Integrating Danube Region into Smart
& Sustainable Intermodal Transport Chains

Port Development Plan for Port of Vukovar (Croatia)

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Content

1 Introduction - Dionysus – about the project

The Danube and its navigable tributaries offer significant capacity for cargo and passenger flows. The water transport sector contributes to a sustainable transport system and regional growth. In addition to better waterway conditions, a more modern, energy-efficient fleet is needed, better management of the transport system through comprehensive infrastructure planning and investment solutions. The investment needs relate to port infrastructure and upgrading, and multimodal connections with the port hinterlands.

The project will focus on addressing major regional infrastructure management and planning challenges, highlighting key actions needed to support Danube traffic and port infrastructure planning. The development of the project is based on the results of the DAPhNE project, which concerns the development of port infrastructure and cooperation between the Danube ports network.

DIONYSUS results will be used to elaborate transport corridor development policies through reports and recommendations, as well as an analysis of the current situation. It will provide a framework for identifying deficiencies in rail and road infrastructure for access to Danube ports and consolidating investment needs based on market analyses. Alignment of port planning with transport infrastructure and regional economic development plans will provide recommendations for their adaptation in line with sectoral priorities. Targeted and specific studies for line container services and agricultural products will be developed. Also, the Master Plan of Infrastructure for the River Cruise Industry will be developed.

The baseline results will consist of port development plans and operational and business models that support decisions on quality, sustainable development and investment. All project results will ensure coherence with the specific objectives of EU transport policy, TEN-T and cohesion policy for 2014-2020 and beyond, including the next Multiannual Financial Framework (2021-2027), making DIONYS a key instrument for contributing to the implementation of the EUSDR.

2 Objectives of the document

The main objective of the document is to develop a concrete development plan for the port of Vukovar, as well as operational and business plans and development models for the strategic document of the port of Vukovar in order to facilitate its integration into multi/intermodal transport chains and improve its transport connections. For that purpose, the Plan contributes to improved connectivity and follows a transnational (corridor) approach.

The plan takes into account all the findings of previously conducted analyses and studies and capitalizes on the results achieved by DTP projects, such as DBS Gateway and DAPhNE, as well as TEN-T/CEF and nationally funded projects through operational programmes. The plan shall be consistent with national/regional economic strategies and regional development plans of related areas and fully aligned with long-term investment strategies and plans.

The content of the Plan has a mandatory and default structure defined by the DIONYSUS Project Consortium. The final documents will reflect all collected recommendations in accordance with the collected and processed economic, environmental and social factors.

The final document presents a concrete plan for the development of the port of Vukovar in order to facilitate their integration into multi/intermodal transport chains. The document provides the basis for future investment decisions. The document must be developed in such a way that an annual update is possible. At the same time, the Plan will be a central element of the annual SWOT analyses and budget processes of the port of Vukovar.

3 Document structure

The document is divided into several separated but interconnected parts. After the introductory remarks, the objectives of the document, the summary, the structure of the document and the confidentiality provisions shall be indicated.

The following is an elaboration of the current European context relevant to the port, which addresses relevant strategies, policies and programmes related to the Plan.

The development of the project is based on the results of the DAPhNE and GRENDEL projects. Common characteristics, common objectives and development measures are described in Chapter 7 entitled 'DAPhNE project: Danube region – common characteristics (SWOT, Action plan, measures)'. The GRENDEL project, which aims to improve the environmental and economic effects of the Danube fleet, is described in Chapter 8 in the context of future infrastructure development.

Further chapters provide a detailed description of the current position of the port within its national and regional environment, as well as information such as history, development, the current situation, the organisation of the port and its activities, owners and key stakeholders, and the legal and legitimate framework. It also provides an overview of the existing port infrastructure and services offered within the port, as well as data on transshipment volumes. The chapter 'Market Analysis' elaborates in detail the analysis of the port capacities and current and future demand for port services. It also describes competition at national and international level and synergies with other ports in the region.

The project is in accordance with the relevant national, regional and local strategies and programmes described in Chapters 12 and 13. The following chapters describe indicators related to the DAPhNE project at the national level, the organization and operations of the Port Authority Vukovar and other key stakeholders. At the port level, legal compliance and the current situation were evaluated from the aspect of SWOT analysis, an assessment of future maintenance was given and an overview of the impact of external factors such as the quality management system was also given.

Chapter 22 elaborates development and planning documents and identified indicative investment plans, such as investment in port infrastructure, suprastructure and equipment. Concepts of activities related to the certification process, improvement of water elements, noise protection measures and concepts of work and cooperation with other bodies are elaborated. The investment options and risks and the expected performance of the selected investments were analysed. Strategic projects, action plan and activity plan are defined.

The integration of other results of activities within the DIONYSUS project is elaborated in Chapter 24, and in Chapter 25 an adaptation of the PDCA cycle for future updates of the document is adopted.

4 Data confidentiality provisions

The contracting parties undertake to keep confidential all information and data obtained orally, in writing, electronically or by any other means during the contracting of the work, the performance of the contracted work and after the completion thereof without time limit.

5 Summary

The Port of Vukovar Development Plan is a strategic document developed to facilitate the integration of the port into multi/intermodal transport chains and to improve its transport connections.

The plan was prepared in a way that takes into account the conclusions of previously conducted analyses and studies and capitalizes on the results achieved in DTP projects, such as DBS Gateway and DAPhNE, as well as TEN-T/CEF and nationally funded projects through operational programmes.

When preparing the plan, national and regional economic strategies and regional development plans of related areas were taken into account, in full alignment with the long-term investment strategies and plans. Particular emphasis has been placed on increasing energy efficiency and environmental sustainability.

The Port of Vukovar Development Plan has been developed to be the basis for future investment decisions and a central element of the annual SWOT analyses and budget processes of the port of Vukovar.

The port of Vukovar was founded in 1960. It is located at 1.335 km downstream of the Danube River, on the right bank of the coast, and its activity is mainly related to the transshipment of goods in export, import and transit. The favorable position of the port in relation to the Danube River nut enables normal operation throughout the year regardless of the water level of the river, in such a way that even at the lowest water level of the Danube port can be normally operated.

During the Homeland War (from 1991 to 1995) the infrastructure and suprastructure of the port was completely destroyed, and the entire equipment was alienated. For this reason, the operation of the port was disabled during this period.

In the process of peaceful reintegration, the port reconstruction process was launched in 1997. In the following years, the Government of the Republic of Croatia financed various projects for the purpose of equipment procurement and reconstruction of existing capacities.

The long-standing recession of the last decade has affected the Port's operations and the appearance of other operators and sources of raw materials. Traditional bulk traffic (coal, cereals and iron ore) has decreased significantly, while coal transshipment has increased significantly.

The share of general cargoes in the total transshipment has significantly increased and today in the port there is a bigger emphasis on the transshipment of general cargoes.

Using its potentials, combined with its strategic development objectives, its position, the nature and scope of its activities, the port seeks to attract logistics and manufacturing companies, thus creating the preconditions for exploiting the benefits of multimodality and intermodality.

The core values of the port of Vukovar are aligned with the common core values of the ports of the Danube region, which are focused on excellence and commitment to growth and serving communities by supporting supply chains and economic growth.

The area of the port of Vukovar is managed by the Port Authority Vukovar, while port activities are carried out on the basis of concession contracts with interested operators, based on a previously

conducted public tender. The concessionaires directly and indirectly generate their revenues in the port area, thus generating a multiplier effect on the entire national economy.

In the previous period, the Port Authority Vukovar has made significant efforts to develop port infrastructure, with many investments ensured from EU funds, especially for the development of passenger transport infrastructure.

The potential of the port of Vukovar for the realization of cargo traffic is very big, thanks to the position of the port on the Danube River and its connection to the railway and road network. The main constraint is the impossibility of expanding the port, which is conditioned by a spatial constraint, which poses a challenge in cargo manipulation.

Technical facilities and equipment are regularly maintained, however, it should be pointed out that the technology currently used is outdated and should be replaced with a newer one in due course, which will enable bigger activity and development of the port of Vukovar.

For this reason, investments are necessary for enabling the expansion of the port area and increasing capacity in a way that will be adequate for the needs of cargo transport.

Below are the investments in the area of the port of Vukovar and the timeframe for their realization:

Planned project/ investment	Indicative duration and implementation period	Year										
		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Construction of a vertical coast in the port of Vukovar	102 months											
Construction of a terminal for the disposal of waste from vessels	48 months											
Construction of the passenger pier Vučedol	36 months											
Expansion of the pier for passenger ships in Vukovar	60 months											
Construction of communal and passenger pier on the Island of Sports in Vukovar	24 months											
Construction of smaller piers for local and tourist ships	48 months											
Project for the construction of a communal pier in Batina	12 months											
Construction of communal connections for the supply of alternative fuels	36 months											

Planned project/ investment	Indicative duration and implementation period	Year										
		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Construction of basic infrastructure in the area of Borovo	120 months											
Construction of office building	24 months											
Construction of biomass terminals	36 months											

The indicative financing plan, six projects are planned to be financed through the state budget, with co-financing from EU funds, while the financing of the project of expansion of the pier in Vukovar and the construction of the pier in Batina is foreseen exclusively from the state budget, i.e. from the Port Authority's own revenues.

Among these projects, the construction of the vertical coast and other port facilities, the construction of the passenger pier Vučedol and the expansion of the pier for passenger ships in Vukovar stand out as strategic projects, i.e. priority projects.

In this context, it is possible to distinguish in particular the project of construction of the vertical coast and accompanying port structures, which together form a functional unit and the basis for performing port activities. The aforementioned expansion would extend the existing coast by 286 meters, which would enable the reception of ships with a load capacity predominantly of 1.000 tons and an additional 600.000 tons/year under the assumption of equipping the terminals with three cranes.

The land part of the port area is planned to be arranged in the form of two separate functional units, within which the construction of a bulk terminal and a general cargo terminal is envisaged.

It is envisaged that the bulk terminal occupies most space of the vertical coast, while the general cargo terminal should occupy a smaller part of the space. However, in kind, it will be possible for part of the horizontal operating surface to be used for manipulative purposes and cargo disposal according to the current need of the concessionaire, and the demarcation between the bulk and general cargo terminals will be flexible.

The realization of this investment is expected to increase transshipment as well as diversification of the transshipped goods, thus achieving progress on diversification and removal of seasonality, and the increase in transshipment figures will have a direct impact on the movement of total revenues, as well as the investment potential of the port.

It should also be pointed out that the planned investments in the development of the port of Vukovar will contribute to the realization of the mission, vision and policies defined in the strategic – planning documents.

Multiplicative effects are expected on the economic impact, job creation capacity and economic development of the wider region.

In the coming period, issues of energy efficiency, environmental and nature protection and climate change have a significant place in the general development of the European Union. For the transport sector, these issues are of extreme importance and in the coming ten-year period, it is necessary to undertake investments that will be directed towards the inland navigation sector, which, in addition to improving connectivity, safety, cohesion, transport efficiency, will also contribute to the realisation of the goals of decarbonisation, increasing the share of sustainable energy sources and alternative fuels and climate resilience.

Investments in port infrastructure, transport and technology aspects, strengthening human resources and information and communication technologies, while removing procedural barriers, will result in the creation of a competitive, high-performance and modern port, fully integrated into the European transport network and functioning according to the principles of economic and environmental sustainability.

6 Current European context relevant to the port

6.a. Transport sector of inland navigation – strategic context

The following strategic documents refer to the inland navigation transport sector:

- **Transport Development Strategy of the Republic of Croatia (2017 – 2030)**

The Transport Development Strategy of the Republic of Croatia (2017-2030) defines goals and future measures (infrastructure, work and organization) in the transport sector related to internal and international traffic in all transport segments regardless of funding sources.

In Chapter 2.7. 'Navigability of inland waters and river transport', emphasized the need for development of logistics centers of the ports of Vukovar, Osijek, Slavonski Brod and Sisak and associated port areas in accordance with the strategy of logistics and intermodal transport. They need to be developed in logistics centers that, in addition to the usual services such as storage, loading and unloading of cargo, will provide added value within business zones.

It is emphasized that it is necessary to enable economic activities in business zones, with a special focus on cargo distribution and logistics, finishing and processing of goods, as well as industrial activities that will further encourage the economical use of port capacities.

Among the specific objectives of inland navigability and river transport, it is stated (p. 197):

- increase the competitiveness of ports in Vukovar and Osijek as the main river ports for cargo transport;
- determined according to the role of the port of Slavonski Brod, which, in addition to the Croatian part of the hinterland, also relies on the hinterland in Bosnia and Herzegovina, and on the port of Sisak, whose hinterland is the whole Central Croatia, and can be an important factor in transit traffic between North Adriatic ports and Central and Eastern Europe;
- exploit the potential of inland waterway navigation in the tourism segment;
- adapt navigability conditions to traffic needs and maintain the necessary level of navigability and improve the level of navigability on Drava from 0 to 13 km and on the Sava River;
- remove bottlenecks on waterways (Danube, Sava, Drava);
- improve operational and organisational conditions in river transport (economic sustainability).

As part of the development goals through the sectors, the port of Vukovar is listed as one of the Croatian ports that need to be developed as one of the main logistics centres along the port of Rijeka, the port of Split, the port of Ploče, the port of Osijek, the port of Slavonski Brod and the Zagreb hub.

It follows from the abovementioned that the development of the port of Vukovar is among the priority objectives in the Transport Development Strategy of River Transport, especially from the point of view of cargo transport and the Danube River.

The measures, which propose interventions related to the improvement of the infrastructure of the river transport system, highlight the development of the port of Vukovar (as a basic TEN-T port) and

the construction of the multi-purpose channel Danube – Sava. These measures are fully aligned with the objectives set.

- **Strategic Plan of the Ministry of Maritime Affairs, Transport and Infrastructure for the period 2020-2022**

The Strategic Plan for the period from 2020 to 2022 was adopted on March 26, 2019, with the vision of achieving a highly developed, efficient, safe, environmentally friendly and modern transport and communication system, fully integrated into the network of the main international transport routes, which makes the best use of the traffic and geographical position of the Republic of Croatia and satisfies the needs of cargo and passenger transport.

The mission is to create conditions and build capacities that will ensure the drafting of quality laws and other regulations, and their implementation related to the protection of the sea, maritime domain and inland waterways, ensuring the traffic connectivity of the islands with each other and with the mainland, achieve high development of electronic communications and postal services markets, organize the development of strategic infrastructure projects and investment programs of special importance for the Republic of Croatia, organize works on the construction of modern transport infrastructure, which will connect all regions and develop all types of traffic with a high degree of professionalism and security in the provision of transport services, and undertake all environmental protection measures in transport.

The objectives of the strategy are based on:

1. sustainable development of the transport system
2. the development of electronic communications and postal services
3. ensuring a high level of utilisation of European Union funds for its transport system

Under the first point of the strategic objective 'Sustainable development of the transport system', point 1.2. The 'Developed inland navigation system' highlights the importance of ensuring optimal infrastructure conditions of inland waterways and inland water ports to attract markets to increase the volume of inland navigation transport and connect it to the transport network of the European Union countries and the surrounding countries.

The development of multimodal and logistic hubs within port areas to ensure a high level of safety and environmental conditions for navigation are key processes for the sustainable development of traffic as a whole and the share of inland navigation in the total traffic flows in the Republic of Croatia. The modernisation of technical and technological conditions for passenger and cargo transshipment, the development of intelligent traffic management systems and transport processes are essential for the improvement and competitiveness of river shipping and inland water transport.

Furthermore, it is pointed out that in the next three-year period, infrastructure projects in the port areas will continue to be managed by the port authorities of Vukovar, Osijek, Slavonski Brod and Sisak in order to ensure as much as possible the preconditions for the development of port activities in the areas along the Danube, Drava and Sava River waterways.

Consequently, in order to increase the competitiveness of inland ports, the development of economic zones in port areas will continue in addition to the construction of port infrastructure, attracting concessionaires who would carry out economic activities closely related to port activities. The development of economic zones in inland water ports is particularly important because in the immediate vicinity transport by river navigation is possible, which is the most environmentally friendly form of transport, especially if transporting large quantities of cargo with relatively low energy consumption.

6.b Strategies, policies and programmes at EU and international level

The transport sector of inland navigation is covered by the following strategic documents at EU and international level:

- **Danube Strategy**

The Danube Strategy is a programme designed to foster cooperation and coordinated action to achieve the common goals of the 14 countries where the Danube River flows.

The programme includes eight EU member states, respectively Austria, Bulgaria, the Czech Republic, Hungary, Germany (Baden-Württemberg), Bavaria, Romania, Slovakia, Slovenia and Croatia. Partner countries include Bosnia and Herzegovina, Montenegro, Moldova, Serbia and Ukraine.

Four main objectives or pillars of cooperation have been identified:

1. Connecting the Danube Region: includes creating sustainable transport and energy connectivity, strengthening tourism, cultural exchange and people-to-people contacts
2. Environmental conservation in the Danube Region: includes the conservation of water resources, biodiversity, air and soil quality, and risk management
3. Building prosperity in the Danube Region: includes fostering socio-economic and human development
4. Strengthening institutional capacity and security in the Danube Region: includes strengthening institutional capacity and cooperation, and cooperation in the field of security and crime prevention

The main objectives of the Danube Strategy will be developed through eleven priority areas:

1. Strengthening mobility and inter-modality of transport (inland waterways, rail, road and air transport)
2. Encouraging the development of sustainable energy sources
3. Strengthening cultural cooperation, tourism and people-to-people contacts
4. Conservation of water quality
5. Environmental Risk Management
6. Preservation of biodiversity, landscapes and air and soil quality
7. Development of the knowledge society through research, education and information technologies
8. Strengthening the competitiveness of companies

9. Investing in people and skills
10. Strengthening institutional capacity and cooperation
11. Joint consideration of security issues and the fight against organised crime

The Republic of Croatia is coordinator in Priority area 6 - 'Conservation of biodiversity, landscape and air and soil quality' (competence of the Ministry of Environment Protection and Nature) with the German Federal Province of Bavaria and in Priority area 8 – 'Strengthening the competitiveness of entrepreneurship and development of economic clusters' (competence of the Ministry of Entrepreneurship and Crafts), together with the German Federal Province of Baden-Württemberg.

In other priority areas, the Republic of Croatia also has representatives appointed by departamental ministries, who, together with representatives of other participating countries, participate equally in deciding on issues related to a particular area of the Strategy.

The main development priorities of the Croatian Danube region are (Reconstruction and Development Strategy of the City of Vukovar 2020, p. 62):

- improving intermodal transport and effectively connecting the Danube region with the Adriatic coast
- increasing economic competitiveness through the development of entrepreneurship, modernization of agriculture and the development of special forms of tourism
- environmental protection, risk prevention and the development of renewable energy sources
- strengthening human resources

- **Danube Transnational Interreg Programme**

The Danube Transnational Programme has been in use since 2015 and is an instrument financing European Territorial Cooperation (ETC), known as Interreg. European Territorial Cooperation (ETC) represents one of the objectives of the European Cohesion Policy as a framework for contributing to the implementation of joint activities and the policy of exchange between state, regional and local actors from different member countries.

The Danube Transnational Programme is a way of implementing integration policy, encouraging countries in the Danube Region to strengthen their economic, social and territorial cooperation. In order to achieve bigger geographical integrity, the Danube Transnational Programme acts as a driver in the implementation of common challenges and specific needs in areas where transnational cooperation is expected, in order to achieve substantive results.

The Interreg Programme is closely related to the Danube Strategy and is designed to finance projects for the development and implementation of regulatory frameworks, tools and services, and pilot investments of small scale.

As part of the development of transport infrastructure, the Programme encourages the improvement of river infrastructure through the entire Danube flow, the removal of administrative barriers that impede the traffic of goods and passengers in river transport, the inclusion of river ports in multimodal

hubs, the ecological modernization of the navigable fleet and the improvement of the interoperability of sea and river waterways.

In the period from 2021 to 2027, it was conceived that the Programme is based on 4 main priorities, which are divided into 10 specific objectives, which are the basis for the implementation of the future Programme:

- Smarter Danube Region:
  - Strengthening innovation and technological transfer
  - Development of smarter specialisation skills, industrial transition and entrepreneurship

- Greener, low-carbon Danube Region:
  - Promoting renewable energy sources
  - Promoting habits in climate change and disaster management
  - Improvement of water and sediment quality
  - Protection and conservation of biodiversity in ecological corridors and eco-regions

- A more social Danube Region:
  - Affordable, more flexible and efficient labour market
  - Affordable and inclusive quality in education, training and lifelong learning
  - Socio-economic development through heritage, culture and tourism

- Improved cooperation management in the Danube Region:
  - Improving institutional capacity for territorial and macro-regional governance

- **White Paper – Roadmap to a Single European Transport Area – Towards a Competitive and Resource-efficient Transport System**

The White Papers are documents adopted by the European Commission and contain proposals for actions by the European Union in a specific area. If the Council of the European Union agrees to the White Paper, it may launch an action programme for the European Union in a specific area.

'The White Paper – Roadmap to a Single European Transport Area – Towards a Resource Efficient and Competitive Transport System' was adopted in 2011 and defines a long-term vision for the transport sector in support of the economy and passenger transport, which is projected to face constraints in the future, such as lack of fuel, growing congestion and the need to reduce CO2 and harmful gas emissions, in order to improve air quality in cities.

The plan includes 40 initiatives to build a competitive transport system to increase mobility, eliminate barriers in key areas and stimulate economic growth and employment.

The White Paper also foresees a 60% reduction in harmful gases in the atmosphere by 2050, as a contribution to the target of 80% to 95% reduction in the entire economy.

The strategy set out in the White Paper is based on:

- low CO2 emissions
- improving energy efficiency
- improving multimodal transport
- the development of new technologies that will contribute to the optimization of travel

- **Trans-European Transport Network (TEN-T) as a European Commission policy**

The Trans-European Transport Network represents the European Commission's policy towards the implementation and development of the European road network, rail network, inland waterways, maritime routes, ports, airports and rail terminals.

It is based on two main sections: the Comprehensive Network, which applies to all European regions, and the Main Network, which covers roads within the Comprehensive Network.

The objectives of the Trans-European Transport Network (TEN-T) are related to reducing inequalities, eliminating bottlenecks, establishing economic and territorial cohesion and contributing to the creation of a single European market. They aim to consolidate the passenger and cargo transport chain, in line with the existing transport chain using the latest technology.

The implementation of this includes the construction of new infrastructure, the adoption of innovative digital technology, alternative energy sources and universal standards, and the modernization and development of existing infrastructure.

- **Connecting Europe Facility (CEF)**

The European Union is implementing a CEF Programme to support the development of a high-performance, sustainable and efficient interconnected Trans-European Network in the field of transport, energy and digital services. The investments which arise from this programme focus on initiatives leading to the further integration of the single market.

Railways, other modes of transport, electricity, gas, carbon dioxide and smart grids, as well as the interconnection of infrastructure and interoperable digital services, are crucial for the quality of doing business, the integration of the economic area and social and territorial cohesion.

The benefits of the CEF Programme affect the performance of business activities, as well as the daily life of citizens of the European Union. Travel becomes easier, energy security is increased by expanding the use of renewable energy sources, and cross-border cooperation between public administration, business entities and citizens becomes simpler.

The CEF is a key instrument of the European Union to finance the implementation of the European Green Deal and to enable the decarbonisation targets for 2030 and 2050.

For the financial period 2021-2027, funding is proposed for a total value of EUR 42,3 billion, with an amount of EUR 30,6 billion under the transport area for the financing of strategic projects related to:

- continuing work on the European Transport Network, accelerating the EU's transition to connected, sustainable, inclusive and secure mobility
- decarbonisation of transport, e.g. building a European Network of alternative fuels infrastructure and favouring environmentally friendly modes of transport,
- investment in high value-added transport projects in Cohesion Policy countries, earmarked for EUR 11,3 billion
- adaptation of parts of the transport network for dual, civil-military purposes (for example, according to the technical conditions for dimensions and capacity), for which EUR 6,5 billion is planned under the European Defence Initiative

- **Directive on the Establishment of Alternative Fuels Infrastructure (AFID)**

Directive 2014/94/EU of the European Parliament and of the Council of October 22, 2014, on the establishment of alternative fuels infrastructure of October 22, 2014, was created as a result of congestion, environmental pollution and dependence on the use of oil and petroleum products.

The aim of the Directive is to stimulate the market for alternative fuel vehicles by setting minimum requirements for the construction of infrastructure for alternative fuels for electricity, natural gas (in the form of LPG and LNG) and hydrogen, in order to ensure mobility at European Union level through the use of these fuels.

Alternative fuels within the meaning of the Directive are defined as fuels or energy sources that serve as a partial substitute for fossil fuels in energy supply and that have the potential to contribute to the decarbonisation of the transport system and improve the environmental performance of the transport sector. Regarding this, we are talking about:

- Electricity,
- Hydrogen,
- Biofuels,
- Synthetic and paraffinic fuels,
- Natural gas (compressed – SPP and liquefied – LNG), and
- Liquefied petroleum gas (LPG).

The use of alternative fuels in the transport sector is expected to have many positive effects, including reducing CO2 emissions and other harmful gases, increasing cross-border traffic of citizens, creating new jobs in the production and installation of alternative fuel infrastructure across the European Union, increasing investment in materials and services for the construction and maintenance of infrastructure, and increasing the development and competitiveness of the European economy.

The Directive provides for each Member State to adopt a National Policy Framework (NPF) for the development of the market for alternative fuels in the transport sector and for the deployment of appropriate infrastructure.

In order to implement the provisions of Directive 2014/94/EU, the Decision of the Government of the Republic of Croatia of April 6, 2017, adopted the National Policy Framework for the Establishment of Infrastructure and Development of the Transport Alternative Fuels Market (OG, No. 34/17).

- **Renewable Energy Directive (RED)**

The Renewable Energy Directive is the legal framework for the development of renewable energy sources in all economic sectors of EU member states. It contains common principles and rules that apply for the purpose of removing restrictions, encouraging investment and reducing the costs of using renewable energy sources, and encouraging citizens, economic operators and other consumers to participate in the creation of clean forms of energy.

Directive 2018/2001/EU revised the original Directive 2009/28/EC in 2018, in order to encourage bigger use of renewable energy sources and to establish general rules for the production and promotion of energy from renewable sources. The aim of this revision was to raise the use of the entire share of energy from renewable sources to 20% of total gross energy consumption in 2020 and to increase it to 32% by 2030.

In July 2021, the European Commission again proposed a revision of the Directive to implement the European Green Deal package. The aim of the proposal is to harmonize the existing regulation with the goals that are going to be achieved in the context of climate change, as well as to introduce new measures to supplement the already set foundations in 2009 and 2018, in order to reduce the existing greenhouse gas emissions by 55% by 2030 and achieve the EU's climate neutrality target by 2050. This achieves the goal of increasing the share of renewable energy use in total energy to at least 40% by 2030, which represents a doubling of current levels.

The proposal seeks to increase the flexibility of the energy system, to make it more accessible to use district heating, heat pumps, home batteries and electric vehicles, in order to better express its potential. The proposal also covers increased use of hydrogen in those circumstances where the use of electricity is difficult. Also, new rules have been proposed to strengthen the sustainability criteria for the forest biomass, to ensure that this type of raw material can continue to make a significant contribution to meeting biodiversity targets.

Analyses carried out by the European Commission have identified the need for bigger emission reductions in the construction sector, which accounts for about 40% of energy consumption in the European Union (of which 80% relates to heating and cooling). In line with the above, the new revision highlights the adoption of objectives that emphasize in particular:

- Buildings – increase the share in the use of renewable energy sources to 49% by 2030
- Industry – increase the use of renewable energy sources by 1,1 percentage points per year
- Heating and cooling - the existing indicative annual increase of 1,1 percentage points becomes mandatory for all member states, with specific indicative additions at national levels
- District heating and cooling – indicative annual increase of 1 percentage point in the use of renewable energy sources and waste heat and cold (to 2,1 percentage points)

In the transport sector, the proposal includes the involvement of a 13% reduction target for greenhouse gas emissions from fuel use by 2030, compared to a new benchmark based on emissions produced by all modes of transport; with an additional 2,2% sub-target for advanced biofuels. These targets are significantly ambitious, since the current target is to reduce greenhouse gases by 14% using fuels, with an additional sub-target of 2,2% for advanced biofuels.

Among the other objectives covered by the new revision of the Renewable Energy Directive, there is also the need for:

- Increased electrification and flexibility in the energy system – a new credit mechanism in the transport sector that will encourage the use of electricity in the transport system. The proposal also includes a range of new measures to strengthen the flexibility of the European Union's energy system; e.g. facilitating the integration of renewable energy systems by providing real-time information, smart charging of electric cars
- Encouraging the use of renewable hydrogen in sectors where decarbonisation is difficult to implement – use of renewable hydrogen and its derivatives in industry and transport
- Strengthening the sustainability of bioenergy – bioenergy that provides 60% of renewable energy sources in the EU, while tightening the sustainability criteria for forest biomass.

- **Green Deal**

The European Green Deal was published in December 2019 by the European Commission. This is the initial indicative plan of key policies and measures that are updated to maximise their results for health, quality of life, resilience and competitiveness. The Green Deal is an integral part of the Commission's strategy for the implementation of the United Nations 2030 Agenda and the Sustainable Development Goals.

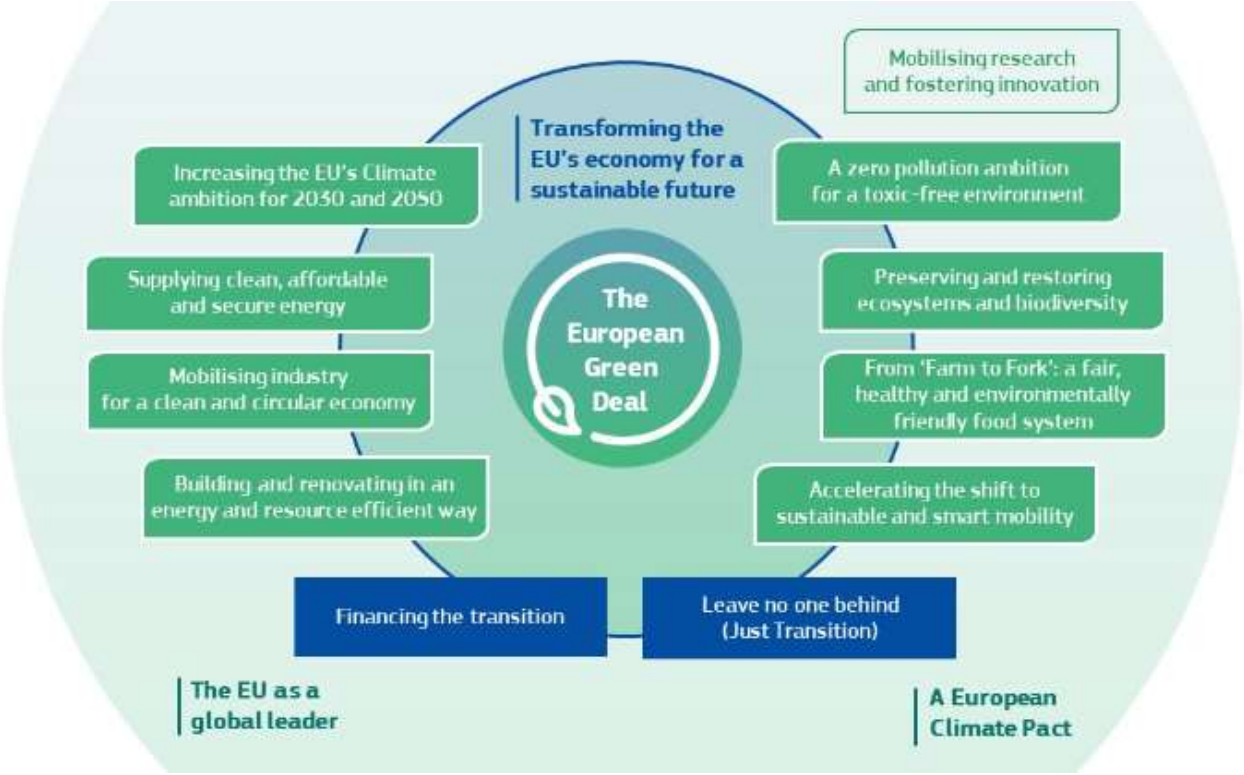
It presents a new growth strategy that seeks to transform the EU into a fair and prosperous society with a modern, resource-efficient and competitive economy that will not generate net greenhouse gas emissions in 2050 and where economic growth is not connected to resource use. To achieve this, policies for clean energy supply throughout the economy, industry, production and consumption, large infrastructures, transport, food and agriculture, construction, taxation and social benefits need to be reviewed.[1]

Policies implementing the European Green Deal include: climate policy, energy policy, industrial policy and the circular economy, construction, environmental protection and biodiversity, agriculture and tourism, mobility, social policy and research, development and innovation.[2]

[1] European Commission (2019b), p. 2-4

[2] European Commission, European Green Plan, Policy Areas [online]. Available at: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en#policy-policy-area [06/07/2022]

Figure 1. Elements of a European Green Deal



Source: https://eur-lex.europa.eu/legal-content/ENG/TXT/HTML/?uri=CELEX:52019DC0640&from=ET

The figure shows the elements and areas of action of the European Green Deal, which are interconnected and mutually supportive.

The European Green Deal builds on existing development documents in the EU. In Croatia, the situation varies from sector to sector. The main development document has not been adopted, and the relationship between the sector and the method of cooperation varies significantly depending on political will and institutional capacities.[3] European and national policies relevant for the implementation of the European Green Deal are shown in the table below.

Table 1. Overview of EU policies, Croatian policies and implementation documents relevant to the European Green Deal

Area	Policies and instruments	
	EU	Croatia
General Development Document	• European Green Deal	• National Development Strategy

[3] A. Boomisa, Who will and how to implement the European Green Plan [online]. Available at: https://irmo.hr/wp-content/uploads/2020/11/Analiza_EUROPSKI-ZELENI-PLAN.pdf [06/07/2022]

Area	Policies and instruments	
	EU	Croatia
Climate policy	• European Climate Law • Climate Change Adaptation Strategy • Climate and Energy Package • Greenhouse Gas Emissions Trading Scheme (ETS) • Decision to Share Efforts to Achieve Objectives • National Renewable Sources Targets • Regulation on Land Use, Land Conversion and Forestry	• Law on Climate Activities and Protection of the Ozone Layer (OG 127/2019) • Low-Carbon Development Strategy of the Republic of Croatia • Climate Change Adaptation Strategy in the Republic of Croatia • Action Plan for the Implementation of the Low-Carbon Development Strategy of the Republic of Croatia • Action Plan for the Implementation of the Climate Change Adaptation Strategy in the Republic of Croatia • Integrated Energy and Climate Plan of the Republic of Croatia
Energetic policy	• 'Clean energy for all Europeans' • Energy Union	• Energy Strategy • Integrated Energy and Climate Plan
Industrial policy and the circular economy	• Industrial Strategy • An EU Action Plan for the Circular Economy • EU model for separate waste collection • Strategic Battery Action Plan	• Law on Sustainable Waste Management • Waste Management Plan • Decision on the Implementation of the Waste Management Plan
Engineering	• Energy renovation of buildings	• Long-term Building Renovation Strategy
Environmental protection and biodiversity	• Action Plan to Achieve Zero Air, Water and Soil Pollution • Strategy on Chemicals for Sustainability • Biodiversity Strategy	• Nature Protection Strategy and Action Plan of the Republic of Croatia for the period from 2017 to 2025
Agriculture	• Common agricultural policy	• Agriculture 2020 Strategy • Strategy for the Development of Wood Processing and Furniture Production of the Republic of Croatia 2017-2020 • Action Plan of Implementation 2017
Mobility	• Strategy for Sustainable and Smart Mobility	• Transport Development Strategy 2017 – 2030
R&D and innovation	• Horizon 2020	• Programme for the promotion of research and development activities in the field of climate change
Horizontal themes	• Digitisation, social policy (fair transition mechanism, suppression energy poverty), fiscal policy, state aid, public procurement	

Source: https://irmo.hr/wp-content/uploads/2020/11/Analiza_EUROPSKI-ZELENI-PLAN.pdf

The adoption and implementation of key policies in Croatia is delayed in relation to the prescribed deadlines and plans. The main reasons are the lack of political will, weaknesses in the strategic planning process, insufficient institutional capacity to prepare and implement policies and investment projects, and inadequate funding.

Transport accounts for a quarter of EU greenhouse gas emissions and continues to grow. In order to achieve climate neutrality by 2050, a 90% reduction in transport emissions is needed. Road, rail, air and water transport will have to contribute to the reduction. In order to achieve sustainable transport, users must be put first, and more affordable, accessible, healthier and cleaner alternatives to current mobility habits must be more available to them.

The European Green Deal underlines the need to promote multimodal transport, which will increase the efficiency of the transport system. One of the key objectives is to decarbonise transport, with the priority being that a significant part of the 75% of land cargo transported by road today should start transporting by rail and inland waterways. The Commission plans to adopt the measures needed to better manage and increase the capacity of railways and inland waterways. One such measure is the European Parliament Resolution of September 14, 2021, entitled 'Towards Resistant Future Inland Waterway Transport in Europe' (2021/2015 (INI)), which defines the following areas:

- a change in the way cargo is transported from roads to inland waterways,
- greening of inland waterway transport,
- digitization and autonomous maritime transport,
- ports resistant to future challenges: energy and circular hubs,
- education and training, working conditions and research and innovation,
- the financial plan of the European Union; and
- passenger transport, urban mobility, urban waterway logistics and tourism.

Transport prices should reflect its impact on the environment and health. Fossil fuel subsidies should be abolished and the Commission will, in the context of the revision of the Energy Taxation Directive, carefully consider existing tax exemptions, including for aviation and maritime fuels, and how best to address any legal shortcomings. Likewise, the Commission will propose to extend European emissions trading to the maritime sector and reduce the emission allowances allocated to airlines in the framework of EU emissions trading. This will be coordinated with action at global level, in particular within the International Civil Aviation Organisation and the International Maritime Organisation. The Commission will take into account political considerations on how to achieve effective pricing of road charges in the EU.

Measures planned to be taken in relation to maritime transport include the regulation of access to the most polluting ships to ports in the EU and the obligation of berthed ships to use coast-side electricity.

The transformation towards a climate-neutral economy requires investments, and their order and amount will affect the success of the transition. It also requires coordinated action and a move away from the sectoral approach and a clear division of competences between national authorities.

The European Green Deal launches a new growth strategy for the EU. It supports the transition of the EU to a fair and prosperous society that responds to the challenges posed by climate change and environmental degradation, thus improving the quality of life of present and future generations.

- **Tentative Water Directive**

The Tentative Water Directive (2000/60/EC) is a European Union directive by which Member States have undertaken to prevent the deterioration of the status of water bodies and to achieve good qualitative and quantitative properties of freshwater areas (rivers, lakes, transitional waters, including the seacoast up to one nautical mile from the coast) by 2015. This includes, in particular, the protection of all forms of water (surface, ground, land and transitional), the renewal of ecosystems within and around those water bodies, the reduction of pollution in water bodies and the guarantee that individuals and businesses will make sustainable use of the supply.

Among the objectives of the Directive, it also points out:

- establishment of water protection targets on all waters, including surface and groundwater
- river basin-based water management
- combined approach of emission limit values and quality standards
- correct pricing
- encourage bigger citizen involvement
- rationalization of legislation

The Directive came into force in December 2000 and has contributed to increasing the level of protection of water bodies and managing flood risk to date. However, as only 40% of Europe's freshwater ecosystems are currently in good condition, the objectives of the Directive remain up-to-date and have been extended to 2027.

In accordance with the Tentative Water Directive, the Legislation places clear obligations on national authorities, which have an obligation to:

- determine individual river basins in its area, i.e. surrounding land areas that flow into the systems of particular rivers,
- determine bodies to manage these watersheds in accordance with European Union rules,
- analyse the characteristics of each river basin and set reference conditions for each type of body of water in order to qualify their status,
- analyse the impact of human activity and the economic assessment of water use,
- monitor the water status in each basin,
- register protected areas, such as those used for drinking water, which requires special attention,
- develop and implement 'river basin management plans' to prevent deterioration of surface water, to protect and improve groundwater and to preserve protected areas;
- ensure the recovery of costs for water services so that resources are used efficiently and polluters pay;

- provide public information and consultation on their river basin management plans

As the flow course of the river often crosses national borders, representatives of different countries should cooperate and undertake joint activities in order to improve water management and achieve the objectives set by the Directive. To this end, for each river basin area, a management plan should be developed and updated every six years, which will ensure that the coordination requirements are realized.

At European level, it is essential to establish a mechanism to protect general ecology, unique and valuable habitats, drinking water and bathing water. This needs to be integrated separately for each specific river basin, whereby the protection of unique and valuable habitats, drinking water and bathing water applies only to certain water surfaces, while the protection of general ecology needs to be applied to all types of water.

7 DAPhNE project: Danube region – common characteristics (SWOT, Action Plan, measures)

The DAPhNE project – Danube Ports Network aims to facilitate the balanced development of Danube ports as environmentally friendly, well accessible multimodal hubs for the region's transport system and to transform them into bustling economic centres that function as catalysts for economic growth and the creation of high-value jobs. The project was implemented by an international consortium consisting of 16 institutions and 7 associated strategic partners (public institutions, consulting companies, universities and NGOs) from 9 European countries (AT, SK, HU, CRO, RS, RO, BG, UK, MD).

The project has established a well-managed working platform that addresses the most urgent shortcomings with the help of guidelines, recommendations and concrete pilot activities based on good practices that lead to a general development strategy and action plan for Danube ports. The activities aim at improving port legislation, financing port investments (state aid schemes and public-private partnership models), port administration processes, port operations strategies as well as port infrastructure strategies and industrial development strategies. Particular attention is paid to human capacity building and ecological improvement opportunities for the port sector.

The partners involved in the project agreed on a 'joint SWOT analysis' - all the strengths, weaknesses, opportunities and threats that are in most cases common to the entire port industry on the Danube. 'Common' SWOT will serve as a basic input for the Strategy and Action Plan for the development of the Danube port.

Table 2: Joint SWOT analysis for the entire port industry in the Danube region

Strengths	Weaknesses
• Dense network of ports and transport infrastructure – ports, roads, railways in the region • Connection to maritime transport • Shipping costs and low level of emissions associated with the volume of cargo transported • Experienced and flexible port operators and logistics competence • Good level of competition • Multimodality. Most ports are trimodal • Proactive management to promote development projects and apply the principle of partnership at the level of the port community • Demand-driven development experience • Good planning of the development of inland water ports	• Low utilisation of available capacity in ports • Public economic situation • Old infrastructure and suprastructure in many ports; old handling equipment; many ports do not have container handling equipment • Needs for investments in rail and road connectivity • Lack of inventory of real development needs and plans • Lack of long-term port policies and port development strategies • Insufficient coordination between different modes of transport and lack of integrated transport systems; • Lack of Port Community System (PCS) • Business development • Intermodal traffic is not sufficiently developed • Insufficient lobbying for ports and IWT

• Availability of a wide range of shipping and cargo services • Experience in developing projects and determining measures for the development of ports • Qualified staff • Consolidated port management models (includes: port management model; use of a corporate port management model, enabling development in line with market requirements) • Membership in international and European organisations • Waterway administration established and in charge of ensuring good navigation conditions.	• Long transport duration • Too strong competition from road and rail connections to/from nearby container ports, in terms of distance, prices and regular services • Lack of means of maintenance and repair • Insufficient investment in port infrastructure and new handling technologies.
Opportunities	**Threats**
• Introduction of companies/industries to ports • Existence of available European funds for the development of transport infrastructure • Exploitation of free capacities • Modal split shift • New Industrial Clusters/Developing Clusters to strengthen competitiveness • European Union support for the development of water transport • Alternative fuels/ecological footprint philosophy • Decarbonisation strategy • Regional European policies related to the Danube and the Black Sea • 'One Belt, One Road' – new transport routes to/from the Far East • New markets (biomass, LNG, H&H, Ro-Ro, containers, etc.) • Improvement of navigation conditions (Danube waterway, CEF projects) • Taking advantage of the possibility of cooperation with the port of Constanta as an entrance port for all Danube ports • Training of port professionals, training of the workforce appropriate to each port • Research and design of modern equipment for handling in ports and for container traffic	• Problems with navigability/hydrological conditions of the Danube • Occurrence of bottlenecks on the waterway (insufficient depth) or in road/rail connections • Direct competition from rail as well as road transport • Competition between ports • Unstable market and demand for port services • Low predictability for transport demand and economic framework • Bureaucracy • Heavy industry dislocation • Industry emigration/Industrial production decline in the region • The economic situation in Eastern Europe and the global economy • Economic situation of port operators and service providers • Stronger environmental regulations for ports / Potential new cost of implementing environmental legislation, • Insufficient investment in port infrastructure and new handling technologies • Lack of labour supply • Risk of delays in the implementation of large infrastructure projects • Small market

• Modern standards and technology for transshipment in Austria and Hungary as an opportunity to transfer knowledge to other countries. • Cooperation between ports	

The joint mission of the entire port industry of the Danube region is defined by mutual agreement as follows:

Danube ports are strategically important and efficient multimodal nodes of the region's transport network that enable trade objectives, stimulate job creation, facilitate trade and sustainable economic growth, provide competitive, efficient, reliable and flawless service, while respecting the environment and diversity of port management in coastal countries.

Based on the common objective of the port industry of the Danube region to make ports attractive for business and production, ports must improve their efficiency, attractiveness for the settlement of various logistics and manufacturing industries in and near port areas, and integrate into supply chains as much as possible. In a situation where there is practically no transport of high-value goods (usually in containers) on the Danube and its tributaries, this can be a difficult task, but certainly not impossible. This, however, requires commitment, flexibility, endurance, perseverance, a lot of common work and, above all, the political will for change.

Based on the SWOT analysis elaborated at triple level (individual ports, national port industries and regional port industries), the ports of the Danube region have agreed common strategic objectives and appropriate implementing measures for the development of the regional port industry. Following the process of merging similar objectives and implementing measures, a summary of the filtered and finely aligned common strategic objectives and measures is provided in the table below.

