the stationary train. The bed of the new wagon generation is no longer elevated left and right at the edge of the wagon, it is now in the middle, deep at the surface with almost no space between the wagon and the tracks. The belt has a mobile unit with power supply generator and a radio remote control.

Investment costs

The total investment cost is EUR 99,700. Consisting of the amount of transport, installation and additional hardware. The additional hardware is an electronic control box which enables the controller to manage the entire system. The subsidy rate on this investment is 85% with a ceiling of EUR 90,000. The additional costs incurred are borne by the port. Based on the price model, the system will pay for itself after 10 years, assuming that the machine is in operation 250 hours a year on average.

Figure 24.
Conveyor belt in the Port of Vienna
Source: Port of Vienna, 2018

Key success factors

Trimodality: excellent modal split is developed – trimodality is the state-of-the-art operation in Austrian ports (rail-road-IWW); proximity and good connections to international airports (European regional hub Vienna).

Transnational connections: very good connections to seaports in Europe in the north and west relations, also to the Black sea region and Adriatic seaports; in general Austria has got a very great potential to direct connections in the middle section of the New Silk Road (one belt one road) in the eastern part of the country (a new detailed plan just started recently) as well as the south section of this strategic corridor via the Danube axis.

Modern standards: The Port of Vienna is well developed and provide very good and modern infrastructure standards with sufficient capacity installed (huge investments in the last decades), including intermodal terminals with great capacities being installed.

Qualified staff: highly qualified logistic experts and workers of all levels are available in Austria; specialized education in this sector is provided.

Challenges

Clearly, the generally known challenges the waterway transport branch faces also apply to the Port of Vienna and the companies handling and processing biomass. Especially low tides have an influence on the travel time. The excess capacity for waterside transshipment is notable – the port is facing a decreasing water cargo statistic in Austria; even the whole section of the Danube in Austria is still used to quite a small rate compared to the river Rhine.

Competitiveness issues: truck transport of round wood is the most competitive below 200 km distance. At higher distances and escalating costs, railway is the most competitive up to 500 km, while IWT becomes more competitive than railway in distances over 500 km. Log transport on the Danube may achieve a competitive price if shipped from Romania and Bulgaria to Vienna.[8]

The recent high demand for log wood indicates a lack of wood on the market. Thus, it is hard to contract the procurement of required quantities. There is a visible price increase in Romania and Serbia, while Austria still has very competitive prices. The business models for water transshipment are also old and do not support today's dynamic demands of the relevant market and client needs; due to public ownership the ports are faced with relatively complex decision processes and supervising structures. Port business in general is a small market and acts in a narrow niche, few market partners, small competition – no boosting and booming market situation with intrinsic improvement and dynamic processes.

Outlook

The envisaged small-scale investment offers an opportunity for the Port of Vienna to develop a more favourable transport concept by means of inland shipping in order to develop a more efficient supply for biomass power plants in the future. The envisaged conveyor belt, equipped with different components, would entail the advantage to be able to handle a wider range of different cargo and operate more flexibly with regards to existing requests of customers as well as future business cases of the port. Furthermore, the use of the existing heavy machinery in the port could be reduced by using a conveyor belt instead, which would contribute to decrease the fuel consumption and the connected pollutant emissions. After the Green Electricity Act expires 2019 without a planned renewal, projects to create an efficient value chain for the supply of biomass power plants, especially the Simmering power plant, are already running in 2019. The Port of Vienna will set up an interim storage facility for biomass in the port of Vienna. Also, a stronger use of the carrier vessel is planned. In addition, the first attempts will be made in 2019 to position the conveyor belt in the port area for a long-time perspective in order to achieve fast capability deployment and save on material and staff costs. Likewise, the Port of Vienna will implement a pilot project with two partners, with the aim of storing and processing biomass before it leaves the port. These points will be implemented by mid-2020. This is followed by further strategic considerations on how the Port of Vienna can strengthen these areas.