Table 3: Summary of common objectives and development measures for Danube ports

Strategic goals	Necessary development measures
1. Connect Danube ports with new routes and new ('Belt & Road Initiative' - BRI) (SWOT Ref.: S1O9)	• Explore the possibilities of connecting Danube ports with the BRI corridors • Present the possibilities of Danube ports to relevant Chinese partners
2. Increase the competitive position in road and rail transport by attracting new markets and fostering multimodality (SWOT Ref.: W13O3O10)	• Facilitate the development of hybrid logistics zones in or along to ports
3. We will use our experience in preparing projects to improve the situation using public and EU funds (SWOT Ref: S7T10T11)	• Engaging experts to assist in the preparation of high-quality project proposals

Strategic goals	Necessary development measures
4. Use public, EU and private funds (PPPs) to rebuild infrastructure, suprastructure, equipment and connections to the hinterland and give priority to investments (SWOT Ref.: W3W4W14W15O2)	• Make a list of projects and prioritize them • Ensure the highest level of relevance, maturity and impact for priority projects to apply for EU co-financing • Influence (lobby) DG MOVE to ensure sufficient budget for priority investments in inland waterways and ports
5. Increase the level of cooperation between ports, and in particular between nearby ports (SWOT Ref.: S5O16)	• Explore business and market segments where ports can collaborate for a common interest, while competing in basic services
6. Attract industrial facilities in or near port areas (SWOT Ref.: S9O3O5)	• Create joint commissions of port authorities with spatial planning institutions
7. To turn towards specialized markets (SWOT Ref.: S11O10)	• Undertake specialized research, market research and studies (e.g. for large and heavy, so-called 'project' cargoes, LNG, biomass, vehicles, etc.) • Take advantage of the objective of the proposed CEF II 'adaptation of the TEN-T network to military mobility needs'.
8. Provide lifelong training and specialization in modern port operation and management (SWOT Ref: S12O13O14)	• Organize annual courses on various topics of the port industry
9. Proactive attitude towards 'greening' the ports (SWOT Ref.: S7S11T12)	• Regular calculation of greenhouse gas emissions in ports • Ecological certificate • Mandatory supply of coast-side electricity to vessels • LNG supply and bunkering stations for vehicles and vessels in ports • Electrification of inland port railways • Alternatively powered handling equipment
10. Focus on multimodality (by offering a wide range of road and rail services in port areas) (SWOT Ref.: S6S10T3)	• Attract road and rail operators to use ports as their hubs by encouraging them, or through attractive price schemes • Make infrastructure adjustments to facilitate intermodal operations

Strategic goals	Necessary development measures
11. Prepare mitigation measures to struggle market volatility, seasonal effects and unpredictability (SWOT Ref: S8T5T6)	• Diversify services and focus on multi-purpose terminals for non-sensitive goods • Develop the concept of 'flexible land port' • Develop the concept of 'flexible' concessions • Explore the benefits of mobile cranes instead of coast-mounted cranes
12. Use modern technologies and digitization to reduce bureaucracy and increase efficiency (SWOT Ref: S12T7)	• Use Port Community Systems • Leverage RIS-based technologies for port planning • Harmonise requirements for ship and cargo documents • Explore opportunities for IWT/Single Window systems and paperless document processing
13. Create redevelopment policies to optimize amenities and available space (SWOT Ref.: W1O3)	• Diagnose and locate overcapacities and optimize available space for different port and logistics functions • Optimize and/or modernize handling equipment
14. Create long-term port strategies using qualified experts and collaboration/networking opportunities (SWOT Ref.: W6O13O16)	• Formulate flexible strategies and ensure regular updates
15. Join forces for a common goal in the development of ports and seafaring (SWOT Ref.: W11W12O11O16)	• Create a functional and active organization for port networking
16. Optimize port development and capacity through pricing (SWOT Ref.: W1T3)	• Investigate and assess the impact of different pricing systems as tools for port and hinterland development and capacity optimization
17. Rehabilitation of port facilities (to reduce logistics costs and retain industries in or nearby ports) (SWOT Ref.: W3T8T9)	• Reconstruct sloping coasts into vertical ones • Surrender unused 'second tier' land for industrial and/or logistical use
18. Align demand and development plans and seek realistic investment opportunities (SWOT Ref.: W5T13)	• Align port planning with transport infrastructure and regional economic plans • Facilitate private participation in the financing of ports
19. Increase awareness of the importance of the port and attract new skilled labour (SWOT Ref.: W11T14)	• Ensure wider social acceptance and awareness of ports • Ensure favourable working conditions in ports
20. Enhance and maintain the treatment of ports as a public good of national strategic importance (SWOT Ref.: W13T16)	• Promote ports as strategic facilities of national transport infrastructure • Protection of the public interest and the public good in ports

8 GRENDEL project: Inputs – project results in the context of future infrastructure development

The GRENDEL project supports Danube fleet operators and their public colleagues in modernising the sector. GRENDEL deals with various aspects of fleet modernisation: [i] use of low-carbon and alternative fuels, [ii] reduction of air pollutant emissions (CO2, NOx, PM) and [iii] overall energy consumption. In addition, [iv] transport and logistics management processes are processed to ensure better integration of Danube IWT into logistics chains through new services (including River Information Services), the provision of digital data as well as dedicated tools to improve the efficiency of fleet operations.

The overall objective of the project was to improve the environmental and economic effects of the Danube fleet. This is achieved through three specific objectives:

- Know-how transfer to Danube fleet operators through intensive transnational cooperation between private and public stakeholders and targeted knowledge transfer activities to overcome the existing knowledge gap, lack of activities and lack of instruments for implementing innovative solutions
- Elaboration of innovative technical vessel concepts and improved transport and logistics management processes of fleet operators and sharing them as good practice for broad implementation in order to strengthen the competitive position of inland navigation and exploit its market potential
- Supporting the development of a favourable regulatory framework and well-designed public support measures by introducing the State Aid scheme model and innovative financial instruments to design national public support measures that will clearly respond to the needs of the sector

GRENDEL's activities seek to achieve bigger acceptance and use of inland waterway transport (IWT) as an environmentally friendly mode of transport that contributes to economic growth and a more sustainable transport system in the Danube region.

Recommendations resulting from the project:

- Challenge 1 – Environmental topics
    - Create a harmonised technical and environmental legal framework at corridor level to ensure equal conditions
    - Adapt funding opportunities to the strict requirements set by the legislator
    - Ensure the smooth integration of European legal provisions at national level
    - Adopt a widely harmonized State Aid scheme for fleet modernisation using the GRENDEL proposal on fleet management as a basis
    - It is recommended to closely monitor developments regarding the Recovery and Resilience Fund.
- Challenge 2 – Logistical aspects
    - Continuous cooperation between Danube countries involved in River Information Services (RIS)

- Continuous cooperation between relevant national authorities and logistics providers
- Promoting best national practices promoted at transnational level
- Development of central RIS solutions with regard to the corridor approach
- All Danube countries should participate in the international exchange of RIS data with particular emphasis on position data and electronic reporting.

General overview of the supported measures as proposed by GRENDEL State Aid scheme for fleet modernisation:

Priority 1 Improvement of environmental performance

1.1 Purchase (purchase or replacement) of low-emission engines

1.2 Measures to reduce the emission of air pollutants (except low-emission engines)

1.3 Measures to improve energy efficiency and optimise on-board energy management

1.4 Measures to reduce noise emissions

1.5 Measures to reduce and treat discharges to water or waste

1.6. Adaptation of the vessel to improve the energy/fuel consumption effect through improved hydrodynamics

1.7 Promoting education and training in inland navigation

Priority 2 Better integration of inland water transport into logistics chains to increase the multimodality of cargo transport

2.1. Adaptation of vessels to attract new traffic or cargo or to maintain existing traffic or cargo

2.2. Construction or procurement of vessels to attract new traffic or cargo

2.3. Construction or adaptation of vessels serving maritime ports

2.4. Procurement of instruments and software to help navigate or operate the vessel/fleet

Priority 3 Modernisation of vessels leading to increased safety of inland water transport

3.1. Measures for the adaptation of equipment used for manoeuvring internal vessels and associated indicating and monitoring devices

3.2. Measures relating to vessel safety equipment and fire protection systems

3.3. Measures relating to workplace safety and crew safety

3.4 Measures relating to other safety-related issues

Priority 4 Renewal of actors in the sector

4.1 Procurement of the first vessel for new inland water companies and new participants

Priority 5. Promote the emergence of innovative solutions

5.1 Developing an innovative solution and experimenting with innovation

9 Current position of the port within its national/regional environment

The port of Vukovar is the only river port in Croatia located on the right bank of the Danube River, which with its class of navigability VIc in this part enables the availability of navigation 365 days a year. The port has the technical characteristics of an E port under the European Agreement on Main Inland Waterways of International Importance (AGN; OG 16/98), the status of an international port and is of economic importance for the Republic of Croatia and has its personal protection.

It is located in the area of Vukovar-Srijem County, in the far east of the Republic of Croatia. From this fact arises its peripheral position in relation to the regions of the center in Croatia. Two important traffic routes lead from the central regions to the eastern part of Croatia, Posavina and Podravina, which do not allow optimal connection and functional relations, since due to historical development they are formed in a way that they are directed towards significant foreign centers.

Vukovar is 294 km away from the administrative center of the country, the city of Zagreb, and from significant cities in the vicinity, Osijek and Vinkovci, 39 km i.e. 22 km. Vukovar is 50 km away from Županja, where the most accessible road junction is directly connected to international corridors.

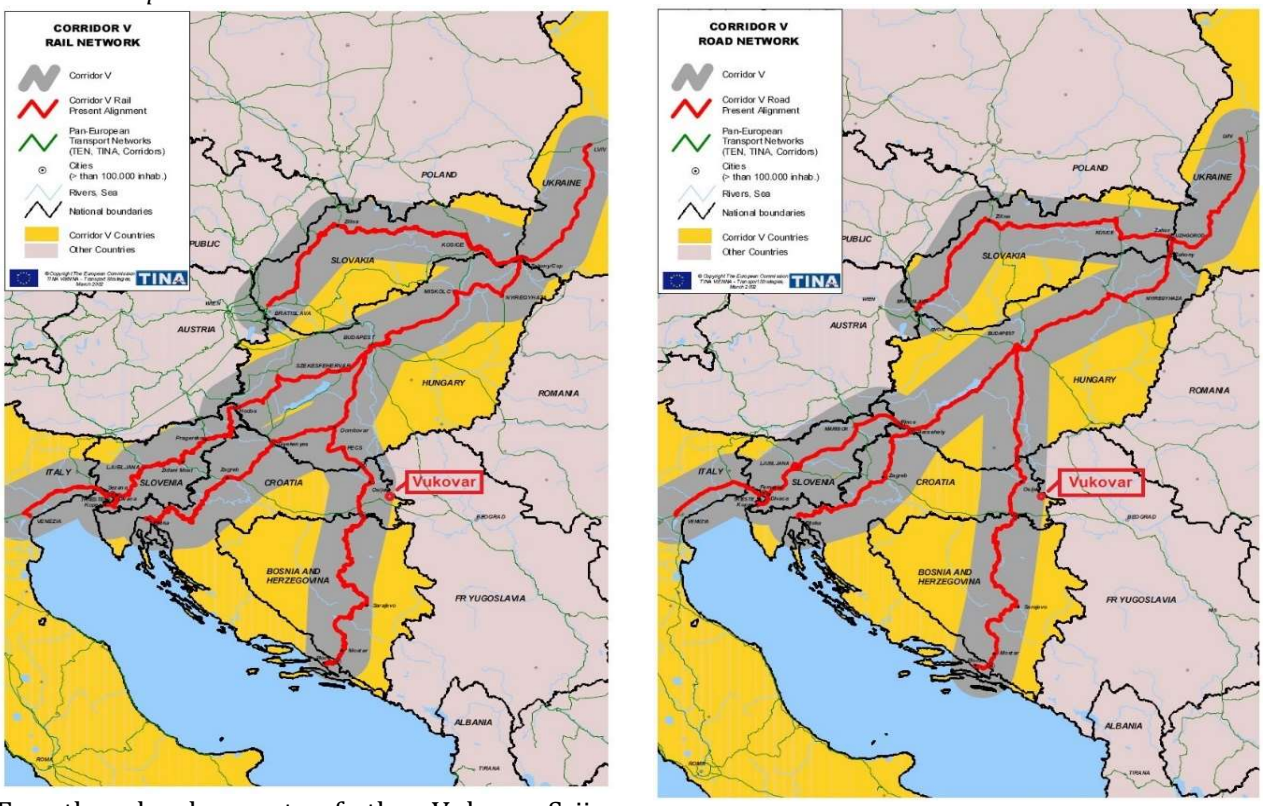
Nevertheless, the County is strategically important in the transport system of Croatia and its potential as a transport and logistics centre is unquestionable. This arises primarily from the fact that its center is Vukovar, the most important and largest Croatian river port, located on the Danube, which significantly influenced the overall development of the city of Vukovar and the entire County.

Two pan-European transport corridors, VII and X, pass through Vukovar-Srijem County. Corridor X, which connects the cities of Salzburg – Ljubljana – Zagreb – Slavonski Brod – Belgrade – Niš – Skopje – Veles – Thessaloniki and is significant in the context of Croatia as a whole, passes only through the peripheral part of the Vukovar-Srijem County (it bypasses Vukovar and Vinkovci, and passes in the immediate vicinity of Županja), but the most important connection is connection between the County and the rest of Croatia.

Pan-European Corridor X is the most equipped transport corridor in Croatia that integrates road, rail, pipeline and river transport. It was particularly stimulated during the time of the former Yugoslavia, when it connected the two largest cities of the former state. Today, the entire length of this corridor in Croatia has been built as a modern highway (from the Bregana border crossing with Slovenia to the Bajakovo border crossing with Serbia). Also, this corridor is equipped with the most modern railway line in Croatia, which is electrified, mostly two-track, and in some parts allows very high speeds (up to 160 km/h), while there are parts that have yet to be modernized (Dugo Selo–Novska).

The route of corridor X is also followed by the Sava waterway, which is neglected in a significant part and does not meet the technical criteria for the navigation of modern Danube ships.

Figure 2: Corridor V – railway (left) and road (right)
Source: www.prometna-zona.hr



For the development of the Vukovar-Srijem County, and especially the area of the city of Vukovar, the pan-European transport corridor VII is of particular importance, which refers to the Danube waterway, since it is the only pan-European corridor that passes through the 'center' of the Vukovar-Srijem County. The Danube is the most important Croatian waterway and is navigable along the entire length of Croatia and according to the European Agreement on Main Inland Waterways of International Importance (AGN) classified as class VIc. International, regional and local traffic is taking place along the Danube.

Since the smallest investments are needed in the development of this transport corridor, it is also the most attractive for attracting investments. The corridor gained further importance after the completion of the Rhine – Main – Danube channel, which united the two largest European navigation systems, thus connecting the Black Sea with the North Sea (Atlantic Ocean).

In accordance with the Development Strategy of the Vukovar-Srijem County for the period up to 2020, strategic projects important for the development of the port of Vukovar that are yet to be realized are the reconstruction and extraordinary maintenance of certain sections of state roads and the construction of the bypass of the cities of Vinkovci and Vukovar, and in terms of railway traffic reconstruction and electrification of the Vinkovci-Vukovar railway line and reconstruction of the Vinkovci station (revitalization of the former cargo station). In addition, the construction of the LDC (logistics-distribution center) Vinkovci-Vukovar and the construction of the Cargo center Vinkovci-Vukovar is planned, and the priorities in river transport are the implementation of the strategic project

of the Republic of Croatia 'Multipurpose channel Danube-Sava', a special-purpose port, industrial ports with economic and production facilities, modernization and construction of additional capacities of the port of Vukovar in the existing port area and terminals of liquid and bulk cargoes, etc. for the oil and chemical industry.

The port of Vukovar is in the central part of all strategic plans of the Republic of Croatia aimed at encouraging the development of Eastern Slavonia.

Although the Sava and Drava rivers are navigable, due to lack of maintenance waterways and natural characteristics and the influence of water levels, they are not in navigable function for most of the year, and significant ports on the Sava River – Slavonski Brod and Sisak, are mostly used for transport of petroleum products and in this case do not represent a significant competition to the port of Vukovar.

Quality transport infrastructure and transport connectivity is a prerequisite for the development of modern logistics. While the road corridor is in very good condition, the railway needs further improvement in order to achieve quality at the level of European standards. One of the primary tasks is to restore container transport on the main corridors, which should be monitored and the construction of a network of transshipment terminals.

Stronger integration of railways and the use of the Danube for the transport of goods, i.e. intermodal forms of transport, in combination should encourage local development.

In conclusion, the position along the international waterway, the Danube River, makes Vukovar a significant transport hub of the main routes, and the largest Croatian river port included in the international intermodal logistics chain connecting Central and South-Eastern Europe and the Black Sea, and with the potential of a significant port included in the same chain on the Adriatic-Danube route. Despite the necessary investments in these chains, the port of Vukovar already represents a big development potential essential for the development of the entire region.

10 Port description

10.a History/development/current situation/environment

The port of Vukovar was founded in 1960 by the national shipowner Danube Lloyd Sisak.

The port of Vukovar is located at 1.335 km downstream of the Danube River, on the right bank of the coast. It extends in the east-west direction in the length of approximately 850 m and the width of 45 m. Its activity is closely related to the transshipment of goods in export, import and transit. The favorable position of the port in relation to the Danube River nut enables normal operation throughout the year regardless of the water level of the river, in such a way that even at the lowest water level of the Danube port can be normally operated.

Due to its position, as the only port in Croatia located on the Danube River, and the natural gravity of a large industrial basin in Northern Bosnia, the port of Vukovar has become one of the larger Central European ports. During the 70s and 80s of the XX century, cargo transshipment from wagons to ships and vice versa, on average, ranged between 1.000.000 and 1.300.000 tons of various goods per year, which in that period ranked the port of Vukovar among the largest river ports of the former Yugoslavia. The goods mainly came from Eastern European countries (Russia, Ukraine and Romania), mainly for the needs of Lukavac coking plant and Zenica ironworks.

For coking purposes, coal was mainly imported, while iron goods (billets, sheets, and concrete iron) were exported.

Bauxite extracted from bauxite mines in Bosanska Krupa and Vlasenica accounted for a significant share of export. For many years in the port of Vukovar, transshipment of iron ore (pyrite) was carried out, which came from Brazil by combined transport for Austrian steel mills in Linz. At that time, the Port employed about 120 workers, so the average annual transshipment per worker was from 8.000 to 10.000 tons, i.e. from 200.000 to 250.000 tons per crane.

During the Homeland War (from 1991 to 1995) the infrastructure and suprastructure of the port was completely destroyed, and the entire equipment was alienated. For this reason, the operation of the port was disabled during this period.

In the process of peaceful reintegration, the process of rebuilding the capacity of the port of Vukovar was launched in 1997. In the following years, the Government of the Republic of Croatia financed various projects for the purpose of equipment procurement and reconstruction of existing capacities, the value of which is estimated at approximately EUR 5.5 million.

The closed storage area of 3.000 m^2 was repaired, the capacity of which has been shown to be insufficient in the course of the previous work, as there is a significant demand for the use of storage services.

On this occasion, a mobile crane with a load capacity of 63 tons was purchased, for transshipment of containers and heavy cargoes, and other related equipment (diesel locomotive, ship, forklifts, rakes, C hooks).

Regarding this, it is also necessary to highlight the contribution of the Government of the Kingdom of Belgium, which donated two used cranes, the value of which is estimated at about EUR 650.000.

A new vertical coast was opened in the length of 55 m, which enabled the port to accept ships for transshipment of heavy cargoes and containers at the lowest water level. Repairs of infrastructure facilities were carried out, such as repair of operating surfaces, industrial tracks (about 3 km in length) and backup power supply to the substation with electric power cable.

Again, part of the donation of the Government of the Kingdom of Belgium and part of it from the state budget of the Republic of Croatia, in 2007, a portal crane with a capacity of 25 tons was purchased.

The port of Vukovar is the only river port where transshipment of general and bulk cargo is carried out. Its operations are conducted through the company Port of Vukovar Ltd., which is 100% owned by the state.

The company has about 70 employees, and additionally employs seasonal workers if necessary. Since the port of Vukovar was a preferential port of the northern industrial parts of Bosnia and Herzegovina, which also suffered seriously in the war, the traffic of large quantities of coal, coke and steel, which in the pre-war period brought up to a million tons of transshipped tons, is missing.

It is also necessary to highlight the corresponding effect of the long-standing recession on the operations of the Port in the last decade, the emergence of other operators, as well as other sources of raw materials. The quantities of transshipment of traditional bulk cargoes (coal, cereals and iron ore) have fallen, but there has been a noticeable recovery recently, with a particular emphasis on coal transshipment.

The share of general cargoes in the total transshipment has significantly increased and today in the port of Vukovar there is a bigger emphasis on transshipment of general cargo.

Current economic indicators suggest that in the near future traffic in the port will increase, although in absolute terms it has not yet reached the levels from the period before the Homeland War.

The total Port area is 26 hectares, while the length of the operational coast, controlled by the company Port of Vukovar Ltd., consists of four berths in the area of 450 m. The purpose of the multi-purpose terminal is the transshipment of cargo for bulk, palletized, bulk cargo, containers and special cargoes. The terminal extends over a total area of 3,8 hectares.

In the Port area there are three operational railway tracks for handling the ship-coast and loading, i.e. unloading, general and bulk cargo with a total length of about 1.630 m. The port's internal road system consists of a main port road, a weather-protected material handling terminal ring road and a container terminal economic road, which provides access to the public road system for each terminal or facility. The port also has a truck parking lot.

The transshipment port of the Company Vupik plus Ltd. for loading and unloading of cereals and oilseeds in Vukovar consists of a river mooring 205 m long, equipped for the reception of river ships and barges up to 3.000 tons of load capacity and 120 m long. Loading and unloading of ships and barges

is possible 24 hours a day. The terminal is fully connected to the silo and loading and unloading capacities on the railway, as well as to truck loading and unloading capacities. The purpose of the terminal is the loading, unloading, transshipment, conveyance and storage of bulk cargo (grains and oilseeds).

Figure 3: Port of Vukovar

Source: www.marinetraffic.com

The terminal of the company Nautica Vukovar Ltd. intended for the supply of fuel and lubricant to vessels, transshipment and storage of petroleum products, port-agency and forwarding operations and the reception of bilge and wastewater has 100 m of operational coastline and one berth, while the type of coastline is oblique + pontoon. The target market of Nautica Vukovar, as a diesel fuel supply station, is the complete Danube area from Slovakia to Romania.

The area that was under the concession of the Company Lukoil Croatia Ltd. has a terminal for transshipment, storage and transport of petroleum products, an operational coastline of 75 m with one connection and a type of coastline oblique coastline + pontoon.

The company Port of Vukovar Ltd. is equipped with one mobile crane – Gottwald HMK 170E with a load capacity of 63 tons and one portal crane - Ganz DAF350 with a load capacity of 25 tons, thus ensuring the transshipment capacity for transshipment of bulk and general cargo and 20- and 40-foot containers. It also has two smaller port cranes of 5/6 tons (GANZ), forklifts with a capacity of 2 to 20 tons (a total of 8 forklifts), two loaders, a diesel locomotive and a boat-pusher of 300 hp.

Figure 4: Cranes in the port of Vukovar

In this area there are also two used portal cranes with a load capacity of 5/6 tons, produced in 1977 and 1987, and a crane Mannesman Dematic HMK 170E (Gottwald), with a capacity of 63 tons. The last one has the special feature that, in addition to the possibility of transshipment of heavy cargoes, it can also transship general and bulk cargoes, as well as all types of containers.

Depending on the type of cargo, the current capacities allow the transshipment of goods from 1.200.000 – 1.500.000 tons per year.

In the previous period, repairs of infrastructure facilities were carried out, such as repairs of operating areas, industrial tracks in the length of approximately 3 km and the backup power supply to the substation with electric power cable, and by opening a new vertical coast in the length of 55 m, it was possible for the Port to receive heavy cargoes and containers at the lowest water level.

The company Vupik plus Ltd. has a static transshipment tower with a mechanical lift and conveyors, with a capacity of 200 t/h (wheat 0.75 t/m^3) and an automatic system for moving vessels, and holds certificates ISO 9001, ISO 14001, HACCAP and GlobalGap. The company Vupik plus Ltd. has two own industrial tracks with a total length of 620 m and a truck parking lot with a capacity of 50 parking spaces.

In this area there is also a state-of-the-art direct dryer LAW with aspiration and recirculation of hot air, with a capacity of 30 t/h, which uses gas as an energy source. The installation of this dryer has achieved numerous savings, with special attention to environmental protection and energy savings.

Considering that the investment in the port of the Company Vupik plus Ltd. was realized in 2012 and amounted to HRK 530 million, it is a very modern building.

The maximum annual capacity allows for the annual transshipment of goods up to 300.000 tonnes, while the maximum storage capacity is 480.000 tonnes.

Nautica Vukovar Ltd. has a floating facility PO-9-VK with a length of 76,50 m and a fuel tank capacity of 3.047 m^3, and a floating facility PO-1-VK with a length of 82,40 m and a fuel tank capacity of 1.334 m^3. Among other equipment, the company has pumps, measuring devices, a car scale and its own industrial track with a useful length of 340 m. The maximum annual capacity is 100.000 tonnes.

The terminal of Lukoil Croatia Ltd. has a floating facility with a length of 75 m and 4 land fuel tanks R-1 V=3.000 m^3, R-2 V=1.000 m^3, R-2 V=2.000 m^3 and R-2 V=2.000 m^3. Among other equipment, the

company has pumps and measuring devices and truck parking with a capacity of 10 parking places and its own industrial track 240 m long.

The maximum annual capacity is 100.000 m^3, while the maximum storage capacity is 8.000 m^3.

The Danube oil terminal is one of the most modern fuel terminals in Europe and one of the most modern in Croatia.

A significant problem for the development of the port is the lack of space for further development within the existing area of the port, both covered and open storage areas, and the landscaped operational coast.

Vukovar-Srijem County, as the nearest hinterland of the port of Vukovar, occupies a significant part of the area of Slavonia and Baranja; geographical regions located in the easternmost part of Croatia. The county borders two states, the Republic of Serbia in the east and Bosnia and Herzegovina in the south, from which arises its important geostrategic position in a transversal direction in the east-west and north-south direction. This area represents the intersection of very well developed road routes, underutilized and outdated railways and river traffic that opens to the east - European markets.

Vukovar-Srijem County is important in agricultural production and forestry, and its position makes it favourable for the development of logistics and transport services.

The port of Vukovar is based on the transshipment and storage of general and bulk cargo, which is primarily related to the transshipment of coal, fertilizers, iron and scrap. Business pressure is caused by insufficient cargo, as a result of the poorly developed economy and fluctuations in the prices of goods and services on the domestic and foreign markets.

In the last 5 years, the domestic market for the port of Vukovar accounts for 68% of the total transshipment of the company, and the main clients are domestic companies, especially from the central part of Croatia, which is more determined by market than geographical reasons.

Although the port of Vukovar has the possibility of loading containers and the market is present, the traffic of these containers is not significant due to the inability to store a large number of containers, and low demand and high transport prices. The company Port of Vukovar Ltd. does not transship cargo in liquid form, since there is no installed equipment for such jobs, but for the same there is an infrastructure in the concession area where the owner of the equipment is Lukoil Croatia Ltd.

In the grain and oilseed markets, concessionaires in the port of Vukovar, Port of Vukovar Ltd. and Vupik plus Ltd. work in competition with each other, whereby Vupik plus Ltd. has an advantage in the fact that it owns a silo, while Port of Vukovar Ltd. has the possibility of direct manipulation from railway wagons or ships into trucks and vice versa. In doing so, it should be noted that they do not own their own silo, nor the floor warehouse, which affects the departure of a larger load of grains and oilseeds towards the seaports.

From a regional point of view, the competitors of the port of Vukovar are present on the domestic and foreign markets. The largest domestic competitor of the port of Vukovar is the port of Osijek (company

Tranzit Ltd., part of the Nexe Group), located on the Drava River and oriented towards providing services to the parent company Nexe (import of gravel, coal and slag used in the production of cement, the basic product of the group). Only occasionally companies from the Nexe group choose the port of Vukovar.

Among other competitors, port of Brčko in BA also stands out. This port is located on the Sava River and is mostly used by entities whose goods are intended for the BA market or exported from it in order to reduce transport costs. It should be noted, however, that due to the natural conditions for transshipment, the port of Brčko usually operates only half a year. The estimate of Port of Vukovar Ltd. shows that in 2017, about 80.000 tons of cargo were transshipped, which was originally intended for the port of Brčko, and which was not realized due to the low water level. This cargo accounts for about 34% of the total traffic of the port of Vukovar.

Among the areas gravitating towards the port of Vukovar, Eastern Slavonia, Central Croatia, the northern part of BA, as well as interested industries from other areas that import and export products from Eastern European countries should certainly be highlighted.

Among the main activities in the nearest hinterland of the port, it is possible to highlight the food and beverage industry, wood processing, metal processing, the construction materials industry and the construction industry, as well as the textile and leather industry, for the domestic and international market.

According to the revenue criterion in 2021 for companies from the agriculture and production sector, the largest company is Žito Ltd. Osijek with HRK 2,3 billion in turnover and 565 employees. The activity of the Company is closely related to agriculture, silo storage, industrial production, livestock breeding, energy production and trade. Within the Group itself there are several other important entities, such as Čepin Plc. Oil Factory, Osijek Sugar Factory and Novi agrar Ltd.

Important business entities of interest for the port of Vukovar are the Company Belje Plc. (agriculture), other companies from the Fortenova group (Vupik plus Ltd., PIK Vinkovci plus Ltd. etc.), the company DS Smith Belišće Croatia Ltd. (packaging production), Harburg-Freudenberger Belišće Ltd. (production of components and production of plants for the rubber and eatable oil industry), Đuro Đaković Group Plc. Slavonski Brod (mechanical group for the production of wagons, trams, special vehicles, combat vehicles, agricultural machinery, bridges, industrial plants, auto parts), Sladorana Ltd. Županja (sugar production), Spačva Plc. Vinkovci (wood industry), Slavonia – malt Ltd. Nova Gradiška (malt production), Plamen Ltd. Požega (production of cast-iron products), Decospan Mato furnir Ltd. Oprisavci (production of veneers), ITS - RB Ltd. Križevci (production of rack structures), Starco Beli Manastir Ltd. (production of bearings, conveyors and portable and propulsion elements), Lipik glas Ltd. (production of glass), Osatina group Ltd. Đakovo (arable production, production of fruit, vegetables, milk, meat and animal feed, purchase and sale of mercantile goods, wholesale and retail sale of seed goods, fertilizers and plant protection products, fattening of pigs and bulls and production of electricity from bio-gases), Saint Jean Industries Ltd. Slavonski Brod (aluminium parts predominantly for the automotive industry) and many others.

It follows from the above that the most likely users of the services of the port of Vukovar are business entities closely related to agricultural production and related industries.

In addition to these companies, there are also important producers of mineral fertilizers such as the Petrokemija Plc. Company from Kutina, the Končar Electrical Industry Plc. Company from Zagreb, whose products are often distributed through the port of Vukovar and traders of secondary raw materials, mostly from the city of Zagreb, from which it can be concluded that interest in the services of the port of Vukovar does not arise only from the nearest regional area.

10.b Port organization and activities, owners, (key) stakeholders

The performance of port activities in the area of the port of Vukovar takes place through the concession award system by the Public Institution Port Authority Vukovar. The following shows the organization and activities of the Port Authority Vukovar and the concession holder in the area of the port of Vukovar.

- **Port Authority Vukovar**

Public Institution Port Authority Vukovar is a non-profit organization founded in 2001 by the Republic of Croatia, then Ministry of Maritime Affairs, Transport and Communications.

The Port Authority Vukovar, as well as other port authorities in Croatia, is obliged to ensure the viability of operations and financial stability taking into account the economic criteria of valuation of the port services market. It is also obliged to ensure equal conditions of use of services to all vessels and all persons without discrimination, within the limits of available capacities.

The bodies of the Port Authority shall be composed of the Director, as well as the Head of Operations, and the Governing Council, composed of the President, the Deputy President and three members.

The activities of the Port Authority are:

- organization and supervision of berthing and manoeuvring of vessels in the port,
- control of port traffic, entry and exit of means of transport and cargo
- maintenance of joint port facilities in the port area
- maintaining order in the port, a high degree of safety and environmental protection in the port
- construction and modernization of port facilities on behalf of the Republic of Croatia
- management of real estate in the port area in which the port authority has the right to construct
- management of the free zone in the port area established by the decision of the Government of the Republic of Croatia in accordance with the regulations governing free zones
- performing professional tasks related to the granting of the Approvals
- supervision of the operations of port operators and port users performing port activities, in accordance with the obligations assumed
- marketing and promotion of the port in the transport market

- ensuring the provision of services of general interest or for which there is no economic interest of other economic operators
- preparation of proposals for planning documents for the development of the port system on inland waters
- technical assistance to local and regional self-government bodies in the field of port and pier development
- other business as determined by law

The Port Authority Vukovar performs its activities in the port areas located on the Danube River waterway from the border of the Republic of Hungary km 1.433,1 to the border with the Republic of Serbia – km 1.295,5; in the port areas on the waterways of the Vukovar-Srijem County (except for the area of the city of Županja and the areas of the municipalities of Babina Greda, Gradište, Bošnjaci, Drenovci, Gunja and Vrbanja) and in the areas on the waterway of the municipalities of Draž, Erdut from Osijek-Baranja County.

Concessionaires in the area of the port of Vukovar

This section analyses the operations and activities of companies with which a concession contract has been concluded for the performance of port activities in the port of Vukovar area.

- **Port of Vukovar Ltd.**

Port of Vukovar Ltd. is a limited liability company with its registered office in Vukovar, Dunavski prilaz 8. It was founded on January 1, 1960, by a separation from the national shipping company Danube Lloyd from Sisak. Since that time, the Company has changed its owner and legal form several times, and since April 2002 it has been operating as an independent 100% state-owned Company. The Company is managed by Marijan Kuprešak, as director and sole member of the Management Board. In 2020, The company had a share capital of HRK 35.716.200,00 and employed 65 people on average.

The Company is registered to perform business in the following activities:

- Purchase and sale of goods, except weapons and munition, medicines and poisons
- Commercial mediation at domestic and foreign markets
- Water transport
- Mooring of boats, yachts, fishing, sports and other boats and craft
- Loading and unloading of goods
- Storage and transport of goods and other materials
- Passenger embarkation and disembarkation
- Towing of ships
- International transport agency activities (international shipping, warehousing, port services and agency services in transport, etc.)
- Maintenance and collection of car parks owned by the company

The concession for performing port activities granted to the Company Port of Vukovar Ltd., which is currently in force, was concluded on March 10, 2006, and expires on March 31, 2026. The fee is calculated on a quarterly basis and consists of a permanent part which amounts to EUR 60.887, while the variable part amounts to 0,5% of the revenues generated from the performance of port activity.

The awarded concession refers to the performance of the following activities:

- Loading, unloading and transshipment of cargo, storage and conveyance of cargo at the existing general cargo terminal
- Loading, unloading and transshipment of cargo, storage and conveyance of cargo at the multi-purpose terminal
- Loading, unloading and transshipment of cargo, storage and conveyance of cargo at the bulk terminal
- Loading, unloading and transshipment of cargo, storage and conveyance of cargo at the terminal for palletized and bulk cargo
- Parking of vehicles in the port area
- Approval for port-agency operations

According to the recapitulation from 2019, the Company Port of Vukovar Ltd. has transhipped 356.986 tons of various types of goods, which represents an increase of 4,54% compared to the transshipment in 2018. In the structure of the total quantity of goods transshipped, artificial fertiliser (share of 32,4%), coal (share of 24,8%) and iron and scrap products (share of 23,2%) are the most prevalent.

- **Nautica Vukovar Ltd.**

Nautica Vukovar Ltd. is a company with its registered office in Vukovar, Priljevo 14. It was founded on March 2, 1999, and is 100% owned by the Company DJSM Holding Limited, based in Cyprus. The Company is managed by Ivan Leko, as Director and sole member of the Management Board. In 2020, The company had a share capital of HRK 26.000,00 and employed 5 people on average.

The Company is registered to perform business in the following activities:

- Supply of ships
- Port-agency affairs
- Forwarding operations
- Purchase and sale of goods, except weapons and munition, medicines and poisons
- Commercial mediation at domestic and foreign markets
- Inland waterway transport
- Transport by international waterways
- Cargo transshipment and storage
- Retail sale of petroleum products
- Wholesale of petroleum products
- Storage of oil and oil derivatives
- Trading, brokerage and representation in the market of oil and petroleum products

The concession for performing port activities granted to the Company Nautica Vukovar Ltd., which is currently in force, was concluded on May 23, 2005, and expires on June 30, 2017 – i.e. until the award of a new concession. The fee is calculated on a quarterly basis, and consists of a permanent part which amounts to EUR 9.375,00, while the variable part amounts to 0,3% of the revenues generated from the performance of port activity.

The awarded concession refers to the performance of the following activities:

- Supply of ships with diesel fuel and lubricant at the ship supply terminal
- Transshipment and storage of diesel fuel and lubricants at the ship supply terminal
- Port-agency and forwarding operations throughout the port area

In the last years, the concessionaire Nautica Vukovar Ltd. did not perform port activities, although Vukovar regularly submits to the Port Authority an annual plan for the intended transshipment of goods.

- **Vupik plus Ltd.**

The Vupik company, based in Vukovar, has been engaged in agricultural production for more than 70 years. The beginnings of Vupik date back to 1945, when the Federal Agricultural Property of Vukovar was founded, with the aim of performing agricultural production in the area of the city of Vukovar and surrounding places. Throughout its history, the organization has expanded its business and changed its organizational form in order to operate under the name of Vupik since 1982. Since 1994, Vupik has been operating as a joint stock company, and since 2010 it has become part of the Agrokor Group. In 2019, the economic unit was transferred to Fortenova Group Plc., i.e. from Vupik Plc. to Vupik plus Ltd. On the date 31/12/2020 the company had a share capital in the amount of HRK 20.000,00 and employed 451 employees.

The operations of the Company Vupik plus Ltd. are based on five production units:

- farming and vegetable farming
- pig farming
- beef farming
- wineculture and winemaking
- tourism
- transshipment port

The company is managed by Goran Miličević, in his role as President of the Management Board, and Ivan Boban, as a member of the Management Board.

The concession for performing port activities awarded, which is currently in force, was awarded to Vupik Plc. by concluding the Contract on August 16, 2007. The expiry of the Agreement is scheduled for August 31, 2017 – i.e. until the award of a new concession. The permanent part of the concession fee amounts to EUR 5.000,00, while the variable part amounts to 0,5% of revenues generated by the port activity.

The awarded concession refers to the performance of the following activities:

- Loading, unloading and transshipment of bulk cargo (cereals and oilseeds) at a specialized terminal for cereals and oilseeds
- Storage and conveyance of bulk cargo (cereals and oilseeds) at a specialised terminal for cereals and oilseeds

According to the recapitulation from 2019, the company Vupik plus Ltd. transshipped 54.199 tons of various types of cereals and oilseeds, which represents 36% of the planned transshipment in 2019 and a 10% drop in relation to the transshipment in 2018. In the structure of the total quantity of transshipped cargo, the largest share is occupied by oilseeds (65,7%), soybeans (24,2%), maize (6,5%) and wheat (3,6%).

- **Komunalac Vukovar Ltd.**

The company Komunalac Ltd. was founded in 1954 with the aim of providing utilities to the inhabitants of Vukovar and the surrounding areas. The registered office of the Company is located at Sajmište 174, Vukovar.

Komunalac Ltd. operates with a share capital of HRK 8.036.900 and employs 150 persons. The Company is 100% owned by the City of Vukovar and managed by Igor Štrangarević, as director and sole member of the Management Board.

Among the main activities that represent the subject of the Company's operations, it is possible to point out:

- Maintenance of cleanliness
- Human waste disposal
- Maintenance of public areas
- Retail markets
- Management and maintenance of public city parking space
- Parking service charge
- Realocation of illegally parked vehicles
- Management of city cemeteries and Memorial Cemetery of Homeland War Victims

The contract on the use of the port of Vukovar with the Company Komunalac Ltd. refers to the temporary performance of port activities. The contract was concluded on February 1, 2017, with an expiry date of January 30, 2018. The permanent part of the usage fee is HRK 2.500,00 per month, while the variable part is calculated quarterly for the extracted sand in the amount of HRK 1/t.

Based on the the agreement on the use of the port, the company Komunalac Ltd. landed 72.774 tons of sand in the port area of the port of Vukovar in 2019.

Other stakeholders of importance for the business and development of the port of Vukovar

Other stakeholders that are closely related to the operations and development of the port of Vukovar are shown below.

- **City of Vukovar**

In the self-governing scope, the City performs tasks of local importance that directly exercise the rights of citizens, which are not assigned to state bodies by the Constitution or law, in particular tasks related to:

- Organization of settlements and housing,
- Physical and urban planning,
- Communal management
- Childcare,
- Social welfare
- Primary health protection
- Upbringing and primary education,
- Culture, physical education and sport,
- Consumer protection
- Protection and advancement of the environment,
- Firefighting and civil guard
- Traffic in its territory; and
- Other activities in accordance with special laws.

The City is the leader of local development and an indispensable stakeholder of each Project in the City area. The City sets strategic guidelines for development, if one of the most important guidelines is the concept of encouraging sustainable development, which is based on economic development, increasing living standards and preserving natural, cultural and traditional heritage. Such a development system allows defining development needs, priorities and developing ideas and projects.

- **Vukovar-Srijem County**

Vukovar-Srijem County adopts strategies and development measures at the county level. These strategies set out specific objectives and a series of measures and actions to be taken to achieve them, taking into account the specificities of the county. Strategies at the county level are aligned with the strategies of the Republic of Croatia.

- **Ministry of Maritime Affairs, Transport and Infrastructure**

The Ministry proposes a legislative framework and development strategy at the national level. The Ministry is responsible for the publication of the Call for Co-financing and for the evaluation of project proposals through the grant procedure.

10.c Management model

In accordance with the Law on Navigation and Ports of Inland Waterways (Article 169, OG 144/2021) (hereinafter referred to as the Law), the Port Authority Vukovar is defined as a public institution that

manages an area classified as a public port and real estate owned by the Republic of Croatia, located in that area.

Port activities in public ports are carried out on the basis of a concession, i.e. (Article 176):

- service concessions, for the provision of port services
- concessions for the economic use of general or other income, for the performance of port activities
- concessions for works, for the construction of port facilities used for performing port activities

The concessions are awarded by the Port Authority, with the consent of the competent Ministry or the Government of the Republic of Croatia, in the public tender procedure in accordance with the special regulations governing the concession and public procurement and the Rulebook governing the criteria for determining the amount of port fees.

The concession award procedure is initiated on the basis of a mid-term (three-year) concession award plan and other planning documents.

By the decision granting the concession, the Port Authority shall sign the concession contract with the concessionaire for a term (Article 179):

- service concessions, for the provision of port services:
  - for nautical services up to 10 years
  - for transport services up to 20 years
- concessions for the economic use of general or other goods, for the performance of economic activities carried out in the port area for up to 25 years
- concessions for works, when the concession is granted for the construction of port facilities, up to 30 years, and with the prior consent of the Government of the Republic of Croatia up to 50 years

The concession fee for the provision of port services in public ports consists of a fixed and variable part. The permanent part of the fee is paid under the title of use of the port area, in a one-off annual amount. The variable part of the fee is paid quarterly, depending on the realized business activity of the concessionaire, i.e. as a percentage of the generated income.

Exceptionally, the Port Authority does not grant a concession, but on the basis of a request of an economic operator, issues a decision permitting the performance of: cargo forwarding services, services of shipping agents, quality control and sampling of goods and ancillary economic activities.

The performance of secondary economic activities shall be subject to a lease, the amount of which shall be decided by the Port Authority.

10.d Legal and legitimate framework

This section sets out the essential parts of the Law on Navigation and Ports of Inland Waterways, the Regulation on Technical and Technological Requirements for Ports and the Conditions of Safe

Navigation in Ports and Piers of Inland Waters and the Regulation on the Management and Conduct of the Operations of Inland Water Port Authorities.

- **Law on Navigation and Ports of Inland Waterways**

The Law on Navigation and Ports of Inland Waterways (OG 144/2021) (hereinafter referred to as the Law) regulates water transport on inland waterways of the Republic of Croatia, safety of inland waterway navigation, legal status, protection of waters against pollution from vessels, manner of managing waterways, ports and inland water ports, material - legal relations relating to all inland navigation facilities, procedures for registration of vessels and floating facilities, transport operations and contracting of transport, inspection supervision and other matters relating to navigation and inland waters ports.

From Article 155 to Article 220 the Law presents the part relating to the construction and use of ports and applies accordingly to piers. In the text below, selected parts of the Law are presented, closely related to the definition of river ports in Croatia, their construction and management.

Ports can be open to international and domestic inland waterway traffic. If the port is open to international traffic, it is also considered to be open to domestic traffic.

According to its purpose, ports can be classified as (Article 156):

- public ports: open to public traffic, which can be used under equal conditions by any natural or legal person according to their purpose and within the limits of available capacities
- special purpose ports: they are opened for the public needs of the founder

Ports founded by the Republic of Croatia, whose establishment, development and operations are of transport, economic and other interest to the Republic of Croatia, are defined as ports of national importance (Article 158).

A public port of national importance shall be opened and classified on the basis of a decision of the Government of the Republic of Croatia.

According to the activities carried out in ports, they may be (Article 159): industrial – commercial, passenger, shipbuilding, protective and combined.

The construction of port facilities is in the interest of the Republic of Croatia and for the purpose of their construction, an expropriation request may be submitted directly in accordance with the provisions of the expropriation regulations. Any investment in port facilities used for the provision of port services in a port of national importance shall be considered to have been made in the interest and for the needs of the Republic of Croatia, when carried out in accordance with the Mid-Term Plan for the Development of Waterways, Ports and Piers (Article 160).

On real estate within the port area of public ports, the Republic of Croatia has the right of pre-emption.

When constructing new ports or modifying the borders of the port area of existing ports, it is necessary to prepare a traffic-technological study consisting of: navigation and hydrographic features of the aquatorium, technical and technological features of the coast and piers, and vessels that will enter the

port, manoeuvring procedures and safety measures that must be provided at the mooring point and emergency procedures (Article 161).

It is important to point out that the said study must be prepared before obtaining a building permit and be previously approved by the competent port authority or, if a building permit is not required, before opening the port.

The port authority may also require the preparation of a traffic-technological study in the case of existing ports when it deems it necessary for the safety of navigation or safety at the port.

Prior to commencement of port construction or modification of the borders of the port area of an existing port, the port area must be identified, in accordance with the physical planning documents and the planning bases for water management. The port area can include several port basins and anchorages, i.e. several separate traffic-technological units (terminals) specialized for transshipment of certain types of cargo, and is located in the area of several municipalities, cities and counties.

The Government of the Republic of Croatia decrees the area of public port and port for the needs of state bodies. The declaration of the port area shall be entered in the land register by means of a note (Article 163).

In the event of a change in the scope of economic use of the port, the port manager (port authority) is obliged to propose an amendment to the act designating the port area.

The land part of the port area of a port open to international traffic must be enclosed and entrances to the port marked and under constant surveillance. The land part of the port area open only to domestic traffic must be specifically marked.

The conditions to be met by ports, the procedure for their opening and closing and the criteria for their classification and change of classification shall be laid down by the Government of the Republic of Croatia in a regulation (Article 167).

For this purpose, account shall be taken of the total turnover of each port in the previous ten-year period and its characteristics; the operational capacities of the port; the construction and condition of the port infrastructure and suprastructure and their maintenance; the functionality of the facilities and services for the supply of vessels, crew and passengers and the repair of vessels; the continuity, navigability and classification of the waterway, the quality and significance of traffic connections with the hinterland; the spatial and economic possibilities for further development of the port, and others.

The port must be constructed in such a way that it meets the requirements of navigation safety and that the width of the waterway does not narrow to a level lower than the prescribed criteria. The port manager (port authority) is obliged to maintain the port in such a way as to ensure order and compliance with the Law and the rules on order in the port.

Port activities, i.e. port services and economic activities, are carried out in the port area. In so doing, port services may be (Article 175):

- nautical services: mooring and unloading of vessels; boxing; reception and supply of vessels, crews and passengers and servicing of vessels at anchorage; reception of waste

normally generated on board, which includes the activity of waste collection in accordance with the regulation governing sustainable waste management

- transport services: loading, unloading and stacking of cargo; storage, deposit and transport operations depending on the type of cargo; preparation and unloading of cargo for transport
- passenger embarkation and disembarkation services
- cargo forwarding and shipping agent services

Economic activities are divided into (Article 175):

- basic economic activities: industrial, commercial, craft and leisure activities; related to port services
- secondary economic activities: carried out within a space of maximum 12 m2 of the port area

Port services are performed in piers, which according to the activity performed may be (Article 196): commercial, passenger, shipbuilding, river marinas, boat supply stations, scaffolding crossings and piers for the needs of state bodies or public bodies. Merchant and passenger piers opened for own account may be navigated only by vessels of which the shipowner is the manager of the pier.

In the port, any activity that endangers the safety of persons or vessels, pollutes the environment, as well as any other activity that isn't in line to the prescribed provisions on order in the port is forbidden.

According to Art. 211 of the Law, the port manager (port authority) is obliged to:

- equip the port with appropriate devices for the handling and reception of solid and liquid waste, cargo residues from the ship, oily waters, oil residues and waste from the ship and residues and mixtures containing residues of harmful liquid substances in accordance with the provisions of the regulations governing waste management
- adopt the Plan for the reception and handling of solid and liquid waste and harmonise and renew it every three years
- determine the area in the port where dangerous goods may be handled, with the prior consent of the port authority and other competent authorities
- restrict the handling of hazardous substances, in quantity or by species, in accordance with the equipment and spatial capabilities of the port

The supply of fuel to ships at the port and outside the port shall be carried out in accordance with the provisions of special regulations on the handling and transport of dangerous goods in inland water transport and special regulations on the handling and transport of dangerous goods in inland water transport and special regulations on the rules of navigation on inland water transport.

For the supply of fuel and lubricant, ships must use supply vessels, supply stations or lorries specially designated by the competent authorities. Without the approval of the competent port authority, the loading of fuel and lubricants into the ship is forbidden in the port and outside the port.

According to Article 212 of the Law, in the port it is forbidden:

1. disable access to berthing devices
2. move, change and remove berths, anchors and devices of another vessel except when necessary to prevent immediate and apparent damage or when necessary due to the arrival and departure of the vessel
3. bind vessels to navigational and other markings, devices and apparatus not intended for mooring
4. put, relocate, alter, remove or damage navigational and other mooring markings or devices without authorization
5. damage the operational coast with heavy vehicles, placing heavy objects over the permissible load, driving wedges, beams and the like into the coast, and lifting stones and the like from the coastal walls or performing any other action that causes damage to the operational coast
6. welding, burning fire on an open fire pit on the coast or on the vessel and on mooring devices
7. clean, scrape or paint the underwater or underwater part of the vessel's formwork
8. pollute the air by releasing dust, smoke and other gases above the permissible quantities established by special regulations
9. keep the propeller running, except for performing the required maneuver of the vessel
10. swimming, speeding, windsurfing, ski or airbag or similar devices towing
11. keep a vessel on vessel landing ramps where no work is carried out or keep any material
12. carry out repair and reconstruction work on the vessel of the formwork, deck, equipment and machine outside the normal operations
13. fish from vessels and fish with nets, tips and other fishing gear
14. burn waste on board
15. jeopardize the safety of navigation in any way

The operations referred to in points 2, 6, 7, 9, 10 and 12 may be carried out at the port only with the approval of the port manager (port authority), with the consent of the port authority.

- **Regulation on Technical and Technological Conditions for Ports and Conditions of Safety of Navigation in Ports and Inland Waters**

The Regulation on Technical and Technological Conditions for Ports and Conditions of Safety of Navigation in Ports and Inland Waters (OG 32/2009) (hereinafter referred to as the Regulation) prescribes the conditions that inland water ports must comply with before their opening for traffic, the procedure for opening ports, the criteria for classifying ports and piers and the conditions of safety of navigation in the port and pier area.

For anything not provided for in the Regulation, the provisions of the European Treaty on Major Inland Waterways of International Importance (AGN) in the part relating to ports of international importance shall apply accordingly.

Since most of the provisions are presented under the Navigation and Ports of Inland Waters Act, only those parts that have not previously been listed will be segregated in this section.

The Regulation stipulates that a port open to domestic or international traffic, for the purpose of meeting technical requirements, must have (Article 3 Regulation):

1. piers, devices, equipment and port aquatorium of adequate size where the berthing, anchoring and manoeuvring of the vessel is enabled in a safe manner
2. a restricted area on land where port activities can be carried out in a safe manner and effective control over the movement of people and things;
3. navigation safety facilities set up in accordance with the marking plan;
4. devices for loading, unloading and storage of cargo, depending on the type of port;
5. landscaped and lighted operational areas and port roads;
6. a facility arranged for the reception of passengers and baggage and the short stay of passengers if the port is intended for passenger traffic;
7. fixed installations on coast for the reception of waste from vessels and the separation of oily liquids or mobile installations for the same purpose, of adequate capacity depending on the planned number of berths;
8. equipment to prevent pollution of water from vessels located in the port;
9. equipment and trained fire protection personnel depending on the type of port and according to special regulations.

A berth for public vessels must be provided at the international port and there must be an area with an associated facility in order to carry out border control in accordance with the regulations governing state border control. The land area of the international port must be enclosed and the entrances to the port marked and under constant surveillance.

In each port, the port manager must provide the users (Article 4 Regulation):

- berthing of vessels;
- embarkation, disembarkation, transshipment, transfer, storage and other transport services depending on the type of cargo and the type of port;
- the reception and dispatch of passengers, if the port is intended for passenger traffic;
- information service within the scope of the application of the River Information Services (RIS);
- the supply of fuel, lubricants, water and electricity to vessels;
- reception of waste from vessels;
- the emergency medical service.

In addition, the operator of a port open to international traffic must also provide users with boxing services; reception and servicing of vessels at the anchorage; service of control of berthing, manoeuvring and control of the vessel's stay in the port area; supply of vessels, crew and passengers with supplies; service of hygiene-sanitary protection, disinfection, disinsectisation and pest control.

Ports and piers are classified according to the significance of the port system (Article 8 of the Regulation) to ports and piers of national importance, ports and piers of county importance and private ports and piers.

Ports and piers may be classified as a port or pier of state or county importance if the port infrastructure in the area of the port or pier is owned by the Republic of Croatia or a local self-

government unit, or if the Republic of Croatia or a local self-government unit have the right to build over the port infrastructure.

In ports and piers of national or county importance, the sustainability of operations and financial stability must be ensured, taking into account the economic criteria of valuation of the port services market.

If the above conditions are not met, the port or pier may be classified as a private port or private pier.

In order to classify a river port into a port of economic importance for the Republic of Croatia, it is necessary to meet the following criteria (Article 9 Regulation)

1. the port must be located on an international waterway, at least Category IV navigability from that port to the ports on the main TEN-T network;
2. they must be able to accept vessels customary for the category of waterway on which the port is situated;
3. the total transshipment capacity of the port should be at least 500.000 tonnes of cargo per year;
4. the port must be connected to international road and rail corridors;
5. must be able to handle standard containers;
6. suitable conditions for the development of the port industrial-economic zone must be present.

Ports specialised in bulk cargo do not have to meet the requirement of being able to handle standard containers. The term bulk cargo means dry bulk cargo and liquid bulk cargo.

Suitable conditions for the development of the port industrial-economic zone shall be the area of the port area of at least 100.000 m2 intended for port activities of an industrial-economic character. If it is not possible to secure the aforementioned area, it is possible to conclude a contract with the free zone manager or the economic zone manager in the area of the city or municipality where the port is located, which regulates the conditions of use of the zone by port users.

When sorting, each port or pier must meet all the criteria prescribed for the respective port or pier category.

The criteria for classifying ports into ports of economic importance for the county are (Article 10 Regulation):

1. the possibility of accepting vessels usual for the category of waterway on which the port is located;
2. the total transshipment capacity of the port should be at least 250.000 tonnes of cargo per year;
3. road or rail connections to the main county centres.

The criteria for classifying piers into piers of economic importance for the Republic of Croatia are (Article 11 Regulation)

- for industrial and commercial piers – a total transshipment capacity of more than 50.000 tonnes per year;

- for shipbuilding piers – pier size bigger than 80 meters, or pier size for vessels bigger than 800 tons of load capacity.

Piers that do not satisfy the abovementioned criteria, as well as passenger and sports piers, are classified as piers of economic importance for the county. Other types of piers shall be classified according to their intended use.

In order to ensure the safety of navigation in ports and piers, the Port Manager shall adopt a separate act specifying in more detail the order in the port or pier, in accordance with the provisions of the Regulation, with the prior consent of the competent port authority. Control and supervision of law enforcement in ports and piers shall be carried out by the competent port authority.

- **Regulation on the Management and Leading of the Affairs of Port Authorities of Internal Waters**

The Regulation on the Management and Leading of the Affairs of Port Authorities of Internal Waters regulates the composition and power of the members of the Governing Council, the conditions for appointment, dismissal and power of the Director, and other matters related to the operation of port authorities of internal waters.

The Statute is a general legal act of the port authority regulating the internal organisation, powers and decision-making methods of the bodies of the port authority, composition, method of establishment, scope and competence of professional and advisory bodies, manner of establishing relations with local and regional self-government units in matters of managing the port area, public work and other matters of importance for the performance of activities and operations of the port authority.

For the operational management of the port system for one or more ports, branches may be established as organizational units of the port authority, to whose operation and establishment the Law on Institutions applies (OG 76/93 - 127/19). The managing bodies in the port authority are the Governing Council and the Director.

The Governing Council shall be appointed and dismissed by the Minister and shall be composed of:

- three representatives of the founder, one representative of the local self-government unit in whose territory the port of state significance is located, at the proposal of the city or municipal authority,
- one representative of the local self-government unit in whose territory the port of state significance is located, at the proposal of the city or municipal authority,
- one representative of companies performing port activities on the basis of the approval of the port authority, upon the proposal of the professional association of companies performing port activities.

The members of the Governing Council shall be elected for a period of four years, with no impediment to the reappointment of the same persons as members of the Governing Council. The number of members of the Governing Council must be odd number.
The President and the Vice-President shall be elected from among the representatives of the founders, by a majority vote of the members of the Governing Council.

Governing Council:

1. sets out the Proposed Mid-Term Port and Pier Development Plan;
2. adopt a decision on interim financing for a period not exceeding 3 months, for the following year at the latest by December 31 of the current year;
3. determine the amount of port fees;
4. confirms tariffs
5. make a decision on the granting of a concession for the performance of port activities;
6. take decisions on the implementation of the basic guidelines of port policy;
7. adopt acts regulating the order in the port and the handling of dangerous goods in the port;
8. take decisions to coordinate the operations of companies operating in the port area;
9. adopts the proposal to change the borders of the port area
10. adopt the Port Authority's Annual Work Programme and Financial Plan for the following year no later than December 31 of the current year;
11. adopt the operational programme for the construction and modernization of port facilities and the operational programme for the maintenance of port facilities;
12. adopt the annual financial and business report on the work of the port authority and the report on the work of port users;
13. make a decision on the allocation of surplus revenue to the founder's own resources when the state budget funds have acquired non-depreciable fixed assets;
14. make decisions on the acquisition, encumbrance or alienation of real estate or other property owned by the Republic of Croatia, and managed by the port authority, or on the conclusion of legal transactions, which are not decided by the director, up to the amount of HRK 5.000.000, and above that amount with the consent of the Government of the Republic of Croatia;
15. decide on taking out cargo with the consent of the Government of the Republic of Croatia;
16. establish port patterns;
17. adopt the Statute of the Port Authority;
18. adopt other general acts prescribed by the Statute;
19. accepts the Director's reports;
20. announce a call for proposals for the selection of directors;
21. appoint and dismiss the Director of the Port Authority;
22. conclude employment contracts with the Director and the Assistant Director;
23. performs other tasks and tasks specified by the Law, the Statute and general acts.

The Governing Council shall discuss and decide at sessions at which a simple majority of all members of the Council must attend. Decisions shall be taken by a majority vote of the members present, except

for decisions and other acts requiring the approval of the Minister and adopted by a majority vote of all members of the Governing Council.

The tasks of the port authority shall be managed by the Director and appointed on the basis of a public tender for a period of 4 years. Upon expiry of the term of office, the same person may be reappointed as Director. The Governing Council shall appoint and dismiss the Director, with the consent of the Minister, on the basis of a public tender.

The Director shall perform the following tasks:

1. organizes business operations, manages and supervises professional work and is responsible for the legality of the work and operations of the port authority,
2. represent the port authority,
3. execute the decisions of the Governing Council,
4. undertake all legal actions in the name and on behalf of the port authority in accordance with the Statute, including the conclusion of contracts with port users on the basis of the authorisation for performing port activities,
5. proposes the adoption of acts to the Governing Council,
6. submit reports to the Governing Council on the operations of the port authority and port users,
7. propose general acts established in the Statute,
8. proposes the appointment and dismissal of the Assistant Director,
9. decides on the establishment and termination of employment of employees and concludes employment contracts with employees,
10. sign contracts on legal affairs on which a decision is made by the Governing Council,
11. participates in the work of the Governing Council without the right to decide,
12. submit to the Governing Council a proposal for a decision on the allocation of surplus revenue to the founder's own resources in the year when non-depreciable fixed assets were acquired from the state budget;
13. adopt decisions in administrative proceedings for which the Governing Council is not responsible;
14. performs other tasks determined by the Law and the Statute and by general acts.

In addition, the Director is obliged to inform the Governing Council and the Ministry without delay if market disruptions occur in the operation of ports and piers (reduction of cargo quantity, number of passengers, etc.).

The port authority in legal transactions shall be liable for all its assets, and the founder shall be jointly and severally liable for the obligations of the port authority.

- **Other regulations related to the construction and management of the river port area**

Below are the regulations from other areas that are closely related to the construction and management of the river port area.

<u>Construction</u>

- Building Law (OG 153/13, 20/17, 39/19, 125/19)
- Physical Planning Law (OG 153/13, 65/17, 114/18, 39/19, 98/19)
- General Urban Plan of the City of Vukovar ('Official Gazette' of the City of Vukovar, no. 5/07, 4/12, 11/15 and 12/18);
- Decree on the Designation of the Port Area of the Port of Vukovar (OG 21/18);
- Decision on the Spatial Plan of the Vukovar-Srijem County ('Official Gazette' of the Vukovar-Srijem County, No. 25/21).
- Decision on the Adoption of a Spatial Plan of Special Features of the Multi-Purpose Channel Danube – Sava (OG 121/2011)

Public tender

- Public Tender Law (OG 120/16)
- Regulation on Public Tender Publications (OG 10/12);
- Law on the State Commission for the Commission of Control of Public Tender Procedures (OG 18/13, 127/13, 74/14, 98/19 and 41/21);
- Ordinance on Training in the Field of Public Tender (OG 65/17);
- Decision on Tender Categories (OG 64/16);
- Decision on the Determination of Relative Weights for Architectural and Engineering and Related Advisory Services in Construction and Physical Planning (OG 119/18 and 5/19 – Correction)
- Ordinance on the Application of the Uniform Dictionary of Public Tender (CPV) (OG 6/12);
- Ordinance on the List of Obliged Entities Applying the Public Tender Law (OG 19/12);
- Rulebook on Supervision of the Implementation of the Public Tender Law (OG 65/17);
- Rulebook on Tender Documents and Offers in Public Tender Procedures (OG 65/17, 75/20 - consolidated text);
- Ordinance on Electronic Complaint in Public Tender (OG 101/17);
- Rulebook on Tender Plan, Contract Register, Prior Consultation and Market Analysis in Public Tender (OG 101/17, 144/20);
- Law on Electronic Invoicing in Public Tender (OG 94/18);
- Rulebook on Technical Elements, Issuance and Exchange of Electronic Invoices and Supporting Documents in Public Tender (OG 32/19);
- Ordinance on the Type and Amount of Fees for the Services of Receiving and Sending Electronic Invoices for Contracting Authorities in Public Tender (OG 32/19);
- Instructions on the Conduct of Public Tender Procedures in Case of Unavailability of the Electronic Public Procurement Bulletin of the Republic of Croatia (OG 88/16).

Labour Relations, Labour Protection and Fire Protection

- Labour Law (OG 93/14, 127/17, 98/19);
- Rulebook on the Content and Manner of Keeping Records on Workers (OG 73/17);
- Rulebook on the Content of the Calculation of Salary, Salary Compensation or Severance Pay (OG 32/15, 102/15, 35/17);

- Ordinance on the Manner of Publishing the Ordinance on Work (OG 146/14);
- Ordinance on Jobs in Which the Worker Can Work Only After Prior and Regular Determination of Medical Fitness (OG 70/10);
- Labour Protection Law (OG 71/14, 118/14, 154/14 , 94/18, 96/18);
- Ordinance on the Performance of Occupational Health and Safety Activities (OG 126/19);
- Ordinance on the Use of Personal Protective Equipment (OG 5/21);
- Ordinance on Jobs with Special Working Conditions (Official Gazette 05/84)
- Rulebook on Training in Labour Protection and Safety and Passing the Professional Exam (OG 112/14);
- Rulebook on Inspection and Testing of Work Equipment (OG 16/16);
- Ordinance on the Testing of the Working Environment (OG 16/16);
- Ordinance on Labour Protection for Workplaces (OG 105/20);
- Ordinance on the Use of Personal Protective Equipment (OG 5/21);
- Ordinance on Labour and Health Protection of Pregnant Workers, Workers Who Have Recently Given Birth and Workers who are Breastfeeding (OG 91/15);
- Rulebook on Safety Signs (OG 91/15, 102/15, 61/16);
- Ordinance on the Provision of First Aid to Workers at Job (OG 56/83)
- Fire Protection Law (OG 92/10):
- Rulebook on the Preparation of the Fire and Technological Explosion Threat Assessment (OG 35/94, 110/05 and 28/10);
- Ordinance on the Preparation of Risk Assessment (OG 112/14, 129/19);
- Pension Insurance Law (OG 157/13, 151/14, 33/15, 93/15, 120/16, 18/18, 62/18, 115/18, 102/19, 84/21 – consolidated text);
- Law on Seniority of Insurance with Increased Duration (OG 115/18, 34/21);
- Law on Compulsory Health Insurance (OG 80/13, 137/13, 98/19);
- Ordinance on the Manner of Registration and Deregistration, and the Acquisition of the Status of an Insured Person in Compulsory Health Insurance (OG 2/14, 17/15, 99/17, 129/17);
- Ordinance on the Conditions and Manner of Exercising Rights from Compulsory Health Insurance (OG 49/14, 51/14 - corrigendum, 11/15, 17/15, 123/16 - corrigendum, 129/17, 9/21).

Accounting and Taxes

- Budget Law (OG 144/21)
- Law on the System of Internal Controls in the Public Sector (OG 78/15, 102/19)
- Ordinance on Financial Reporting in Budgetary Accounting (OG 37/22)
- Rulebook on Budgetary Classifications (OG 6/10, 120/13, 01/20)
- Ordinance on Budgetary Accounting and Calculation Plan (OG 124/14, 115/15, 87/16, 3/18, 126/19)
- General Tax Law (OG 115/16, 106/18, 121/19, 32/20, 42/20);

- Bankruptcy Law (OG 71/15, 104/17, 36/22)
- Income Tax Law (OG 177/04, 90/05, 57/06, 146/08, 80/10, 22/12, 148/13, 143/14, 50/16, 115/16, 106/18, 121/19, 32/20, 138/20);
- Ordinance on Income Tax (OG 177/04, 90/05, 57/06, 146/08, 80/10, 22/12, 148/13, 143/14, 50/16, 115/16, 106/18, 121/19, 32/20, 138/20);
- Law on Value Added Tax (OG 73/13, 99/13, 148/13, 153/13, 143/14, 115/16, 106/18, 121/19, 138/20, 39/22);
- Ordinance on Value Added Tax (OG 79/13, 85/13, 160/13, 35/14, 157/14, 130/15, 01/17, 41/17, 128/17, 1/19, 1/20, 01/21, 73/21, 41/22);
- Income Tax Law (OG 115/16, 106/18, 121/19, 32/20, 138/20);
- Ordinance on Income Tax (OG 10/17, 128/17, 106/18, 01/19, 80/19, 01/20, 74/20, 01/21);
- Law on Fiscalisation in Cash Transactions (OG 133/12, 115/16, 106/18, 121/19, 138/20);
- Ordinance on Fiscal Consolidation in Cash Transactions (OG 146/12, 46/17, 70/20, 1/21, 144/21);
- Law on the Financing of Local and Regional Self-Government Units (OG 127/17, 138/20).

Other regulations

- Concessions Law (OG 69/17, 107/20 – consolidated text);
- Institutions Law (OG 76/93, 29/97, 47/99, 35/08, 127/19);
- Personal Data Protection Law (OG 103/03, 118/06, 41/08, 130/11, 106/12);
- Right to Access to Information Law (OG 25/13, 85/15)
- Lease and Purchase of Business Premises Law (OG 125/11, 64/15, 112/18);
- Ownership and Other Real Rights Law (OG 91/96, 68/98, 137/99, 22/00, 73/00, 129/00, 114/01, 79/06, 141/06, 146/08, 38/09, 153/09, 143/12, 152/14);
- Land Registration Law (OG 63/19)
- Performance of Geodetic Activity Law (OG 25/18);
- Physical Planning Law (OG 153/13, 65/17, 114/18, 39/19, 98/19)
- Law on Architectural and Engineering Works and Activities in Physical Planning and Construction (OG 152/08, 49/11)
- Rulebook on the Criteria for Determining Concession Fees in Ports and Inland Waters (OG 72/15);

Internal regulations of the Port Authority Vukovar

- Statute of the Port Authority Vukovar
- Decisions on the Level of Port Charges in Ports and Piers
- Rulebook on the Organization of Fire Protection Systems;
- Rulebook on Determining the Class and Quantity of Hazardous Substances;
- Ordinance on the Handling of Dangerous Substances;
- Rulebook on the Organization and Systematization of Workplaces;
- Ordinance on Salaries, Salary Benefits and Other Monetary and Non-Monetary Benefits;

- Rules for the Management of Public Documentary Material of the Port Authority Vukovar with a Special List of Materials with Retention Periods;
- Rulebook on the Amendment of the Rulebook on the Organization and Systematization of Workplaces;

10.e Port area and users

The chapter provides an overview of several geodetic bases, which are attached to the Plan, as follows:

10.e.1.a Geodetic bases with ortho-photo map and situational plan

The port area of the port of Vukovar is spread over the following cadastral plots:

Table 4: Cadastral plots of the port area of the port of Vukovar

No.	Cadastral plotnumber	Land Registry	Area (m^2)	Owner	Beneficiary/concessionaire/purpose
1	506	1712	523	RC – managed by PAV	Remaining part of the Port area
2	507	1712	523	RC – managed by PAV	Remaining part of the Port area
3	503	1713	467	PRIVATE	Remaining part of the Port area
4	504/1	1713	1.359	PRIVATE	Remaining part of the Port area
5	508/4	1713	4.038	PRIVATE	Remaining part of the Port area
6	513	1752	442	RC – managed by PAV	Remaining part of the Port area
7	514	1752	136	RC – managed by PAV	Remaining part of the Port area
8	515	1752	919	RC – managed by PAV	Remaining part of the Port area
9	520/4	1762	961	RC – managed by PAV	Port of Vukovar Ltd.
10	522/6	1762	1.052	RC – managed by PAV	Port of Vukovar Ltd.
11	508/3	1817	3.477	CITY OF VUKOVAR	Remaining part of the Port area
12	7096/6	1981	2.525	JDUOU (Public good in general use) RC – managed by PAV	Vupik Plus Ltd.
13	7096/7	1981	42	JDUOU (Public good in general use) RC – managed by PAV	Vupik Plus Ltd.
14	516	2120	421	RC – managed by PAV	Remaining part of the Port area
15	509	2675	713	RC – managed by PAV	Remaining part of the Port area
16	510	2675	1.069	RC – managed by PAV	Remaining part of the Port area
17	part 518/2	3056	4.584	INA Plc.	Remaining part of the Port area/Port area
18	522/4	3072	1.198	RC – managed by PAV	Remaining part of the Port area
19	522/5	3072	2.384	RC – managed by PAV	Remaining part of the Port area
20	521/2	3546	450	RC – managed by PAV	Port of Vukovar Ltd.
21	499/2	3676	4.111	VUPIK PLUS Ltd.	Remaining part of the Port area
22	1043/5	4509	2.573	RC – managed by PAV	Terminal for liquid cargo

No.	Cadastral plotnumber	Land Registry	Area (m^2)	Owner	Beneficiary/concessionaire/purpose
23	512/2	4572	2.425	RC – managed by PAV	Remaining part of the Port area
24	508/5	4573	2.311	CITY OF VUKOVAR	Remaining part of the Port area
25	508/1	5761	20.632	RC – managed by PAV	Terminal for liquid cargo
26	511/2	5885	1.483	RC – managed by PAV	Remaining part of the Port area
27	7098/2	6369	150	RC – managed by PAV	Remaining part of the Port area
28	7102/2	6583	50	RC – managed by PAV	Remaining part of the Port area
29	523/4	6590	4.633	RC – managed by PAV	Port of Vukovar Ltd.
30	523/5	6590	492	RC – managed by PAV	Port of Vukovar Ltd.
31	523/6	6590	6.284	RC – managed by PAV	Port of Vukovar Ltd.
32	523/7	6590	5.881	RC – managed by PAV	Port of Vukovar Ltd.
33	523/8	6707	81	RC – managed by PAV	Port of Vukovar Ltd.
34	523/9	6707	2.632	RC – managed by PAV	Port of Vukovar Ltd.
35	508/2	6971	1.376	CITY OF VUKOVAR	Remaining part of the Port area
36	7068/14	7356	95	RC – managed by PAV	Vupik Plus Ltd.
37	7102/3	7771	114	RC – managed by PAV	Remaining part of the Port area
	512/2	7912		LUKOIL CROATIA Ltd.	Remaining part of the Port area
38	504/2	8440	1.135	CITY OF VUKOVAR	Remaining part of the Port area
39	502	9128	617	PRIVATE	Remaining part of the Port area
40	7100	9219	341	HRB DANUBE LLOYD-SISAK Ltd.	Remaining part of the Port area
41	1046/1	9244	251	CITY OF VUKOVAR	Remaining part of the Port area
42	7098/5	9300	292	INTERŠPED VUKOVAR Ltd.	Remaining part of the Port area
43	7101/1	9300	316	INTERŠPED VUKOVAR Ltd.	Remaining part of the Port area
44	7102/1	9300	286	INTERŠPED VUKOVAR Ltd.	Remaining part of the Port area
45	519/2	9366	2.459	RC – managed by PAV	Remaining part of the Port area
46	519/3	9366	5.073	RC – managed by PAV	Remaining part of the Port area
47	7107	9514	563	RC – managed by PAV	Nautica Vukovar Ltd.
48	504/3	9606	365	CITY OF VUKOVAR	Remaining part of the Port area
49	505	9613	2.016	JDUOU (Public good in general use) City of Vukovar	Remaining part of the Port area
50	1044	9854	396	JVDUOU (Public water good in general use) RC – managed by PAV	Port of Vukovar Ltd.
51	1045	9854	104	JVDUOU (Public water good in general use) RC – managed by PAV	Port of Vukovar Ltd.

No.	Cadastral plotnumber	Land Registry	Area (m^2)	Owner	Beneficiary/concessionaire/purpose
52	1046/2	9854	618	JVDUOU (Public water good in general use) RC – managed by PAV	Port of Vukovar Ltd.
53	498	9855	556	VUPIK PLUS Ltd.	Remaining part of the Port area
54	474/2	9856	22.360	VUPIK PLUS Ltd.	Vupik Plus Ltd./ Terminal for liquid cargo
55	474/6	9856	20	VUPIK PLUS Ltd.	Vupik Plus Ltd.
56	504/4	9856	3.359	VUPIK PLUS Ltd.	Remaining part of the Port area
57	508/6	9856	470	VUPIK PLUS Ltd.	Remaining part of the Port area
58	497/5	9857	120	VUPIK PLUS Ltd.	Vupik Plus Ltd.
59	517/2	9858	981	RC – managed by PAV	Remaining part of the Port area
60	497/2	9884	700	VUPIK PLUS Ltd.	Terminal for liquid cargo
61	1043/1	10349	311	JVDUOU (Public water good in general use) RC – managed by PAV	Remaining part of the Port area
62	7103/2	10516	1.466	RC – managed by PAV	Port of Vukovar Ltd./ Remaining part of the Port area
63	part 7147	10563	6.761	JDUOU (Public good in general use) City of Vukovar	Remaining part of the Port area /Port area
64	part 7132	10579	44.560	JDUOU (Public good in general use) – managed by HRV. CESTE Ltd.	Port of Vukovar Ltd./ Remaining part of the Port area /Port area
65	7096/1	10717	14.118	JVDUOU (Public water good in general use) RC – managed by PAV	Terminal for liquid cargo /Nautica Vukovar Ltd./ Port of Vukovar Ltd./ Remaining part of the Port area
66	7068/16	11190	5.482	RC JVD (Public water good) – managed by PAV	Vupik Plus Ltd.
	7068/16	11191		VUPIK PLUS Ltd.	Vupik Plus Ltd.
67	part 501/1	11248	2.170	JDUOU (Public good in general use) City of Vukovar	Remaining part of the Port area /Port area
68	501/2	11248	609	JDUOU (Public good in general use) City of Vukovar	Remaining part of the Port area
69	500	11249	301	JDUOU (Public good in general use) City of Vukovar	Remaining part of the Port area
70	1043/3	11379	163	RC – managed by PAV	Port of Vukovar Ltd.
71	1043/6	11379	675	RC – managed by PAV	Remaining part of the Port area

No.	Cadastral plotnumber	Land Registry	Area (m^2)	Owner	Beneficiary/concessionaire/purpose
72	7097	11379	2.860	RC – managed by PAV	Nautica Vukovar Ltd./ Port of Vukovar Ltd./ Remaining part of the Port area
73	7098/3	11379	178	RC – managed by PAV	Port of Vukovar Ltd.
74	7099	11379	264	RC – managed by PAV	Port of Vukovar Ltd.
75	7101/2	11379	44	RC – managed by PAV	Remaining part of the Port area
76	7111	11379	605	RC – managed by PAV	Port of Vukovar Ltd.
77	7113	11379	36	RC – managed by PAV	Port of Vukovar Ltd.
78	520/3	11554	147	RC – managed by PAV	Port of Vukovar Ltd.
79	522/2	11554	51	RC – managed by PAV	Port of Vukovar Ltd.
80	518/3	11561	557	RC – managed by PAV	Remaining part of the Port area
81	518/4	11561	440	RC – managed by PAV	Remaining part of the Port area
82	1043/4	11649	2.540	RC JVD (Public water good) – managed by PAV	Remaining part of the Port area
83	1043/8	11649	2.266	RC JVD (Public water good) – managed by PAV	Port of Vukovar Ltd.
84	1043/9	11649	1.933	RC JVD (Public water good) – managed by PAV	Port of Vukovar Ltd./ Remaining part of the Port area
85	7068/2	11649	135	RC JVD (Public water good) – managed by PAV	Remaining part of the Port area
86	7068/3	11649	863	RC JVD (Public water good) – managed by PAV	Port of Vukovar Ltd.
87	7068/4	11649	422	RC JVD (Public water good) – managed by PAV	Remaining part of the Port area
88	7068/5	11649	112	RC JVD (Public water good) – managed by PAV	Remaining part of the Port area
89	7098/4	11649	6.934	RC JVD (Public water good) – managed by PAV	Port of Vukovar Ltd.
90	7096/10	11707	319	JVDUOU (Public water good in general use) RC – managed by PAV	Remaining part of the Port area
91	7096/5	11812	3.522	JVDUOU (Public water good in general use) RC – managed by PAV	Nautica Vukovar Ltd./ Remaining part of the Port area

No.	Cadastral plotnumber	Land Registry	Area (m^2)	Owner	Beneficiary/concessionaire/purpose
92	7068/29	12011	183.701	JVDUOU (Public water good in general use) RC – managed by PAV	Vupik Plus Ltd./ Terminal for liquid cargo /Nautica Vukovar Ltd./ Port of Vukovar Ltd./ Remaining part of the Port area
93	7098/1	12014	18.415	RC – managed by PAV	Port of Vukovar Ltd./ Remaining part of the Port area
94	7098/6	12015	599	RC – managed by PAV	Port of Vukovar Ltd.
	part 7131/2	12044	77.707	RC JDUOU (Public good in general use) HRV. CESTE Ltd.	Terminal for liquid cargo / Port of Vukovar Ltd./ Remaining part of the Port area /Port area
95	474/5	12048	250	VUPIK PLUS Ltd.	Vupik Plus Ltd.
96	474/8	12048	65	VUPIK PLUS Ltd.	Vupik Plus Ltd.
97	7104/1	12095	5.428	JVDUOU (Public water good in general use) RC – managed by PAV	Vupik Plus Ltd.
98	7108	12095	58	JVDUOU (Public water good in general use) RC – managed by PAV	Nautica Vukovar Ltd.
99	7109	12095	65	JVDUOU (Public water good in general use) RC – managed by PAV	Port of Vukovar Ltd.
100	7148	12206	1.971	RC – managed by PAV	Vupik Plus Ltd.

The geodetic map of the review with the ortho-photo map and situational plan is in **Annex 10.e.1.a**. of this Plan.

10.e.1.b. Underground and aboveground installations (water supply, sewerage, energy, electricity, telecommunications network) and display on the geodetic substrate, and a technical description of all installations with their technical specifications including the ownership structure;

The following underground and aboveground installations are located in the port area of the port of Vukovar:

Table 5: Underground and aboveground installations

Installation length by type	Length (m)
Electricity Infrastructure (EEI)	2.610
Electronic communication infrastructure and other related equipment (ECI)	2.695
Petrol and oil infrastructure (Oil)	356
Drainage (OI)	2.390
Polyethylene Pipeline (PE)	376
Sand	89
Sewage installations (PP)	204
Water supply (VI)	792

Total within the Port Area:	**9.512**

There is no detailed technical description of these since the documentation for underground installations was lost to a significant part in the Homeland War, and it was not possible to determine the technical specifications of these by geodetic measurements.

The geodetic map of the review with the ortho-photo map and situational plan can be found in **Annex 10.e.1.b.** of this Plan.

10.e.2 Cartographic review of underground and aboveground installations, and a statement of the length of all installations, as well as review and a statement of them for each concessionaire individually;

A cartographic review of underground and aboveground installations, as well as a review and a statement thereof for each concessionaire individually, is presented in **Annex 10.e.2** of this Plan.

The following table specifies the lengths of all installations, by concessionaires.

Table 6: Underground and aboveground installations (by concessionaires)

Length Installation by Type	Length (m)			
	Liquid Cargo Terminal	Nautica Vukovar Ltd.	Port of Vukovar Ltd.	Non-concession area
Electricity Infrastructure (EEI)		59	1.150	1.401
Electronic communication infrastructure and other related equipment (ECI)	67		288	2.340
Petrol and oil infrastructure (Oil)	82	197		77
Drainage (OI)	816	213	1.022	339
Polyethylene Pipeline (PE)			6	370
Sand			89	
Sewage installations (PP)	204			
Water supply (VI)	491	93	62	146
Total within the Port area:	**1.660**	**562**	**2.617**	**4.673**

10.e.3 Determining the borders of the port area of the port of Vukovar, and determining the borders of the concessionaire's work in the port area of the port of Vukovar;

The borders of the port area of the port of Vukovar and the borders of the concessionaire's work in the port area of the port of Vukovar are shown in **Annexes 10.e.3.a and 10.e.3.b** of this Plan.

Cadastral plots, according to the concessionaires, are specified under Annex 10.e.1.a of the **Geodetic Survey with the display on the ortho-photo map and the situational plan** of this Plan.

10.e.4 Cartographic review on the geodetic basis of all infrastructure facilities in the port area (roadways, car parks, railway lines, crane paths, manipulative plateaus, open/closed storage areas, coastal length oblique/vertical/unregulated, number of berthing points for vessels...);

The cartographic review on the geodetic basis of all infrastructure facilities in the port area (roadways, parking lots, railway lines, crane paths, manipulative plateaus, open/closed storage areas, coastal length oblique/vertical/unregulated, number of berthing points for vessels...) is shown in **Annex 10.e.4.** of this Plan.

10.e.5 Descriptive review of the length/area in the entire port area and for each concessionaire individually for the complete infrastructure; review of the complete port infrastructure on the map, and individually for each type separately (especially roadways, railway and industrial tracks, manipulative plateaus...);

The following table provides an overview of the complete infrastructure in the entire port area and for each concessionaire individually.

Table 7: Port infrastructure (by concessionaires)

Port infrastructure by type	Length (m)						
	Liquid Cargo Terminal	Nautica Vukovar Ltd.	Port of Vukovar Ltd.	Vupik plus Ltd.	Area outside the Port area	Non-concession area	Total
Industrial Rail Length (m)	182	425	2.098		339	1.276	**5.091**
Surface area of roads (m^2)	391	1.348	2.809	474		5.850	**10.872**
Manipulative areas (m^2)	3.968	0	13.550	2.166		4.017	**23.701**
Crane track (m^2)			2.077			551	**2.628**
Open Storage (m^2)			11.700			4.784	**16.484**
Indoor storage (m^2)	957	0	2.711	5.841		1.240	**10.749**

A cartographic review of the complete infrastructure in the entire port area and for each concessionaire individually is shown in **Annex 10.e.5.** of this Plan.

10.f Evaluation of development in the context of existing spatial/regional/urban plans (current and future plans – non-compliances/needs for changes)

Following are the sections of the Spatial Plan of the Vukovar-Srijem County, the General Urban Plan of the City of Vukovar and the Spatial Plan of Special Characteristics of the Danube – Sava Multipurpose Channel which are closely related to the construction and development of the port of Vukovar.

- **Compliance with the Spatial Plan of the Vukovar-Srijem County**

The Spatial Plan of Vukovar-Srijem County defines the purpose and use of business space in accordance with the neighbouring counties. The Plan was adopted in 2002, and was subsequently amended on five different occasions, i.e. 2007, 2011, 2014, 2020 and 2021.

The Plan emphasizes that the construction and reconstruction of ports, piers, anchorages, hydrotechnical interventions and structures and associated infrastructures is allowed in the corridors of river waterways. It is planned to reconstruct, rearrange or build the existing port and the new port of Vukovar on the Danube.

The construction of new river ports should be planned at locations where the morphological condition of water bodies is assessed as very good, i.e. at locations where there are no existing pressures on the hydromorphological condition. In the planned ports, it is necessary to organize the collection of solid waste and to provide adequate infrastructure for the collection of waste water from ships.

The port of Vukovar on the Danube, the new port of Vukovar on the multi-purpose channel Danube-Sava and the existing river border in Vukovar stand out as buildings of importance for the State.

In the area of the new port of Vukovar ('Bršadin'), the facilities specified in the Spatial Plan of the area of special features of the Danube-Sava multifunctional channel can be built (in addition to the facilities in the function of the port and the facilities in the function of other economy such as: production, business and similar activities).

The new eastern port on the Danube in Vukovar should be planned outside the borders of the Special Forest Vegetation Reserve of Vukovar Danube Ada.

Within ports and piers, it is possible to plan basic port activities and accompanying facilities, organize winter boxes for boats, berths for small vessels, arrange ports of nautical tourism and the like.

On rivers, wherever the waterway profile allows it, or on watercourses and other water surfaces, it is possible to plan floating facilities (water houses, pontoons, etc.) of all purposes on them, with the conditions and consent of the competent authority, which needs to be elaborated in more detail through the development of the Physical Plan of the city or municipality.

- **Compliance with the General Urban Plan of the City of Vukovar**

General Urban Plan of the City of Vukovar ('Official Gazette' of the City of Vukovar, no. 5/07, 4/12, 11/15 and 12/18) determines the basic organization of the area, the protection of natural, cultural and historical values, the use and purpose of the areas, with the proposal of conditions and measures for their development. It covers ways and forms of protection and use, conditions and guidelines for the regulation and protection of the area, measures for the improvement and protection of the environment, areas with special and other characteristics, and other elements important for the city of Vukovar.

The abovementioned GUP points out that ports on inland waters are considered to be buildings of economic purpose.

The initial part of the Plan, within the economic purpose (point 1.2.4.), states that on the areas intended for the needs of the port on internal waters, it is possible to build the facilities necessary for the functioning of the port and the accompanying facilities of production and storage of the Vukovar state river port according to the concept of port development. It is also pointed out that on the surfaces of the multi-purpose channel, all the facilities necessary for the functioning of the port and the

accompanying production and storage facilities can be built in accordance with the Spatial Plan of Special Characteristics of the multi-purpose channel Danube – Sava and the construction of a goods-transport center.

Within the framework of the conditions for the development of premises for buildings of importance for the state and the Vukovar-Srijem County, among the buildings that are important for the state and the county, the state port of Vukovar, the county passenger port and the piers are among the buildings that are important for the state and the county.

In point 5.4.4., buildings of economic purpose on the surface of the port on inland waters, it is pointed out as follows:

- The level of construction of the building plot on the surfaces of the port can be at most 80%
- the largest buildings can be built up to three floors, and silos, cranes and the like according to technological needs
- the need for parking spaces should be solved in the port zone
- In order to improve port operating conditions, a new riverbank line is created

Within the part relating to infrastructure buildings (point 5.7), it is pointed out that petrol and gas stations can be built only in mixed and economic use zones and on the surfaces of infrastructure systems.

In the section related to river traffic (point 6.1.7.), it is stated that the GUP of the city of Vukovar enables:

- construction and reconstruction of the capacity of the existing Vukovar state river port, as well as its expansion along the planned multi-purpose channel Danube – Sava
- construction of the content of the goods-transport center along the planned multi-purpose channel Danube – Sava
- expansion and reconstruction of existing and construction of new piers on the right bank of the Danube and construction of new piers along the planned multi-purpose channel Danube – Sava
- placement/berthing of floating facilities (water houses, pontoons and other facilities on internal waters) along the banks of the Danube and Vuka rivers.

For the Vukovar state river port, the port area has been established by a special regulation, and for the purposes of reconstruction of the port of Vukovar, the GUP of the city of Vukovar allowed the modification of the existing port area. The same special regulation also established anchorage areas.

Along the banks of the Danube and Vuka rivers, it is possible to set up and berth floating facilities (a house on the water, pontoons and other facilities on the internal waters).

In item 9.2.4., construction, maintenance and development of the area of the multifunctional channel Danube – Sava, it is stated that until the construction of the multifunctional channel Danube – Sava, it is not possible to issue an act for construction in the area of the channel intervention for interventions in the area that do not relate to the channel system.

Until the construction of the mentioned channel, the issuance of acts for construction is possible in the economic purpose zones – ports on internal waters in the part that is included in the spatial plan outside the border of the channel intervention, acts for construction in the economic purpose zones – production in the part that is included in the spatial plan of the channel outside the border of the channel intervention in accordance with the conditions of the competent public law bodies and infrastructure buildings in accordance with the conditions of the competent public law bodies.

In the area covered by the Spatial Plan of Special Characteristics of the Danube – Sava Multipurpose Channel, building permits cannot be issued on the basis of this Plan, but in the part of the area within the border of the channel intervention zone, they can be issued on the basis of this plan.

- **Compliance with the Spatial Plan of Special Characteristics of the Danube – Sava Multipurpose Channel**

The decision on the adoption of the Spatial Plan of Special Characteristics of the Danube – Sava Multipurpose Channel (OG 121/2011) was adopted by the Croatian Parliament on October 21, 2011, which determines the position, conditions and measures for the construction of the channel and associated functions, as well as the conditions of design, use and protection of the area.

Article 37, which defines 'Space for the development and development of economic purposes of ports and piers', and which refers to the port of Vukovar, states a plan for the expansion of the port in the zone of entry of the channel into the Danube and the construction of a new port of Vukovar ('Bršadin').

Article 38, as a follow-up to the previous article, highlighted the possibility of constructing ancillary facilities in the function of ports and piers, open and closed economic and storage areas.

Article 155, within the framework of the navigation measures of the plan, states the possibility of constructing the complex of the new port of Vukovar in other phases of realization, at the same time or after the execution of the channel, and the construction of the channel itself can be realized independently of the dynamics of the construction of the port.

The same article specifies the possibility of expanding the existing Port by constructing a pier and a turning point in the Danube entry zone.

Construction and maintenance projects are carried out every year, and are based on the investment in the port infrastructure of the port of Vukovar in order to qualitatively and technologically modernize the port of inland navigation in order to better meet the existing and expected traffic demand on inland waters. By reconstructing the existing port capacities, building new capacities and expanding the port area, the Port Authority Vukovar wants to technically and technologically modernize the port and connect it to the economic and entrepreneurial zones or integrate it into the logistics-distribution chains (LDCs).

The most significant planned projects in the period 2021-2023 are:

Extension of the port area by land acquisition. According to the 'Previous Feasibility Study for the Expansion of the Port Area in the Port of Vukovar – with different scenarios', which was prepared in

March 2019, the most suitable area for further expansion of the port area is located at the location of the existing factory complex Borovo Plc. and occupies an area of about 18 hectares.

Construction and modernization of passenger and communal ports, for which funds are planned in 2021, 2022 and 2023.

The Port Authority Vukovar currently operates six ports. In the coming period, it is planned to modernize and expand passenger ports in Vukovar and Ilok due to the increased need for mooring of passenger ships, dilapidation of facilities and the overall need to increase passenger safety standards. The construction of four new piers is also planned: the communal pier of the Island of Sports in Vukovar, the communal pier in Batina, the passenger pier in the area of the Vučedol as part of the Development Project of the Vučedol Archaeological Park and the passenger pier in the Nijemci.

10.g. Infrastructure and closer environment – river bank, land part of the port, suprastructure (e.g. piers, floating plants, cranes, etc.) together with their technical characteristics such as depth, width, materials, etc. – marks of the beforementioned on the abovementioned map

The total of the port area is 385.361 m^2, of which 171.837 m^2 refers to the area of the river. The port of Vukovar is an open type port without port basins. It has the largest river gauge of 2,6 meters.

The total length of the coast is 1.772 m; 82 m is a vertical concrete coastline, 1.361 m is a sloping coastline (walled with concrete elements), and 329 m refers to an untreated coastline (mostly earthen, overgrown with shears 3 to 4 m high).

286 m of vertical coastline is additionally designed.

The port area has a total of 8 parking places, with a total area of 4.458 m^2, of which 2.357 m^2 refers to a paved parking places for trucks, and 2.111 m^2 to a paved parking places for cars and other purposes.

In the port area there are 38 bollards, with the following specifications:

Table 8: Bollards

No.	Recorded Detail Point Number	Height of the top of the bollard (m)	Height from the top of the bollard to the concrete (m)	Height of the bottom of the bollard – concrete (m)	Diameter of bollard (m)	E coordinate HTRS96/TM (m)	N coordinate HTRS96/TM (m)	Concessionaire
1	5907	83,54	-0,39	83,15	0,33	695074,09	5027644,90	Remaining part of the Port area
2	4003	83,44	-0,32	83,12	0,33	695010,40	5027684,88	Remaining part of the Port area
3	4004	83,31	-0,50	82,81	0,33	694963,28	5027718,50	Port of Vukovar Ltd.
4	158	80,33	-0,57	79,76	0,33	694954,61	5027730,56	Remaining part of the Port area
5	224	83,31	-0,47	82,84	0,33	694927,06	5027742,29	Port of Vukovar Ltd.