8. Pre-Feasibility Study on availability of log wood and waste wood in selected Danube ports and its inland waterway transport potential, iC consulenten Ziviltechniker GesmbH, 2018

Pilot actions in the field of processing and handling of renewable energy resources

Project co-funded by European Union funds (ERDF)

Port of Vienna: Conveyor belt system

The first step of the pilot action was the establishment of a pre-feasibility study by the Port of Vienna. The aim of the study was to analyse the availability of log wood and waste wood in the port, and its potential regarding inland waterway transport. The results were examined by the stakeholders of the port, and the study was further used to determine the future strategic orientation of the transshipment area within the port. The results were also discussed with a stakeholder from the wood processing field, Fundermax. This company is interested in using the port for transport and storage, and also in the available wood material within the Danube region. Steps for future analysis were also determined based on the study. As a pilot action of the project, the Port of Vienna has purchased a conveyor belt. This investment should strengthen the existing businesses in the port, while improving the service portfolio of the break bulk area. The belt is part of a conveyor system. This system is necessary for loading and unloading the modern wagons. This system is mobile, suitable for radio remote control and has a power supply generator. The conveyor belts are mostly used to transfer cargo between rails and ships. The daily set up takes about 2 hours, and two workers are needed in the process. The set-up is planned based on the operation it should support. Before the project, the port was unable to handle large volumes of biomass products efficiently, since it was lacking equipment, that could link transshipment storage and processing together. The transfer of biomass cargo into the bulk storages was also unsolved. Due to these shortcomings, the port had a weak market position regarding biomass cargo. The project and the investment helped to strengthen its position. The pilot action

Figure 25.
The conveyor belt system – pilot investment funded by ENERGY BARGE in the Port in Vienna
Source: Port of Vienna, 2018

Project co-funded by European Union funds (ERDF)

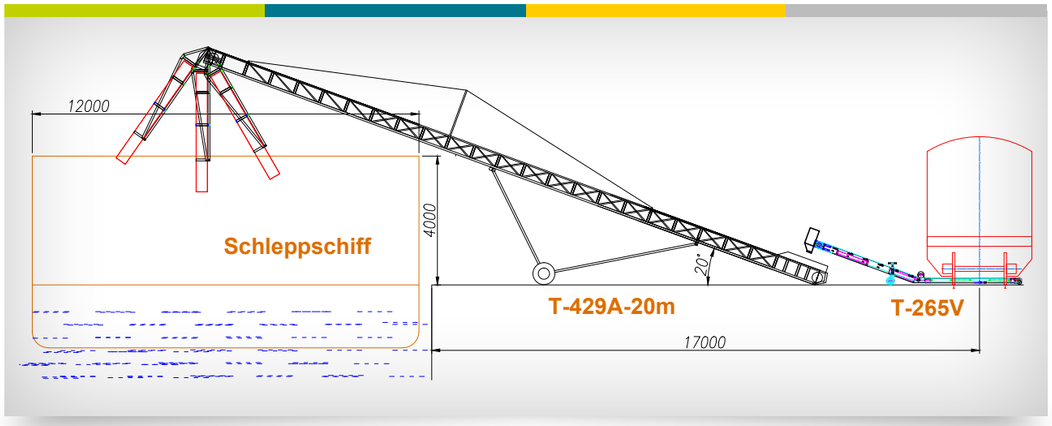


Figure 26. **Conveyor belt system plan** *Source: Port of Vienna, 2018*

helps to activate the potential of waterborne transport and has transnational effects as well. The operation of the purchased equipment was done by the port itself. The material will be imported by Fundermax, in the frame of a cooperation. Wood chips and pellets are particularly good for the transport by a conveyor belt, since they have a low weight and are non-corrosive. The development of a strategic long-term cooperation involving the Port of Neuss – that is responsible for the German logistic part of the supply chain – is planned. A strategic cluster of consumer goods including biomass production can be developed in the future. This investment creates an opportunity to develop a better transport concept regarding inland waterway shipping, therefore contributing to a more efficient way of supplying biomass power plants, especially the power plant in Slimmering. Since the conveyor belt can be equipped with different components and is suitable to handle a wider range of loads, it can fulfil more costumer needs. The purchased equipment has been tested and validated. The control box of the system has an integrated safety system, which makes the conveyor belt highly safe to operate.

MAHART-Freeport: forklift with a handling adaptor

Freeport of Budapest is the largest Danube port in Hungary which is technically able to load and store all kinds of cargo. The port is the main hub on the Danube in the Budapest region with strong rail and road connections. The most important goods that are handled in the port are oil, grain and metal products. Biomass is a completely new cargo type in the port and opens a new market segment for further services. Due to the investments in the past 10 years, the port now hosts over 60 companies. One of the future focus areas of the port is energy supply and energy related services which is also a key strategic area for most of the companies located in the Freeport, since energy related costs and environment friendly operation is a key element of competitiveness. The development of a cost-efficient, environmentally friendly form of energy supply is highly important. A strategic aim of MAHART is to increase transport volumes in the port, in which biomass could play an important role, since it can be transferred and bulk commodity, and it is less time sensitive with adequate storage capacities.