No.	Recorded Detail Point Number	Height of the top of the bollard (m)	Height from the top of the bollard to the concrete (m)	Height of the bottom of the bollard – concrete (m)	Diameter of bollard (m)	E coordinate HTRS96/TM (m)	N coordinate HTRS96/TM (m)	Concessionaire
6	189	83,35	-0,47	82,88	0,33	694904,35	5027754,86	Port of Vukovar Ltd.
7	203	80,00	-0,42	79,58	0,33	694904,73	5027762,81	Remaining part of the Port area
8	286	80,12	-0,47	79,65	0,33	694896,13	5027768,24	Remaining part of the Port area
9	247	83,30	-0,47	82,83	0,33	694888,70	5027764,93	Port of Vukovar Ltd.
10	264	83,28	h1=-0,39	82,89	0,33	694867,70	5027780,20	Port of Vukovar Ltd.
			h2=-0,53	82,75	0,33			
11	272	79,93	-0,38	79,55	0,33	694845,24	5027800,64	Remaining part of the Port area
12	334	83,19	h1=-0,29	82,90	0,33	694826,99	5027806,57	Port of Vukovar Ltd.
			h2=-0,55	82,64	0,33			
13	338	83,31	-0,38	82,93	0,33	694799,07	5027826,15	Port of Vukovar Ltd.
14	383	83,44	-0,51	82,93	0,33	694769,30	5027847,96	Port of Vukovar Ltd.
15	396	83,44	-0,48	82,96	0,36	694742,38	5027867,98	Port of Vukovar Ltd.
16	437	83,40	-0,47	82,93	0,36	694716,51	5027887,28	Port of Vukovar Ltd.
17	664	83,46	-0,55	82,91	0,36	694685,27	5027910,45	Port of Vukovar Ltd.
18	4006	83,96	h1=-0,78	83,18	0,55	694678,24	5027925,80	Remaining part of the Port area
			h2=-1,94	82,02	0,55			
19	4007	83,99	h1=-0,80	83,19	0,55	694642,13	5027952,61	Remaining part of the Port area
			h2=-1,95	82,04	0,55			
20	1985	83,40	-0,45	82,95	0,27	694618,92	5027960,32	Remaining part of the Port area
21	778	83,38	-0,45	82,93	0,27	694594,76	5027978,34	Remaining part of the Port area
22	825	83,42	-0,45	82,97	0,27	694570,74	5027996,18	Remaining part of the Port area
23	863	83,51	-0,53	82,98	0,31	694542,58	5028016,76	Remaining part of the Port area
24	898	83,57	-0,56	83,01	0,33	694514,51	5028037,64	Remaining part of the Port area
25	4091	83,01	-0,52	82,49	0,30	694449,66	5028081,77	Port of Vukovar Ltd.
26	6040	83,05	-0,49	82,56	0,33	694310,24	5028198,67	Nautica Vukovar Ltd.

No.	Recorded Detail Point Number	Height of the top of the bollard (m)	Height from the top of the bollard to the concrete (m)	Height of the bottom of the bollard – concrete (m)	Diameter of bollard (m)	E coordinate HTRS96/TM (m)	N coordinate HTRS96/TM (m)	Concessionaire
27	6041	82,92	-0,29	82,63	0,33	694272,23	5028231,61	Nautica Vukovar Ltd.
28	6042	85,09	-0,52	84,57	0,55	694186,05	5028294,66	Remaining part of the Port area
29	674	84,87	-0,55	84,32	0,52	694127,64	5028357,36	Liquid cargo terminal
30	6045	85,19	-0,57	84,62	0,52	694095,79	5028393,62	Liquid cargo terminal
31	6047	82,87	-0,57	82,30	0,33	694067,27	5028445,05	Liquid cargo terminal
32	6048	85,25	-0,60	84,65	0,55	694056,65	5028439,64	Liquid cargo terminal
33	6049	85,25	-0,50	84,75	0,52	694031,55	5028475,42	Vupik Plus Ltd.
34	6052	83,92	-0,55	83,37	0,33	694024,54	5028497,81	Vupik Plus Ltd.
35	6053	83,82	-0,52	83,30	0,33	693993,94	5028529,32	Vupik Plus Ltd.
36	6054	83,76	-0,45	83,31	0,33	693937,98	5028586,55	Vupik Plus Ltd.
37	6055	83,88	-0,52	83,36	0,33	693909,66	5028615,63	Vupik Plus Ltd.
38	6058	84,53	-0,55	83,98	0,33	693856,58	5028659,26	Vupik Plus Ltd.

There are 10 piers in the port area, as follows:

Table 9: Piers

Pier no.	Description
P1	Pier of Harbour Master's Office
P2	Consent Police
P3	pier for loading / unloading of goods
P4	pier for loading / unloading of goods
P5	pier for loading / unloading of goods
P6	pier for loading / unloading of goods
P7	sand landing pier
P8	pier for loading oil for external traffic (oil sales)
P9	pier for oil loading / unloading and storage
P10	pier for loading / unloading of goods

The company Port of Vukovar Ltd. is equipped with one mobile crane – Gottwald HMK 170E with a load capacity of 63 tons and one portal crane - Ganz DAF350 with a load capacity of 25 tons, thus ensuring the transshipment capacity for transshipment of bulk and general cargo and 20- and 40-foot

containers. It also has two smaller port cranes of 5/6 tons (GANZ), forklifts with a capacity of 2 to 20 tons (a total of 8 forklifts), two loaders, a diesel locomotive and a boat-pusher of 300 hp.

In this area there are also two used portal cranes with a load capacity of 5/6 tons, produced in 1977 and 1987, and a crane Mannesman Dematic HMK 170E (Gottwald), with a capacity of 63 tons. The last one has the special feature that in addition to the possibility of transshipment of heavy cargo, it can also transship general and bulk cargo, as well as all types of containers.

Depending on the type of cargo, the current capacities allow the transshipment of goods from 1.200.000 – 1.500.000 tons per year.

The company Vupik plus Ltd. has a static transshipment tower with a mechanical lift and conveyors, with a capacity of 200 t/h (wheat 0,75 t/m^3) and an automatic system for moving vessels, and holds certificates ISO 9001, ISO 14001, HACCAP and GlobalGap. The company Vupik plus Ltd. has a truck parking lot with a capacity of 50 parking places. In this area there is also a state-of-the-art direct dryer LAW with aspiration and recirculation of hot air, with a capacity of 30 t/h, which uses gas as an energy source. The maximum annual capacity allows for the annual transshipment of goods up to 300.000 tonnes, while the maximum storage capacity is 480.000 tonnes.

The terminal is fully connected to the silo and loading and unloading capacities on the railway, as well as to truck loading and unloading capacities. The purpose of the terminal is the loading, unloading, transshipment, conveyance and storage of bulk cargo (grains and oilseeds).

Nautica Vukovar Ltd. has a floating facility PO-9-VK with a length of 76,50 m and a fuel tank capacity of 3.047 m^3, and a floating facility PO-1-VK with a length of 82,40 m and a fuel tank capacity of 1.334 m^3. Among other equipment, the company has pumps, measuring devices and a scale. The maximum annual capacity is 100.000 tonnes.

The terminal for liquid cargoes has a floating facility of 75 m in length and 4 land fuel tanks R-1 V=3.000 m^3, R-2 V=1.000 m^3, R-2 V=2.000 m^3 and R-2 V=2.000 m^3. Among other equipment, there are pumps and measuring devices, as well as a truck parking lot with a capacity of 10 parking places. The maximum annual capacity is 100.000 m^3, while the maximum storage capacity is 8.000 m^3.

Infrastructure and proximate environment – the river coast, the land part of the port, the suprastructure (e.g. piers, floating installations, cranes, etc.) together with their technical characteristics such as depth, width, materials, etc. are indicated on the map in **Annex 10.e.5** of this Plan.

10.h Connection of ports (water, rail, road, air) – technical characteristics

Until the Homeland War, Vukovar-Srijem County was an important transport and logistics centre, but due to war injuries and extensive damage, primarily to railway infrastructure, this status was lost. Nevertheless, the potential of the County as a transport and logistics centre remains unquestionable. European transport corridors, corridor VII (Danube) and corridor X (Salzburg – Thessaloniki, with the Zagreb section passing through Croatia – Bajakovo) pass through the wider area. While Road Corridor X is in very good condition, the railway needs to be further improved to reach the quality at the level of European standards.

The County area has four exits from the A3 motorway (Babina Greda, Županja, Vrbanja, Lipovac). Cities (Ilok, Otok, Vinkovci, Vukovar and Županja) are interconnected by state roads, while other inhabited places within the county are connected by local and county roads and state roads. Due to the relocation of heavy cargo traffic, faster flow of vehicles in transit and increasing traffic safety, bypasses are needed around the cities of Vinkovci, Vukovar and Ilok (e.g. corridor of the state road D2 passes through the center of the city of Vukovar). Their preparations are underway, bypass construction projects have been started, and some sections have already been built in traffic in public road networks. Corridor X has well built highways. In addition, the connections to Corridor X are well built state roads, so along Corridor X one can talk about a good transport network. Corridor Vc is also a highway, so here a high standard and quality is ensured. The port of Vukovar is located near the intersection of corridor X and corridor Vc and therefore benefits from well-built road infrastructure.

The port of Vukovar is connected to the cities of Županja, Vinkovci and Brčko (Bosnia and Herzegovina) by the M55 road. It is connected by the same road to the E-75 highway that connects Zagreb and Belgrade (Republic of Serbia). It is also connected by the M2 road with the city of Osijek and the VC corridor (Budapest-Osijek-Sarajevo-Ploče).

Corridor X is equipped with the most modern railway line in Croatia, which is electrified, mostly two-track, and allows very high speeds (up to 160 km/h) in some parts, while there are also parts that are yet to be modernized (Dugo Selo–Novska).

The upgrading and electrification of the railway line from Vinkovac to Vukovar with a length of 18,71 kilometers, sections important for international traffic, will also enable an increase in the volume of railway traffic and transshipment of goods in the port of Vukovar and a better connection of railway passenger transport of the Vukovar-Srijem County with the main transport corridors and other counties, and in particular will have a positive impact on the comfort and safety of travel as part of daily passenger migration.

The modernization of the Vinkovci – Vukovar section will enable the speed of trains of maximum 120 km/h, which will reduce the travel time by about 50% and the duration of the journey in passenger transport will be 20 minutes, and in cargo transport 30 minutes. Electrification of the section will ensure economically and energy-efficient and environmentally sustainable rail transport. The capacity of the section will be increased and access to the port of Vukovar will be improved, thus it will be well connected to the Corridor RH1, the former X Pan-European Corridor, located on the TEN-T Rhine-Danube Corridor. The modernisation of the railway line from Vinkovci to Vukovar will contribute to the economic development of the local community and the recovery of the eastern part of Slavonia.

The project of modernization and electrification of the railway infrastructure will reduce the existing port area by approx. 5,8 ha.

The port of Vukovar is the largest river port on Croatian waterways and the only cargo port on the Croatian part of the Danube River. The port extends to the east and west, and good position on the Danube allows the port to be accessible throughout the year regardless of the water level. This includes berthing even during the period of the lowest water level.

The port is located on the Danube River, which is a pan-European corridor VII and is part of the Rhine-Danube core network corridor.

There are no primary airports in the County, and the nearest airport is Osijek. There are several sports and agricultural airfields, including the Borovo airfield in Vukovar, but they have no relevance for the port of Vukovar.

The connection of ports (water, rail, road, air) is indicated on the map in **Annex 10.h.**

10.i Communal connections (electricity, gas, water, waste collection, CDNI, bilge water)

The port area of the port of Vukovar is connected to the existing electricity distribution network and to the existing public water and sewage network.

Waste is collected by public service providers or authorised private service providers.

There is no gas network in the port area, nor are there any special facilities and facilities for receiving bilge water and infrastructures in accordance with the CDNI (Convention on the Collection, Housing and Recovery of Wastes Produced During Navigation on the Rhine and Other Inland Waterways). The port has facilities for ship-generated waste as well as used oil, but this equipment is not currently in operation.

Gas and oil infrastructure, electronic communication infrastructure and sand water infrastructure have been developed in the port area.

The distribution of the communal infrastructure is given in **Annex 10.e1.b**.

10.j Situation regarding clean fuels ('AFID'): LNG/CNG, OPS

Clean fuels are not available in the port area of the port of Vukovar, nor are there any installations or plans currently to support their implementation.

10.k Services within the port (customs, maintenance, other activities, gastronomy)

The services offered by the port of Vukovar and port fees are determined by the Decision on the Amount of Port Fees in Ports and Piers adopted by the Governing Council of the Port Authority Vukovar on the basis of the Law on Navigation and Ports of Inland Waterways (OG 144/21) and the Regulation on the Management and Conduct of Operations of Port Authorities of Inland Waters (OG 100/08, OG 76/12, OG 31/16) and the Order on Criteria for Determining the Amount of Port Charges in Ports and Piers of Inland Waters (OG 124/15, OG 128/15).

- **Waterfront or Pontoon Fee**

A fee for the use of the coast or pontoon shall be paid for a vessel using a public or private port and a public or private port for the purpose of loading and/or unloading cargo or passengers, supplying the vessel with fuel, lubricant, water, foodstuffs. The fee for the use of the coast is calculated and paid on the gross weight of the cargo, i.e. on the loaded/unloaded indivisible tonne of cargo, and in the case of passenger ships it is calculated and paid according to the number of passengers.

The fee for the use of the coast or pontoon is not paid by Croatian public and military vessels.

The taxpayer shall be the owner of the vessel or the shipowner. Fees shall be collected directly, through an agent or other person representing the vessel owner or the shipowner. The shipowner, his agent or other person representing the shipowner shall provide credible data on the cargo or passengers to the Port Authority in writing (waybill, bill of lading, etc.).

The fee for the use of the coast is calculated and paid on the gross weight of the cargo, i.e. on the loaded/unloaded indivisible tonne of cargo.

The fee for containers shall be expressed in TEU.

The fee for passenger vessels is calculated and paid according to the number of passengers.

The fee for the use of the coast or pier for passenger vessels shall be determined by the number of passengers embarking or disembarking from the vessel in the case of passenger vessels carrying passengers on panoramic waterways.

If a passenger vessel carrying passengers with panoramic waterways disembarks or embarkes fewer than 10 passengers, a fee for 10 passengers may be imposed. If the cruise liner carries fewer than 30 passengers, a fee for 30 passengers may be imposed.

The fee for the use of the coast or pier shall apply to vessels attached to the coast or passenger pontoon, and vessels attached to the flank of another vessel, provided that other vessels may be attached to their vessel. If other vessels cannot be tied to the coast or passenger pontoon, the fee may be increased up to 100% of the basic fee.

The cancellation fee for a reservation in international navigation is not payable in case of extraordinary circumstances and force majeure (in the event of death, illness or to provide medical assistance to persons on board, in case of adverse meteorological conditions — storm, ice, low or high water level or suspension of navigation by the competent authorities and if there is any threat to the persons on board or to the vessels).

The fee for vessels using the coast or pier only for the purpose of supplying fuel, lubricant, water and food shall be determined according to an indivisible meter length of the vessel over everything.

Table 10: Table of the amount of the fee for the use of the coast/pontoon

No.	Basis for the calculation of the fee	Unit	Per measure unit of vessels (HRK)
CARGO VESSELS			
1	**LOADING/UNLOADING OF BULK CARGOES**		
	a) Coal, iron ore and other ores, clay, kaolin, bitumen, shamot, cement, coke, petrolcoke	indivisible tone	2,30
	b) Artificial fertilisers, phosphates, salts, sulphur	indivisible tone	2,30
	c) scrap iron and other scrap	indivisible tone	2,30
	d) Gravel, natural gravel and stone aggregates, iron slag, sand	indivisible tone	1,00

No.	Basis for the calculation of the fee	Unit	Per measure unit of vessels (HRK)
	e) Cereals and oilseeds in grain and in the usual state after industrial processing	indivisible tone	2,30
	f) Other bulk cargoes	indivisible tone	2,30
2	**LIQUID CARGO LOADING/UNLOADING**		
	a) Petroleum and petroleum products, bioethanol, ethanol	indivisible tone	3,20
	b) Wine, vinegar, wine distillates, liquid bitumen, edible oils, lubricants and fats of vegetable and mineral origin, latex, chemicals and molasses	indivisible tone	3,0
	c) Other bulk cargoes	indivisible tone	2,80
3	**GENERAL CARGO LOADING/UNLOADING**		
	a) Concrete iron, pipes, corner iron, sheets in packages, reels, steel billets, ingots, crude iron	indivisible tone	2,50
	c) Wood, including logs, cut timber, wood products	indivisible tone	2,50
	d) Packed cargo (packages, cartons, crates)	piece	2,50
	e) Palletized cargo	indivisible tone	2,50
	f) Cargoes in bags	indivisible tone	2,50
	g) Vehicles, motorcycles	indivisible tone	22,20
	h) Containers empty	TEU	11,00
	i) Containers full	TEU	52,00
	j) Heavy cargo over 40 t	indivisible tone	10,00
	k) Other general cargoes	indivisible tone	2,50
4	**LOADING/UNLOADING OF DANGEROUS GOODS (EXCEPT FUEL)**	indivisible tone	15,00
5	**VESSEL SUPPLY**	meter	10,00
PASSENGER VESSELS			
1	ACCEPTANCE/DISPATCH OF PASSENGERS IN INTERNATIONAL NAVIGATION	passenger	15,00
2	ACCEPTANCE/DISPATCH OF PASSENGERS ON DOMESTIC NAVIGATION	passenger	2,00
3	VESSEL SUPPLY	meter	10,00
4	RESERVATION CANCELLATION	vessel	1.500,00

- **Stowage**

The stowage shall be paid for a vessel using a public port or a public pier for purposes other than coastal operations or when using a port for those services for longer than the time required for

departure after the completion of the transshipment operations or, for a passenger vessel, after the expiry of the time for port stay according to the published (announced) timetable.

For vessels staying in the port for storm, repair, accident or due to the closure of the waterway, a stowage of 50% of the basic amount may be set.

For vessels permanently located in the port for the purpose of carrying out economic activities, the stowage may be determined on the basis of a separate contract, increased up to 100% of the maximum amount.

For vessels carrying out boxing used by the concessionaire of the port or pier, no stowage shall be charged.

Table 11: Table of stowage

STOWAGE		
ITEM	**BASIS**	**AMOUNT (HRK)**
Cargo vessels	According to the indivisible day of 24 hours and the indivisible meter of the vessel	30,00 x 30,00 x 30,00 m number of days
Ships on cruise journeys in international navigation	According to the indivisible day of 24 hours and the indivisible meter of the vessel	50,00 x 50,00 x 50,00 m number of days

Berth fee

The berth fee is paid by the vessel using the public pier permanently (annually) or occasionally (daily or monthly).

A berth fee of up to 50% of the full amount may be imposed on vessels in scheduling.

A user of a public pier who does not own a vessel and has booked a berth in a public pier shall pay the berth fee on a flat-rate basis. If a vessel is in possession or sold during the year, the lump sum will be calculated in proportion to the number of days in the year for which it has a reservation.

Table 12: Table of the amount of the berth fee

PERMANENT BERTH (ANNUAL)			
No.	**ITEM**	**BASIS**	**AMOUNT (HRK)**
1	Vessels long up to 5 m	vessel	600,00
2	Vessels from 5 to 12 m in length	vessel	900,00
3	Vessels from 12 to 20 m in length	vessel	1.200,00
4	Vessels long over 20 m	indivisible meter due to the vessel	150,00 x m
PERIODICAL BERTH (MONTHLY)			

PERMANENT BERTH (ANNUAL)			
No.	**ITEM**	**BASIS**	**AMOUNT (HRK)**
1	Vessels long up to 5 m	vessel	200,00
2	Vessels from 5 to 12 m in length	vessel	300,00
3	Vessels from 12 to 20 m in length	vessel	400,00
4	Vessels long over 20 m	indivisible meter due to the vessel	50,00 x m
PERIODICAL BERTH (DAILY)			
1	Vessels long up to 5 m	vessel	100,00
2	Vessels from 5 to 12 m in length	vessel	200,00
3	Vessels from 12 to 20 m in length	vessel	300,00
4	Vessels long over 20 m	indivisible meter due to the vessel	30,00 x m

In the port area of the port of Vukovar, the company Port of Vukovar provides services in the field of port activity - berthing and unberthing of ships, yachts, fishing, sports and other boats and vessels, loading and unloading of goods, storage and transport of goods and other materials, embarkation and unloading of passengers and other economic activities that are in direct economic, traffic or technological connection with these.

In addition to the transshipment and storage part, Port of Vukovar Ltd. is developing a program of agency services, both for merchant ships and cruise ships, which have significantly increased their presence on this part of the Danube in the last few years. The Company also provides cargo forwarding services.

The Customs Administration is an administrative organization within the Ministry of Finance that prepares expert bases for determining economic and development policy in the field of the customs and excise system and the system of customs and non-tariff protection. For the port area of the port of Vukovar, the Regional Customs Office Osijek, CO Vukovar is in charge, which performs professional tasks related to the direct implementation of all control and customs security measures in the area of jurisdiction as well as in the entire customs territory of the Republic of Croatia specified in the Customs Service Law and other regulations.

Harbour Master's Office are regional units of the Ministry which do not have the capacity of a legal entity. Harbour Master's Office shall perform the tasks of supervising the safety of navigation, saving human lives and property on inland waters, carrying out investigations of navigational accidents, inspection tasks, tasks of determining the ability of boats to sail, tasks of determining the professional qualifications of crew members for acquiring the profession in inland navigation, technical and other professional tasks of navigational safety which are placed under their competence by this Law or other regulations.

The Harbour Master's Office shall also perform administrative tasks within their competence, and in particular the registration and deletion of vessels, and in this regard shall keep the prescribed official

records, perform the tasks of issuing the prescribed documents and books, personal documents of crew members, resolve misdemeanour procedures and perform other administrative tasks that are placed under their jurisdiction by this Law or other regulations. In the port area of the port of Vukovar, the Harbour Master's Office Vukovar operates, based in Vukovar.

Maintenance services and gastronomic services are not available in the port area, but are used for the same services of external service providers in the wider area of the city of Vukovar.

10.l Key indicators of procedures for environment, energy and CO2 circumstances

In the port area of the port of Vukovar, no key indicators of procedures for the environment, energy and CO2 circumstances have been set.

The Port Authority Vukovar is committed to the following quality and environmental policy:

Focus on customer needs and customer satisfaction with the work performed are the most important values according to which the Port Authority Vukovar measures and determines its overall performance. In order to achieve, maintain and strengthen these values, the Port Authority Vukovar permanently undertakes:

- employ professional and ambitious staff who will have opportunities and obligations to constantly develop and improve
- obtain state-of-the-art information and communication resources and other equipment, infrastructure and environment for pleasant work
- cultivate and develop partnership relationships with suppliers
- offer users optimal and complete solutions
- implement solutions that fully support the requirements and needs of service users
- apply and improve the effectiveness of the quality and environmental management system based on the requirements of the international standard ISO 9001 and ISO 14001 and strive to overcome the level of these requirements
- preventive activities reduce the possibility of sudden pollution of the river
- comply with applicable legal regulations in the field of environmental protection
- set ambitious, measurable and achievable quality and environmental objectives,
- the environmental policy is also familiar with the organizations that work with the Port Authority.

Every employee of the institution shall be familiar with quality control, it shall understand and accept it as a permanent principle in its own work.

10.m Data on transshipment quantities and other relevant key indicators (historical data, forecasts,..)

By examining the movements of the realized cargo of the port of Vukovar in the last 14 years, it can be seen the lack of traditional cargoes in the port that used to be particularly prominent; such as iron ore, sugar in bags and the general lack of certain general types of cargo, such as processed agricultural products, wood and wood products.

In recent years, the market for mineral fertilisers and raw materials produced and exported to EU countries has been significant. The largest producer of mineral fertilizers in the Republic of Croatia is Petrokemija Plc. Kutina, which is also the leading company in the region with the production of complex mineral fertilizers of 1,2 million t per year, 66% of which is intended for export, mainly to the countries of the Danube region and transported via Port of Vukovar Ltd.

The second most important client for the port is the company Adriatica Dunav Ltd. Vukovar, which produces blends – composite mineral fertilizers are produced mainly from raw materials imported from Eastern Europe. Their annual production amounts to 90.000 t and the main raw materials are transshipped to the Port of Vukovar Ltd., including the part of finished products that is also exported through the port, which together amounts to 9% of the company's total turnover.

In the last three years, the artificial fertilizers market accounts for an average share of 30% of the total port turnover.

Among other cargoes important for the port of Vukovar, the turnover of coal (average share of 24% in the last three years), wire in the reel (average share of 7% in the last three years), grains (average share of 7% in the last three years), building block in pallets (average share of 7% in the last three years), sheets in packages (average share of 7% in the last three years) and manure in bags (average share of 6% in the last three years) is particularly prominent.

Since 2016, the Port has also been delivering combine harvesters (60 pcs) from the factory Same Deutz-Fahr Harvesters from Županja to the countries of the Danube region, which in 2017 amounted to 97 pcs.

Regarding the foreign market, it is very important to point out the nearby market of Bosnia and Herzegovina (BA), where the Arcelor Mittal Company from Zenica is located, which uses the services of the Port when the price ratio on the market of non-ferrous metallurgy is favorable, whereby significant competitiveness is created by the ironworks in Smederevo (Serbia). In 2017, the company generated 14% of the traffic in the total traffic of the port.

Also, several companies from BA, such as Sisecam Soda Lukavac and Ingram Plc. Srebrenik, import anthracite through the port of Vukovar for the factory in Tuzla and the region, since it is a deficient high-calorie coal in the territory of BA. However, it should be pointed out that anthracite is transshipped in the port of Vukovar only when the Sava River is not navigable and the cargo cannot be delivered to the port in Brčko.

The most important destinations for cargoes passing through the port of Vukovar are the ports of Krems, Baja, Smederevo, Turnu Severin, Rousse, Vidin, Giurgiu, Galati, Constanta and Izmail, while the

most important points of departure are Izmail, Reni, Constanta, Galati, Giurgiu, Rousse, Budapest and Krems.

Below is an overview of traffic in the port of Vukovar in the period from 2007 to 2020.

Table 13: Cargo turnover in the port of Vukovar in the period from 2007 to 2020

Description	Year													
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Packed cargoes	**10.984**	**4.997**	**12.759**	**245**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**43.941**	**70.247**	**44.570**
Building block in pallets	0	0	0	0	0	0	0	0	0	0	0	24.626	22.245	19.280
Sugar in pallets	0	0	0	0	0	0	0	0	0	0	0	3.679	6.193	0
Fertilizer in bags	0	0	0	0	0	0	0	0	0	0	0	9.359	34.691	20.633
Sugar in sacks	10.984	4.997	12.759	245	0	0	0	0	0	0	0	3.679	0	0
Heavy soda	0	0	0	0	0	0	0	0	0	0	0	2.598	7.118	4.657
Bulk cargo	**672.846**	**189.121**	**92.917**	**190.211**	**260.596**	**338.223**	**369.926**	**290.117**	**390.508**	**233.001**	**263.079**	**271.458**	**225.912**	**188.470**
Basic Field Products	92.182	41.630	20.811	14.312	36.129	32.450	110.846	81.766	125.223	78.857	63.760	0	0	0
Coal	42.927	39.751	7.052	12.833	36.163	0	0	12.434	0	12.130	68.128	66.219	88.471	85.678
Koks	48.914	0	0	2.983	0	28.111	17.363	0	0	0	0	0	0	0
Fertilizers	41.514	41.648	28.742	131.525	169.486	277.662	241.717	195.917	265.285	142.014	131.191	174.332	81.631	44.137
Iron ore	447.309	66.092	36.312	28.558	0	0	0	0	0	0	0	6.890	22.146	14.060
Iron cone	0	0	0	0	0	0	0	0	0	0	0	0	0	2.786
Cereals	0	0	0	0	0	0	0	0	0	0	0	24.017	27.813	14.946
Oilseeds	0	0	0	0	0	0	0	0	0	0	0	0	0	26.863
Gravel, natural gravel etc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salt	0	0	0	0	0	0	0	0	0	0	0	0	5.851	0
Liquid cargo	**8.905**	**25.174**	**18.520**	**16.831**	**0**	**25.034**	**8.322**	**11.053**	**12.243**	**11.184**	**9.246**	**0**	**0**	**0**
Bio Fuel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals	0	0	0	0	0	0	0	0	0	0	0	0	0	0

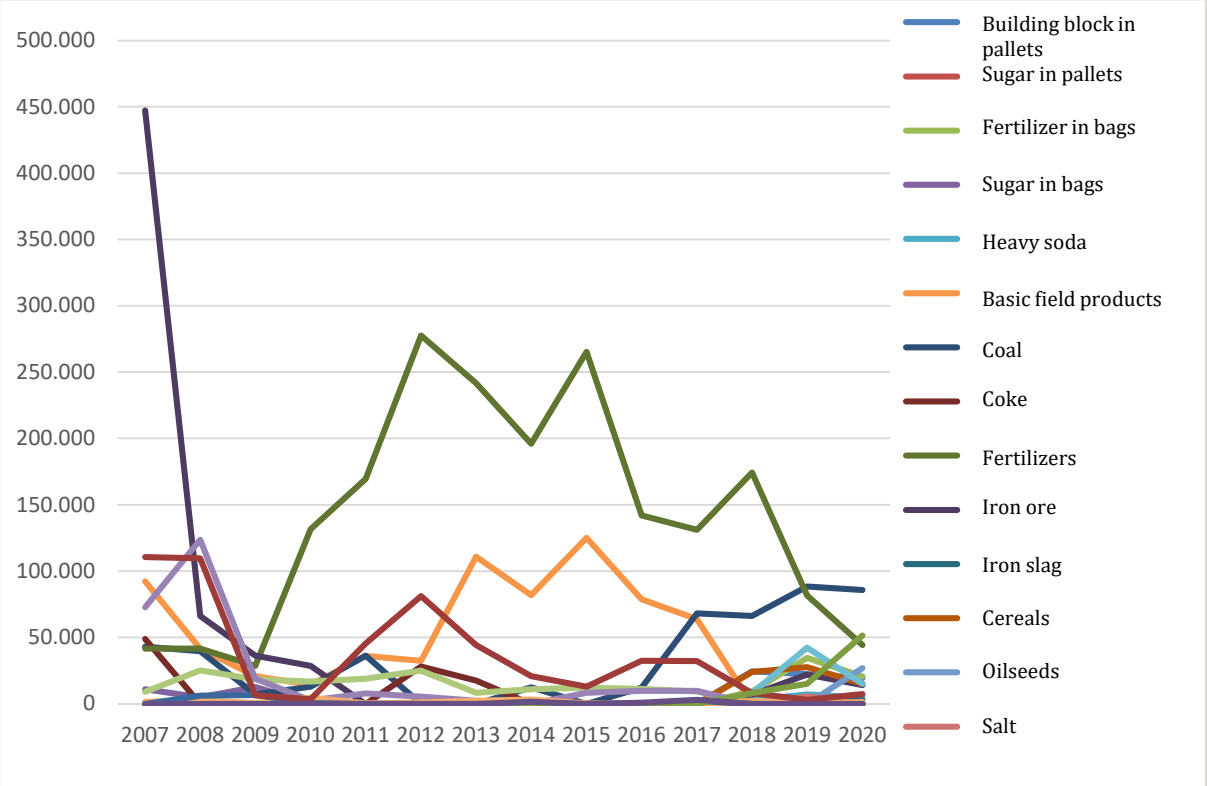
Description	Year													
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Petroleum products / fuel	8.905	25.174	18.520	16.831	18.818	25.034	8.322	11.053	12.243	11.184	9.246	0	0	0
General cargo	185.011	242.056	32.265	11.218	53.421	87.672	48.778	25.684	21.553	42.916	47.142	26.037	60.828	75.204
Construction Material	72.634	123.834	18.851	2.392	7.698	5.345	2.260	0	8.266	9.794	9.657	0	0	0
Ingot Steel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sheets in packages	0	0	0	0	0	0	0	0	0	0	0	7.944	42.458	15.042
Teška opterećenja	1.567	2.525	497	4.868	313	1.063	2.370	3186	305	0	0	2.205	92	1.215
Processed field products	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iron/raw iron	0	6.040	6.644	535	0	0	0	0	0	0	2.229	0	0	0
Steel, iron and steel plates	110.810	109.657	6.273	3.423	45.410	81.264	44.148	20926	12.982	32.360	32.191	7.944	3.188	7.347
Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood and Wood Products	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wire in reel	0	0	0	0	0	0	0	0	0	0	0	7.944	15.090	51.600
Other	0	0	0	0	0	0	0	1572	0	762	3.065	0	0	0
Containers (tonne)	0	0	60	0	0	0	0	0	0	0	0	0	0	0
Ro-Ro traffic	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	877.746	461.348	156.461	218.505	314.017	450.929	427.026	326.854	424.304	287.101	319.467	341.436	356.987	308.244

By insight into the structure of traffic in the port of Vukovar in the period from 2007 to 2020, it is evident that during the analysed period, according to the category, the traffic of bulk cargo prevails and that it accounts on average for 75% of the total annual turnover. Its highest value was reached in 2015, when it represented 92% of the turnover in the analysed structure, and the lowest value was reached in 2008, when bulk cargo represented 41% of the turnover in the analysed structure. Within this category, the turnover of manure (annual average share of 51% in the bulk structure), coal (annual average share of 14% in the bulk structure) and iron ores (annual average share of 13% in the bulk structure) is particularly prominent.

Apart from bulk cargo, it is also necessary to highlight the importance of general cargo traffic, which on average accounts for 17% of the total turnover during the analysed years. Its highest value was reached in 2008, when it represented 52% of turnover in the analysed structure, and its lowest value was reached in 2015, when bulk cargo represented 5% of turnover in the analysed structure. Within this category of cargo, the turnover of steel, iron and steel plates (annual average share of 51% in the structure of general cargo) and construction materials (annual average share of 20% in the structure of general cargo) is particularly prominent.

The following graph shows the turnover by type of cargo in the period from 2007 to 2020.

Graph 1: Movement by individual types of cargo in the period from 2007 to 2020



Looking at the previous graph, it can be seen that in 2007 the absolute value prevailed in the iron ore trade, which amounted to 447.309 tonnes. During that year, there was a sharp drop in

turnover, whereby the turnover of iron ore in other years did not exceed the level of 67.000 tonnes per year.

In the period from 2010 to 2018, fertilizer traffic prevails, which ranges from 81.000 tons to 131.000 tons per year and as such has the most significant impact on the movement of the total traffic generated in the port of Vukovar.

Since 2017, a sharp increase in coal turnover can be observed, 4,7 times higher than in 2016. The continuation of the growth of the said cargo can also be observed in 2019, when the coal turnover exceeded the level of 88.000 tonnes and thus the eight-year predominance of fertilizer turnover was overtaken, whose turnover decreased by 53% in the same year.

In 2020, among the three main cargoes that make up the most significant traffic in the port of Vukovar, the wire in the reel stands out, with a turnover of 51.600 tons and a growth of 2,4 times more than in 2019.

Estimated volume of traffic

According to statistics at the level of the European Union, the transport of goods by inland waterways oscillates from year to year and ranges from 505 million tonnes to 554 million tonnes. What characterized the transport of goods by inland waterways after the 2008 economic crisis was a steady fluctuation in the increase and decrease in demand with high amplitudes.

In 2020, a decrease in total river traffic of 3,1% can be observed compared to 2019. This decline has been the largest since 2012, and it was particularly pronounced in international traffic, which in 2020 decreased by 4,3% on the territory of the European Union compared to the same type of traffic in the previous year. The impact of lockdown caused by the COVID-19 pandemic in the first half of 2020, as well as disruptions that occurred directly in supply chains, is particularly highlighted as the main reason for this decline.

Transport is also characterized by significant fluctuations in the quarters, from which it follows that it is not possible to determine whether there is an impact of seasonality on traffic in inland waterways.

Table 14: Total traffic of goods in river transport on the territory of the European Union, in the period from 2017 to 2020 (data in thousands of tonnes)

COUNTRY	TOTAL TRAFFIC			2020				GROWTH SHARE 2019-2020 (%)			
	2017	2018	2019	NATIONAL	INTERNATIONAL	TRANSIT	TOTAL	NATIONAL	INTERNATIONAL	TRANSIT	TOTAL
EU-27	554.230	507.393	521.750	255.916	249.611		505.526	-1,9	-4,3		-3,1
BELGIUM	201.129	151.972	155.695	36.024	115.320	4.787	156.131	5,1	-0,4	-14,8	0,3
BULGARIA	16.247	15.462	18.449	811	3.004	15.109	18.924	-24,2	1,2	4,8	2,6
CZECH REPUBLIC	510	390	779	318	80		397	-52,5	-26,6		-49
GERMANY	222.731	197.904	205.066	49.986	127.509	10.528	188.022	-5,6	-8,5	-17,4	-8,3
FRANCE	63.247	59.582	64.207	28.829	22.216	4.934	55.979	-8,3	-13,9	-29,1	-12,8
CROATIA	6.221	5.182	6.491	91	856	6.129	7.007	40	14,1	8	9
ITALY	434	355	288	859			859	198,3			198,3
LITHUANIA	15	13	12	9			9	-25			-25
LUXEMBOURG	6.157	5.741	6.433		839	4.916	5.755				-10,5
HUNGARY	8.414	6.926	8.592	105	6.182	2.516	8.803	-13,9	15,7	-19,5	2,5
NETHERLANDS	365.786	357.277	357.069	120.773	185.073	43.160	349.006	1,5	-3,5	-6,5	-2,3
AUSTRIA	9.620	7.202	8.512	595	6.050	1.602	8.247	134,3	-6,2	-11,3	-3,1
POLAND	3.604	3.126	2.870	2.103	414	1	2.517	-10,4	-20,1	-75	-12,3
ROMANIA	29.043	29.714	33.261	13.978	13.329	3.211	30.518	-18,7	18,1	-32,9	-8,2
SLOVAKIA	6.896	5.567	6.430	19	1.415	4.570	6.004	-36,7	8	-10,2	-6,6
FINLAND			527	512			512	-2,8			-2,8
SWEDEN	324	686	614	904			904	47,2			47,2
GREAT BRITAIN	4.067	3.466	6.446								

Source: Author's work according to data available on the Eurostat website (https://ec.europa.eu/eurostat) (consulted on 03/06/2022)

By analysing the total transport of goods by individual member states of the European Union, it can be seen that the most significant share of the European market is occupied by the Netherlands, Germany and Belgium. Of these countries, only Belgium did not see a decline in total traffic in 2020, which is primarily due to an increase in national traffic, but also a slight decrease in international transport.

Looking at the turnover of total goods in the countries of the European Union individually, it can be observed that the total turnover in 2019, compared to 2017, increased in Sweden (by 89,5%), the United Kingdom (by 58,5%) and the Czech Republic (by 52,7%). Among the other countries that achieved a total increase in goods turnover, it is also worth noting the increases in Romania (by 14,5%) and Bulgaria (by 13,6%).

The achievement of such growth was particularly affected by the increase in turnover in the following categories:

- Coke and refined petroleum products: by 357,6% in the UK, 12,3% in Romania and 9,4% in Bulgaria
- Metal ores and other mining and stone products: by 56,4% in the Czech Republic, 17,1% in Romania and 7,4% in Bulgaria
- Chemicals, chemical products and man-made fibres: by 176% in the Czech Republic, 47,4% in Romania and 3,2% in Bulgaria
- Basic metals and finished metal products, except machinery and equipment: by 18,9% in Romania and 32,2% in Bulgaria
- Machinery and equipment: by 12,2% in Romania and 34,4% in Bulgaria

According to the way the cargo was packed, in the analysed period, on average 10% of the cargo was transported in containers, while the rest of the traffic took place in other forms of packaging. It should be noted, however, that the transport of goods in containers tends to grow.

Given that previous cargoes are present in the port of Vukovar, encouraging growth figures at the global level and increasing demand are also expectations in the increase of cargo quantities in the port of Vukovar.

Coal as one of the significant cargoes of the port is closely related to the long-standing cooperation with the company Sisecam Soda Lukavac Ltd. (BA), which is the only producer of soda in the territory of the former Yugoslavia and part of the group that is among the top 10 world producers in the industry. Given the growing production as well as the inability of the Brčko port to receive significant coal traffic, it is assumed that the quantity of cargo passing through the Vukovar port will grow in accordance with global demand, i.e. at a rate of 2% per year.

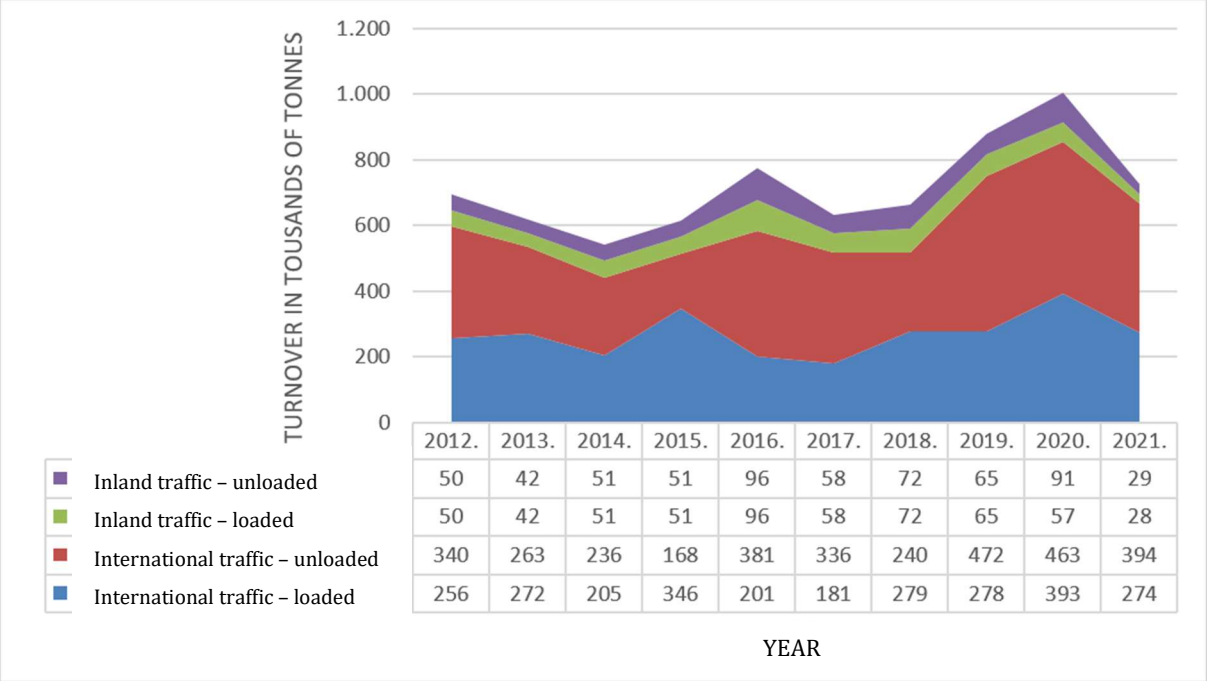
Since the market of sheet metals, steel concrete ribbed iron, steel profiles, etc. of steel products is in recovery and growth, as confirmed by the abovementioned figures, it is reasonable to expect the continued moderate growth of transshipments of this type of cargo.

Old iron, as a type of cargo, is one of the fastest growing at the EU level, and considering the signed contracts with companies engaged in the collection and trade of such products, a monthly transshipment of 2.000 to 4.000 tonnes is planned with a significant annual growth of 10%.

The movement of goods on inland waterways in the Republic of Croatia is characterized by fluctuations that largely follow European trends with certain local specificities. In 2020, the largest Croatian port by tonnage of transhipped cargo is the port of Vukovar, with 56% share in the total traffic. The port of Osijek, with a share of 20%, the port of Slavonski Brod, with a share of 18%, and the port of Sisak, with a share of 5%. The port of Slavonski Brod is mostly based on the transport of oil and refinery products.

The following graph shows the traffic of goods in ports on inland waterways of the Republic of Croatia, in the period from 2012 to 2021.

Graph 2: Turnover of goods in inland waterway ports – Republic of Croatia in the period from 2012 to 2021



Source: Author's work according to the data available on the website (https://podaci.dzs.hr/hr/statistika-u-nizu/) (consulted on 06/06/2022)

By insight into the movement of traffic in ports on inland waterways in the Republic of Croatia, it is evident that the largest turnover occurred in 2020, when a total of 1.004 thousand tons of goods were loaded/unloaded. The lowest turnover of goods was recorded in 2014, when a total of 543 thousand tons of goods were loaded/unloaded. In the years presented, the total traffic is particularly affected by the loading and unloading of goods resulting from international traffic, which in the analysed period represents 75% to 92% of the total annual traffic.

The following table shows the structure of traffic of goods in inland waterway ports in 2020.

Table 15: Structure of traffic of goods in inland waterway ports – Republic of Croatia in 2020

TYPE OF GOOD	TOTAL TURNOVER (tonnes)	SHARE (%)
Products of agriculture, hunting and forestry; fish and fish products	2.334.444	33,0
Coal and lignite, crude oil and natural gas	590.839	8,3
Metal ores and other mining products, peat, uranium and thorium	1.552.134	21,9
Foodstuffs, beverages and tobacco	172.974	2,4
Wood and articles of wood and cork (excluding furniture); articles of straw and knitted or crocheted fabric; wood pulp, paper and paper products; printed materials and recorded media	10.846	0,2
Coke and refined petroleum products	666.362	9,4
Chemicals, chemical products and man-made fibres, rubber and plastic products, nuclear fuel	835.756	11,8

TYPE OF GOOD	TOTAL TURNOVER (tonnes)	SHARE (%)
Other non-metallic products	23.902	0,3
Metallic fabrications and articles thereof, except machinery and equipment	693.974	9,8
Machinery and equipment n.m.e.; office equipment and computers; electrical machinery and apparatus n.m.e.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; clocks and clocks	37.028	0,5
Transport equipment	29.586	0,4
Furniture and other manufactured goods n.m.e.	125.921	1,8
Equipment and materials for the transport of goods	2.980	0,0
UKUPNO	**7.076.746**	**100,0**

Source: Author's work according to the data available on the website (https://podaci.dzs.hr/hr/statistika-u-nizu/) (consulted on 06/06/2022)

It is evident that in 2020, in the structure of traffic of goods in ports on inland waterways in the Republic of Croatia, in 2020, prevails turnover:

- products of agriculture, hunting and forestry; fish and fish products (33% of total turnover)
- metal ores and other mining products, peat, uranium and thorium (21,9% of total turnover)
- chemicals, chemical products and man-made fibres, rubber and plastic products, nuclear fuel (11,8% of total turnover)
- metal creations and manufactured metal products, except machinery and equipment (9,8% of total turnover)

Turnover in these categories together accounts for 77% of total turnover in 2020, while turnover in other categories of the analysed structure individually does not exceed a share of 10%.

Due to the exceptional agricultural potential in the surroundings, cereals and oilseeds are certainly one of the loads expected to be permanent in the port of Vukovar. Likewise, given the current situation in Ukraine, as one of the major grain producers and exporters, higher growth rates of this cargo can be expected in the coming years.

The absence of certain cargoes in the port of Vukovar is certainly a consequence of the infrastructure deficiencies of the port area itself, primarily conditioned by spatial constraints. The confined space of the port was conditioned by the lack of open storage areas for the functioning of the general cargo terminal and container terminal, the lack of closed (covered) storage areas for the handling of weather-protected material, the lack of open parking lots and Ro-Ro ramps and the lack of back-end logistics centres and industrial zones, modelled on successful ports from Central Europe.

The connections between missing infrastructure and industrial-economic development are also a significant factor in the development of the port itself. The plans for the development of the port

of Vukovar and its infrastructure are based on real demand and the creation of assumptions for the unhindered acceptance of potential future cargoes.

The most significant customer of the services of the port of Vukovar is the company Petrokemija Plc, which plans to transfer an average of 300.000 tons of cargo transported through the port of Šibenik to the Port of Vukovar Ltd. with the opening of the eastern market, which represents a significant increase in the volume of business.

The global demand for mineral fertilisers (N, P2O5 and K2O) for 2022 and the forecasts of demand forecasts for the period from 2016 to 2022 by the Food and Agriculture Organisation (FAO) are summarised in the table below. The total demand for fertilisers is estimated at 185,06 million tonnes in 2016 and is projected to reach 200,92 million tonnes by the end of 2022, with an average annual growth of 1,4% in the following years. N, P2O5 and K2O demand growth is projected at rates of 1,0%, 1,7% and 2,1% per year for individual nutrients from 2015 to 2020.

Table 16: World demand for the use of mineral fertilizers, 2016-2022 (data in thousands of tonnes)

Year	2016	2017	2018	2019	2020	2021	2022
Nitrogen (N)	105.148	105.050	105.893	107.424	108.744	110.193	111.591
Phosphate (P_2O_5)	44.481	45.152	45.902	46.587	47.402	48.264	49.096
Potassium (K_2O)	35.434	36.349	37.171	37.971	38.711	39.473	40.232
Total	**185.063**	**186.551**	**188.966**	**191.982**	**194.857**	**197.930**	**200.919**

Source: Food and Agriculture Organization (FAO): World Fertilizer Trends and Perspectives until 2022, Rome, 2019

FAO also expects to see an increase in global fertiliser production capacity over the coming years, and given the global disproportion of supply and demand with current production capacity lagging behind demand, it can be expected that there will also be good export potential for domestic producers who are also the largest customers of port services. For this reason, planned exports via the port of Vukovar can be forecasted at an annual growth of 2%.

According to the Global Agricultural Productivity Report 2021, total food production, as the main indicator of agricultural production, is growing by 1,36% globally (annual average from 2010 to 2019). Such growth is 21,4% lower than the target annual growth size (1,73%), which is needed to meet the projected global demand by 2050.

Agricultural productivity is not only about higher production or achieving higher yields, but also about making the best use of natural resources, reducing costs for farmers, reducing losses and waste, and achieving lower prices for agricultural products.

For this reason, it is clear that investments in agricultural production will continue, which means bigger investment in technology and bigger global trade, and which will have positive effects on the operations of the port of Vukovar.

Port of Vukovar Ltd. has inquiries of the Company Same Deutz-Fahr Železnica Ltd. Županja, which is interested in import and export of agricultural machinery, and for which there are no current conditions in the port of Vukovar due to lack of Ro-Ro ramp. The planned annual quantity of cargo is 200-300 machines, and in line with global trends, it is expected that trade in agricultural products and agricultural machinery will continue to grow in the future, and therefore it is reasonable to assume further growth of interest in the service of transport of goods of this type.

Significant enquiries to the port also come for the transport of special and heavy cargoes, such as the transformers of the Company Končar elektroindustrija Plc., which require the equipment of a crane that is not available in the port today. The possibility of transshipment of this type of cargo would contribute to a significant improvement in competitiveness for the port of Vukovar, since the surrounding ports do not have the possibility to offer such a service.

According to the Croatian Energy Market Operator (HROTE), there are a total of 42 biomass power plants and 41 biogas power plants in the Republic of Croatia, the most significant of which are located in the territory of eastern Croatia.

The number of producers of energy from renewable sources continues to increase, and this will increase their connection to the national network, which is also encouraged by the energy regulation of the Republic of Croatia. However, such a trend of development and the fact that biomass power plants concluded long-term contracts with Hrvatske šume Ltd. on the supply of biomass guaranteed the market and procurement of raw materials and the market of energy sales.

Figure 5: Bioelectric plant with woodchip storage

The port of Vukovar so far had no business connections with plants operating in the territory of Slavonia and Baranja, since they are supplied from domestic biomass sources, guaranteed under long-term contracts on raw material insurance. However, in 2019, there was a shift in the policy of Hrvatske šume Ltd. and many contracts on raw material supply were terminated, which means an increase in demand for biomass products, and thus the import market is naturally opened, in which port of Vukovar becomes a natural partner for importing raw materials from Eastern European countries.

The demand for imports can also be generated by other biomass market participants, such as pellet factories, which will also be pressured by increased demand.

As biomass does not currently exist as a cargo in the port of Vukovar, according to the optimistic scenario elaborated in the Pre-Feasibility Study - the development of the port of Vukovar as a biomass hub, an annual cargo volume of 126.000 tonnes per year is projected.

In addition to these cargoes, containers should not be neglected due to the global containerization of transport and the ambitious plans of the port of Constanta (Romanian ports on inland waters generate an annual growth of 133% for this type of cargo), which will certainly divert a significant part of world trade to the inland waters of the lower Danube region, which is why it is expected that traffic will spill over to all ports along the Danube, including the port of Vukovar.

Looking at the micro and macro region, the port of Vukovar does not have significant competition for previously processed types of cargo.

The following table shows the forecast of traffic in the port of Vukovar for the next 25 years.

Table 17: Traffic forecast in the port of Vukovar

Description	Year												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Packed Cargo	**42.919**	**47.000**	**48.360**	**49.764**	**51.214**	**52.710**	**54.256**	**55.852**	**57.500**	**59.203**	**60.962**	**62.779**	**64.656**
Building block in pallets	20.243	21.000	21.840	22.714	23.622	24.567	25.550	26.572	27.635	28.740	29.890	31.085	32.329
Fertilizer in bags	18.020	26.000	26.520	27.050	27.591	28.143	28.706	29.280	29.866	30.463	31.072	31.694	32.328
Heavy soda	4.656	0	0	0	0	0	0	0	0	0	0	0	0
Bulk cargo	**239.514**	**211.550**	**218.121**	**225.012**	**232.247**	**239.851**	**247.850**	**256.275**	**265.157**	**274.533**	**284.440**	**294.921**	**306.020**
Coal	82.598	60.000	61.200	62.424	63.672	64.946	66.245	67.570	68.921	70.300	71.706	73.140	74.602
Fertilizers	45.103	77.500	79.050	80.631	82.244	83.888	85.566	87.278	89.023	90.804	92.620	94.472	96.362
Iron ore	13.476	18.000	19.800	21.780	23.958	26.354	28.989	31.888	35.077	38.585	42.443	46.687	51.356
Iron cone	2.786	0	0	0	0	0	0	0	0	0	0	0	0
Cereals	18.556	11.300	11.526	11.757	11.992	12.231	12.476	12.726	12.980	13.240	13.505	13.775	14.050
Oilseeds	26.995	14.750	15.045	15.346	15.653	15.966	16.285	16.611	16.943	17.282	17.628	17.980	18.340
Pebbles, natural pebbles and other	22.000	30.000	31.500	33.075	34.729	36.465	38.288	40.203	42.213	44.324	46.540	48.867	51.310
Salt	28.000	0	0	0	0	0	0	0	0	0	0	0	0
General cargo	**77.296**	**73.290**	**80.619**	**88.681**	**97.549**	**107.304**	**118.034**	**129.838**	**142.821**	**157.104**	**172.814**	**190.095**	**209.105**
Ingot Steel	0	10.000	11.000	12.100	13.310	14.641	16.105	17.716	19.487	21.436	23.579	25.937	28.531
Sheets in packages	15.294	13.000	14.300	15.730	17.303	19.033	20.937	23.030	25.333	27.867	30.653	33.719	37.091
Heavy loads	1.146	290	319	351	386	425	467	514	565	622	684	752	827
Steel, iron and steel plates	7.347	0	0	0	0	0	0	0	0	0	0	0	0
Wire in reel	53.509	50.000	55.000	60.500	66.550	73.205	80.526	88.578	97.436	107.179	117.897	129.687	142.656
Total	**359.729**	**331.840**	**347.100**	**363.457**	**381.010**	**399.865**	**420.140**	**441.964**	**465.479**	**490.840**	**518.216**	**547.795**	**579.781**

Description	Year											
	14	15	16	17	18	19	20	21	22	23	24	25
Packed cargo	**66.596**	**68.600**	**70.672**	**72.812**	**75.025**	**77.312**	**79.677**	**82.121**	**84.648**	**87.261**	**89.964**	**92.758**
Building block in pallets	33.622	34.967	36.365	37.820	39.333	40.906	42.542	44.244	46.014	47.854	49.768	51.759
Fertilizer in bags	32.974	33.634	34.306	34.993	35.692	36.406	37.134	37.877	38.635	39.407	40.195	40.999
Heavy soda	0	0	0	0	0	0	0	0	0	0	0	0
Bulk cargo	**317.788**	**330.280**	**343.554**	**357.675**	**372.715**	**388.750**	**405.867**	**424.156**	**443.721**	**464.671**	**487.128**	**511.225**
Coal	76.095	77.616	79.169	80.752	82.367	84.014	85.695	87.409	89.157	90.940	92.759	94.614
Fertilizers	98.289	100.255	102.260	104.305	106.391	108.519	110.689	112.903	115.161	117.464	119.813	122.210
Iron ore	56.492	62.141	68.355	75.190	82.710	90.980	100.079	110.086	121.095	133.204	146.525	161.177
Iron cone	0	0	0	0	0	0	0	0	0	0	0	0
Cereals	14.331	14.618	14.910	15.208	15.512	15.823	16.139	16.462	16.791	17.127	17.470	17.819
Oilseeds	18.707	19.081	19.462	19.852	20.249	20.654	21.067	21.488	21.918	22.356	22.803	23.259
Pebbles, natural pebbles and other	53.876	56.569	59.398	62.368	65.486	68.761	72.199	75.809	79.599	83.579	87.758	92.146
Salt	0	0	0	0	0	0	0	0	0	0	0	0
General cargo	**230.015**	**253.017**	**278.319**	**306.151**	**336.766**	**370.442**	**407.486**	**448.235**	**493.058**	**542.364**	**596.601**	**656.261**
Ingot Steel	31.384	34.523	37.975	41.772	45.950	50.545	55.599	61.159	67.275	74.002	81.403	89.543
Sheets in packages	40.800	44.880	49.367	54.304	59.735	65.708	72.279	79.507	87.457	96.203	105.824	116.406
Heavy loads	910	1.001	1.101	1.211	1.333	1.466	1.612	1.774	1.951	2.146	2.361	2.597
Steel, iron and steel plates	0	0	0	0	0	0	0	0	0	0	0	0

Wire in reel	156.921	172.614	189.875	208.862	229.749	252.724	277.996	305.795	336.375	370.012	407.014	447.715
Total	**614.400**	**651.897**	**692.544**	**736.638**	**784.505**	**836.505**	**893.030**	**954.512**	**1.021.427**	**1.094.296**	**1.173.692**	**1.260.244**

10.n Digitization and automation

The Harbour Master's Office Vukovar operates the RIS Centre Vukovar.

RIS (River Information Services) - River Information Services are a group of related information, communication and navigation services to support the management of traffic and transport of goods in inland navigation, including connections to other types of transport.

The task of RIS is to improve the safety and efficiency of inland waterway traffic, which contributes to their more intensive use and reduced number and consequences of navigation accidents.

The basic determinants of the RIS system are:

- covers all types of inland waterways (rivers, channels, lakes);
- includes an interface to other modes of transport (maritime, rail, road);
- integrates all individual information services supporting inland navigation;
- collect, process and forward information on the waterway, traffic and transport.

The RIS system is based on the application of modern information and communication services, and the basic concept of the system consists of vessel information and waterway information.

Vessel information is collected and transmitted via an automatic identification receiver located on the vessel, the so-called AIS (Automatic Identification System) receiver, and using onshore base stations that receive information and send it directly to the RIS system.

Waterway information is contained in the form of Electronic Navigation Charts (ENCs) and Notice to Skippers (NtS).

All information, nautical data and the current traffic state are available in real time, and are automatically stored in the central database, from where they can be downloaded at any time and ready for use.

River information services are based on two IT levels.

Strategic Traffic Information:

- influence the mid- and long-term decisions of the users of the RIS system;
- contributes to the implementation of decisions related to planning and safer and more cost-effective implementation of travel;
- are created in the RIS center and are delivered at the request of the system users;

- show a picture of all vessels located in the RIS area, giving an insight into their characteristics, the cargoes they carry and the position in which they are located;
- are stored in databases and displayed on an electronic navigation map and tables, as appropriate

Tactical Traffic Information:

- related to current navigation decisions in a narrow geographical area;
- contain all relevant information on the position of the ship, shown on the electronic chart;
- are available on board, and in the RIS centre on the coast;
- assist vessel masters in direct navigational decision-making and in consultation with masters of other vessels on the waterway.

The RIS system offers the following services to end users:

Information on the waterway:

- contain geographical, hydrological and administrative data on the waterway in the area covered by the RIS system;
- enable users to plan, conduct and monitor their trips successfully;
- allow an overview of the current traffic situation and make proper and timely navigation decisions;
- combine all static and dynamic information on the waterway, transmitted on the basis of a previously established timetable;
- current information was transmitted in real time, and safety-related information was issued and validated by the competent authorities.

Traffic control:

- enable monitoring, control of the situation and action in accordance with the available information, which is particularly relevant in areas of heavy traffic, on approaches to constituencies, ports, bridges and other control points set up by the air traffic control authorities;
- significantly contributes to increasing the usability of infrastructure, and to increasing the safety of navigation.

Accident prevention:

- at the beginning of the journey, each vessel shall provide the information to the RIS Centre and update it during the journey;
- in the event of a navigational accident, the RIS Centre shall immediately deliver the data to the rescue and emergency services.

Information for transport logistics:

- include planning of vessel arrivals at ports and vessel departures from ports, monitoring of port and technological processes;
- enables the exchange of information between fleet operators, vessels, terminals, customs and other stakeholders.

Information for the implementation of supervision:

- allow the management of cross-border procedures, compliance with traffic and other relevant regulations in the field of inland navigation.

Statistics and Statistical Data Services:

- contribute to a better and simpler collection of statistics related to inland navigation;
- the data are available to companies and responsible administrative levels of inland navigation, and are used for monitoring and strategic planning purposes.

Insight and cost planning:

- easier and faster collection of fees without administrative burdens;
- the ship's journey data can be used for automatic charging and invoicing.

The advantages of the RIS system are monitoring of the waterways and vessels; increasing traffic safety; prevention of navigation accidents (disasters); monitoring and rapid response in the event of navigation accidents (disasters); supervision of the transport of dangerous goods; better management of resources in ports and terminals; nautical support to vessel masters; better and simpler planning of transport processes; facilitated integration of inland navigation into intermodal and logistics chains; optimization of logistics processes; acceleration of navigation and reduction of fuel consumption.

The RIS service is organized within the Agency for Waterways, as the National RIS Centre managed by the National RIS Coordinator.

There are no further significant digitizations and automations in the supporting port systems in the port area of the port of Vukovar, and the transshipment machinery is also not digitized or automated.

11 Market analysis

11.a Port capacities - analysis

In the port area of the port of Vukovar, it is possible to manipulate all types of cargo including liquid cargo, bulk cargo, palletized cargo, heavy cargo and containers. Currently, the port of Vukovar has 7 berths, 2 of which for liquid cargo and one for cereals, bulk, general, palletized and mixed cargo. Of the four Croatian ports of inland waters, the port of Vukovar has the highest cargo turnover. The advantage of the port of Vukovar is certainly the class of navigability and the possibility of sailing the Danube throughout the year, which enables the smooth operation of the port.

The port of Vukovar has suffered significant losses and damage to infrastructure and suprastructure as a result of the war and since 1997 investments in reconstruction have been undertaken. The potential of the port of Vukovar for the realization of cargo transport is very big, thanks to the position of the port on the Danube River and the connection of the port with the railway and road network. The difficulty is the inability to expand the port due to spatial constraints, which also leads to challenges in cargo manipulation. Therefore, investments are necessary to enable the necessary expansion of the port area of the port of Vukovar in the west in relation to the existing port and to increase the capacity of the port in an adequate manner for the needs of cargo transport. The spatial limitation of the existing port is also evident if we consider the project of modernization and electrification of the railway line on the Vinkovci-Vukovar section passing through the port.

Specificity in relation to other ports and inland waters is prominent passenger traffic, i.e. a significant number of berths of river cruise ships in passenger piers. The Port Authority Vukovar manages a total of four international passenger ports (Vukovar, Ilok, Aljmaš and Batina) and one port for smaller vessels in Vukovar.

In the previous period, the Port Authority Vukovar has made significant efforts to develop port infrastructure, with numerous investments secured from EU funds, especially in the development of passenger transport infrastructure. In the next ten-year period, the goal is to achieve the development of the port of Vukovar in a way that will enable:

- Necessary extensions of the port area and maximum use of port capacity for cargo transshipment;
- Further strengthening of the competitiveness of international passenger ports in the provision of passenger ship reception services on the Danube River and strong positioning of Vukovar and the municipalities of Batina, Aljmaš and Ilok as a destination of arrivals of river passenger ships/cruise ships.

The basis of the operations of the port of Vukovar is the transshipment of bulk, general and liquid cargo. Within the port there are three operational railway tracks for cargo handling 'ship-to-coast' and loading/unloading of general and bulk cargo. The port of Vukovar can accommodate vessels of class 5. Port of Vukovar Ltd., Nautica Vukovar Ltd. and Vupik plus Ltd. are three concessionaires

in the port of Vukovar and each of them is specific for their activities. The port also has a terminal for current cargoes, which is not under concession

Table 18: Concessionaires in the port of Vukovar

Concessionare	Type of concession	Port activities	Concession expiry
Port of Vukovar Ltd., Vukovar	service concession	1. Loading, unloading and transshipment of cargo, storage and conveyance of cargo at the existing general cargo terminal; 2. Loading, unloading and transshipment of cargo, storage and conveyance of cargo at the multi-purpose terminal; 3. Loading, unloading and transshipment of cargo, storage and conveyance of cargo at the bulk terminal; 4. Loading, unloading and transshipment of cargo, storage and conveyance of cargo at the terminal for palletized and bulk cargo; 5. Parking of vehicles in the port area	2026
Liquid Cargo Terminal	-	1. Transshipment, storage and transport of oil and petroleum products at the specialized terminal for liquid cargo in the port of Vukovar, 2. Vessel fuel and lubricant supply	-
Nautica Vukovar Ltd., Vukovar	service concession	1. Supply of ships with diesel fuel and lubricant at the ship supply terminal; 2. Transshipment and storage of diesel fuel and lubricants at the ship supply terminal; 3. Port agency and forwarding operations in the entire area of the port of Vukovar.	2017 (the contract was extended until the assignment of the new concession)
VUPIK plus Ltd., Vukovar	service concession	1. Loading, unloading and transshipment of bulk cargo (cereals and oilseeds) at a specialized terminal for cereals and oilseeds; 2. Storage and conveyance of bulk cargo (cereals and oilseeds) at a specialized terminal for cereals and oilseeds.	2019 (the contract was extended until the assignment of the new concession)

Port of Vukovar Ltd. is a user of four 450 m long berths and coast. Its main activities are the loading, unloading, transshipment and storage of all types of cargo, including: bulk, palletized, and container cargo and special cargoes. It has the capacity of a closed warehouse of about 3.000 m^2 and an open warehouse of about 15.000 m^2. About 55 m of the operational coast was built as a vertical pier wall of reinforced concrete structure. The remaining 395 m consists of an inclined coastline with a lining of concrete blocks and an intermediate landing site of reinforced concrete. It has the largest length of the operational coastline, which makes it the largest concessionaire in

the port area. The company Port of Vukovar Ltd. is equipped with one mobile crane – Gottwald HMK 170E with a load capacity of 63 tons and one portal crane – Ganz.

DAF350 with a load capacity of 25 tonnes, thus ensuring the transshipment capacity for bulk and general cargo transshipment and 20- and 40-foot containers. It also has two smaller port cranes of 5/6 tons (GANZ), forklifts with a capacity of 2 to 20 tons (a total of 8 forklifts), two loaders, a diesel locomotive and a boat-pusher of 300 hp. In this area there are also two used portal cranes with a load capacity of 5/6 tons, produced in 1977 and 1987, and a crane Mannesman Dematic HMK 170E (Gottwald), with a capacity of 63 tons. The latter has the special feature that in addition to the possibility of transshipment of heavy cargo, it can also transship general and bulk cargo, as well as all types of containers. Depending on the type of cargo, the current capacities allow the transshipment of goods from 1.200.000 – 1.500.000 tons per year.

Nautica Vukovar Ltd. is a user of one connection and a coastline about 100 m long. Its main activities are the supply of fuel and lubricant to vessels, transshipment and storage of petroleum products, port – agency and forwarding operations and the reception of bilge and wastewater. It has its own industrial track with a length of 390 m. It has a floating facility PO-9-VK with a length of 76,50 m and a fuel tank capacity of 3.047 m^3, and a floating facility PO-1-VK with a length of 82,40 m and a fuel tank capacity of 1.334 m^3. Among other equipment, the company has pumps, measuring devices and a scale. The maximum annual capacity is 100.000 tonnes.

The terminal for liquid cargoes consists of one berth and a coastline with a length of about 75 m. The main activities at the terminal are transshipment, storage and transport of petroleum products. The terminal has four fuel tanks with an average volume of 2.000 m^3 and has its own industrial track with a length of 218 m. Among other equipment, pumps and measuring devices are available at the terminal, as well as a truck parking lot with a capacity of 10 parking places. The maximum annual capacity is 100.000 m^3, while the maximum storage capacity is 8.000 m^3.

Vupik plus Ltd. is a user of a single berth and a coastline about 80 m long. Its main activities are loading, unloading, transshipment, conveyance and storage of bulk cargo (cereals and oilseeds). The maximum storage capacity is 48.000 t. It has two industrial tracks with a total length of 750 m and a truck parking lot with a capacity of 50 parking places. The company has a static transshipment tower with a mechanical lift and conveyors, with a capacity of 200 t/h (wheat 0,75 t/m^3) and an automatic system for moving vessels, and holds ISO 9001, ISO 14001, HACCAP and GlobalGap certificates. In this area there is also a state-of-the-art direct dryer LAW with aspiration and recirculation of hot air, with a capacity of 30 t/h, which uses gas as an energy source. The installation of this dryer has achieved numerous savings, with special attention to environmental protection and energy savings. Considering that the investment in the port of the Company Vupik plus Ltd. was realized in 2012 and amounted to HRK 530 million, it is a very modern building. The maximum annual capacity allows for the annual transshipment of goods up to 300.000 tonnes, while the maximum storage capacity is 480.000 tonnes.

11.b Demand analysis/expected future movements of goods

11.b.1 For the port

In the area of the port of Vukovar, loading or unloading takes place, of various types of packed, bulk, liquid and general cargo in accordance with the demand for it.

In this sense, the turnover of fertilizer is highlighted, which takes place in the port of Vukovar in packaged and bulk.

The global demand for mineral fertilisers (N, P2O5 and K2O) for 2022 and the forecasts of demand forecasts for 2016 to 2022 by the Food and Agriculture Organisation (FAO) are summarised in the table below. The total demand for fertilisers is estimated at 185,06 million tonnes in 2016 and is projected to reach 200,92 million tonnes by the end of 2022, with an average annual growth of 1,4% in the following years. N, P2O5 and K2O demand growth is projected at rates of 1,0%, 1,7% and 2,1% per year for individual nutrients from 2015 to 2020.

Table 19: World demand for the use of mineral fertilizers, 2016-2022 (data in thousands of tonnes)

Year	2016	2017	2018	2019	2020	2021	2022
Nitrogen (N)	105.148	105.050	105.893	107.424	108.744	110.193	111.591
Phosphate (P_2O_5)	44.481	45.152	45.902	46.587	47.402	48.264	49.096
Potassium (K_2O)	35.434	36.349	37.171	37.971	38.711	39.473	40.232
Total	**185.063**	**186.551**	**188.966**	**191.982**	**194.857**	**197.930**	**200.919**

Source: Food and Agriculture Organization (FAO): World Fertilizer Trends and Perspectives until 2022, Rome, 2019.

FAO also expects to see an increase in global fertiliser production capacity over the coming years, and given the global disproportion of supply and demand with current production capacity of supply are behind demand, it can be expected that there will continue to be good export potential for domestic producers who are also the largest customers of port services. For this reason, planned exports via the port of Vukovar can be forecasted at an annual growth of 2%.

According to the Global Agricultural Productivity Report 2021[4], total food production, as the main indicator of agricultural production, is growing by 1,36% annually globally (annual average in the period from 2010 to 2019). This growth is lower by 21,4% compared to the target annual growth size (1,73%), which is needed to meet the projected global demand by 2050.

Agricultural productivity consists not only in higher production or higher yields, but also in the best use of natural resources, reducing costs for farmers, reducing losses and waste, and achieving lower prices for agricultural products.

At the level of the European Union, according to the published Growth Potential Assessment of Major Agricultural Products (Dyonisus, 2021), annual plant production growth of 1,9% per year

[4]College of Agriculture and Life Sciences, Virginia tech: Global agricultural productivity report 2021, 2021.

is expected in the coming years. Cereal production is expected to remain stable in the coming years, at 277 million tonnes in the EU.

Arable areas of barley and wheat should be reduced and arable areas of corn increased; thus offsetting the demand for cereals. On the other hand, due to the value of rapeseed in the crop rotation systems and the constant demand for edible oil, an increased production of oilseeds can be expected.

From the above, it is clear that investments in agricultural production will continue, which implies bigger investments in technology and bigger global trade, which will have positive effects on the operations of the port of Vukovar.

Port of Vukovar Ltd. has inquiries from the company Same Deutz-Fahr Železnica Ltd. Županja which is interested in importing and exporting agricultural machinery, and for which there are no current conditions in the port of Vukovar due to the lack of Ro-Ro ramp. The planned annual quantity of cargo is 200-300 machines, and in line with global trends, it is expected that trade in agricultural products and agricultural machinery will grow in the future, on the basis of which it is reasonable to assume further growth of interest in the service of transporting goods of this type.

Significant enquiries to the port also come for the transport of special and heavy cargo, such as the transformer for Končar Electrical Industry Plc., which also require equipment with a crane that is currently not available at the port. The possibility of transshipment of this type of cargo would bring a significant shift in competitiveness for the port of Vukovar, since the surrounding ports are unable to offer such a service.

According to the Croatian Energy Market Operator (HROTE), there are a total of 26 biomass power plants and 36 biogas power plants in the Republic of Croatia, the most significant of which are located in eastern Croatia.

The number of producers of energy from renewable sources continues to increase, and this will increase their connection to the national network, which is also encouraged by the energy regulation of the Republic of Croatia. However, such a trend of development and the fact that biomass power plants concluded long-term contracts with Hrvatske šume Ltd. on the supply of biomass guaranteed the market and procurement of raw materials and the market of energy sales.

The port of Vukovar for so far had no business connections with plants operating in the territory of Slavonia and Baranja, since they are supplied from domestic biomass sources, guaranteed under long-term contracts on raw material insurance. However, in 2019, there was a shift in the policy of Hrvatske šume Ltd. and many contracts on raw material supply were terminated, which means an increase in demand for biomass products, and thus the import market is naturally opened, in which the port of Vukovar becomes a natural partner for importing raw materials from Eastern European countries.

The demand for imports can also be generated by other biomass market participants, such as pellet factories, which will also be pressured by increased demand.

As biomass does not currently exist as a general in the port of Vukovar, according to the optimistic scenario elaborated in the Pre-Feasibility Study - the development of the port of Vukovar as a biomass hub, an annual cargo volume of 126.000 tonnes per year is projected.

In addition to these cargoes, containers should not be neglected due to the global containerization of transport and the ambitious plans of the port of Constanza (Romanian ports on inland waters generate an annual growth of 133% for this type of cargo), which will certainly divert a significant

part of world trade to the inland waters of the lower Danube region, which is why it is expected that traffic will spill over to all ports along the Danube, including the port of Vukovar.

Looking at the micro and macro region, the port of Vukovar does not have significant competition for previously processed types of cargo.

The following table shows the forecast of traffic in the port of Vukovar for the next 25 years.

Table 20: Expected future traffic of goods

Description	Year												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Packed cargo	**42.919**	**47.000**	**48.360**	**49.764**	**51.214**	**52.710**	**54.256**	**55.852**	**57.500**	**59.203**	**60.962**	**62.779**	**64.656**
Building block in pallets	20.243	21.000	21.840	22.714	23.622	24.567	25.550	26.572	27.635	28.740	29.890	31.085	32.329
Fertilizer in bags	18.020	26.000	26.520	27.050	27.591	28.143	28.706	29.280	29.866	30.463	31.072	31.694	32.328
Heavy soda	4.656	0	0	0	0	0	0	0	0	0	0	0	0
Bulk cargo	**239.514**	**211.550**	**218.121**	**225.012**	**232.247**	**239.851**	**247.850**	**256.275**	**265.157**	**274.533**	**284.440**	**294.921**	**306.020**
Coal	82.598	60.000	61.200	62.424	63.672	64.946	66.245	67.570	68.921	70.300	71.706	73.140	74.602
Fertilizers	45.103	77.500	79.050	80.631	82.244	83.888	85.566	87.278	89.023	90.804	92.620	94.472	96.362
Iron ore	13.476	18.000	19.800	21.780	23.958	26.354	28.989	31.888	35.077	38.585	42.443	46.687	51.356
Iron cone	2.786	0	0	0	0	0	0	0	0	0	0	0	0
Cereals	18.556	11.300	11.526	11.757	11.992	12.231	12.476	12.726	12.980	13.240	13.505	13.775	14.050
Oilseeds	26.995	14.750	15.045	15.346	15.653	15.966	16.285	16.611	16.943	17.282	17.628	17.980	18.340
Pebbles, natural pebbles and other	22.000	30.000	31.500	33.075	34.729	36.465	38.288	40.203	42.213	44.324	46.540	48.867	51.310
Salt	28.000	0	0	0	0	0	0	0	0	0	0	0	0
General cargo	**77.296**	**73.290**	**80.619**	**88.681**	**97.549**	**107.304**	**118.034**	**129.838**	**142.821**	**157.104**	**172.814**	**190.095**	**209.105**
Ingot Steel	0	10.000	11.000	12.100	13.310	14.641	16.105	17.716	19.487	21.436	23.579	25.937	28.531
Sheets in packages	15.294	13.000	14.300	15.730	17.303	19.033	20.937	23.030	25.333	27.867	30.653	33.719	37.091
Heavy loads	1.146	290	319	351	386	425	467	514	565	622	684	752	827
Steel, iron and steel plates	7.347	0	0	0	0	0	0	0	0	0	0	0	0
Wire in reel	53.509	50.000	55.000	60.500	66.550	73.205	80.526	88.578	97.436	107.179	117.897	129.687	142.656
Total	**359.729**	**331.840**	**347.100**	**363.457**	**381.010**	**399.865**	**420.140**	**441.964**	**465.479**	**490.840**	**518.216**	**547.795**	**579.781**

Description	Year											
	14	15	16	17	18	19	20	21	22	23	24	25
Packed cargo	**66.596**	**68.600**	**70.672**	**72.812**	**75.025**	**77.312**	**79.677**	**82.121**	**84.648**	**87.261**	**89.964**	**92.758**
Building block in pallets	33.622	34.967	36.365	37.820	39.333	40.906	42.542	44.244	46.014	47.854	49.768	51.759
Fertilizer in bags	32.974	33.634	34.306	34.993	35.692	36.406	37.134	37.877	38.635	39.407	40.195	40.999
Heavy soda	0	0	0	0	0	0	0	0	0	0	0	0
Bulk cargo	**317.788**	**330.280**	**343.554**	**357.675**	**372.715**	**388.750**	**405.867**	**424.156**	**443.721**	**464.671**	**487.128**	**511.225**
Coal	76.095	77.616	79.169	80.752	82.367	84.014	85.695	87.409	89.157	90.940	92.759	94.614
Fertilizers	98.289	100.255	102.260	104.305	106.391	108.519	110.689	112.903	115.161	117.464	119.813	122.210
Iron ore	56.492	62.141	68.355	75.190	82.710	90.980	100.079	110.086	121.095	133.204	146.525	161.177
Iron cone	0	0	0	0	0	0	0	0	0	0	0	0
Cereals	14.331	14.618	14.910	15.208	15.512	15.823	16.139	16.462	16.791	17.127	17.470	17.819
Oilseeds	18.707	19.081	19.462	19.852	20.249	20.654	21.067	21.488	21.918	22.356	22.803	23.259
Pebbles, natural pebbles and other	53.876	56.569	59.398	62.368	65.486	68.761	72.199	75.809	79.599	83.579	87.758	92.146
Salt	0	0	0	0	0	0	0	0	0	0	0	0
General cargo	**230.015**	**253.017**	**278.319**	**306.151**	**336.766**	**370.442**	**407.486**	**448.235**	**493.058**	**542.364**	**596.601**	**656.261**
Ingot Steel	31.384	34.523	37.975	41.772	45.950	50.545	55.599	61.159	67.275	74.002	81.403	89.543
Sheets in packages	40.800	44.880	49.367	54.304	59.735	65.708	72.279	79.507	87.457	96.203	105.824	116.406
Heavy loads	910	1.001	1.101	1.211	1.333	1.466	1.612	1.774	1.951	2.146	2.361	2.597
Steel, iron and steel plates	0	0	0	0	0	0	0	0	0	0	0	0
Wire in reel	156.921	172.614	189.875	208.862	229.749	252.724	277.996	305.795	336.375	370.012	407.014	447.715

Total	**614.400**	**651.897**	**692.544**	**736.638**	**784.505**	**836.505**	**893.030**	**954.512**	**1.021.427**	**1.094.296**	**1.173.692**	**1.260.244**

11.b.2 For the port hinterland

The Vukovar-Srijem County can be seen as the immediate hinterland of the port of Vukovar. This area is run by important river and land routes and intersects international traffic routes from east to west along the Danube River, and from north across the Sava River to the Adriatic Sea. This area represents the intersection of very well developed road routes, underutilized and outdated railways and river traffic that opens to the east - European markets.

Vukovar-Srijem County is important in agricultural production and forestry, and its position makes it favourable for the development of logistics and transport services. Among the main activities in the immediate hinterland of the port, it is possible to highlight the food and beverage industry, wood processing, metal processing, the construction materials industry and the construction industry, as well as the textile and leather industry, for the domestic and international market.

In the last 5 years, the domestic market for the port of Vukovar accounts for 68% of the total transshipment of the company, and the main clients are domestic companies, especially from the central part of Croatia, which is more determined by market than geographical reasons. Among the areas gravitating towards the port of Vukovar, Eastern Slavonia, Central Croatia, the northern part of BA, as well as interested industries from other areas that import and export products from Eastern European countries should certainly be highlighted. From the above, it can be concluded that the interest in the services of the port of Vukovar does not arise only from the narrowest regional area.

From the previous chapters, it is evident that the most prevalent categories of cargo in the port of Vukovar are fertilizers, coal and cereals. Artificial fertilisers are divided into two categories:

- Rinfuza (bulk) – refers to the export of the company Petrokemija Plc. from Kutina and Adriatica Danube Plc. Vukovar. The company Petrokemija Plc. Kutina produces complex mineral fertilizers. In 2021, 700 million tonnes were produced, 67% of which were intended for export. The company Adriatica Danube Ltd. Vukovar produces mixtures – composite mineral fertilizers that are produced mainly from raw materials imported from Eastern Europe. Their annual production amounts to 90.000 t and the main raw materials are transshipped to the Port of Vukovar Ltd., including a part of finished products that is also exported through the port, which together amounts to 9% of the company's total turnover. The opening of Eastern European markets is expected to increase the number of transshipments for this type of cargo. In 2020, this category accounted for 14% of the total transshipped cargo in the port of Vukovar.

- Fertilizer in bags – refers to the export of the company Adriatica Dunav Plc. Vukovar and partly Petrokemija Plc. from Kutina and in 2020 represents 6,7% of the total cargo turnover.

The turnover of Coal in the port of Vukovar refers to the import of the company Sisecam Soda Lukavac Ltd. from BA, which produces synthetic soda. The amount of transshipment of this type of cargo is significantly influenced by the water level of the Sava River. The transshipment is carried out in the port of Vukovar only when the Sava River is not navigable and the cargo cannot be delivered to the port in Brčko. In 2020, coal was the most prevalent cargo and accounted for 27,8% of total turnover. Based on the increasing needs due to increased production, it is possible to realize larger quantities of

transshipment in the coming years. Given the growing production as well as the inability of the Brčko port to receive significant coal traffic, it is assumed that the quantity of cargo passing through the port of Vukovar will grow in accordance with global demand, i.e. at a rate of 2% per year.

Cereals and oilseeds have big potential due to the agricultural character of the port surrounding area. Port of Vukovar Ltd. does not have its own silo or floor storage of the required capacity, so the transshipment of these types of cargo is mostly carried out through sea ports. During 2020, cereals account for 4,8% of the total transshipped cargo. In the grain and oilseed markets, concessionaires in the port of Vukovar, Port of Vukovar Ltd. and Vupik plus Ltd. work in competition with each other, whereby Vupik plus Ltd. has an advantage in the fact that it owns a silo, while Port of Vukovar Ltd. has the possibility of direct manipulation from railway wagons or ships into trucks and vice versa.

Cargo transshipment in the port of Vukovar is in line with developments in the economic environment. The most important users of the services of the port of Vukovar are companies related to agricultural production and the construction sector and related industries.

The largest entrepreneurs in the Vukovar-Srijem County according to the total revenues generated in 2021 are the companies PIK-Vinkovci plus Ltd., Vupik plus Ltd. and Agro-Tovarnik Ltd. The companies PIK-Vinkovci plus Ltd. and Vupik plus Ltd. are part of the Fortenova Group Plc. PIK-Vinkovci plus Ltd., which processes more than 5.000 ha of land, cooperates with more than 500 subcontractors in the purchase of fruit and vegetables and at the same time processes fruit and vegetables. As part of its commercial activity, it is engaged in the purchase and sale of goods and is one of the most important exporters in agriculture in the Republic of Croatia. The main activities of VUPIK plus Ltd. are pig farming, arable and vegetable farming, meat and dairy cattle farming, viticulture, winemaking and warehousing, which is related to silo business. Within Vupik, there is also a transshipment port at two locations: the Danube Vukovar silo and the Bobota silo. In 2021, the company Agro-Tovarnik Ltd. carried out agricultural production on 2.366 hectares of agricultural land and organized production with OPGs on 6.300 hectares.

From the above, it can be concluded that the companies in the immediate hinterland of the port of Vukovar are oriented towards agricultural production and in the future, there is an increased demand in the movement of goods of such a category, generated by the character of the immediate port hinterland.

11.b.3 Socio-economic aspects of the port and its regions (Danube and its basin)

The analysis of the socio-economic aspect of the port and its region for reasons of transparency is divided into several areas, as indicated below.

- **Territorial aspect**

The city of Vukovar administratively belongs to the Vukovar-Srijem County and is the administrative, educational, economic and cultural centre of it. It is an area located in the far northeast of Croatia, with a total area of 2.448 km^2. It consists of 5 cities, 26 municipalities and 85 settlements, and borders the Osijek-Baranja County in the north, Brod-Posavina County in the west, Bosnia and Herzegovina in the south and the Republic of Serbia in the east.

Figure 6: The area of the city of Vukovar

The city of Vukovar is located on the northern part of the county, along the right bank of the Danube River and at the confluence of the Vuka River. It borders the municipalities of Borovo, Trpinja, Bogdanovci, Negoslavci, Tompojevci and Lovas.

The area of the city is 100,26 km^2, which represents 4,10% of the area of Vukovar-Srijem County.

Vukovar is a city of plains, which has developed on the natural resources of soil, forest, water and mineral resources. Most of the soil is occupied by fertile agricultural land, which is of the highest quality in the peripheral parts of the city. Forests are most common along the Danube and Vuka, and mineral resources originate from sand excavations along the banks of both rivers.

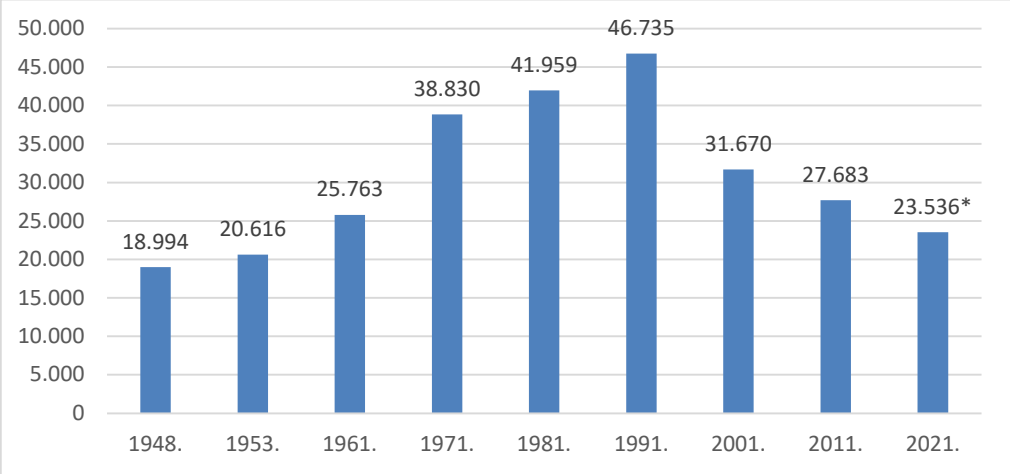
This area has a temperate continental climate, the summers are hot and sunny, and the winters are cold with plenty of snow. The mean annual temperature ranges around 11°C with a mean warmest maximum of 29,9°C and a mean minimum of 12,2°C. Most precipitation is present in spring and mid-summer, and the mean relative humidity is 79%.

- **Demographic aspect**

The city of Vukovar covers an area of 100,26 km^2 and, according to the first results of the 2021 population census, has a population of 23.536. This makes Vukovar the second largest city in the Vukovar-Srijem County (16,3% of the total population).

The following shows the movement of the population of the city of Vukovar in the period from 1948 to 2021.

Graph 3: Movement of the population of the city of Vukovar through the census periods



** First results of the census carried out in 2021*
Source: CBS, 2021, processed by the author

It is evident that the population of the city of Vukovar increased constantly from 1948 to 1991, i.e. there was an average growth of 21% between the conducted census periods. This growth was particularly influenced by the industrialization and economic development of the city in the second half of the 20th century. The largest population growth occurred in 1971, when the population increased by 50,7% compared to 1961.

In 2001, there was a significant decline in the number of the population, by 32,2% compared to the 1991 census, which is directly attributed to the impact of war happenings and the occupation of the city from 1991 to 1998.

The negative trend of the population of the city of Vukovar can be observed in further years. The 2011 census shows a decrease of 12,6% in the population compared to 2001, while the 2021 census shows a decrease of 15% in the population compared to 2011.

The following table shows the movement of the population in the area of the city of Vukovar according to migration characteristics, compared with the movements recorded at the levels of Vukovar-Srijem County and the Republic of Croatia.

Table 21: Population by migration characteristics, comparison of the Republic of Croatia, Vukovar-Srijem County and the city of Vukovar

Regional whole	Total number of inhabitants	In same place since birth	Immigrated to the settlement of residence									Unknown
			from the territory of the Republic of Croatia					from abroad				
			total	from another settlement of the same city or municipality	from another city or municipality of the same county	from another county	Unknown place in the Republic of Croatia	total	Ger.	Countries ex Yu (BA, Serbia, Slovenia, Kosovo)	Other countries	
RC	4.284.889	2.042.279	1.634.453	298.753	634.175	699.943	1.582	604.902	120.717	385.084	99.101	3.255
Vukovar-Srijem County	179.521	78.208	71.180	3.760	36.345	31.022	53	30.094	4.946	22.157	2.991	39
Vukovar	27.683	7.079	16.052	119	4.721	11.207	5	4.551	503	3447	601	1

Source: CBS, 2012a, data processed by the author

Migration, i.e. population mobility, is one of the indicators of quality and space valorisation, and with natural growth, it is a basic determinant of general population dynamics.

According to data from the 2011 census, inhabitants of the city of Vukovar make up 74,4% of the population, which indicates a very high mobility of the population. Among them, the most inhabitants from other counties (11.207 persons, i.e. 54,4%), followed by the number of inhabitants from other cities or municipalities in the same county (4.721 persons, i.e. 22,9%) and the number of inhabitants immigrated from abroad (4.551 persons, i.e. 22,1%). The smallest population moved from another settlement with the area of the city of Vukovar (119 persons, i.e. 0,6%).

Among the inhabitants settled from abroad, the most persons from the territory of the former Yugoslavia (3.447 persons, i.e. 16,7%), while residents living from birth in the same settlement make up a share of 25,6%.

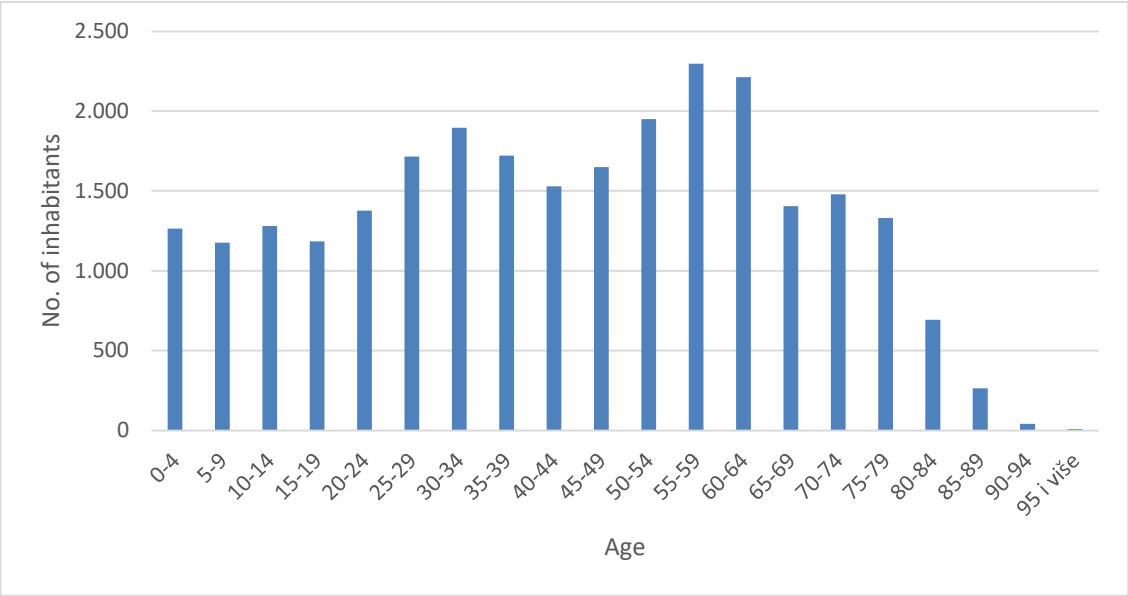
From the conducted analysis, it is evident that significant migratory movements are present in the area of the city of Vukovar, which are significantly higher than the indicators at the level of the Republic of Croatia and the Vukovar-Srijem County.