Within the framework of the ENERGY BARGE project, MAHART purchased a forklift to support the biomass loading, handling and storing in the port. The port has the basic infrastructure but specific storage facilities and equipment for biomass handling are currently missing. The main goal of this pilot action is to demonstrate how the biomass handling can be launched in a port as a new service and how it can contribute to the attraction of biomass cargo.

Based on the development plans and supporting financial programs, it is assumed that the support of bioenergy will play a major role in the vicinity of the port in the coming years. The pilot investment is preparing the port for the future developments related to pellet, firewood and wood chip markets for small- and large-scale energy producers. The purchased forklift can be equipped with a big bag-handling unit, which can be used to transfer biomass arriving in bulk, into easily transportable and storable bags. This can serve as a basis for future developments in services, like energy biomass supply for individuals/households as well as small institutions operating a bag supply technology. The experiences gained with biomass can be used in different biomass-based energy production development in the future. The operation of the equipment will be supervised by MAHART, tenants involved in biomass or agriculture related products will be the prime users. Services and maintenance activities will also be part of MAHART's responsibilities and tenants will provide driver for the forklift.

The utilization level of the purchased equipment is expected to grow with launching more operations related to biomass transport. After the end of the ENERGY BARGE project, further investments are expected, e.g. the expansion of biomass storage capacities. Other project partners are expected to elaborate opportunities for transporting biomass in other Danube ports as well, using this pilot project as a base.

Figure 27.
The forklift - pilot investment funded by ENERGY BARGE in the Freeport of Budapest
Source: MAHART-Freeport, 2019

Conclusions based on the transnational workshop

Source: DTP Danube Transnational Programme

The closing conference of the ENERGY BARGE project was held on 23 May 2019 in Budapest with 85 registered participants from the Danube region's countries. The conference was moderated by Mr Zoltán Erkel, project manager of the Hungarian host partner MAHART-Freeport. The conference was opened by Dr. Péter Kaderják, the Hungarian Minister of State for Energy Affairs and Climate Policy.

Priority Area 1 (PA1) of the Danube macroregional strategy, and the accomplished goals of the strategy so far. In the presentation future development opportunities, and tools that can help project proposals, such as the different online platforms (e.g. www.danubeportal.com) were also introduced together with potential future project initiatives generated by the ENERGY BARGE project.

Figure 28.
Opening speech of Dr. Péter Kaderják, Hungarian Minister of State for Energy Affairs and Climate Policy, 23.05.2019 Budapest A38 Ship
Source: MAHART-Freeport, 2019

Dr. Kaderják presented the integrated energy and climate plan and strategy in Hungary, as well as the country's commitment to the climate and environmental issues. The minister highlighted Hungary's climate performance which can also be seen in the decreasing emission/capita/year value. Mr Thies Fellenberg, project manager at Fachagentur Nachwachsende Rohstoffe e.V. (FNR), coordinator of the ENERGY BARGE project, presented the aims and objectives of the project, the instruments used in order to achieve these objectives as well as the results including the modal shift platform, the pilot investments, B2B meetings and dissemination activities.

Mr. Simon Hartl, team leader at the project partner viadonau introduced the development potentials for the Danube region (biomass & inland waterway logistics) from the viewpoint of the EU Strategy for the Danube Region (EUSDR). The targets of

Mr. Otto Schwetz, Vice-President of Pro Danube Austria. introduced the Pro Danube Austria, its aims and strategy and the different best practices of cargo handling at ports, using the Port of Vienna as an example. Mr. Schwetz presented statistical information such as the transport capacity and transport ranges of different shipment methods and analysed main bottlenecks, opportunities and challenges along the Danube in his presentation. The panel session was closed by Ms Henrietta Benkő, Advisor of the EU Strategy for the Danube Region, who presented the Priority Area 2 "Sustainable Energy".