In 2020, according to the data of the Croatian Bureau of Statistics, there was a negative natural increase in Vukovar. Taking into account that 198 live births and 406 deaths were registered, it follows that in that year there were 208 more deaths compared to the number of live births. The negative natural increase recorded in 2020 is at the level of the natural increase recorded in previous years.

According to the 2011 census, the average age in the city of Vukovar is 43,8 years, which is in line with the average at the level of Croatia, while at the level of Vukovar-Srijem County it is higher by 3,2 years.

According to Eurostat data from 2011, the age is also higher than the EU27 average of 41,2 years. According to the age index, the city of Vukovar has an average of 1,51, which is another indicator that the population of the city of Vukovar is mostly old.

Graph 4: Population distribution by age group in the City of Vukovar



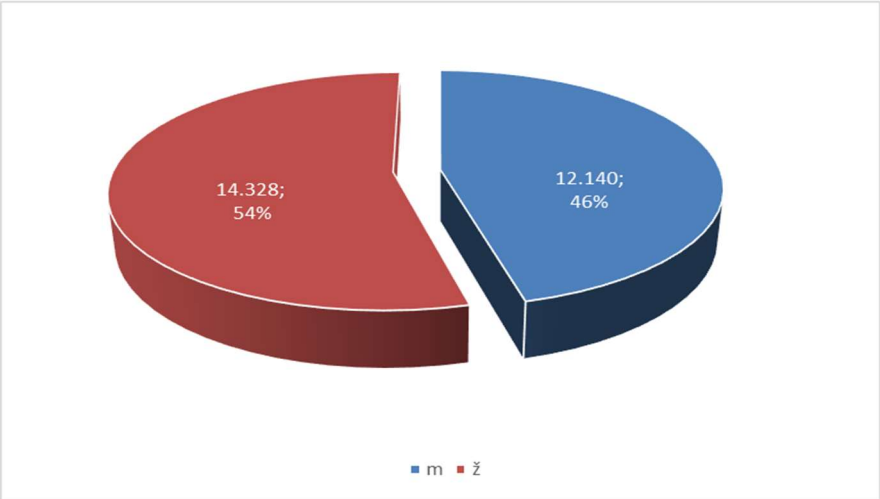
Source: CBS, 2012a, data processed by the author

Graph 2 shows that the largest number of inhabitants of the city of Vukovar is between 55 and 59 years of age, i.e. the said group belongs to 2.296 inhabitants, which makes 8,3% of the total population of the city. With almost the same number of inhabitants follows the age group between 60 and 64 years of age.

By the age of fifty, there are 14.791 inhabitants in total, accounting for 53,4% of the city's total population. At least 70% of the population were aged 80 and over, representing 1.007 inhabitants, or 3,6% of the total population.

Below is a graphical representation of the gender structure of the population of the city of Vukovar in 2011.

Graph 5: Gender structure of the population of the city of Vukovar in 2011



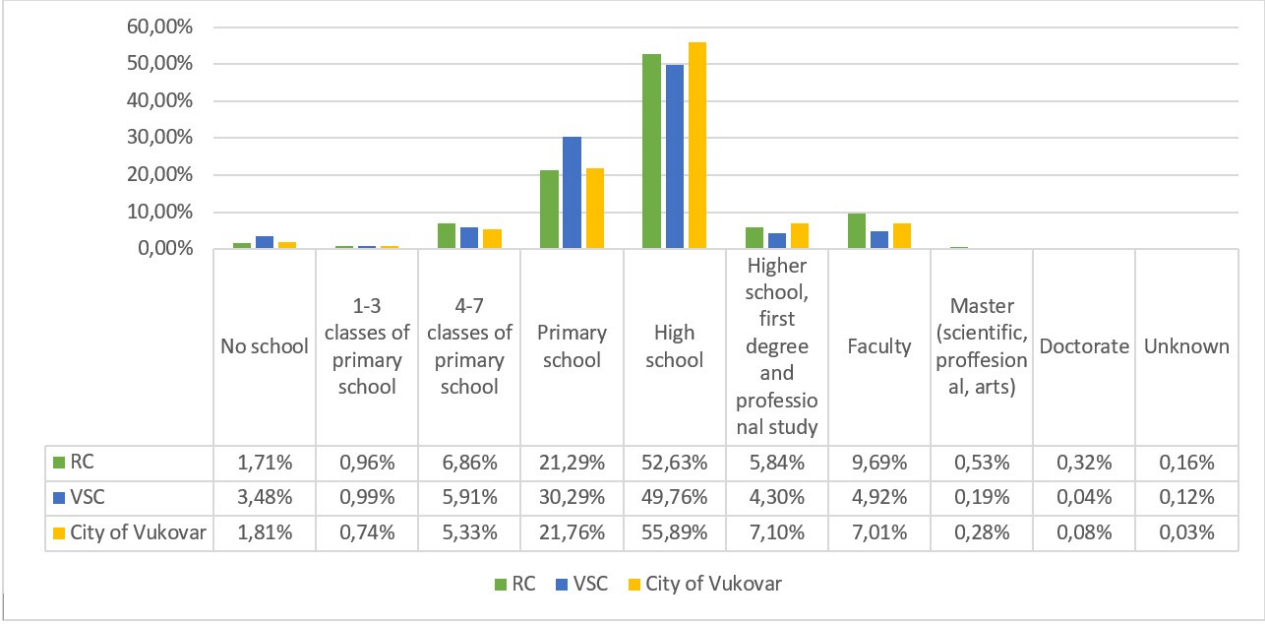
Source: CBS, 2012a, data processed by the author

The gender structure of the population of the city of Vukovar from 2011 shows that in this area the number of women (14.328) is higher than the number of men (12.140) by 18,02%.

The population density of the city of Vukovar is 234,8 inhabitants/km^2, which is 241,8% more than the national level (68,7 inhabitants/km^2) and 298,6% more than the county level (58,9 inhabitants/km^2).

From the aspect of the educational structure of the population, the most persons in the city of Vukovar have completed secondary school (55,9%), followed by persons who have only completed primary school (21,8%), while the least represented are persons with a master's degree (scientific, professional, artistic) and a doctorate. Data of the population older than 15 years, i.e. residents who should have completed primary education by their age, were taken into account in the processing. The following graph shows a detailed comparison of the educational structure in Croatia, Vukovar-Srijem County and the city of Vukovar.

Graph 6: Comparison (RC, VSC, Vukovar) of the population aged 15 and over according to the highest completed school according to the 2011 census



	No school	1-3 classes of primary school	4-7 classes of primary school	Primary school	High school	Higher school, first degree and professional study	Faculty	Master (scientific, proffesional, arts)	Doctorate	Unknown
RC	1,71%	0,96%	6,86%	21,29%	52,63%	5,84%	9,69%	0,53%	0,32%	0,16%
VSC	3,48%	0,99%	5,91%	30,29%	49,76%	4,30%	4,92%	0,19%	0,04%	0,12%
City of Vukovar	1,81%	0,74%	5,33%	21,76%	55,89%	7,10%	7,01%	0,28%	0,08%	0,03%

Source: CBS, 2012a, data processed by the author

From the previous graph, it can be observed that the educational structure of the population of the city of Vukovar differs slightly from that of the state and county levels.

Comparing the difference between the educational distribution of the city of Vukovar and the state level, it can be observed that the biggest difference is present within secondary and university education. In the city of Vukovar, there are more people with secondary education (by 3,25 percentage points) compared to the state level, while the number of people with completed university studies is lower (by 2,69 percentage points). The slightest difference can be observed compared to people without a primary school, master's degree or doctorate.

Compared to the county level, the number of people with completed secondary education is also higher than the county level (by 6,13 percentage points). A positive difference in favor of the city of Vukovar can also be observed within persons with completed higher education, first degree and professional studies (for 2,80 percentage points) and in persons who have completed university studies (for 2,09 percentage points). The smallest difference is present in persons with completed master's and doctorate degrees.

In conclusion, the trend of population movements in the city of Vukovar has been negative from the 1990s to the present day, which is mostly attributable to the war conditions to which the city was exposed and to post-war adverse economic developments.

This also affected the high level of population mobility indicators, since most of the population were forced to leave their homes to return to them after the war.

The town of Vukovar is a densely populated area, home to a predominantly old population. The natural increase in the last five years has been negative, which is in line with developments at the national level, while in terms of educational structure the most present is the population with a secondary school, which is also in line with developments at the national level.

- **Economic aspect**

The following is an analysis of economic activity in the city of Vukovar, including trends in development indicators such as gross domestic product, labour market situation, population income and other relevant indicators.

  - **Business entities**

757 active entrepreneurs operate in the city of Vukovar, i.e. 27% of the total registered active entrepreneurs from the Vukovar-Srijem County.

Most of them belong to the group that performs wholesale and retail activities and repair of motor vehicles and motorcycles (18%), followed by construction (16%), manufacturing (15%) and professional, scientific and technical activities (10%). These activities are performed by 50% of active entrepreneurs from the city of Vukovar, while other activities are individually performed by less than 10% of active entrepreneurs.

Among the companies that stand out in terms of number of employees, it is necessary to highlight those related to manufacturing (Borovo Plc.; 575 employees), agriculture (Vupik plus Ltd.; 371 employees), trade (Flir Ltd.; 207 employees) and utilities (Komunalac Ltd.; 192 employees).

Below is a table showing the number of companies operating in the city of Vukovar, structured according to the NKD qualification from 2007.

Table 22: Companies in the city of Vukovar on 12/07/2022

Operations according to the NKD classification from 2007	Number of active entrepreneurs	Structure
Wholesale and retail trade; repair of motor vehicles and motorcycles	138	18%
Civil engineering	122	16%
Processing industry	110	15%
Professional, scientific and technical activities	79	10%
Transport and storage	69	9%
Accommodation and food preparation and service business	57	8%
Administrative and support service activities	35	5%
Information and communications	29	4%
Agriculture, forestry and fishing	26	3%

Operations according to the NKD classification from 2007	Number of active entrepreneurs	Structure
Activity of health care and social welfare	16	2%
Real estate trading	15	2%
Education	14	2%
Electricity, gas, steam and air conditioning supply	12	2%
Business entities without activity code	12	2%
Other service activities	7	1%
Water supply; wastewater removal, waste management and remediation and environmental activities	6	1%
Arts, entertainment and recreation	6	1%
Financial and insurance activities	3	0%
Total	**757**	**100%**

Source: infor.biz.hr, consulted on: 12/07/2021

- **Gross Domestic Product**

According to the data of the Croatian Bureau of Statistics (CBS, 2022), the nominal value of gross domestic product in the Republic of Croatia in 2019 was HRK 412 billion, which is an increase of 22,7% compared to the value from 2013. In the analysed period, the highest growth was recorded in 2019, when GDP increased by 5,5% compared to the previous year, while a decrease was present in 2014, when GDP decreased by 0,2% compared to the previous year.

By dividing Croatia into Continental and Adriatic, it can be seen that a larger share of GDP comes from counties located in the continental part of the country (on average 68% of the annual amount), while the rest comes from coastal areas (on average 32% of the annual amount).

In the continental part, the largest share in the total GDP of the Republic of Croatia is held by the City of Zagreb (34%), while other counties do not exceed the share of 9%. In the Adriatic part, the counties with the highest share in the GDP of the Republic of Croatia are Primorje-Gorski Kotar and Split-Dalmatia County (8%).

Below is a table showing the evolution of GDP in the Republic of Croatia in the period from 2013 to 2019.

Table 23: Gross domestic product for the Republic of Croatia, according to HR_nuts 2021. – HR nuts 2 and counties, in thousands HRK

HR_NUTS 2021. - HR NUTS 2 and counties	Gross domestic product, thousands HRK						
	2013	2014	2015	2016	2017	2018	2019
Republic of Croatia	335.955.158	335.292.154	344.034.414	355.920.333	372.354.867	390.855.979	412.228.313
Continental Croatia	229.197.214	227.336.942	233.630.617	241.046.926	251.203.518	264.325.127	280.268.082
The City of Zagreb	113.046.483	113.749.368	116.961.544	120.535.275	126.607.221	133.796.436	142.179.995
Zagreb County	19.020.119	19.288.390	19.962.961	20.474.929	21.783.460	23.318.588	24.706.036
Krapina-Zagorje County	6.271.828	6.430.384	6.642.519	7.041.598	7.435.998	7.725.496	8.271.205
Varaždin County	11.205.865	11.252.120	11.561.576	12.181.040	12.944.793	14.185.841	14.930.550
Koprivnica-Križevci County	7.002.255	6.943.274	7.013.748	7.283.215	7.430.570	7.425.033	7.980.541
Međimurje County	8.265.634	7.349.467	7.530.608	7.906.516	8.311.327	8.651.415	9.301.902
Bjelovar-Bilogora County	6.046.033	6.085.727	6.234.632	6.533.422	6.605.570	7.034.351	7.201.208
Virovitica-Podravina County	3.792.637	3.504.016	3.539.292	3.689.350	3.778.716	4.076.598	4.298.311
Požega-Slavonia County	3.529.259	3.338.501	3.384.835	3.457.702	3.530.217	3.804.186	4.040.265
Brod-Posavina County	6.792.635	6.567.051	6.743.276	6.966.936	7.297.996	7.726.206	8.376.922
Osijek-Baranja County	18.648.431	18.296.791	18.725.702	19.363.172	19.439.147	19.615.148	20.706.302
Vukovar-Srijem County	8.105.549	7.766.620	8.007.792	8.265.614	8.522.144	9.014.545	9.633.571
Karlovac County	7.465.051	7.314.206	7.511.420	7.800.610	7.910.742	7.946.091	8.142.102
Sisak-Moslavina County	10.005.435	9.451.027	9.810.712	9.547.546	9.605.618	10.005.194	10.499.170
Adriatic Croatia	106.757.944	107.955.213	110.403.797	114.873.408	121.151.349	126.530.852	131.960.231
Primorje-Gorski Kotar County	29.473.733	29.659.799	29.627.548	30.147.912	31.489.953	32.535.166	31.920.586
Lika-Senj County	2.972.385	2.933.794	2.997.957	3.076.965	3.242.665	3.355.909	3.545.312
Zadar County	10.663.655	10.810.592	11.184.641	11.698.403	12.676.975	13.775.475	14.381.366
Šibenik-Knin County	6.566.609	6.612.339	6.686.802	6.929.367	7.497.998	7.896.353	8.334.448
Split-Dalmatia County	27.489.971	27.693.030	28.657.538	29.899.739	31.277.759	32.777.645	35.727.649
Istria County	19.998.690	20.417.512	21.003.774	22.313.966	23.255.601	23.964.737	24.786.686
Dubrovnik-Neretva County	9.592.901	9.828.148	10.245.538	10.807.055	11.710.397	12.225.567	13.264.184

Source: CBS, Gross domestic product for the Republic of Croatia, HR_nuts 2021. – HR nuts 2 and counties, 2022

The previous table shows that the GDP in Vukovar-Srijem County ranged from HRK 7,8 billion to HRK 9,6 billion in the period from 2013 to 2019, and this is the county with one of the lowest shares in the total GDP of Croatia (about 2,3%). In the stated period (2018 GDP at the county level grew by an average of 3% per year.

GDP per capita for Vukovar-Srijem County in the analysed period averages HRK 63.802, while at the level of the Republic of Croatia it amounts to HRK 101.354. Between the two values, there is a difference of HRK 37.552, which is 41% lower than the national level.

As an indicator of economic growth and development of a certain area, the development index is used, according to which local self-government units are classified into groups (Decision on the Classification of Local, Regional and Regional Self-Government Units According to the Level of Development OG 147/14 and 132/17), and on the basis of the Law on Regional Development of the Republic of Croatia (OG No. 147/14 - 118/18). The level of development is determined on the basis of the development index according to the following indicators: average income per capita, average source income per capita, average unemployment rate, general population movement, educational attainment of the population (tertiary education) and ageing index. According to the statistics for 2017, the city of Vukovar, with a development index of 99,68 and an average per capita income of HRK 28.490, is classified into the IV group of local self-government units; the group that includes the first 25% below the average ranking of local self-government units.

Vukovar-Srijem County is classified into the I group of regional self-government units, with a development index of 92,20 and an average per capita income of HRK 21.630,90, which makes it one of the least developed counties.

- **Employment and unemployment**

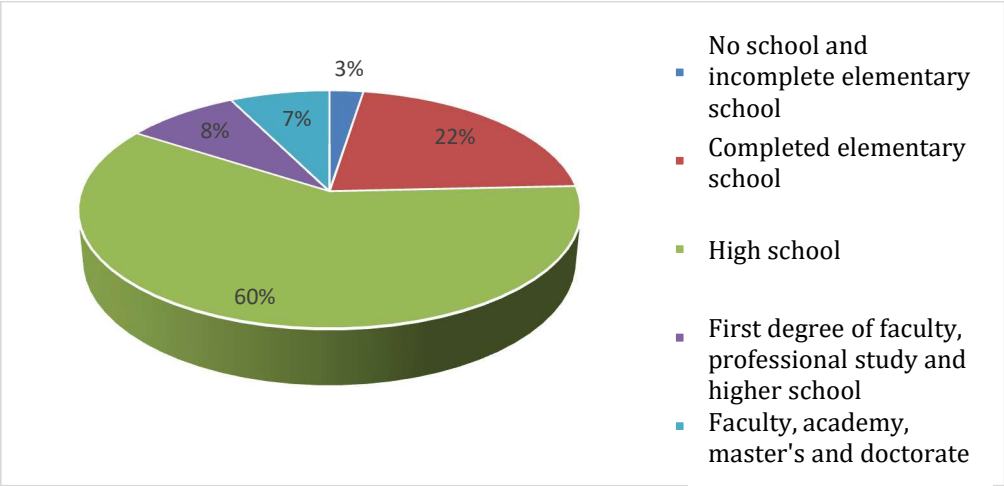
In June 2022, 5.585 unemployed persons were registered in the records of the Croatian Employment Service in Vukovar-Srijem County, which represents a share of 4,8% of total registered unemployment in Croatia and 5,6% less than in the same period of time in the previous year.

Persons with completed secondary school (63,2%) are the most numerous in the educational structure of unemployed persons from the Vukovar-Srijem County; followed by persons with completed primary school (23,1%); first degree of faculty, professional study and higher school (5,1%); faculty, academy, master's and doctorate (5,7%); while the least present are persons without school and incomplete primary school (2,9%). This situation is in line with the present situation at the state level.

In the same period, 873 unemployed persons were registered in the city of Vukovar, which represents a share of 15,6% of the county level. Of these, 55% are unemployed for up to a year.

Below is the structure of persons who are recorded as unemployed in the register of unemployed persons from the city of Vukovar in June 2022.

Graph 7: Structure of unemployed persons from the city of Vukovar in June 2022, by level of education



Source: CES (June 2022), edited by the author

The structure of unemployed persons according to education in the city of Vukovar is in line with the county structure. Out of the total registered unemployed persons, persons with completed secondary school (60%) and primary school (22%) prevail, which together represents over three quarters of the total unemployed persons.

The following table shows the movement of the number of employees in legal entities from the city of Vukovar and Vukovar-Srijem County in the period from 2015 to 2021, with data registered on March 31.

Table 24: Number of employed persons in the city of Vukovar and Vukovar-Srijem County, in the period from 2015 to 2021

AREA	2015	2016	2017	2018	2019	2020	2021
Vukovar	6.437	7.081	6.828	7.490	7.675	8.184	8.278
Vukovar-Srijem County	28.283	29.784	30.107	32.377	33.223	34.220	35.234

Source: CBS 2022, edited by the author

It is evident that between 28.283 and 35.234 persons work in legal entities of the Vukovar-Srijem County during the analysed period. If we compare the situation from 2021 with the one from 2015, it can be noticed that the number of employed persons in the area of that county increased by 24,6%, which does not represent a significant change. During the entire analysed period, the number of persons employed in legal entities in the Vukovar-Srijem County increased by 3,8% on average annually.

At the level of the city of Vukovar, the number of employees in legal entities ranged from 6.437 to 8.278 in the period from 2015 to 2021. By comparing the situation from 2021 with that from 2015, it is evident that the number of employed persons increased by 28,6%. During the entire analysed period,

the number of persons employed in legal entities of the city of Vukovar grew annually by 4,4% on average.

The above analysis shows that the share of employees in legal entities from the city of Vukovar represents on average 23,3% of the total number of employees in legal entities from the area of Vukovar-Srijem County, and that the number of employees grows simultaneously at both levels, with the average annual growth at the city level higher by 0,6 percentage points compared to the average annual growth at the county level.

- **Economic situation in the city of Vukovar and local self-government units of Vukovar-Srijem County**

A big difference in the economic strength of individual counties is also evident through the financial result of business operations of entrepreneurs.

According to the data of the Register of Annual Financial Statements of the Financial Agency, the most entrepreneurs, obliged to submit annual financial statements, are located in the City of Zagreb and Split-Dalmatia, Istria and Primorje-Gorski Kotar County.

Below is a table with data on the business activity of taxpayers of annual financial statements in the territory of the Republic of Croatia in 2021.

Table 25: Business activities of entrepreneurs in the Republic of Croatia in 2021

County	Number of entrepreneurs	Number of employees	Total income	Profit/loss per period
Republic of Croatia	**144.259**	**964.742**	**885.743.632**	**44.835.322**
Continental Croatia	**90.976**	**705.923**	**707.347.982**	**36.322.463**
The City of Zagreb	47.956	370.821	433.182.053	23.616.882
Zagreb County	9.811	66.640	67.815.569	2.695.003
Međimurje County	3.623	28.593	18.593.026	967.557
Vukovar-Srijem County	**2.392**	**20.400**	**35.211.579**	**1.094.095**
Krapina-Zagorje County	2.587	22.148	15.764.438	955.149
Varaždin County	4.506	44.687	31.048.087	1.521.379
Karlovac County	2.534	18.539	12.602.333	891.738
Brod-Posavina County	2.228	19.409	12.009.901	588.575
Koprivnica-Križevci County	2.029	18.205	13.667.134	659.143
Bjelovar-Bilogora County	2.350	15.289	9.568.161	420.338
Virovitica-Podravina County	1.259	9.410	5.643.147	312.162
Požega-Slavonia County	1.031	8.872	5.381.353	283.385
Sisak-Moslavina County	2.536	19.497	13.349.816	483.672

County	Number of entrepreneurs	Number of employees	Total income	Profit/loss per period
Osijek-Baranja County	6.134	43.413	33.511.386	1.833.386
Adriatic Croatia	**53.283**	**258.819**	**178.395.650**	**8.512.859**
Split-Dalmatia County	15.908	81.050	56.201.820	2.562.015
Primorje-Gorski Kotar County	11.753	63.135	45.846.609	2.163.063
Zadar County	5.650	26.157	17.628.378	1.078.472
Dubrovnik-Neretva County	4.450	19.619	10.298.396	516.995
Lika-Senj County	1.010	4.918	3.003.108	147.693
Šibenik-Knin County	2.727	12.634	8.413.125	217.852
Istria County	11.785	51.306	37.004.215	1.826.767
County average[5]	**4.815**	**29.696**	**22.628.079**	**1.060.922**
Continental Croatia average[6]	**3.309**	**25.777**	**21.089.687**	**977.352**

Source: FINA (2022): Results of business operations of entrepreneurs in the Republic of Croatia in 2021, Zagreb

Based on the data presented on the business operations of entrepreneurs during 2021, it is evident that a larger share of revenues and profits was realized in the territory of Continental Croatia.

In Vukovar-Srijem County, the total profit of the company in the amount of HRK 1.094.095 was registered, which ranks it as the fourth largest profit in the Continental Croatia. The realized profit of entrepreneurs in the Vukovar-Srijem County is higher than the average profit achieved in all counties in Croatia, by 3,1%, while compared to the average of counties from Continental Croatia, it is higher by 11,9%. In 2021, the stated profit increased by 78,5% compared to the profit recorded in 2020.

Below is a table of the 5 largest local self-government units from the Vukovar-Srijem County, in which entrepreneurs reported the highest revenues in 2020.

Table 26: Top 5 largest cities/municipalities of Vukovar-Srijem County by criterion of total income of entrepreneurs in 2020

Name of the city/municipality	Number of entrepreneurs	Number of employees	Total income	Net profit
Vukovar	613	5.337	12.961.685	404.199
Vinkovci	688	8.267	5.378.564	69.435
Županja	196	1539	1.235.683	38.408
Ivankovo	54	297	463.128	11.904
Cerna	39	835	353.250	-305

[5] For the purpose of more reliable representativeness, data relating to the City of Zagreb are excluded from the calculation
[6] For the purpose of more reliable representativeness, data relating to the City of Zagreb are excluded from the calculation

Total	1.590	16.275	20.392.309	523.641
Total at county level	2.273	20.063	22.749.604	1.014.728

Source: FINA (2021): Results of operations of entrepreneurs of the Republic of Croatia in 2020, Zagreb

The table shows the activities of the largest cities/municipalities in the Vukovar-Srijem County during 2020, from which it is evident that the city of Vukovar belongs to the local self-government in which the highest income was generated (57% in the total income of the county) and net profit (40% in the total net profit of the county).

11.b.4 Transport infrastructure in the region

The area of Vukovar-Srijem County is covered by international traffic routes, the Rhine-Danube Corridor (TEN-T, former Pan-European Corridor VII) and the international Salzburg-Thessaloniki road and rail route (Mediterranean Corridor, former Pan-European Corridor X).
The Rhine-Danube Corridor is a river route that connects Strasbourg, Frankfurt, Vienna, Bratislava and Budapest, from where one part branches off towards Romania, and the other goes along the Danube between Croatia and Serbia and on to the Black Sea.
The Mediterranean Corridor connects the south of the Iberian Peninsula, crosses the Spanish and French Mediterranean coasts through the Alps in northern Italy, then enters Slovenia and continues towards the Hungarian-Ukrainian border. It is a road and rail corridor, and its integral part is the direction of Rijeka-Zagreb-Budapest (the railway and road direction that is connected with us under the name Vb corridor). The road and railway direction Zagreb-Slovenia continues on the Mediterranean Corridor, for which the name X corridor has been added. Through this corridor, Croatia will be connected to the Baltic-Adriatic Corridor, which runs from the Baltic Sea through Poland, via Vienna and Bratislava to northern Italy. The Rhine-Danube Corridor is a river route that connects Strasbourg, Frankfurt, Vienna, Bratislava, Budapest, from where one part of it branches off towards Romania, and the other one runs along the Danube between Croatia and Serbia and on to the Black Sea, which we know as the VII Corridor.

Figure 7: Traffic network of the Republic of Croatia

The route of corridor X is followed by the Sava waterway, which is neglected in a significant part and does not meet the technical criteria for the navigation of modern Danube ships.

The county area is crossed by the A3 highway, which has four exits (Babina Greda, Županja, Spačva, Lipovac). Cities (Ilok, Otok, Vinkovci, Vukovar and Županja) that are interconnected by state roads, and other inhabited places within the County are connected by state, county and local roads. On the territory of the County there are 278.258 km of state roads managed by the company Hrvatske ceste Ltd.

According to the data of the Road Administration of the Vukovar-Srijem County, which manages classified public roads in its area, and in accordance with the Decision on the classification of public roads from 2016, there are 40 county roads with a total length of 425.720 km and 42 local roads with a total length of 198.458 km.

Despite investments in the network of county and local roads in the past period, the quality of roads is still worse than in other more developed parts of Croatia, and it is necessary to increase the share or percentage of paved roads in the total length of the road network in the County by building the remaining sections of county and local roads, while at the same time providing funds for investments in the sections of paved roads that require reconstruction and modernization.

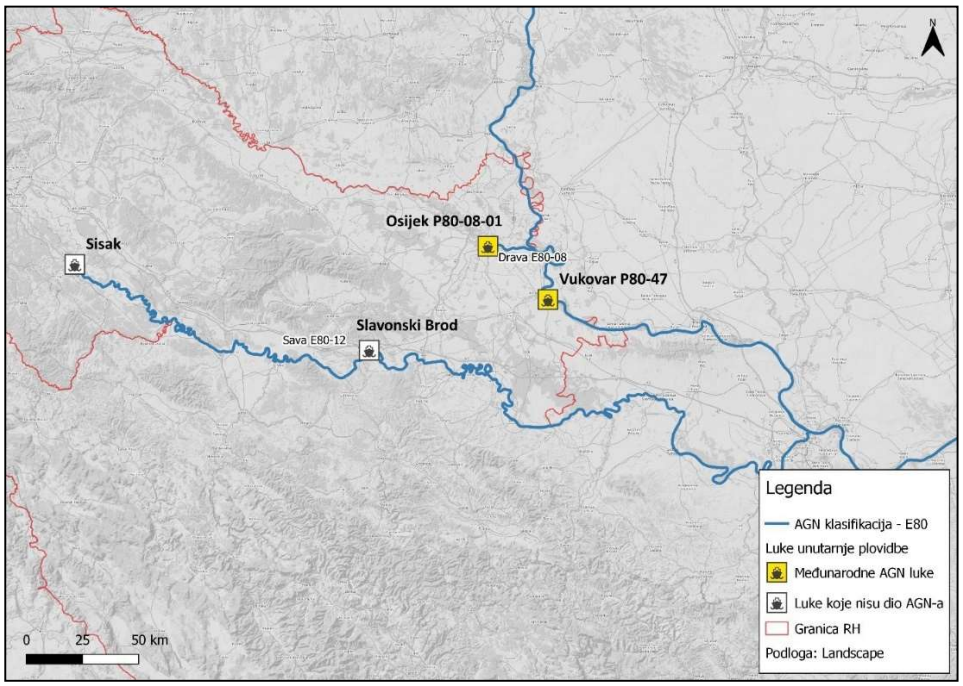
State roads also require reconstruction and extraordinary maintenance of certain sections. The problem of the passage of state road corridors through the city centers was emphasized, which led to an increase in the traffic of cargo vehicles, so due to the faster flow of vehicles in transit and an increase in traffic safety, it is necessary to relocate the route of state roads through the construction of bypasses.

The problem is also the poor traffic connection of the peripheral parts of the County (especially the city of Ilok) with the county centers and the highway, so it is necessary to build fast roads (Srijem border transversal), which would reduce travel time, and at the same time represent the bypasses of settlements in the municipalities through which they pass.

Inland waterways are classified according to the general criteria for the classification of inland waterways in Europe established by the UNECE Waterway Classification 1992, which is accepted by

the European Treaty on Major Inland Waterways of International Importance (AGN). The Republic of Croatia signed the AGN on June 24, 1997, and the Croatian Parliament confirmed on November 12, 1998, the Decision on the promulgation of the Law on the Confirmation of the European Treaty on Major Inland Waterways of International Importance (AGN). On the basis of the AGN contract, the nominal size of the class of navigability is determined by the size of the vessel for regional waterways and the size of the convoy for international waterways. According to the AGN, the Danube River is the main river marked E80, while the Sava is a branch of the Danube under the code E80-12 and the Drava is a branch of the Danube under the code E80-08. In the context of ports, the port of Vukovar is designated as international port code P80-47, and the port of Osijek as international port code P80-08-01. The described categorization is shown in the figure below.

Figure 8: Classification of ports and waterways according to AGN (European Treaty on Major Inland Waterways of International Importance)



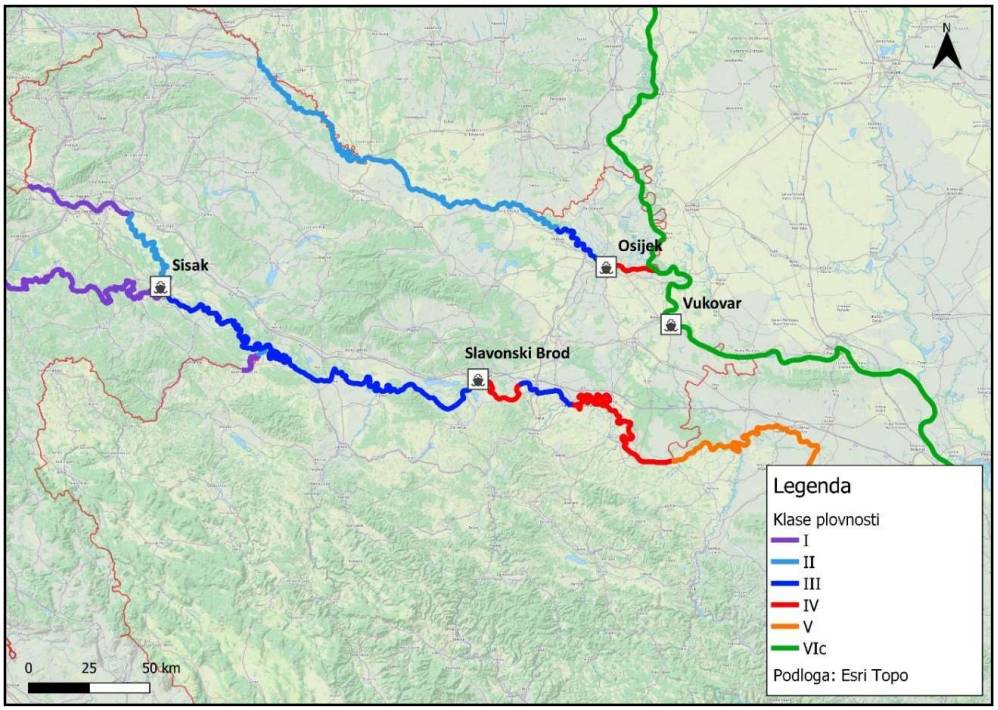
Source: Mid-term plan for the development of inland waters and ports of the Republic of Croatia for a period of ten years

The classification of waterways in the Republic of Croatia is determined by the Ordinance on Classification and Opening of Inland Waters (OG 77/11, 66/14, 81/15) adopted by the Ministry of Sea, Transport and Infrastructure. The Ordinance opens and classifies waterways on inland waters of the Republic of Croatia according to navigability criteria. The classification is determined on the basis of expert bases and studies on the classification of waterways on the internal waters of the Republic of Croatia.

The total length of classified waterways in Croatia is 1.016,80 rkm.

An overview of the navigability classes of all inland waterways is given in the figure below.

Figure 9: Cartographic review of inland waterways



Source: Mid-term plan for the development of inland waterways and ports of the Republic of Croatia for a period of ten years

International waterways

The rivers Danube, Sava, Drava, Kupa and Una are part of the international waterways and their characteristics are shown in the table below. The length of international waterways is 611,60 rkm.

Table 1: International waterways

Watercourse	Type of waterway/river section	Waterway length (rkm)	Waterway class
DANUBE	1295+500 (Ilok) – 1433+100 (Batina)	137,50	VI.c class
SAVA	210+800 (Račinovci) – 313+700 (Sl. Šamac)	102,90	IV. class
	313+700 (Sl. Šamac) – 338+200 (Oprisavci)	24,50	III. class
	338+200 (Oprisavci) – 371+200 (Sl. Brod-city)	33,00	IV. class
	371+200 (Sl. Brod-city) – 594+000 (Sisak-Galdovo)	222,80	III. class
DRAVA	0+000 (Danube confluence) – 14+000 (Osijek port Nemetin)	14,00	IV. class
	4+000 (Osijek port Nemetin) – 55+450 (Belišće)	41,45	III. class
	55+450 (Belišće) – 70+000 (Hungary border)	14,55	II. class
KUPA	0+000 (Sava confluence) – 5+900 (Odra confluence)	5,90	I. class
UNA	0+000 (Sava confluence) – 4+000 (Tanac)	4,00	II. class
	4+000 (Tanac) – 15+000 (Hrvatska Dubica)	11,00	I. class

Source: Ordinance on the classification and opening of inland waterways (OG 77/11, 66/14, 81/15)

State waterways

In addition to international waterways, state waterways include sections of two rivers, namely Kupa and Sava. The total length of state waterways is 276,60 km.

Table 2: State waterways

Watercourse	Type of waterway/river section	Waterway length (rkm)	Waterway class
SAVA	594+000 (Sisak) – 662+000 (Rugvica)	68,00	II. class
	662+000 (Rugvica) – 715+000 (Bregana – border with Slovenia on the right bank)	53,00	I. class
KUPA	5+900 (Odra confluence) – 161+500 (Ozalj – HE Ozalj dam)	155,60	I. class

Source: Ordinance on the classification and opening of inland waterways (OG 77/11, 66/14, 81/15)

Other unclassified national waterways

Unclassified national waterways include other Croatian rivers or river sections and lake Kozjak, lake Visovac, lake Bajer, lake Lokve, lake Dubrava and the Kopački rit Nature Park area.

For the development of the Vukovar-Srijem County, and especially the area of the city of Vukovar, the pan-European transport corridor VII is of particular importance, which refers to the Danube waterway, since it is the only pan-European corridor that passes through the 'center' of the Vukovar-Srijem County. The Danube is the most important Croatian waterway and is navigable along the entire length of Croatia and according to the European Treaty on Major Inland Waterways of International Importance (AGN) classified as class VIc International, regional and local traffic is taking place along the Danube.

Since the smallest investments are needed in the development of this transport corridor, it is also the most attractive for attracting investments. The corridor gained further importance after the completion of the Rhine – Main – Danube channel, which united the two largest European navigation systems, thus connecting the Black Sea with the North Sea (Atlantic Ocean).

In accordance with the Development Strategy of the Vukovar-Srijem County for the period up to 2020, strategic projects important for the development of the port of Vukovar that are yet to be realized are the reconstruction and extraordinary maintenance of particular sections of state roads and the construction of the bypass of the cities of Vinkovci and Vukovar, and in terms of railway traffic reconstruction and electrification of the Vinkovci-Vukovar railway line and reconstruction of the Vinkovci station (revitalization of the former cargo station). In addition, the construction of the LDC (logistics-distribution center) Vinkovci-Vukovar and the construction of the Cargo center Vinkovci-Vukovar is planned, and the priorities in river transport are the implementation of the strategic project of the Republic of Croatia 'Multipurpose channel Danube-Sava', a special-purpose port, industrial ports with economic and production facilities, modernization and construction of additional capacities of the port of Vukovar in the existing port area and terminals of liquid and bulk cargoes, etc. for the oil and chemical industry.

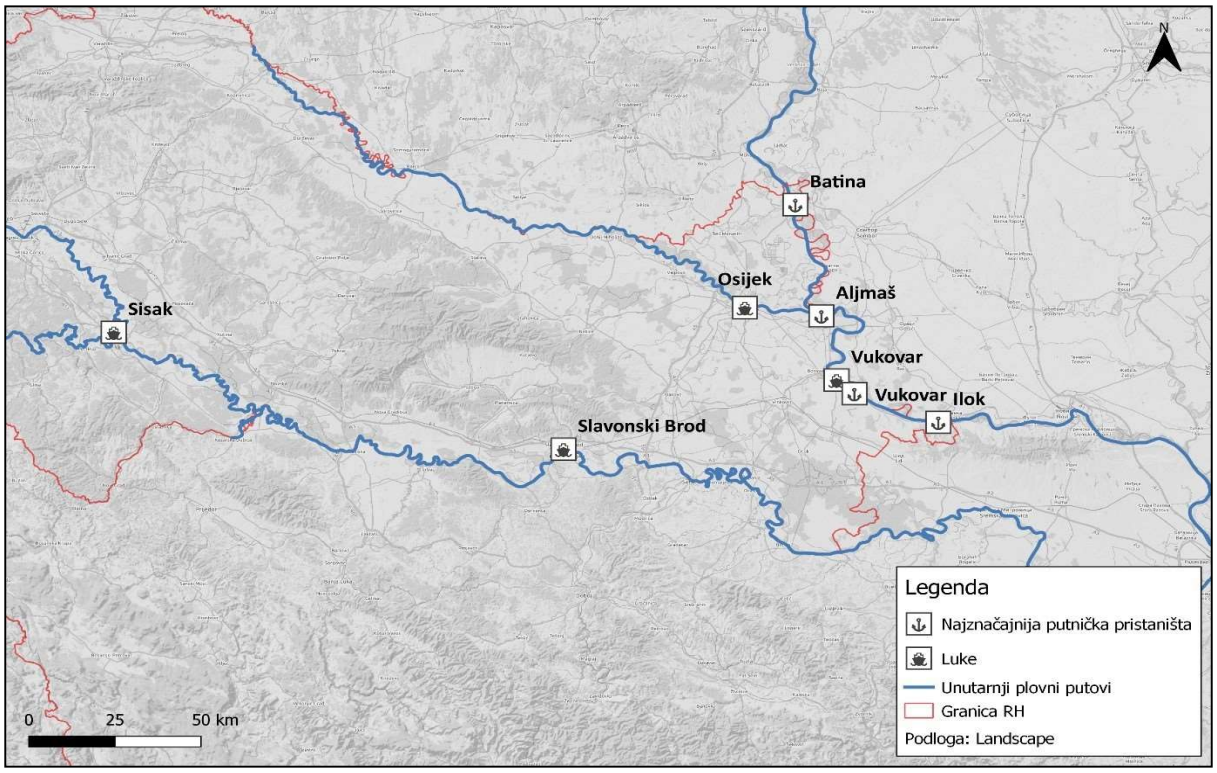
The port of Vukovar is in the middle of all strategic plans of the Republic of Croatia aimed at encouraging the development of Eastern Slavonia. In terms of traffic demand on inland waterways in the Republic of Croatia, most traffic takes place on the Danube River. In addition, the Danube is a river that crosses a large number of countries and because of its position and connection with the Rhine via the Rhine – Main – Danube channel in Germany forms a corridor that transports a large amount of cargo. Although the Sava and Drava rivers are navigable, due to the lack of maintenance of waterways and natural characteristics and the influence of water levels, they are not in navigable function for most of the year, and significant ports on the Sava – Slavonski Brod and Sisak river, mostly serve the transport of petroleum products and in this regard do not represent a significant competition to the port of Vukovar.

Quality transport infrastructure and transport connectivity is a prerequisite for the development of modern logistics. While the road corridor is in very good condition, the railways need further improvement in order to achieve quality at the level of European standards. One of the primary tasks is to restore container transport on the main corridors, which should be monitored and the construction of a network of transshipment terminals. Stronger integration of railways and the use of the Danube for the transport of goods, i.e. intermodal forms of transport, should in combination encourage local development.

11.c Analysis of competition/synergy with other ports in the surrounding area

The ports on the internal waters of the Republic of Croatia are: the port of Osijek, the port of Vukovar, the port of Slavonski Brod and the port of Sisak. The ports of Vukovar and Slavonski Brod are classified as ports of the basic TEN-T network (Rhine-Danube corridor), while the ports of Osijek and Sisak are classified as ports on the comprehensive TEN-T network in the territory of the Republic of Croatia. Apart from inland waterway ports, there are several piers in the Republic of Croatia, the most important being the passenger piers Vukovar, Batina, Aljmaš and Ilok. All these piers are located on the Danube, which is part of the TEN-T corridor Rhine-Danube. In general, all ports and piers located on the Danube are in a strategically better position than other ports and piers with regard to the navigability of the Danube throughout the year and better connection with international traffic flows.

Figure 10: Location of ports and the most important passenger piers in the Republic of Croatia



Source: Mid-term plan for the development of inland waterways and ports of the Republic of Croatia for a period of ten years

The state of navigability and maintenance of waterways have a strong impact on the competitiveness and operations of inland ports and the entire inland navigation sector. One of the key challenges in the inland navigation sector in Croatia is ensuring the navigability of international waterways throughout the year and maintaining AGN navigability classes on some sections.

In the surroundings of the port of Vukovar, competitors can be divided into domestic and foreign competitors. The port of Osijek stands out from its domestic competitors.

The port of Osijek is under the jurisdiction of the Port Authority Osijek. It is located on the right bank of the river Drava (rkm 12+000) in a partially formed port basin, which was built by excavating a new course of the river Drava and carries the navigability class IV. Storage and transshipment are basic activities in the port of Osijek. The main challenge in the operation of the port of Osijek is the navigability of the Drava towards the Danube, where the navigability class is occasionally reduced.

The port of Osijek is part of the comprehensive TEN-T network (TEN-T corridor Rhine-Danube). It is located near the A5 highway which connects the cities of Đakovo - Osijek - Beli Manastir in the north-south direction and forms a connection with the A3 Zagreb - Lipovac highway which connects Zagreb and Belgrade in Serbia. In the vicinity of the Port there is a single-track non-electrified railway of international importance, M302 Osijek - Strizivojna - Vrpolje in the north-south direction, the local railway L208 Vinkovci - Osijek, also a single-track, non-electrified railway that runs in the southeast of

the port of Osijek towards Vinkovci and the section of the regional railway R202 Varaždin - Dalj connecting Eastern and Northern Croatia.

Activities in the port of Osijek are carried out entirely at a location in the eastern part of the city of Osijek near the Industrial Zone Nemetin, 5 rkm from the former location of the port in the city center.

The Port Authority Osijek is responsible for the management of the port of Osijek, and the port of Tranzit Osijek Ltd. is the current concessionaire (part of the Nexe Group). The Port Authority Osijek and the Luka Tranzit Osijek Ltd. signed a concession contract for the implementation of port activities at the end of May 2006.

Capacities of the Luka Transit Osijek:

- 100 m of vertical coast and 250 m of sloping coast,
- 5.700 m of track in the port itself,
- 20.000 m^2 of open storage space and 5.000 m^2 of closed storage space and
- registered type A customs warehouses.

In the port of Osijek, transshipment is carried out predominantly for bulk cargo and sand, and iron and packaged goods are also represented. The port of Osijek is the second of the four ports of inland waterways of the Republic of Croatia in terms of the amount of cargo transported, immediately after the port of Vukovar. It is oriented towards providing services to the parent company Nexe, the import of gravel, coal and slag used in the production of cement, which is the basic product of the Nexe Group.

The Port of Slavonski Brod is under the jurisdiction of the Port Authority Slavonski Brod. The port of Slavonski Brod is located 4 km southeast of the town of Slavonski Brod on the left bank of the Sava River at rkm 363+000 (port of Slavonski Brod) and rkm 363+400 (oil port of Ruščica). On the section Slavonski Brod - Sisak - Galdovo, class III of navigability is prescribed, and on the section Slavonski Brod – Oprisavci, class IV of navigability is prescribed. Like the port of Vukovar, the port of Slavonski Brod is located on the basic TEN-T network, on the Rhine-Danube corridor and is designated as the port of the basic TEN-T network. Difficulties with the navigability of the Sava River, i.e. difficulties with maintaining the prescribed classes of navigability, affect the operations in the port of Slavonski Brod.

The port is connected by railway and road infrastructure with economic operators such as Đuro Đaković, Slavonija DI, Distribution Center of Supply, HŽ Cargo Zagreb, etc. It is located near the A3 highway. Nearby is also the route of the double track electrified railway of international importance M104 Novska - Tovarnik - DG (R. Serbia), which continues on the M502 line and connects Zagreb in the north of Croatia with Belgrade in Serbia. For the development of all forms of industrial plants, warehouses and terminals, an economic zone of 500 hectares was built in the immediate vicinity of the port of Slavonski Brod. Due to its geo-traffic position, the port of Slavonski Brod has the potential to become a significant intermodal hub. The port of Slavonski Brod covers about 90 ha of the port area, of which 858.195 m^2 of the port area and an additional 30.000 m^2 of land with real estate owned by the Port Authority Slavonski Brod outside the port area. The port has a vertical coast of about 350 m in length for cargo transshipment and berthing of ships with a manipulative plateau of 6.000 m^2. The newly constructed area for the container terminal is 5.500 m^2, with another 12.000 m^2 planned. By

means of the coast, the connection of the road and the railway with the river is enabled and minimum conditions for transshipment of all cargoes, as well as special cargoes up to 300 t payload, are ensured. In the port area there is a terminal for general cargoes, a terminal for special cargoes, a container terminal and a terminal for the transshipment of crude oil with 140 m of sloping rocky coastline and a 60 m pontoon for berthing barges and ships. There are a total of four warehouses for general, bulk and container cargo in the port, with the area of the warehouse for bulk cargo being 30.000 m^2 and the area of the warehouse for container cargo being 25.000 m^2. Due to its geo-traffic position, the port of Slavonski Brod has the potential to become a significant intermodal hub. There are three concessionaires in the port of Slavonski Brod. Since 2018, the company Manšped Ltd. has signed a concession contract with the Port Authority Slavonski Brod for the performance of port activities, i.e. the use of the container terminal of the port of Slavonski Brod.

Manšped Ltd. has the following:

- Container terminal with a capacity of 1.000 TEU,
- VGM scale,
- Own railway track,
- Own pier on the coasts of the Sava River with cargo handling equipment.

Crodux energetika Ltd. is the concessionaire in charge of the project for the construction of a combined 2 x 250 MW thermal power plant powered by gas worth 450 million EUR. Along with the thermal power plant Crodux energetika Ltd. is in charge of the planned construction of the hydrogen production facility.

The third concessionaire in the port of Slavonski Brod is the company 'Robno transportni centar Brod' Ltd., which provides crude oil transfer services. This is the existing concessionaire (the concessionaire who was in the port area before the establishment of the Port Authority Slavonski Brod) and has a permanent concession.

Comparing the port of Slavonski Brod with other Croatian ports on inland waterways, this port is the third largest port in terms of the quantity of cargo transported in tonnes. The loaded cargo is dominated by oil, followed by gravel and sand, while the general cargo is few. Analysis of the traffic generated in the port of Slavonski Brod is given under Chapter 2.1.5.

The port of Sisak consists of the Crnac basin (rkm 587+000) and the Galdovo basin (rkm 593+700) on the Sava River, as well as a private port for transshipment of bulk cargo 'Pristanište i skladišta' Ltd., located in the city of Sisak at rkm 4+800 (Kupa River). The port is located on the comprehensive TEN-T network. The main challenges in the context of waterways are the extremely big distance from the Danube as a key European waterway and the difficulties with the navigability of the Sava River.

The distance from the Port to the nearest access to the A3 highway is 25 km. In the vicinity of the port of Sisak there is a single-track electrified railway of international importance, M502 Zagreb Gk - Sisak - Novska.

The Galdovo basin is a shipbuilding pier with a total area of 11.719 m^2 located at rkm 593 + 100 to rkm 593 + 400 on the left bank of the Sava River. The Port Authority Sisak has invested a large amount

of funds on the location of the built pier for ships on the Sava River in Sisak in order to fully equip the pier, vessels, devices, machines and necessary equipment.

The concessionaire Brodocentar Sisak Ltd. is in charge of the economic use of the slipway in order to perform the registered activities of construction, overhaul and repair of river vessels and floating facilities and other activities in the field of shipbuilding in the Galdovo basin. Also, at the pier of the company Brodocentar Sisak Ltd., the inspection and control prescribed by the rules for technical control of inland navigation ships according to the Croatian Register of Ships is performed. The pier contains independent (horizontal and oblique) trolleys on the rails for the purpose of extracting and launching ships weighing up to 400 t and up to 80 m in length.

'Pristanište i skladišta' Ltd. is a private port for bulk cargo transshipment located on the left bank of the Kupa River (rkm 4 + 470 to rkm 5 + 640). It is not administratively included in the port area of the state port of Sisak open to public traffic. Its infrastructure consists of open and closed storage space, two portal cranes, silo and other port machinery, anchorage for cargo and empty ships. Also, access railway tracks and roads have been built to the port and direct transshipment from river vessels to road and rail vehicles is possible. Furthermore, it contains storage areas for transshipment and storage of containers in combined cargo transport. The company 'Pristanište i skladišta' Ltd. is also a concessionaire in the Crnac basin of the port of Sisak and manages the P-30 and PO-36 ports and performs the services of transshipment of crude oil and petroleum products.

Considering the amount of transshipped cargo in tonnes, the port of Sisak has the lowest amount of transshipped cargo compared to other Croatian ports of inland waterways. The reasons are the low navigability of the Sava River (class III) on which this port is located and the specialization of the port for oil transport. Analysis of the traffic generated in the port of Sisak is given under Chapter 2.1.5.

Analysis of cargo transport in Croatian ports

- **Port of Osijek**

Considering the volume of transshipped cargo in the port of Osijek in tonnes in the period from 2014 to 2020, there was a growth in cargo traffic from 2015 to 2017, and then a decline from 2017 to 2019. The port of Osijek is the second of the four ports of inland waterways of the Republic of Croatia in terms of the amount of cargo transported, immediately after the port of Vukovar. The highest turnover was achieved in 2017, 252.743 t. The least amount of cargo was transshipped in 2015 when the transshipped cargo dropped to 133.057 t. In 2020, 222.027 t was transshipped in the port of Osijek. Sand and bulk cargoes strongly dominate the total amount of overloaded cargo. The bulk category is dominated by coal and slag, which on average account for 75% of the total transshipped tonnes of bulk cargo in the port of Osijek for the observed years.

- **Port of Vukovar**

By analysing the quantity of cargo shipped in the port of Vukovar in tonnes in the period from 2014 to 2020, an increase in cargo traffic is evident. Due to its favourable position on the Danube River, which has a high class of navigability, the port of Vukovar counts the largest quantity of transshipped cargo of the four Croatian ports analysed. Cargo traffic is growing, with the majority of cargo transshipped in 2020 (557.534 t), despite the global impact of the COVID-19 pandemic. The least cargo was transshipped in 2017 when the cargo dropped to 319.467 t. In the period from 2015 to 2019, there was a major drop in bulk cargo transshipment, but in 2020 there was a growth. The amount of transshipped liquid cargo increased by 1,5 percent in 2018 compared to 2014, and there was a decrease in 2019. The highest growth is recorded in the transshipment of general cargo. General cargo transport increased from 42.916 t in 2016 to 136.623 t in 2020, an increase of three times.

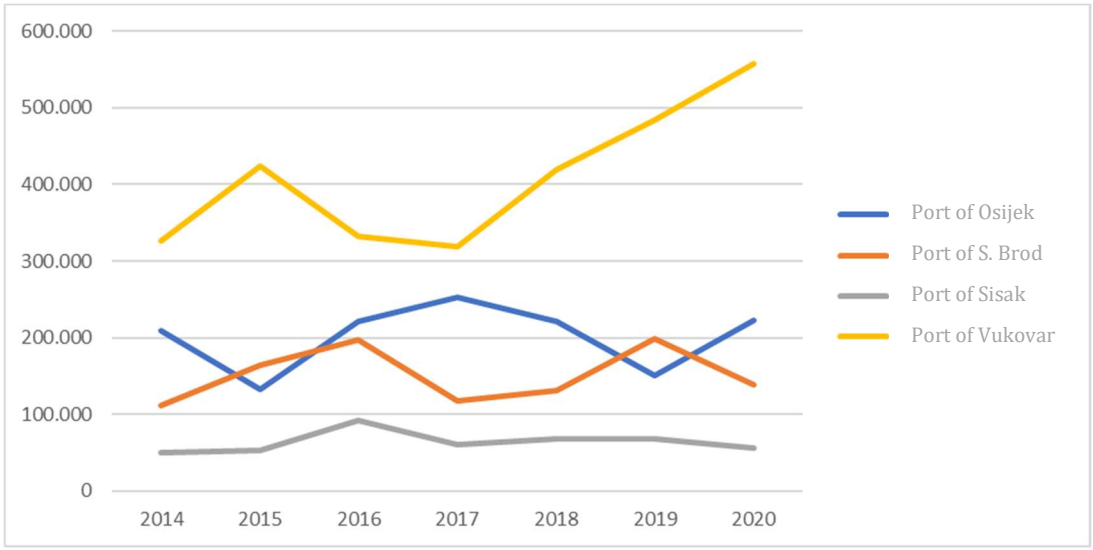
- **Port of Slavonski Brod**

Considering the amount of cargo loaded in the port of Slavonski Brod in the period from 2014 to 2020, it is evident that the most cargo was transshipped in 2019, namely 198.997 t, which is an increase of almost twice compared to 2014. The figure below shows the increase in the quantity of cargo transshipped from 2014 to 2016, the transshipment then dropped to 116.823 t in 2017, after which the quantity of cargo increased again. Comparing the port of Slavonski Brod with other Croatian ports on inland waterways, this port is the third largest port in terms of the quantity of cargo transported in tonnes. In 2020, 138.046 t was transshipped in the port of Slavonski Brod. Regarding the type of cargo transported from the port of Slavonski Brod, it can be concluded that most of the cargo transported is dominated by oil, followed by gravel and sand, while there are few other cargoes. Data on other types of transshipped cargo are not available. The figure below shows the amount of transshipped cargo in the period from 2014 to 2020.

- **Port of Sisak**

Considering the amount of transshipped cargo in tonnes in the period from 2014 to 2020, the port of Sisak has the lowest amount of transshipped cargo compared to other Croatian ports of inland waterways. The reasons are the low navigability of the Sava River (class III) on which this port is located and the specialization of the port on the transport of oil. In 2020, 55.425 t was transshipped in the port of Sisak. The graph shows the data on the quantity of transshipped crude oil from the port of Rušćica - Slavonski Brod to the Crnac basin in the port of Sisak in the period from 2014 to 2020. Oil transshipment was highest in 2016, when 93.788 t was transshipped, after which it dropped to 60.427 t in 2017. Since then, by 2019, the quantity of transshipped oil has increased slightly.

Graph 8: Cargo transport in Croatian inland ports in the period 2014-2020



The graph shows that the port of Vukovar leads in the amount of traffic in all observed years, while the lowest turnover was achieved in the port of Sisak. The ports of Vukovar and Osijek tend to increase their turnover in 2020 compared to 2019.

The synergy of inland ports at national level is achieved through the following associations:

- **The Inland Water Transport Community** at the Croatian Chamber of Economy, Osijek County Chamber - The transport community brings together shipowners, ports and port operators on the Sava, Danube and Drava rivers. The Community shall hold meetings to present plans, reports on operations and the level of traffic in individual ports, information on the operations of inland water operators and the problems encountered by shipowners in their work. The Community is a connection between operators and shipping companies according to the competent Ministry of the Sea, Transport and Infrastructure.
- **The Inland Water Port Authorities Community** is established by the inland water port authorities. It's seat is in Slavonski Brod. The tasks of the Community are prescribed by the Statute of the institution, and they relate to the harmonization of the work of port authorities in terms of providing better and more quality services in public ports, harmonization of fees for the use of ports, procedures for granting concessions as well as all issues related to the functioning of the port system, cooperation with relevant institutions and companies and with seaports, as well as the organization of appropriate education, consultations and seminars and improvement of conditions for the development and strengthening of tourism in inland navigation. Through the work of the Community, information is exchanged and the issues of the system are discussed and solutions are found.
- **The Community of River Tourism** at the Croatian Chamber of Economy, Osijek County Chamber was founded with the aim of improving the development of all forms of river nautical tourism and international river cruises, one-day river cruises and domestic and international

yachts. All these three potentials for the development of river nautical tourism require the necessary coordination of all stakeholders and strategically designed development plans. The conditions of the Community for their integrated development will be created, taking into account the equable development and interests of all stakeholders involved. Croatia, through a naturally developed inland waterway system, has big potential for the development of river nautical tourism, but nevertheless river tourism needs coordinated management and this tourism potential must be developed in accordance with national strategic objectives. In addition to the increased number of cruise ships that berth in Croatian piers on the Danube and Drava, in recent years there has been a trend of development of one-day river cruises by inland waterways. Excursion sailing is more or less developed on the Danube, the upper Sava, Kupa and Bosut, and the interest in investing in this type of tourism is growing.

In practice, there is considerable scope for achieving more significant synergy of ports in the environment.

Of the foreign ports in the vicinity of the port of Vukovar, the port of Brčko in Bosnia and Herzegovina, the port of Baja in Hungary and the port of Novi Sad in Serbia are significant.

The main foreign competitor of the Port of Vukovar is the Port of Brčko in BA, which is located on the Sava River and usually has only half a year of favourable natural conditions for transshipment. Companies engaged in the import or export of goods in BA choose the Port of Brčko for the transshipment of goods whenever possible due to lower transport costs, otherwise, at low Sava water level, they use the port of Vukovar as a transshipment port.

The port of Brčko is located in the northeastern part of Bosnia and Herzegovina, on the right bank of the Sava River waterway (44 52'N; 18 48'E) and has a category IV navigability and an average navigation period of 260 days per year.

Figure 11: Port of Brčko

The port has a direct railway connection with the Tuzla commercial basin and a connection to the European railway network that passes through the Republic of Croatia, and can achieve direct goods flows with the ports on the North and Black Seas.

The area of the Brčko port is 14 ha, and the majority of the area consists of the operational coast with ancillary and accompanying facilities, open and closed warehouses and workshop space. In the immediate vicinity of the operational coast there are three anchorages, formed according to technological operations and type of goods. The length of the built operational coast along

the sloping wall is 104 m and 76 m along the vertical wall. Along the operational coast there are four shunting tracks with a total length of 2.586 m, and with the main railway station Brčko, the port is connected by a single-track route.

The main transshipment machinery, with an annual capacity of about 915.000 tons, enables transshipment of general and bulk goods: coast-to-coast, land-to-coast. The mechanization consists of two portal cranes of the Ganz type (5t, l=30m). Background warehouses are served by forklifts and loaders.

For regulating the transport flows of goods, changes in the type of transport, as well as for the needs of production, the Port has 61.000 m^2 of open and 11.000 m^2 of closed storage space. Closed warehouses are standard, classic floor warehouses. Within the territory of the Port there is also a customs terminal of 5.000 m^2.

Although it used to transship up to 1 million tons of cargo per year, in today's times the results mostly depend on the navigation possibilities, i.e. the Sava River water level, so the annual results vary from 70 thousand tons to a maximum of 250 thousand tons, and the clients are mostly companies from the Zenica and Tuzla regions. The port of Brčko is a significant competitor of the port of Vukovar, especially if it was able to solve the problem of the navigability of the Sava River.

The largest Hungarian ports are located in the cities of Budapest, Győr-Göny and Komárom, which are all located in the northern part of Hungary and on that side do not compete with the port of Vukovar, while to the south, the largest ports in Dunaújváros and Baja are on the Danube River. The plans of the state of Hungary for the upcoming period envisage the construction and development of the port of Mohač from which it is planned to create a top logistics center as the first/last point in the country for vessels arriving/departing in the direction of the port of Constanza.

For now, the port of Mohač represents a small port that transships dry and bulk cargo on an area of 32.000 m^2 and has 1 mobile crane with a capacity of 9 t and open and closed warehouses. The state-owned port of Baja transships dry and bulk cargo, container cargo, special cargo, petroleum products and refined cargo and Ro-Ro cargo and has an area of 208.795 m^2 and 9 terminals. In addition to these services, the port also provides services of collection of waste from ships and supply of drinking water and electricity, as well as a complete logistics service, such as handling of goods and containers, loading and unloading, storage, customs and financial services, phytosanitary station, container and ship repairs, cargo forwarding, etc.

Figure 12: Port of Baja

The town of Baja is located 30 km from the southern Hungarian border to Serbia. The vicinity of the Danube and the favourable geographical location of the city make it one of the main transport hubs not only in Hungary, but also in the entire Bácska region. The city is the center of the agricultural region of southern Hungary and plays an important role in the food and light industry sector.

The port of Baja and the Intermodal Logistics Service Centre, one of the most important Hungarian strategic ports, are located on the left bank of the Danube between river kilometers 1479 + 140 and 1480 + 900, have a direct road and rail connection and are available on inland waterways from the north and the Black Sea. The port has 623 m of embankment, 444 m of vertical coastline, 9.800 m^2 of covered, closed customs warehouse, 1.500 m^2 of open-air customs warehouse, 4.100 m^2 of covered external storage space and 7.000 m^2 of covered storage space, 2 portal cranes and 2 mobile cranes for containers, loading equipment, 45.000 m^3 silo, Ro-Ro ramp, offices and parking places for 120 trucks.

Future plans for the development of the port of Baja include investments in the expansion of the operational coastline, the reconstruction of the track, the reconstruction of the surfaces and the equipping for the reception of cargo weighing up to 120 t, while in the long-term plans it is planned to expand the port by constructing a pool-type port.

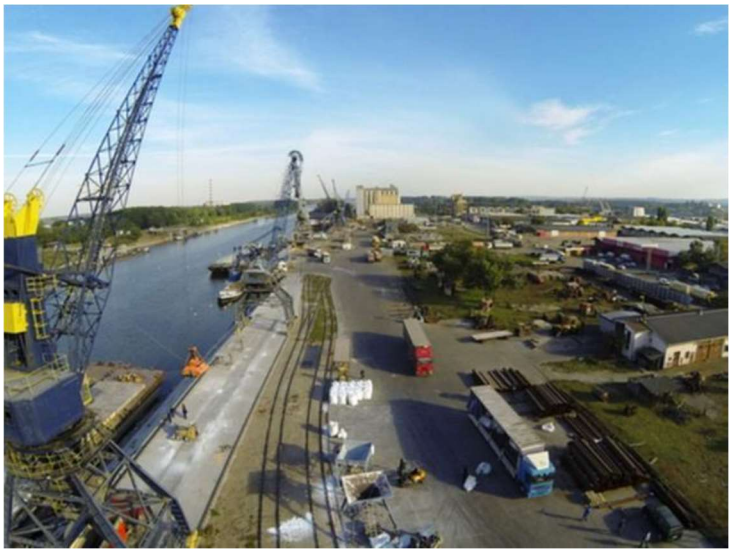
According to the port of Baja, it gravitates the cargo that goes to/from Hungary, so in that sense the Port of Vukovar cannot compete with it.

According to Danube ports in Serbia, mostly gravitates cargo intended for import into and/or export from Serbia, but the ports in Serbia are competitive with the port of Vukovar also because they can take over part of the cargo from BA. With several smaller and poorly maintained and equipped ports, the most important ports are the port of Novi Sad as the closest to Vukovar and Belgrade.

The port of Novi Sad is located along the left bank of the Danube at 1.254 km, at the entrance of the Danube-Tisa-Danube Channel (DTD Channel). The port area encompasses both sides of the channel between the city centre and the industrial zone, allowing multiple port functions (city logistics, import and export of products, etc.). It is located at the intersection of the X rail/road corridor and the VII waterway corridor and has international significance. The owner of the port land and most of the infrastructure is the Republic of Serbia.

There are currently two licensed port operators in the Port of Novi Sad. 'Luka Novi Sad' JSC is a joint stock company operating a multi-purpose terminal, and 'NIS' JSC is a joint stock company operating an oil terminal.

Figure 13: Port of Novi Sad



The total area of the port is 24,19 ha, and the lack of free space for further development within the port area is problematic. However, there is land bordering the port area where the port can be expanded. The navigability of the port is limited to 4 m, and the maximum cargo capacity is 2.000.000 t per year. The anchorage has the capacity to accommodate 12 vessels.

The port has one multi-purpose trimodal terminal and one oil terminal. The total length of the coast of the multipurpose terminal is 800 m, of which the vertical wall is about 170 m, and at the same time 5 vessels can be serviced. The terminal has 6.000 m of railway tracks and is connected to the national railway network and the nearby pan-European railway Corridor X. The port can accommodate block trains on three tracks with a total length of 1.188 m (393 m + 471 m + 324 m).

The storage of multimodal units on the coast is limited by the lifting capacity of the portal crane (27t). The port has 100.000 m^2 of open storage space, 44.000 m^2 of covered storage space and 270.000 m^3 for liquid cargo users.

The structure of cargo is dominated by bulk goods - agricultural products and various fertilizers, and in addition to them, old iron and metal products are transported. The main customers of the services are companies from Vojvodina that deal with cereals. Since the future development of the port is based on multimodal transport, potential users of the port can be companies that already have or plan to start industrial production, or those companies whose products are suitable for transport in containers. Some of these companies are from the automotive industry (Delphi, Lear Corporation, etc.) and others are from the food production sector (Sunoko, Danubius, Mirotin…). Given the significant foreign investment around the port, demand for port services is expected to grow. The port of Novi Sad recorded a steady increase in traffic and reached 1.400.000 t in 2016 with 600.000 t in 2010.

Constanta is extremely important and is the largest river-sea port that connects Europe via the Danube with the Black Sea. It has 155 berths, 23.000 employees and generates 57 million tons of traffic per year. Port of Vukovar Ltd. has concluded a cooperation agreement with the port of Constanta. In June 2015, the ports of Vukovar and Constanta signed a Memorandum of Understanding as a result of the previous business cooperation and recognition of the port of Vukovar as strategic in this part of Southeast Europe, with the potential to carry out significant quantities of transshipments.

Looking at the overall closer competitive environment, it can be concluded that only the port of Osijek, which takes over part of the domestic cargo and has plans for expansion, and the port of Brčko, which can take over a significant part of the cargo from BA in case of more favorable sailing conditions on the Sava River, represent significant competition. Thanks to its navigability, natural position and tradition, the port of Vukovar should still be the dominant port gravitated by continental Croatia and a significant part of BA, especially the regions around the cities of Tuzla and Zenica.

However, given the plans of the ports in the region, it is necessary to invest in expansion and modernization in order to gain a competitive advantage and promote the natural connection of the ports of the Adriatic region with the waterways to the North and Black Seas.

In addition to trying to achieve competitive advantages, the port of Vukovar should be thoroughly investigated and clearly defined in which segments of the business and markets it will compete, and in which segments it can cooperate with the competition. Preferred competition should be mandatory in services, cargo, concession contracts, rental contracts, marketing strategies, pricing strategies, etc. There is scope for cooperation at national and regional level involving associations, port community systems, legislation, security issues, knowledge sharing, expertise sharing, training, lobbying for common interests, common hybrid logistics zones, integration into supply chains, hinterland links (the last three segments are of particular interest to nearby ports) and research and development. The port of Vukovar with ports in the vicinity should also consider the following – specialization for certain port services, such as handling specific bulk cargo or specific types of logistics services for specific cargoes, etc. Two or more ports nearby, specialized by their own agreement, can join forces in many other segments and thus practice cooperation.

11.d Market characteristics and trends – market research

Below is an overview of market characteristics and trends for the most important goods of interest to the port of Vukovar.

- **Fertilizers**

Mineral fertilizers are inorganic and organic substances used in agriculture to improve plant growth and yield. They are produced industrially using natural mineral resources, natural or natural gas (methane), and atmospheric nitrogen and oxygen (air). From these raw materials, chemical technological processes produce base chemicals such as ammonia (NH3) and urea (CO(NH2)2), nitrogen (HNO3) and sulphuric acid (H2SO4), and from them mineral fertilisers as final products. They are most often in the form of various water-soluble salts.

According to the Food and Agriculture Organization (FAO), in 2015 the capacity of the world production of mineral fertilizers amounted to 285 million tons per year, of which more than half were nitrogen fertilizers. The biggest impact on the price of mineral fertilizers is the price of natural gas, which accounts for about 90% of the cost of ammonia production, the basis for nitrogen mineral fertilizers. Ammonia production accounts for about 5% of the world's consumption of natural gas, which is less than 2% of world production.

According to the Global Agricultural Productivity Report 2021, total food production, as the main indicator of agricultural production, is growing by 1,36% globally (annual average from 2010 to 2019). Such growth is 21,4% lower than the target annual growth size (1,73%), which is needed to meet the projected global demand by 2050.

Agricultural productivity is not only about higher production or achieving higher yields, but also about making the best use of natural resources, reducing costs for farmers, reducing losses and waste, and achieving lower prices for agricultural products.

Since the beginning of 2021, the prices of mineral fertilizers and raw materials have been rising on the world market. An additional stimulus to the rise in prices during 2022 was the Russian invasion on the Ukraine. Given the imbalance of geopolitical conditions, the largest sources of raw materials for European food production are subject of restrictions. In the longer term, technological innovation in industry, coupled with growing demand for micronutrient fertilisers, is expected to boost market growth.

The largest producer of mineral fertilizers in the Republic of Croatia is Petrokemija Plc. Kutina, which is also the leading company in the region with the production of complex mineral fertilizers of 1,2 million t per year, 66% of which is intended for export, mainly to the countries of the Danube region and transported via Port of Vukovar Ltd.

The company Adriatica Danube Ltd. Vukovar, produces mixtures – composite mineral fertilizers mainly from raw materials imported from Eastern Europe. Their annual production amounts to 90.000 t and the majority of raw materials are transshipped to the Port of Vukovar Ltd., including the part of finished products that is also exported through the port, which together amounts to 9% of the total turnover of the company.

Fertilizer traffic ranges from 81.000 tons to 131.000 tons per year and as such has the most significant impact on the movement of the total traffic generated in the port of Vukovar. In the last three years, the artificial fertilizers market accounts for an average share of 30% of the total port turnover. The most significant customer of the services of the port of Vukovar is the company Petrokemija Plc., which plans to transfer an average of 300.000 tons of cargo transported through the port of Šibenik to the Port of Vukovar Ltd. with the opening of the eastern market, which represents a significant increase in the volume of business.

From all of the above, it can be concluded that there will still be good export potential for domestic producers who are also the largest buyers of port services. For this reason, planned exports via the port of Vukovar can be forecasted with annual growth.

- **Cereals and oilseeds**

The war in Ukraine has brought disruptions in food supply and inevitable price rises. The announcement of the war in Ukraine, since the beginning of the year, has influenced the increase in the prices of basic agricultural products – wheat and corn. Futures traded on commodity exchanges showed strong price increases since the beginning of the year, so the price of wheat traded on the Chicago stock exchange went up by about 12%, while corn prices went up by 14,5%.

Russia and Ukraine together supply more than 25% of the world's wheat exports, almost 20% of corn exports and 80% of sunflower oil exports. Ukraine is the world's largest producer of sunflowers, but also of potatoes, the sixth producer of corn and barley, the seventh producer of wheat and rapeseed and the ninth producer of soybeans. Ukraine produces wheat, corn, barley and rye on which most of Europe relies.

The beginning of the war in Ukraine comes at a time when food prices have risen to the highest level in ten years, as supply channels have not yet recovered from the COVID-19 crisis, and climate change is having an increasing impact on harvests in major agricultural production basins, while consumption in the Chinese market and markets around the world continues to grow. Current trends point to new upcoming tectonic disturbances on the global food market, which is why it is necessary to take a realistic look at the new situation in Croatia and make decisions that will affect the time so that the disturbances do not affect the drastic increase in prices and negative impact on all agricultural production. In the package of measures to mitigate the impact on the standard of citizens and companies in the amount of HRK 4,8 billion, the Government also included the Small Value Support Programme for the Procurement of Manure and the reduction of the VAT rate on inputs in agriculture.

The growing population around the world, especially in developing economies such as China and India, has led to an increase in food demand, which is expected to stimulate market growth in the coming years. The global agricultural crop market is expected to grow from USD 314,51 billion in 2021 to USD 351,37 billion in 2022 with a compound annual growth rate (CAGR) of 11,7%. The global agricultural crop market is expected to grow to USD 546,92 billion in 2026 with a CAGR of 11,7%.

Due to the exceptional agricultural potential in the surroundings of the port of Vukovar, cereals and oilseeds are certainly one of the cargoes expected to be permanent in the port of Vukovar. Likewise, given the current situation in Ukraine, as one of the major grain producers and exporters, higher growth rates of this cargo can be expected in the coming years.

- **Coal**

Coal prices are rising sharply, however, due to the crisis in global energy supply, global consumption of this energy product is expected to reach record levels from nearly 10 years ago. Constraints on carbon emissions have been pushed to the next level as markets and governments seek to boost the supply of this traditional energy product in conditions of war-torn bottlenecks in Ukraine.

The price of coal used for electricity generation has risen by about 170% since the end of last year, registering a sharp increase since the beginning of the war in Ukraine. Coke coal, which serves as a raw material in steel production, is traded at lower prices. Driven by diverging dynamics, subdued economic growth in China dampens steel production and hence the demand for coking coal.

The International Energy Agency (IEA) warns in its latest report that global coal consumption will grow by 0,7% in 2022 to reach a record 2013 level. The main reason for the continued rise in demand for coal is the shortage of gas, while the European Union is taking steps to reduce the use of Russian gas, holding back from banning imports, and Russia is responding by reducing deliveries. Coal consumption in the EU is therefore expected to rise by 7% in 2022, on top of last year's 14% jump, the IEA estimates. This is driven by demand from the electricity sector, where coal is increasingly used as

a substitute for gas, which is in short supply and has been surging in price since the beginning of the Russian invasion of Ukraine. Several EU countries extend the service life of coal-fired power plants foreseen for shutdown, reopen closed plants or raise the permissible operating ceilings to reduce gas consumption. At the same time, the boycott of Russian coal adds to the upward pressure on the price of coal.

Among other cargoes important for the Port of Vukovar Ltd., the turnover of coal is particularly prominent (average share of 24% in the last three years). Coal as one of the significant cargoes of the port is closely related to the long-standing cooperation with the company Sisecam Soda Lukavac Ltd. (BA), which is the only producer of soda in the territory of the former Yugoslavia and part of the group that is among the top 10 world producers in the industry. Given the growing production as well as the inability of Brčko port to receive significant coal traffic, it is assumed that the amount of cargo passing through the port of Vukovar will grow in line with global demand.

- **Agricultural mechanization**

After the crisis period on the world market in 2008-2012, there was a significant increase in demand for agricultural machinery in the period from 2012-2015. In 2016, due to the decline in the prices of cereals, milk and meat on the world markets, the agricultural equipment market returned to recession. During 2018, there was a recovery in the market. The COVID-19 pandemic has had a negative impact on the market, and the situation has been further aggravated by significant increases in material prices. This caused downtime in the production of equipment, but also increased demand for electronic components, which also limited deliveries. Due to the situation in Russia and Ukraine, several European manufacturers have already offered other markets the machines they were intended for Russia and Ukraine. Demand for food is growing and investment in agricultural production is projected to continue, which includes more investment in technology and more global trade.

Since 2016, port of Vukovar has also been delivering combine harvesters from the factory Same Deutz-Fahr Žetelica from Županja to the countries of the Danube region, which amounted to 97 pcs in 2017.

Port of Vukovar Ltd. has inquiries of the Company Same Deutz-Fahr Žetelica Ltd. Županja which is interested in import and export of agricultural machinery, and for which there are no current conditions in the port of Vukovar due to lack of Ro-Ro ramp. The planned annual quantity of cargo is 200-300 machines, and in line with global trends, it is expected that trade in agricultural products and agricultural machinery will continue to grow in the future, and therefore it is reasonable to assume further growth of interest in the service of transport of goods of this type.

- **Iron**

Within the category of general cargo traffic in the port of Vukovar, the turnover of steel, iron and steel plates is particularly prominent (annual average share of 51% in the general cargo structure). Arcelor Mittal from Zenica uses the services of the Port when the price ratio on the market of non-ferrous metallurgy is favorable, whereby significant competitiveness is created by the steel mill in Smederevo (Serbia). In 2017, the Company generated 14% of the turnover in the total traffic of the port. As the market for sheets, steel concrete ribbed iron, steel profiles, etc. steel products is in recovery and growth, a moderate increase in transshipment of this type of cargo is expected to continue.

Old iron, as a type of cargo in domestic transport, is one of the fastest growing at EU level. After the beginning of the Russian Federation's military aggression against Ukraine, the prices of scrap iron (as well as steel products) rose sharply in almost all regional markets – due to the uncertainty of the situation and the possible deficit of products and raw materials. As the war became the daily life of the world's public, the situation returned to market factors of influence. However, economic conditions in many countries have deteriorated significantly, partly affecting the decline in world steel production. The price limit is expected to have already been reached, and in autumn there is a possible increase in demand for steel products and, as a result, a rise in the price of scrap.

- **Biomass**

Biomass includes forest and agricultural biomass, biomass generated during the production processes of different industries, or waste in terms of municipal waste, waste generated during the treatment of water and sewage sludge, etc. Biomass can be targeted as an energy crop in the form of plantations (fast-growing forests) or crops (energy crops).

The most common source of biomass is solid biomass, especially pellets. Croatia is still dependent on biomass imports, as are all EU members. Therefore, in order to improve the production and consumption of energy from biomass, synergies and joint action by all actors in the energy sector are needed, and decision-makers should take appropriate measures to create preconditions for the development of the biomass market. With the emergence of a new biomass market, new opportunities are also opening up for developing countries. On the one hand, they could reduce their dependence on expensive fossil fuels, for example oil.

Currently, biomass does not exist as a cargo in the port of Vukovar, but the development of the market, according to the optimistic scenario elaborated in the Pre-Feasibility Study - the development of the port of Vukovar as a biomass hub predicts an annual cargo volume of 126.000 tons per year.

- **Containers**

The size of the global shipping container market was estimated at USD 6,41 billion in 2020 and is expected to expand with a compound annual growth rate (CAGR) of 12,0% from 2020 to 2028. According to the International Chamber of Shipping, about 11 billion tonnes of goods are transported by shipping containers each year. The increase in trade activities worldwide is expected to support the growth of industry.

The COVID 19 outbreak in early 2020 had a negative impact on market growth. The pandemic resulted in quarantine in all countries to contain the spread of the disease, which led to a decrease in demand for non-essential consumables, especially in the second and third quarters of 2020. In the first quarter of 2020 China was the epicenter of COVID 19. Therefore, several countries have stopped trade with China to limit the spread of the disease. Trade between the US and China fell by 20,3% in the first quarter of 2020, with a similar decline in trade between China and European countries. As China is a major exporter of consumer goods worldwide, the decline in its exports in 2020 has had a significant impact on the demand for shipping containers.

Due to the global containerization of transport, it is expected that a significant part of world trade will be diverted to the internal waters of the lower Danube region, which is why it is expected that traffic will spill over to all ports along the Danube, including the port of Vukovar.

12 National strategies and programmes

Below is an overview of national strategies and programmes related to port operations:

- **Transport Development Strategy of the Republic of Croatia (2017 – 2030)**

The Transport Development Strategy of the Republic of Croatia (2017-2030) defines goals and future measures (infrastructure, work and organization) in the transport sector related to internal and international traffic in all transport segments regardless of funding sources.

In Chapter 2.7. 'Navigability of inland waters and river transport', emphasized the need for development of logistics centers of the ports of Vukovar, Osijek, Slavonski Brod and Sisak and associated port areas in accordance with the strategy of logistics and intermodal transport. They need to be developed in logistics centers that, in addition to the usual services such as storage, loading and unloading of cargo, will provide added value within business zones.

It is emphasized that it is necessary to enable economic activities in business zones, with a special focus on cargo distribution and logistics, finishing and processing of goods, as well as industrial activities that will further encourage the economical use of port capacities.

Among the specific objectives of inland waterway navigability and river transport, it is stated (p. 197):

- increase the competitiveness of ports in Vukovar and Osijek as the main river ports for cargo transport;
- determined according to the role of the port of Slavonski Brod, which, in addition to the Croatian part of the hinterland, also relies on the hinterland in BA, and on the port of Sisak, whose hinterland is the whole of Central Croatia, and can be an important factor in transit traffic between North Adriatic ports and Central and Eastern Europe;
- exploit the potential of inland waterway navigation in the tourism segment;
- adapt navigability conditions to traffic needs and maintain the necessary level of navigability and improve the level of navigability on Drava from 0 to 13 rkm and on the Sava River;
- remove bottlenecks on waterways (Danube, Sava, Drava);
- improve operational and organisational conditions in river transport (economic sustainability).

As part of the development goals through the sectors, the port of Vukovar is listed as one of the Croatian ports that need to be developed as one of the main logistics centres along the port of Rijeka, the port of Split, the port of Ploče, the port of Osijek, the port of Slavonski Brod and the Zagreb hub.

It follows from the above that the development of the port of Vukovar is among the priority objectives in the Strategy for the Transport Development of River Transport, especially from the point of view of cargo transport and the Danube River.

The measures, which propose interventions related to the improvement of the infrastructure of the river transport system, highlight the development of the port of Vukovar (as a basic TEN-T port) and the construction of the multi-purpose channel Danube – Sava. These measures are fully aligned with the objectives set.

- **Strategic Plan of the Ministry of Maritime Affairs, Transport and Infrastructure for the period 2020-2022**

The Strategic Plan for the period from 2020 to 2022 was adopted on March 26, 2019, with the vision of achieving a highly developed, efficient, safe, environmentally friendly and modern transport and communication system, fully integrated into the network of the main international transport routes, which makes the best use of the traffic and geographical position of the Republic of Croatia and meets the needs of cargo and passenger transport.

The mission is to create conditions and build capacities that will ensure the drafting of quality laws and other regulations and their implementation related to the protection of the sea, maritime domain and inland waterways, ensuring the traffic connectivity of the islands with each other and with the mainland, achieve high development of electronic communications and postal services markets, organize the development of strategic infrastructure projects and investment programs of special importance for the Republic of Croatia, organize works on the construction of modern transport infrastructure, which will connect all regions and develop all types of traffic with a high degree of professionalism and security in the provision of transport services, and undertake all environmental protection measures in transport.

The objectives of the Strategy are based on:

4. sustainable development of the transport system
5. the development of electronic communications and postal services
6. ensuring a high level of utilisation of European Union funds for the development of the transport system

Under the first point of the strategic objective 'Sustainable Development of the Transport System', point 1.2. 'The Developed Inland Navigation System' highlights the importance of ensuring optimal infrastructure conditions of inland waterways and inland water ports to attract markets to increase the volume of inland navigation transport and connect it to the transport network of the European Union countries and the surrounding countries.

The development of multimodal and logistic hubs within port areas to ensure a high level of safety and environmental conditions for navigation are key processes for the sustainable development of traffic as a whole and the share of inland navigation in the total traffic flows in the Republic of Croatia. The modernisation of technical and technological conditions for passenger and cargo transshipment, the development of intelligent traffic management systems and transport processes are essential for the improvement and competitiveness of river shipping and inland water transport.

Furthermore, it is pointed out that in the next three-year period, infrastructure projects will continue in the port areas managed by the Port Authorities Vukovar, Osijek, Slavonski Brod and Sisak in order to ensure as much as possible the preconditions for the development of port activities in the areas along the Danube, Drava and Sava river waterways.

Consequently, in order to increase the competitiveness of inland ports, the development of economic zones in port areas will continue in addition to the construction of port infrastructure, attracting concessionaires who would carry out economic activities closely related to port activities. The development of economic zones in inland waterway ports is particularly important because in the immediate vicinity transport by river navigation is possible, which is the most environmentally friendly form of transport, especially if transporting large quantities of cargo with relatively low energy consumption.

- **National Development Strategy of the Republic of Croatia for the period up to 2030**

The National Development Strategy until 2030 is a capital document and a comprehensive act of strategic planning that guides the development of society and the economy in the long term in all important issues for Croatia in the next decade. The document is based on Croatia's competitive economic potential and development challenges at regional, national, European and global level. The elements of the strategic framework are Croatia's vision in 2030, development directions and strategic goals.

The document starts from the vision of Croatia in 2030, as a competitive, innovative and safe country with a recognizable identity and culture, a country of preserved resources, quality living conditions and equal opportunities for all.

Within the Strategic Objective 4. 'Global Recognition and Strengthening of the International Position and Role of Croatia', part of 'Strengthening the Position of Croatia in Central Europe and the Mediterranean', emphasizes the need to strengthen the international position of Croatia and emphasizes its geostrategic position at the intersection of Central Europe and the Mediterranean, which will be further valued in the coming period. This is planned to be realized by international cooperation aimed at achieving energy security, border security and effective fight against irregular migration, better transport connectivity and increased trade. The plan of strengthening cooperation is highlighted through membership within the framework of two macro-regional strategies of the European Union (Danube Region and Adriatic-Ionian Region) and through the Three Seas Initiative. Furthermore, it is stated that the realization of projects in river transport and better transport connections of the south and north of Croatia will strengthen the poorly used potential of the port of Vukovar on the strategic European waterway Rhine – Main – Danube. This will contribute to strengthening multimodal transport capacity and shifting goods traffic from roads to railways and waterways, as well as to contributing to the green transition.

- **Strategy for the Development of River Transport in the Republic of Croatia for the period from 2022 to 2032**

The Strategy for the Development of River Transport in the Republic of Croatia for the period from 2022 to 2032 (OG no. 87/2022) defines the objectives and measures whose implementation over the next ten years will result in a competitive, high-performance and modernised inland navigation system in the Republic of Croatia, which will be fully integrated into the European transport network.

The strategy consists of analysing the current state of river transport in order to determine the current state of inland navigation in Croatia, while highlighting the needs that need to be undertaken for further development.

The vision of the Strategy is a competitive, high-performance and modern inland navigation system in the Republic of Croatia that is fully integrated into the European transport network and operates according to the principles of economic and ecological sustainability.

The mission is to strengthen capacities, improve organization and cooperation, develop infrastructure and general modernization to enable the exploitation of the potential of the inland navigation sector in the Republic of Croatia, provide an adequate response to traffic demand, ensure the availability and high quality and reliability of transport services in accordance with the modern needs of market players.

The strategic objectives, which define the direction of development for the purpose of achieving an efficient and competitive inland navigation sector, consist of:

- increasing competitiveness and encouraging the sustainable development of the inland navigation sector
- development of infrastructure and increasing navigability in inland navigation

In addition, by fulfilling the defined goals, it is envisaged to increase port infrastructure capacities, which will ultimately contribute to the increase in demand, i.e. the increase of the transshipped cargo in Croatian river ports, while encouraging sustainable development. The defined strategic goals are in line with the National Development Strategy of the Republic of Croatia until 2030.

The following table shows the identified priority areas of public policy and the envisaged measures for the implementation of infrastructure goals, which are an integral part of the strategic goal of infrastructure development and increasing navigability in inland navigation.

Table 29: Priority areas of public policy and envisaged measures for the implementation of infrastructure goals, as part of the strategic goal of infrastructure development and increasing navigability in inland navigation

PRIORITY AREA OF PUBLIC POLICY		MEASURES	
C - 8.1	Maintenance of existing infrastructure	M - 8.1.1	Renovation of port structures and facilities
		M - 8.1.2	Maintenance of waterways
		M - 8.1.3	Settlement of ownership relations in the port area
C - 8.2	Capacity building	M - 8.2.1	Construction of ports and piers
		M - 8.2.2	Construction of new terminals for hazardous substances and specialized terminals and waste management capacities
		M - 8.2.3	Construction of shipyards and cranes for lifting river vessels
C - 8.3	Increasing intermodality	M - 8.3.1	Construction of roads for connecting ports with the rest of the transport network

		M - 8.3.2	Establishment of a national concept for cargo logistics on inland waterways
		M - 8.3.3	Establishment of the national corridor Danube – Adriatic
		M - 8.3.4	Construction of intermodal infrastructure in cargo and passenger transport
C - 8.4	Improvement of navigability and maintenance of waterways	M - 8.4.1	Construction of the multifunctional channel Danube – Sava
		M - 8.4.2	Modernization of waterways and ensuring the navigability of rivers in accordance with the prescribed minimum navigability classes for international waterways

Source: Development Strategy for River Transport in the Republic of Croatia for the period from 2022 to 2032 (OG no. 87/2022)

The measures aim to solve the difficulties identified through the analysis of the current situation and to mitigate the risks in the inland navigation system in the Republic of Croatia. The measures are divided into appropriate priority public policy areas, while their implementation aims to strengthen the competitiveness and attractiveness of inland navigation and to develop the system in line with the principle of economic and ecological sustainability.

The river transport development strategy does not define individual projects or activities that will be implemented as part of a particular measure, but sets a strategic direction for the next ten years. The elaboration of individual projects and activities is foreseen by lower-ranked strategic documents.

Infrastructure measures relate to the implementation of infrastructure interventions and various types of works and equipping (capacity expansion, construction and modernization of facilities and infrastructure, procurement of goods, equipment etc.).

By examining Table 9, it can be observed that the development plan of the port of Vukovar is aligned with most of the prominent priority areas and measures.

- **Spatial plan of special features of the multi-purpose channel Danube – Sava**

The decision on the adoption of the spatial plan of special features of the multi-purpose channel Danube – Sava (OG 121/2011) was adopted by the Croatian Parliament on October 21, 2011, which determines the position, conditions and measures for the construction of the channel and associated functions, as well as the conditions of design, use and protection of the area.

Article 37, which defines 'Space for the Development and Development of Economic Purposes of Ports and Piers', and which refers to the port of Vukovar, states the plan for the expansion of the port in the zone of entry of the channel into the Danube and the construction of a new port of Vukovar ('Bršadin').

Article 38, as a follow-up to the previous article, highlighted the possibility of constructing ancillary facilities in the function of ports and piers, open and closed economic and storage areas.

Article 155, as part of the navigation measures of the plan, states the possibility of constructing the complex of the new port of Vukovar in other phases of realization, at the same time or after the execution of the channel, and the construction of the channel itself can be realized independently of the dynamics of the construction of the port.

The same article specifies the possibility of expanding the existing Port by constructing a pier and a turning point in the Danube entry zone.

13 Regional/local strategies and programmes

Below is an overview of regional/local strategies and programmes:

- **Development plan of Vukovar-Srijem County for the period from 2021 to 2027**

The Development plan of the Vukovar-Srijem County for the period from 2021 to 2027 is the most important mid-term strategic planning act that determines the development directions and goals of the Vukovar-Srijem County.

It defines specific objectives for the implementation of strategic goals from long-term strategic planning acts and as such is a basic document that provides a framework for encouraging development with the purpose of strengthening the development potential of the Vukovar-Srijem County. As a regional development policy document, it is aligned with the National Development Strategy of the Republic of Croatia for the period up to 2030, sectoral and multi-sectoral strategies and is a direct connection between European, national and local development plans.

The development plan is adopted with the purpose of developing plans for the realization of long-term national, sectoral or cross-sectoral development directions and strategic goals for the planning period until 2027, and the document itself also represents the basis for the use or withdrawal of funds for financing development projects from various sources of financing, with an emphasis on EU funds.

The vision defined by the Development Plan of Vukovar-Srijem County is to become a place of competitive, innovative and sustainable economy, high digital readiness, recognizable traditional and tourist potential and safe, employed and satisfied population by 2027.

Within the framework of point 3 'Description of Development Needs and Potential (in the medium term)' shows the results of the analysis of the situation and SWOT analysis of key determinants of the economy, society, space and environment and the institutional framework or system of development management in Vukovar-Srijem County. In the introductory part related to the analysis of space and the environment, the importance of the need for the construction of waterways and ports in the county, ports for ship repair and modernization of port infrastructure is emphasized. In this part, among the forces of Vukovar-Srijem County, the navigability of the Danube and Sava Rivers is emphasized, excellent geo-traffic position as a big possibility in the development of the economy, especially in the segments of transport and logistics. Weaknesses highlight the underutilisation of waterways, existing ports and the disconnection of the Danube and Sava; while the opportunities highlight the possibility of building waterways and ports.

In section 2 'Development needs' emphasizes the need for bigger utilization of waterways, existing ports, as well as enabling a bigger connection between the Danube and the Sava River, by investing in infrastructure of this form. In general, the need for a bigger focus on development in the transport logistics sector is highlighted.