The second panel started with the presentation of Ann-Kathrin Kaufmann, Director of Biobased Economy at the BioCampus Straubing GmbH and Prof. Wolfgang Dorner representative of project partner Deggendorf Institute of Technology. They introduced the online platform elaborated within the project. The aim of this instrument is to strengthen

Figure 29.
Afternoon session of the closing conference led by Ms. Milica Nikolic, project manager of viadonau, 23.05.2019 Budapest A38 Ship
Source: MAHART-Freeport, 2019

national and transnational cooperation and know-how exchange regarding biomass and bioenergy. The platform includes a bioenergy market landscape in the Danube region and a biomass & bioenergy atlas. Ms Milica Nikolic, project manager at the project partner viadonau gave an overview of the concept of the regional business-to-business (B2B) meetings, as well as the key findings and collected feedback of these events. Finally, Mr. Hauke Köhn assistant for EU and international projects at FNR gave a summary of the ENERGY BARGE's latest outputs and policy recommendations to improve energy security via biomass logistics The SWOT analysis, examining all countries participating in the project and the elaborated Transnational Energy Security Strategy were briefly presented by Mr Köhn. In the afternoon session, each project partner from Danube ports presented briefly the findings of their

Figure 30.
Transnational workshop at the closing conference, 23.05.2019 Budapest A38 Ship
Source: MAHART, 2019

pre-feasibility studies and also the pilot investments implemented by MAHART and the Port of Vienna. As a final session of the conference, participants took place in a transnational workshop to discuss most relevant issues of IWT and energy biomass transport. (Main findings of the workshop are summarised below) The closure of the conference was held by Mr. Thies Fellenberg, who summarized the project results and the main conclusions of the implementation.

Main findings of the transnational workshop

In the frame of the thematic transnational workshop, participants discussed the following topics, with the assistance of keynote speakers in three sessions:

Placement of biomass industry in ports

Questions discussed:

- What technical requirements are necessary for these services and key success factors of placement of biomass industry of ports?
- What kind of services and functions could be provided with the involvement of energy biomass in ports?

Future development of Danube ports

Questions discussed:

- What kind of future trends are foreseen which may increase the competitiveness of inland waterway transport?
- How can these trends contribute to the use of energy biomass in the ports?

Derivation of policy recommendations for the Danube region

Questions discussed:

- What are the present challenges and threats that stand in the way of the increasing role of energy biomass in inland waterway transport?
- How can legislation/policy make the use of IWT more attractive/competitive in the Danube Region?

During the session discussions, participants articulated the following key findings regarding future development needs of IWT and energy biomass transport:

- For the involvement of ports to biomass value chains, the most effective way is to develop systems with multiple actors. The presence of a major processing unit is an advantage and it creates the basis of further connected developments and services;
- Production of higher value goods in ports and the integration of the advantages of cheap and environmentally friendly waterway transport mode are able to provide considerable competitive advantages;
- To successfully attract new biomass related enterprises in ports, specific infrastructure requirements (e.g. wastewater network, steam, heat pipe system etc.) and port profiles have to be taken into consideration and adjusted to potential customer needs. Flexible buffer storage capacities and trans-shipment options are the most frequently used services by them. By current trends however, renting is a more typical solution than investing to new services and capacities;
- Biomass-based power generation (both heat and electricity) within the port is an attractive service for potential biomass industry customers;
- In many cases, lack of space for expansion is a major obstacle of service and infrastructure developments in ports. New solutions should be developed to handle this problem;
- Ports have to actively contribute to local and national policies and strategies in order to favour sustainable waterway transport of biomass-based materials and to integrate Danube logistics to the location selection of major processors;
- EU and government level initiatives are necessary to increase IWT's competitive position (official actions to reach 2.5 m Danube depth for increased navigability, subsidies and regulations to give preference to sustainable waterway transport). Presently, because of changing EU regulations, it is difficult to forecast future trends of IWT;
- Shippers and potential clients have limited information and experience in pricing, the administrative process looks difficult, and shipment time is sometimes unpredictable because of weather and waterway conditions;
- There is a great demand for harmonisation and simplification of the legislation and administrative processes at the border controls at the Schengen borders along the Danube;

Figure 31.
Transnational workshop at the closing conference, 23.05.2019 Budapest A38 Ship
Source: MAHART-Freeport, 2019

- Ports and shipment companies have to be motivated to make IWT faster and more reliable regarding delivery time; Digitalisation of ports will allow them to significantly increase the efficiency and reliability of the logistics chain; To foster the role of energy biomass in inland waterway transport, trading platforms should be introduced at transnational level;
- As port infrastructure developments provide slow returns on investments, private developers should be motivated by public (government or municipality) subsidies or tax allowances;
- "The polluter pays" principle should be applied in the intermodal freight transport, which could increase the competitiveness of IWT compared to road and railway transport (The Combined Transport Directive is under discussion at EU level); Environmentally friendly technologies should be introduced in vessels;
- For the increased competitiveness of waterway transport, definition of marketable advantages (like transport costs, definition of specific goods suitable for waterway transport) should be the focus of communication.

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Source: MAHART-Freeport, 2019

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