Within the framework of point 6 'Special Goals of Vukovar-Srijem County', i.e. as part of the strategic goal of Sustainable Mobility and the special goal of improving transport and other basic infrastructure, emphasizes the need to develop transport and other basic infrastructure in order to improve economic infrastructure that enables better accessibility and therefore investments, which will be the driver of even and sustainable regional development and innovation that bring economic changes, high-quality services and products, revenues, business models and opportunities for increasing competitiveness. Furthermore, it is stated that investing in the transport system is an effective investment that has tangible effects on the transport network, among which the increase in the transshipment of goods in the port of Vukovar is highlighted. It is also pointed out that the merging of the port of Vukovar and the port of Rijeka, and also the port of Vukovar and the port of Ploče, as well as corridors Vc and X corridor, represents a driving force for the economy of the Republic of Croatia.

The measure Maintenance, Construction and Modernisation of Inland Waterways and Ports and the Development of Inland Waterway Transport highlights the trend towards shifting traffic from roads to more environmentally friendly modes of transport, which includes inland waterway transport, as well as benefits in terms of cost savings, environmental protection with sustainable use of natural resources and bigger transport safety. In order to achieve this, it is necessary to improve the existing port infrastructure.

The measure of development of multimodal and integrated infrastructure and transport, emphasizes the favorable position of the Vukovar-Srijem County for the development of multimodal transport, as a modern method of transport of goods. The purpose of the measure is to connect the inland waterway port with transport networks (road, rail corridors) in order to contribute to the development of multimodal transport and achieve better integration with the economic hinterland, thus creating preconditions for the development of intermodal transport.

- **Strategy for the Development of the Economy of the City of Vukovar 2021 – 2023**

The Strategy for the Development of the Economy of the City of Vukovar for the period from 2021 to 2023 aims to provide a clear framework for the systematic and effective action of the city authorities in the area of encouraging the economic development of the city of Vukovar in the next decade.

The document starts from a thorough analysis of the state of the economy through the identification of key strengths, weaknesses, opportunities and threats, identifying key strategic objectives for the period up to the end of 2031. The way in which strategic objectives are achieved is then elaborated in detail through the identification of a number of priorities, specific objectives and measures. All the elaborate activities are guided by the vision that the city of Vukovar will become a recognizable investment destination in the Republic of Croatia and the wider area in the next decade.

The strategy aims to take a stronger step forward in terms of creating preconditions for new investments.

Under Chapter 1 'Analysis of the Situation', port of Vukovar stands out as an infrastructure resource that can significantly contribute to the economic development of the city. The favorable position of the port, as well as its connection with the railway and road network, as a significant potential for its further development, stands out. The biggest obstacle arises in the form of the inability to expand the port due to the narrowed space, which leads to a challenge in cargo manipulation. It therefore stresses the necessity of investing in order to expand the port area westwards and to increase capacity for cargo transport. For this reason, within the future development of the area of the port of Vukovar, it is envisaged to expand upstream along the bank of the Danube into the part of the former Borovo complex, which occupies an area of approximately 18 hectares.

In the next ten-year period, the port of Vukovar envisages investments in the construction of communal connections for the supply of alternative fuels (charging station for electricity, liquefied natural gas, biodiesel and hydrogen).

In addition to the above, it is planned to invest in the preparation of project documentation and the construction of a terminal for the disposal of waste from vessels, in accordance with the applicable environmental standards. The project will be implemented as part of a comprehensive approach to the disposal of waste from inland water vessels and the concept of a sustainable waste management system in inland water ports.

Within the part 1.10. 'SWOT Analysis' within the forces emphasizes that the port of Vukovar is the only Croatian port on the Danube, which is open to traffic all year round, and that the process of green transition in traffic should further increase the attractiveness of river transport, and thus the port itself.

14 DAPhNE; national indicators (national SWOT analysis, Action Plan, measures)

The SWOT analysis of the Croatian port industry at the level of the entire country contains strengths, weaknesses, opportunities and threats that have been identified as common to the entire port industry in Croatia.

Table 30: SWOT matrix for the port industry in Croatia

Strengths	Weaknesses
• All inland ports (including Vukovar and Slavonski Brod) are defined as ports of state interest, which guarantees state investments • The public interest in public ports is protected by law and the port authority • All port users have the same conditions in public ports (port fees and availability) • Experience in EU projects • Good networking with other inland navigation institutions and port authorities along the Danube • Community of Inland Waters Port Authorities	• All inland ports (including Vukovar and Slavonski Brod) are defined as ports of state interest, which guarantees state investments even for ports that do not have a development (or have a lower) perspective • There are no clear criteria for the needs and development plans of inland water ports • There are no clear criteria for defining port categories • Infrastructure projects not prepared for EU funding • Staff in the Ministry and port authorities were not trained for the preparation and implementation of large investment projects • The land within the ports has different owners, which requires a large financial investment to solve the problem • The Community of Inland Waters Port Authorities needs a redefinition of activities
Opportunities	**Threats**
• Good position of the ports of Vukovar and Slavonski Brod and good connection with the main transport routes and railways • Good planning of the development of inland ports • Navigability in the port of Vukovar 365 days a year • Availability of EU funds	• Lack of clear strategies and development plans • Investment projects are not prepared and are not ready for EU funds • Feasibility of the Danube – Sava channel project • The economic situation in the eastern part of Croatia is reflected in the development of the port • Some of the inland ports have problems with navigation and availability for vessels.

	• Port operators depend on the economic situation – not stable

Strengths

All inland ports (including Vukovar and Slavonski Brod) are defined as ports of state interest, which guarantees state investments for all of them. At the same time, we consider it a weakness. The port of Vukovar and Slavonski Brod are well positioned and connected by roads and railways. Public ports are available to all users under the same conditions, port fees are the same for each port user (although they may differ between ports). Port authority staff have experience in managing and implementing EU projects (soft projects). The Port Authority Vukovar has good contacts with other similar institutions and inland navigation authorities along the Danube. In Croatia, the Community of Inland Waters Port Authorities has been established, which can be a lever for better cooperation between port authorities and the development of inland water ports and inland navigation in Croatia.

Weaknesses

All inland ports (including Vukovar and Slavonski Brod) are defined as ports of state interest, which guarantees state capital investments even for ports that do not have a perspective due to navigability or lack of traffic. Clear criteria for the development of internal ports and development plans should be defined in national strategies and regulations and should be measurable. There are no clear criteria for defining port categories. These criteria must be measurable by the quantities of cargo and other important inputs. Infrastructure projects require good and detailed preparation for EU funding, and staff need education to implement such projects. The land within the ports has different owners, which requires a large financial investment to solve the problem. The IWG community needs a redefinition of activities, it needs to work with maritime ports, with international organisations, participate in EU projects and be more proactive in general.

Opportunities

The ports of Vukovar and Slavonski Brod are well positioned and connected to the main road routes and railways. The port of Vukovar is navigable throughout the year. EU funds are available for port development.

Threats

Strategic documents and plans for the development of inland water ports are not mutually consistent and contain some questionable projects (such as the Danube-Sava channel). The feasibility study for the Danube – Sava channel is still in the process of public procurement. The Agency for Waterways is in charge of this activity. It is also questionable that this Study is done only from the point of view of inland navigation (the channel has agricultural significance), etc. The economic situation in the eastern part of Croatia is directly reflected in the development of the port in a negative sense. If the economic situation were better, port traffic would also increase significantly. Port operators also depend on the economic environment and the situation directly affects their operation and stability. Some of the inland ports have permanent problems with navigability (Slavonski Brod), so their activities are more oriented towards the port area 'other economic activities'.

15 Management Analysis results (internal view)

The Public Institution Port Authority Vukovar was established in 2001 by the Republic of Croatia, i.e. the then Ministry of Maritime Affairs, Transport and Communications.

The Port Authority Vukovar performs the tasks of managing ports and piers in the area of local jurisdiction of the Port Authority Vukovar, and according to the Navigation and Ports of Internal Waters Law (OG No. 144/2021) and the Regulation on the Management and Leading of the Affairs of Port Authorities of Internal Waters (OG no. 109/07 – 31/2016).

The Statute represents the general legal act of the Port Authority regulating the internal organization, powers and decision-making methods of the bodies of the Port Authority, composition, method of establishment, scope and competence of professional and advisory bodies, manner of establishing relations with local and regional self-government units in matters of port area management, public work and other matters of importance for the performance of activities and operations of the Port Authority.

The managing bodies in the Port Authority are the Governing Council and the Director.

The Governing Council shall be appointed and dismissed by the Minister and shall consist of:

- three representatives of the founder, one representative of the local self-government unit in whose territory the port of state significance is located, at the proposal of the city or municipal administration,
- one representative of the local self-government unit in whose territory the port of state significance is located, at the proposal of the city or municipal authority,
- one representative of companies performing port activities on the basis of the approval of the Port Authority, upon the proposal of the professional association of companies performing port activities.

The members of the Governing Council shall be elected for a term of four years, with no impediment to the reappointment of the same persons as members of the Governing Council. The number of members of the Governing Council must be odd.

The Governing Council shall deliberate and decide at sessions at which a simple majority of all members of the Council must attend. Decisions shall be taken by a majority vote of the members present, except for decisions and other acts requiring the approval of the Minister and adopted by a majority vote of all members of the Governing Council.

The President and the Vice-President of the Governing Council shall be elected from among the representatives of the founders, by a majority vote of the members of the Governing Council.

The President of the Governing Council shall perform the following tasks:

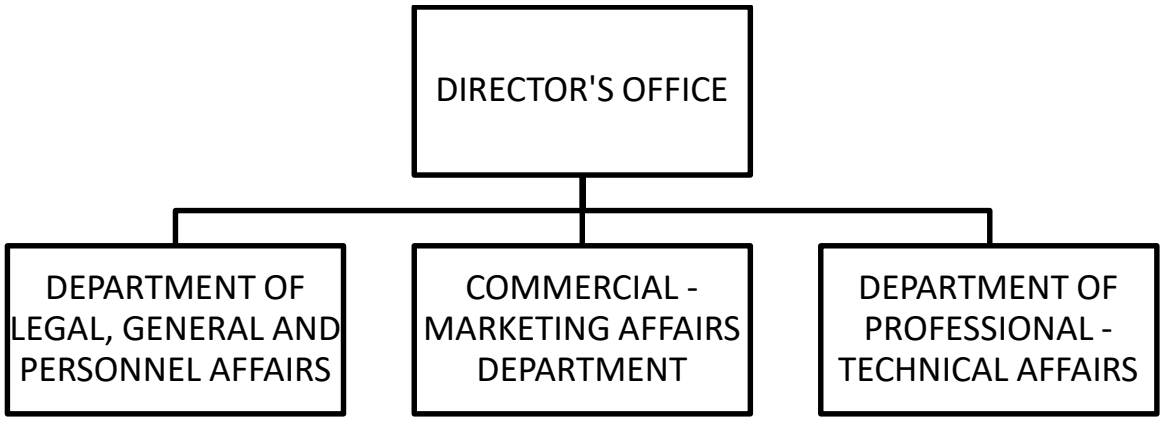
- represented by the Governing Council
- convenes and manages sessions, and at least once every three months
- sign general acts and decisions adopted by the Governing Council

- perform other tasks in accordance with the Law, Regulation and general acts of the Port Authority

In case of impediment of the President, the aforementioned tasks shall be performed by the Vice-President.

As a rule, the Director and the Secretary of the Governing Council shall participate in the work of the Governing Council, but without the right to decide.

According to the Rulebook on the Organization and Systematization of Workplaces, the internal organization of the Port Authority Vukovar is shown below:



Source: Rulebook on the organization and systematization of workplaces, Port Authority Vukovar (03/11/2020)

Based on the structure shown, it is evident that the Director's office is superior to the legal, general and personnel affairs department, the commercial – marketing affairs department and the professional – technical affairs department.

The Office of the Director shall be headed by the Director of the Port Authority, who shall organize and manage the professional work and operations of the Port Authority[7]. It shall be appointed for a period of 4 years and shall be accountable to the Governing Council for its work and the legality of its operations.

The Director is authorized to conclude legal transactions whose value does not exceed the amount of HRK 500.000, and he may transfer his powers through a written power of attorney to the Assistant Director or another person to represent the Port Authority in legal transactions.

The performance of port activities is based on the concession award system to port operators interested in performing port activities on the territory of the Port Authority Vukovar, with whom a concession contract is concluded.

[7] Detailed tasks of the Governing Council are described under item 10.d Legal and legitimate frameworks - Regulation on the Management and Leading of the Activities of Port Authorities of Internal Waters

The following table shows the performance data of the Port Authority Vukovar in the period from 2016 to 2020.

Table 31: Movement of revenues, expenditures and surplus/shortfall of revenues in the period from 2016 to 2020

DESCRIPTION OF POSITION	2016	2017	2018	2019	2020
REVENUES	**7.219.227**	**6.511.888**	**7.212.147**	**8.670.098**	**4.679.469**
Revenue from sale of goods and provision of services	0	13.685	0	0	0
Revenues under special regulations	6.274.525	5.854.627	5.843.466	7.091.439	3.976.190
Property revenue	517.551	255.252	251.458	334.034	100.724
Revenue from grants	37.547	156.647	929.345	973.558	599.671
OTHER REVENUE	389.604	231.677	187.878	271.067	2.884
EXPENSES	**6.840.465**	**6.811.736**	**7.199.169**	**8.056.915**	**6.101.634**
Expenses for workers	1.076.563	1.264.081	1.277.385	1.638.594	1.736.446
Material expenses	4.368.042	4.081.342	4.291.468	4.609.140	3.006.050
Depreciation expenses	1.209.953	1.356.798	1.407.642	1.318.241	1.112.185
Financial expenses	8.883	16.242	35.641	11.939	14.148
Donations	0	0	0	0	5.000
OTHER EXPENSES	177.024	93.273	187.033	479.001	227.805
SURPLUS/SHORTAGE OF REVENUES	**378.762**	**-299.848**	**12.978**	**613.183**	**-1.422.165**

Source: Port Authority Vukovar, 2022.

It can be seen that in the period from 2016 to 2020, the Port Authority achieved the largest surplus of total revenues in 2019, when the amount of HRK 613.183 was reached; while the largest shortfall of revenues was achieved in 2020, when the result of HRK -1.422.165 was reached. This deficit was significantly affected by the decline in revenue (by 46% compared to 2019), as a result of lower economic activity caused by the COVID-19 pandemic.

By insight into the structure of revenues, it is evident that during the analysed period, revenues are predominant under special regulations, which range from HRK 3.976.190 to HRK 7.091.439 and as such account for 85% of total revenues. Considering their size, they significantly affect the total annual result of the operations of the Port Authority Vukovar. These are revenues whose significant share consists of revenues from concessions, generated on the basis of concluded contracts with the concessionaires of port areas, i.e. the companies Port of Vukovar Ltd., Vupik plus Ltd., Nautica Vukovar Ltd., Komunalac Vukovar Ltd. and Pannonian Sea.

By analyzing the structure of expenditures, it is evident that on average material expenditures prevail, which range from HRK 3.006.050 to HRK 4.609.140, and as such make in average 58% of total

expenditures. These are mostly the costs of ongoing investment maintenance in the port of Vukovar and the piers of Vukovar, Ilok, Aljmaš and Batina.

16 Target groups and impact on them (level I) – current situation

Among the target groups of the Port of Vukovar Development Plan, the following stand out:

- Port Authority Vukovar, as port manager
- Ministry of the Sea, Transport and Infrastructure, as the most significant state public body
- City of Vukovar and Vukovar-Srijem County, as local self-government units
- Infrastructure and public service providers
- small and medium enterprises

The Port Authority Vukovar manages ports and piers in the area of local jurisdiction of the Port Authority Vukovar. It has an obligation to ensure the viability of the business and financial stability, taking into account the economic criteria of valuation of the port services market, as well as a level playing field for the use of services by all vessels and persons without discrimination, within the limits of available capacity.

The model of managing port areas is based on the award of concessions to port operators who, through previously conducted public tenders, expressed interest in performing port activities in port areas under the jurisdiction of the Port Authority Vukovar. Revenues arising from concessions represent the most significant revenues in the structure of the total revenues of the Port Authority Vukovar.

The concessions are awarded with the consent of the Ministry of Sea, Transport and Infrastructure, or the Government of the Republic of Croatia, in accordance with special regulations governing concessions and public procurement and the Rulebook governing the criteria for determining the amount of port fees.

In the process of managing the Port Authority Vukovar, it is also necessary to emphasize the role of the Ministry of Sea, Transport and Infrastructure, as the founder of the Port Authority Vukovar.

Since the area of the port of Vukovar is located in the area of the city of Vukovar and Vukovar-Srijem County, these local/regional self-government units especially emphasize the importance of the port as one of the key partners for the development of the local economy and increasing competitiveness. This is also stated in particular in previous regional/local strategies and programmes.

Among the basic infrastructure and public services that are necessary for the operations of the port of Vukovar, it is possible to emphasize the need for continuous supply of electricity, water, drainage and waste management. In this sense, at the local level, the company Vodovod grada Vukovara Ltd., whose activity is related to water supply and drainage, and the company Komunalac Ltd. Vukovar, whose activity is related to waste management, are particularly prominent. It is necessary to point out that the company Komunalac Ltd. is one of the concessionaires of the port of Vukovar area. Taking into account the fact that the city of Vukovar is also the owner or co-owner of these companies, it should also be emphasized that through these companies the relationship between the port of Vukovar and local self-government units is reflected.

The fundamental role of the port of Vukovar consists in supporting small and medium-sized enterprises and the economy in general, in the local and wider area. The services of the port of Vukovar are of particular importance for entrepreneurs whose activity is closely related to the import, export and transport of various types of cargo. In this sense, the concessionaire Port of Vukovar Ltd. actively cooperates with the Croatian Chamber of Economy – Vukovar County Chamber, one of the most important activities being the organization of the meeting between port Constanta and port Vukovar. The meeting aims to highlight the advantages in the transport of goods using river transport, port services and the intention to establish and improve cooperation between businessmen from Romania and Croatia and other countries in the region. The port of Constanta, with which the company Port of Vukovar Ltd. has concluded a cooperation agreement, is of big economic importance and is the largest river-sea port that connects Europe via the Danube River with the Black Sea, and thus with the whole world.

17 Reflection of legal compliance ('in the future' for the next ten years)

The operations of the port area of the port of Vukovar fit into the existing local, regional, national and European Union policies, which are previously referred to in points 6, 12 and 13.

- **Transport Development Strategy of the Republic of Croatia 2017 – 2030**
- **Strategic Plan of the Ministry of Maritime Affairs, Transport and Infrastructure for the period 2020-2022**
- **Danube Strategy**
- **Danube Transnational Interreg Programme**
- **White Paper - Roadmap to a Single European Transport Area – Towards a competitive and resource-efficient transport system**
- **Trans-European Transport Network (TEN-T) as a European Commission policy**
- **Connecting Europe Facility (CEF)**
- **Directive on the Establishment of Alternative Fuels Infrastructure (AFID)**
- **Renewable Energy Sources Directive**
- **Green Deal**
- **Water Framework Directive**

However, there are areas from the above policies for which the port area of the port of Vukovar has yet to make adjustments, and since the strategies are long-term, it is expected that by fitting into them, the port area of the port of Vukovar will meet the criteria of long-term compliance.

The operations of the port area are in accordance with all the basic legal regulations.

- **The Law on Navigation and Ports of Inland Waters** (OG 109/07, 132/07, 51a/13, 152/14, 118/18) is the basic legal act governing navigation in inland waters of the Republic of Croatia, safety of navigation in inland waters, legal status, manner of managing waterways and ports of inland waters, material and legal relations regarding vessels, procedures for registration of vessels, transport and contracting of transport, navigation accidents, organization and operation of port authorities and supervision and other matters relating to navigation and ports of inland waters. The Maritime Code (OG 181/04, 76/07, 146/08, 61/11, 56/13, 26/15, 17/19) shall apply accordingly to matters that are not the subject of the Law.
- **The Law on Institutions** (OG 76/93, 29/97, 47/99, 35/08, 127/19) refers to the operation of public institutions and defines how institutions are established for the permanent performance of activities of public interest in accordance with a special law.

- **The Harbour Master's Office Law** (OG 118/18) applies simultaneously to maritime ports and inland water ports. The Law regulates the territorial organization and organization of the work of harbour master's offices, determines the tasks of navigation safety and the manner of organization of their performance, rights, obligations and responsibilities of officials and employees in the performance of these tasks, their employment and legal position, inspection powers and other issues important for the work of harbour master's offices and the performance of tasks within their scope.
- **The Regulation on the Internal Organisation of the Ministry of the Sea, Transport and Infrastructure** (OG 97/20, 2/21) regulates the organisation of the Ministry and the affairs of each of the individual authority in its composition.
- **The Regulation on the Management and Conduct of Internal Waters Port Authorities** (OG 100/08, 76/12, 31/16) regulates the composition and powers of the members of the Governing Council, the conditions for appointment, dismissal and powers of the Director, as well as other issues related to the operation of internal waters port authorities.
- **The Ordinance on Inland Navigation Safety Inspection** (OG 31/14) defines the manner and procedures of performing the inspection of navigation safety, professional qualifications, special examinations and conditions to be met by the port State control officer, as well as the forms of the port state control officer's identity card and badges.
- **The Ordinance on the Conditions for Performing the Activity of a Shipping Agent** (OG 81/16) prescribes the conditions for performing agency activities in shipping, the rights and obligations of a shipping agent and an inland navigation agent, and the test program and method of taking the professional examination for obtaining the authorization of an inland navigation agent.
- **The Ordinance on the Technical Supervisory Authority and Conditions for the Recognition of Classification Societies** (OG 84/18) defines the composition, procedure and criteria for the designation of the Technical Supervisory Authority and the procedure and conditions for the recognition of classification societies.

The operations of the port area of the port of Vukovar will be adjusted to any legal changes affecting its operations, as such requirements arise.

At this point, it is not possible to predict whether and to what extent the legal framework of the business will change, although it is expected that adjustments to the Law and the general legal framework will be necessary.

18 Evaluation of the current situation in the port – SWOT – detailed internal analysis

The following table shows the SWOT matrix of the port of Vukovar, i.e. its strengths, weaknesses, opportunities and threats, for the purpose of conducting an evaluation of the current situation in the port of Vukovar.

Table 32: SWOT matrix of the port of Vukovar

STRENGHTS	WEAKNESESS
Government investments and government guarantees	Lack of port capacity
Protection of state interests - legally defined public service	Lack of a vertical pier
Port Authority as a Governing Body	Narrow port space
The port area is predominantly state-owned	Different landowners within the port area
Public port - accessible to all users on equal terms	Lack of financial resources for land acquisition
Guaranteed continuity of the provision of port services	Long deadlines for realization of investments
Many years of experience in the provision of port services	Lack of strategic mid-term development plans
Conducting marketing activities	Part of the land, including the infrastructure, is privately owned.
Experience of carrying out EU projects	Entrance to the port is not adapted - difficult management of port traffic
Expert staff	Lack of long-term contracts between port operators and port service users
OPPORTUNITIES	**THREATS**
Good position on the Danube River	Unstable market and transport - uncertainty
Possibility of sailing throughout the year	Costs of land acquisition
Good connection to major road routes and railways	Demanding expropriation procedure (in case of refusal to sell land by current owners)
Favourable geographical location on the European Transport Corridor VII	The uncertain realization of the Danube – Sava channel project is reflected in the port development plans
Establishment of 100% state-owned and operated port area	The realization of the Danube – Sava channel project can affect the reduction of goods traffic and the change of the current location of the port
Flexible legal acts contributing to better adaptation of port operators to market requirements	The development of the railway is adapted to passenger transport, instead of the development of the port.
Finding new possibilities for financing investments (public-private partnership, EU funds)	Low quality in the development of plans directly reflected in the possibility of an application to EU funds

Building new capacities, in line with market demand	Failure by the operator to comply with the conditions of the concession contracts, which relate to the quantities of traffic and investment plans
Determination of the railway (subject of a future railway modernization project) for industrial needs and return of this part to the port area	Obsolete equipment and technology
Regulation of the port coast	A long process of implementing the expansion of the port area
Preparation of quality strategic and concession plans for the port	-
Marketing activities	-

19 Maintenance assessment reflection, technical assessment (long-term forecast)

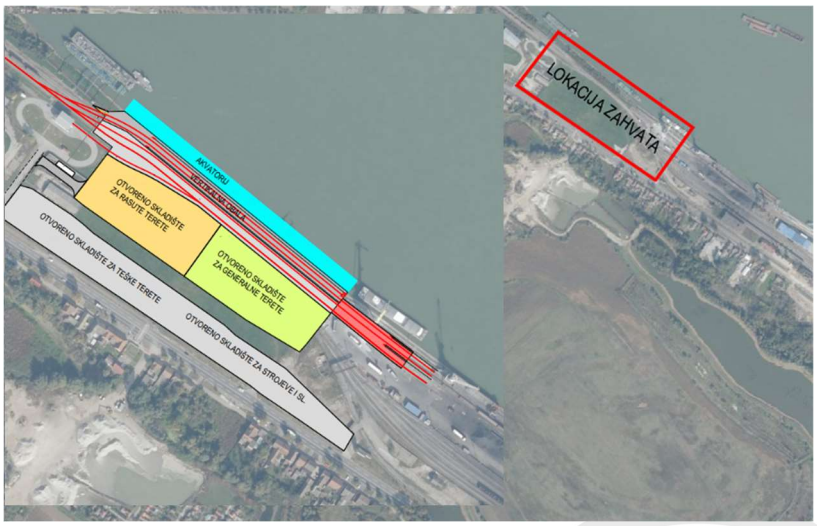
Below are highlights of significant investment maintenance in the area of the port of Vukovar in the past two decades:

- a new vertical coast in the length of 55 m was opened, so that the port can receive heavy cargoes and containers at the lowest water level
- repairs of infrastructure facilities, such as repairs of operating surfaces, industrial tracks and backup power supply to the substation with electric power cable
- with the donation of the Government of the Kingdom of Belgium and the funds of the state budget of the Republic of Croatia, the Ganz DAF350 portal crane with a capacity of 25 t was purchased

The operational area and the available machinery of the port of Vukovar are regularly maintained, however, it should be pointed out that the technology currently used is outdated and should be replaced in due course with a newer one, which will enable better activity and development of the port of Vukovar.

In the near future, it is envisaged to expand the vertical coastline, in the length of 286 m, upstream of the existing location.

Figure 14: Location of vertical coast expansion



The main concept of the planned state of the port of Vukovar is defined through the reorganization of the port infrastructure, i.e.:

- reconstruction of part of the operational coast in the length of about 300 m in terms of construction of the vertical coast, allowing more efficient access of cranes to moored vessels
- organization of appropriate storage space in the zone of construction of port buildings
- reconstruction, including reorganisation of other infrastructure so that the basic activities of cargo handling are not hindered and interrupted during the construction of the port

On the surface, it is envisaged to arrange a part of the port area together with a new vertical coast and a pier for ships. On the coast as well as on the areas for transport and storage, the organization of bulk terminals and general cargo terminals is envisaged.

It is envisaged that the bulk terminal occupies most of the coast of the vertical coast, while the general cargo terminal should occupy a smaller part of the space. However, in kind, it will be possible for a part of the horizontal operating surface to be used for the manipulation and disposal of cargo according to the current needs of the concessionaire, and the demarcation between the bulk and general cargo terminals will be flexible.

Part of the area will be intended for accompanying buildings and structures of transport and utility infrastructure. At the same time, the technical solution of the port road bypassing open storage areas provides space for trucks waiting to be loaded/unloaded and reduces the required capacity of parking areas.

The construction of these terminals envisages obtaining:

- a new coastline of 286 metres in length which will serve to accommodate vessels with a carrying capacity of predominantly 1.000 tonnes
- new storage and handling areas of about 1,5 ha, which will be used for the above terminals, will enable the transshipment of an additional 600.000 tonnes/year under the assumption of equipping the terminals with three cranes

The land part of the port area is arranged as two separate functional units, within which two terminals are distinguished, where a certain type of construction and development of surfaces is envisaged:

- Bulk terminal (about 9.450 m^2)
- Terminal for general cargoes (about 8.860 m^2)
- Automotive and truck parking (about 15.000 m^2)

For the needs of the new operational coast, it is planned to build four new port tracks on the part between the two existing track groups, as well as the connection of the industrial track to the new track situation. The new port tracks will be separated from the existing, passing track, and continue to the new coast. The first track closest to the coast is foreseen as a cliff and ends together with the new coastal structure, while the other tracks are foreseen as pass-through and fit into the existing tracks on the existing coast. The industrial track (Nautica) needs to be connected to the new track image, i.e. to the new main passing track (track 4).

Due to the height difference of the new vertical coast compared to the existing coast, it is planned to perform an elevation ramp on the part of the connection of new and existing tracks, all in order to maintain the continuity of runs between the new and the existing coast. The ramp is provided in the width of all three passing tracks together with a part of the crane paths.

All new tracks are provided as loading-unloading, with the following total useful lengths:

- 1st industrial track; operational tracks (306 m)
- 2nd industrial track; operational pass-through (765 m)

- 3rd industrial track; auxiliary passing track (725 m)
- 4th industrial track; main passing track (700 m)

Industrial tracks allow for a permissible mass per axle of 22,5 t and 8,0 t/m.

Between the two tracks along the coast, the installation of a crane path in the length of 238 m is planned, for the operational work of portal cranes.

Road traffic will take place by entering from the east side of the terminal, by visiting the open warehouses for bulk and general cargo back to the exit from the east side of the terminal. For the purposes of parking cars and trucks, the area south of the public railway will be used.

As part of the expansion of the vertical coastline, a new transformer station is planned to be built.

In addition, it is also necessary to point out that the plan includes the construction of a new authority building, i.e. the reconstruction of an existing older building, which was removed and deleted from the cadastral plan. The building should have two floors, a total gross building of about 1.500 m^2 (approximately 500 m^2 per floor), and it would be intended for four users:

- Ground floor: police and customs
- 1st floor: office areas of the port
- 2nd floor: office premises of the Port Authority Vukovar

In front of the building in question, it is also planned to create a parking places for employees.

20 Impact of other external factors (audits, quality management systems)

Management systems are an important tool for achieving efficiency and competitiveness. According to international standards, the generally accepted method is to ensure the desirable properties of products, services and activities (quality, safety for the environment, safety, reliability, efficiency,) in a cost-effective manner. The management system is a framework for the processes and procedures used to ensure that all the requirements necessary to achieve the business objectives.

The quality management system can be based on several different models, i.e. approaches. It is important to take into account the prevalence of the model in the industry, region or world, and whether it is a model that is recognized by customers and suppliers of the port.

The models applied within the European Union are:

- ISO 9001 - the most widespread international standard applicable to organisations of all types (profit/non-profit, production/service, small/medium/large).
- TQM (Total Quality Management): orientation towards continuous quality improvement that will meet customer expectations.

The Port Authority Vukovar involved an environmental management system according to the ISO 14001:2004 standard, and this certificate was awarded by Det Norske Veritas.

In 2003, the Port Authority introduced a quality management system according to ISO 9001:2000. Given the increase in turnover by 173 percent, i.e. from 290 in 2004 to 796 thousand tonnes in 2005, and the increase in the number of partners engaged, among other things, in the transshipment and storage of oil and petroleum products in the port of Vukovar, the need for defining significant environmental aspects and better supervision of concession holders and their business processes related to the environment was understood. The port operates in accordance with the International ISPS Code (International Ship and Port Facility Security Code).

The concessionaire in the area of the port of Vukovar, the Company Vupik Plc. has ISO 9001, ISO 14001, HACCAP and GlobalGap certificates.

Additional investments in the quality management system are required in the port of Vukovar. Also, it is important to define the quality policy and long-term business policy objectives. This implies responsible management of port resources and taking care of the construction, maintenance, management, protection and improvement of the maritime domain that represents the port area. The policies must satisfy the legal acts and other mandatory regulations, as well as the requests and needs of the service users, business partners, state institutions and local community' s institutions.

The aims of the quality system are implemented via the operative sectors, with which the quality management system is installed, documented, supervised and improved, and the internal information system is introduced via the intranet and the WEB presentations. Similarly, port security activities are being carried out to prevent terrorist attacks and to ensure enhanced security of the crew of ships and passengers and cargoes on board and in ports. It constantly takes care that all the people in the port area are acting in accordance with the port' s Safety Plan and the levels of security in use.

This system guarantees the correct performance of tasks related to the implementation and realization of directions regarding the handling of dangerous supstances in the port, the conditions and ways under which the transport is done, the loading of cargo and the oil spills prevention procedure.

The system improves the supervision and control of the legality of subjects doing business in the port area and vessels arriving into the port, and takes care of securing the constant and undisturbed performance of the port traffic, the technical- technological unity, the safety of navigation and of the port traffic.

Finally, the performance of all business process is constantly supervised so as to be able, without delay, recognise and remove causes of real or possible drops in quality, reliability or safety.

21 Status quo of the port based on SWOT analysis

Based on the presented SWOT matrix in Chapter 18, below is an analysis of strengths, weaknesses, opportunities and threats for the port of Vukovar.

Strengths

The strengths of the port of Vukovar are reflected through the fact that it is a port of interest, which in itself is a guarantee of capital investment. The provision of public services is determined by the Navigation and Inland Waters Law (OG 144/2021), pursuant to which the public interest is protected by the Port Authority and supervised by the Ministry of Sea, Transport and Infrastructure. The port area is managed exclusively by the Port Authority Vukovar, while the port area is predominantly owned by the State.

The Navigation and Inland Ports Law (OG 144/2021) guarantees the availability of port services to all interested users on equal terms. Most port operators (concessionaires) have many years of experience in the provision of port services, handling of goods and cooperation with other users.

The Port Authority Vukovar employs young and highly educated staff, ready to use their knowledge and experience, among which the management of EU projects, for the purpose of achieving the strategic and operational goals of the Port.

Weaknesses

Current capacities cannot satisfy the development needs of the port, especially in terms of storage space. In addition, it is necessary to provide for space and equipment for waste collection and management of the vertical coastline, which should be expanded.

As a result of the implementation of the railway modernization and electrification project, the port area is projected to narrow by approximately 5,8 ha. The project also envisions splitting the port into two parts, implying restrictions on traffic communication and other restrictions.

Most of the land plots within the port area are state-owned, but there is also a certain part that is owned by natural persons. The Port Authority is not able to buy the land, as it is a long-term procedure that requires significant financial resources from the State.

The port entrance is not adequately arranged, which affects the creation of bottlenecks when goods are received by road.

Port operators do not have long-standing agreements with users of port services, which is reflected in the uncertainty in forecasting port traffic and cargo transshipment, as well as in the annual plans of the operators themselves.

Opportunities

The Rhine-Main-Danube waterway, through which a significant part of intra-European transport passes, is of big importance for the port of Vukovar. In addition, the port is connected to the main road corridors and the railway.

It is necessary to take actions on the basis of which the port area will be 100% owned by the State and managed by the Port Authority, in order to facilitate the concession award procedure. Legal procedures related to the award of concessions should be more flexible and better adapted to the needs of demand.

The possibility of financing capital investment through public-private partnerships and the use of EU funds needs to be better explored and applied.

As the construction of railways for passenger purposes will narrow the port area, the Port Authority should in future endeavour to adapt the railways to industrial needs. The port coast is partially regulated and needs to be improved.

The basis for the implementation of the above is in the quality development of plans and strengthening of marketing activities.

Threats

The fact that the market for port services is not always stable and as such can contribute to poor planning of the quantity and type of cargo shipped, contributes to a certain degree of uncertainty and is directly reflected in investments and planned revenues.

The costs of land purchase are high and cannot be settled from EU funds, which means that state funds must be included in the purchase of land. If the land owner refuses to sell his ownership interest, there is a possibility that the expropriation procedure may be prolonged for several years.

The uncertainty in the implementation of the state investment project, the Danube – Sava channel, is reflected directly in the port development plans, since it is planned within the strategic documents and spatial plans. If the realization of this project occurs, there is a fear that a certain share of cargo traffic could be diverted to other nearby ports.

The construction of railways intended for passenger transport can be a burden on the port and its development.

Concession contracts in the port area shall be concluded on the basis of public tenders, taking into account the business plans of the operators that have applied for that tender. Most of these plans and investments listed in them are not implemented, which directly affects the planned sizes.

In addition, it should also be noted that current equipment and technology are outdated and need to be modernised.

22 Preparation of development/planning documents (strategy, focus, measures, activities, projects)

22.a Mission, Vision, Policies

Mission

'Creating preconditions for providing efficient and quality port service'

The outdated and insufficient infrastructure and accompanying suprastructure is common to all inland water ports in Croatia. This directly affects the work of the port of Vukovar. Well-developed infrastructure and suprastructure are a prerequisite for the provision of quality port services.

Vision

'Have a modern, the most contemporary port infrastructure and a quality recognizable port service on the Danube in Croatia'

The future development of the port of Vukovar should be based on a well-planned and analysed strategy and mid-term plans with concession plans. All these documents should envisage a realistic scenario of the development of the port of Vukovar and the role of the port, which is positioned on the international market and consequently has a high quality and recognizable port service.

Policies

The core values of the port of Vukovar are aligned with the common core values of the ports of the Danube region, which are focused on excellence and commitment to growth and serving communities by facilitating supply chains and economic growth.

INNOVATION

The port accepts change and the opportunity to create and innovate by following new ideas to improve governance and business.

SUSTAINABILITY

The port is the responsible guardian of all the goods entrusted to her for the construction, use, respect and handing over to the next generations.

COOPERATION

The port possesses expertise, but cooperation enables the best use of collective expertise in common objectives.

SERVICES EXCELLENCE

Exceed expectations, retain existing ones and attract new customers.

FLEXIBILITY AND ADAPTABILITY

Customers are main focus of port activities and are served efficiently, and their changing requirements are met flexibly and adaptable.

EMPLOYEE SATISFACTION

Knowing that the skilled workforce is in deficit and difficult to find and form, the port pays the utmost attention to the health, safety, satisfaction and well-being of port authority employees and port operators. The port helps continuous learning, training and development of port employees and encourages the creation of a working culture of cooperation and teamwork.

FACILITATING GROWTH

Using its potentials, combined with strategic development goals, its position in transport networks and the nature and scope of its activities, the port seeks to become a magnet for logistics and manufacturing companies, and with the help of creating preconditions, planning policy and the ability to take advantage of multimodality and intermodality.

22.b Strategic planning documents (strategic objectives, strategic focus)

This document has been drafted respecting the European and national regulatory and strategic framework in use at the time of drafting. At EU level:

- White Paper on Transport Policy for the period 2011-2020, European Commission 2011 (White Paper: Roadmap to a Single European Transport Area – Towards a Competitive and Resource-efficient Transport System),
- EU Inland Navigation Action Programme – NAIADES II, European Commission (2013),
- Platinum 2 project (2013 - 2016), European Commission (2013),
- Europe 2020 Strategy, European Commission (2010),
- Regulation (EU) No. 1315/2013 Regulation of the European Parliament and of the Council of December 11, 2013 on Union Guidelines for the Development of the Trans-European Transport Network and repealing Decision No. 661/2010/EU
- Regulation (EU) No.1316/2013 of the European Parliament and of the Council of December 11, 2013 establishing a Connecting Europe Facility
- Directive 2014/94/EU of the European Parliament and of the Council of October 22, 2014
- EU Strategy for the Danube Region - Danube Strategy, European Commission (2010),
- European Treaty on Major Inland Waterways of International Importance (AGN).

National Strategy Papers:

- National Development Strategy of the Republic of Croatia until 2030 (OG 13/21),
- Transport Development Strategy of the Republic of Croatia for the period from 2017 to 2030 (OG 84/17)
- Strategy for the Development of River Transport in the Republic of Croatia for the period from 2022 to 2032 (OG 87/22),

- Water Management Strategy (OG 91/08),
- Energy Development Strategy of the Republic of Croatia until 2030 with a view to 2050 (OG 25/20)
- National Policy Framework for Infrastructure Establishment and Market Development of Alternative Fuels in Transport (OG 34/2017),
- Strategic Plan of the Ministry of Sea, Transport and Infrastructure (2020 – 2022),
- Implementation Program of the Ministry of Sea, Transport and Infrastructure (2021 – 2024),
- Law on Navigation and Inland Ports (OG 109/07, 132/07, 51a/13, 152/14, 118/18),
- Water Law (OG 66/19),
- Law on Environmental Protection (OG 80/13, 153/13, 78/15, 12/18, 118/18),
- Nature Protection Law (OG 80/13, 15/18, 14/19, 127/19),
- Law on Concessions (OG 69/17, 107/20),
- Building Law (OG 153/13, 20/17, 39/19, 125/19)
- Law on the Establishment of Infrastructure for Alternative Fuels (OG 120/2016)
- Law on the Organization and Scope of State Administration Bodies (OG 85/20)
- Law on Institutions (OG 76/93, 29/97, 47/99, 35/08, 127/19),
- Port Authorities Law (OG 118/18),
- Regulation on the Internal Structure of the Ministry of the Sea, Transport and Infrastructure (OG 97/20, 2/21),
- Ordinance on the Classification and Opening of Inland Waters (OG 77/11, 66/14, 81/15),
- Ordinance on Navigation on Inland Waters (OG 138/15),
- Ordinance on Technical Maintenance of Waterways (OG 62/09, 136/12, 41/17, 50/19),
- Ordinance on Inland Navigation Safety Inspection (OG 31/14),
- Ordinance on Floating Objects (OG 72/15, 83/15),
- Ordinance on the Transport of Dangerous Goods in Inland Waters (OG 106/08),
- Ordinance on Special Conditions for the Performance of Commercial Inland Waterway Transport Activities (OG 38/08, 50/16),
- Rulebook on the Criteria for Determining Concession Fees in Ports and Inland Waters (OG 72/15),
- Ordinance on Cargo Bays (OG 128/15),
- Regulation on the Management and Leading of the Affairs of Internal Waters Port Authorities (OG 100/08, 76/12, 31/16),
- Regulation on Inland Waters (OG 134/08),
- Regulation on Technical and Technological Conditions for Ports and Conditions of Safety of Navigation in Ports and Inland Waters (OG 32/09).

The purpose of these strategic documents is to define goals, measures and investments whose implementation over the next ten years will result in a competitive, high-performance and modernised inland navigation system in the Republic of Croatia that will be fully integrated into the European transport network.

In accordance with the strategic documents, the port of Vukovar will continue to adopt development plans to ensure the successful implementation of these documents.

22.c Result of tentative pre-feasibility and strategic calculations underpinning strategic decisions (documents as a basis for decision-making/basic documents)

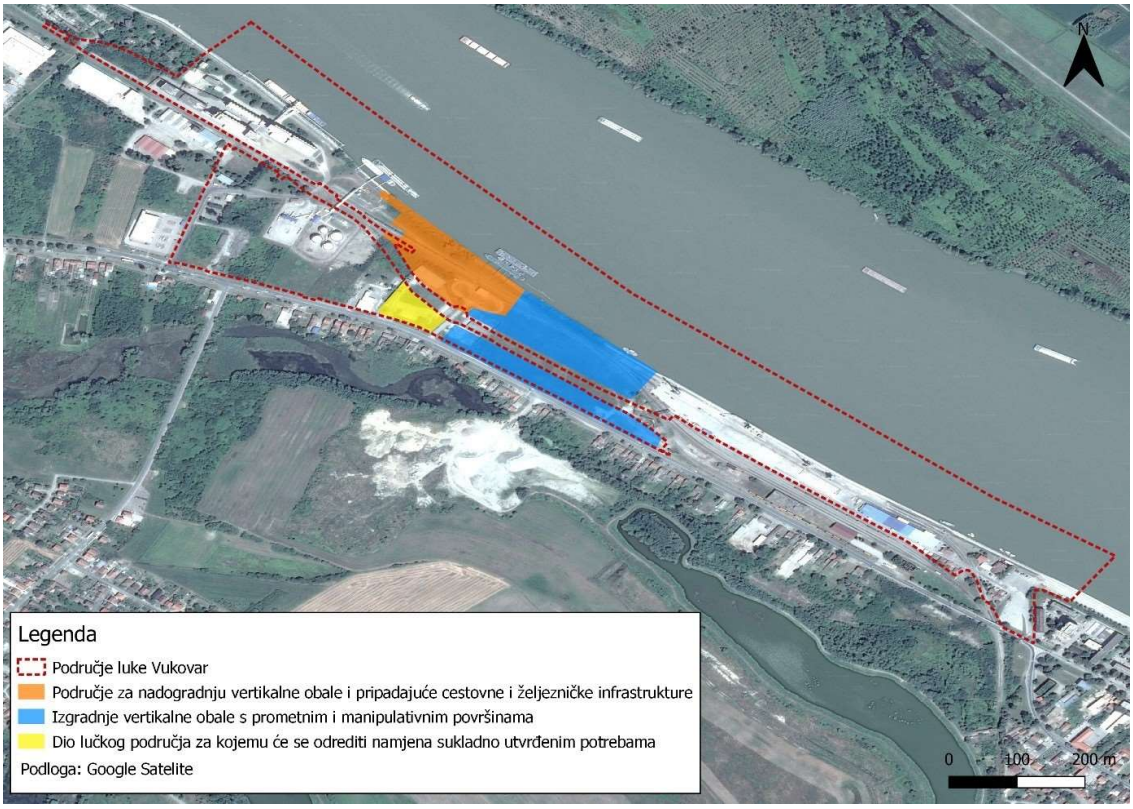
The following basic documents were used as the basis for the decision:

- Mid-term plan for the development of inland waters and ports of the Republic of Croatia for a period of ten years
- Danube Port Development Strategy & Network Formation - O.6.1: Danube Port Development Strategy and Action Plan
- Pre-feasibility study for the expansion of the port area of the port of Vukovar - with different scenarios
- Preliminary design drawing - Vertical coast in the port area of the port of Vukovar
- Terms of Reference – Authority Building Construction Project

22.d.1 Proposal for the use of the unused part of the port of Vukovar, land and water (part not in concession), harmonization of the same with the projects under implementation (reconstruction of the international railway line M601), and the planned construction of the vertical coast

In order to create needed additional space for cargo transshipment in the port of Vukovar, and taking into account the existing spatial limitations and the specificity of the port location, it is planned in the coming period to invest in the design and construction of the vertical coast and other port structures that form a functional whole with the vertical coast and are the basis for performing port activities. The site where the construction of the vertical coast is planned is located upstream of the existing vertical coast from km 1335+240 in the length of approximately 300 m. In the subject area, the coastline is not regulated and the implementation of this investment will prevent the harmful effects of high waters, erosion of the existing coastline and will put into operation a part of the port that is currently not usable, and for which there is a big need, since the implementation of the project 'Upgrading and electrification of the Vinkovci – Vukovar railway line' exempts a part of the port area and is intended for the passage of a new corridor of the railway line. The project also plans to build new tracks on the vertical coast and tracks along the vertical coast which will fit into the existing system of industrial tracks in the port area. Funds for the preparation of project-technical and study documentation have already been secured from the financial instrument CEF Transport and the implementation of this project began at the end of 2020. After the project preparation of the project documentation, the construction phase of the vertical coast and the storage and manipulation area with roads is planned, whereby the technical conditions will finally be met to put into operation approximately 3 ha of the port area that cannot be used at the moment.

Figure 15: Overview of planned intervention areas in the port of Vukovar (indicative)



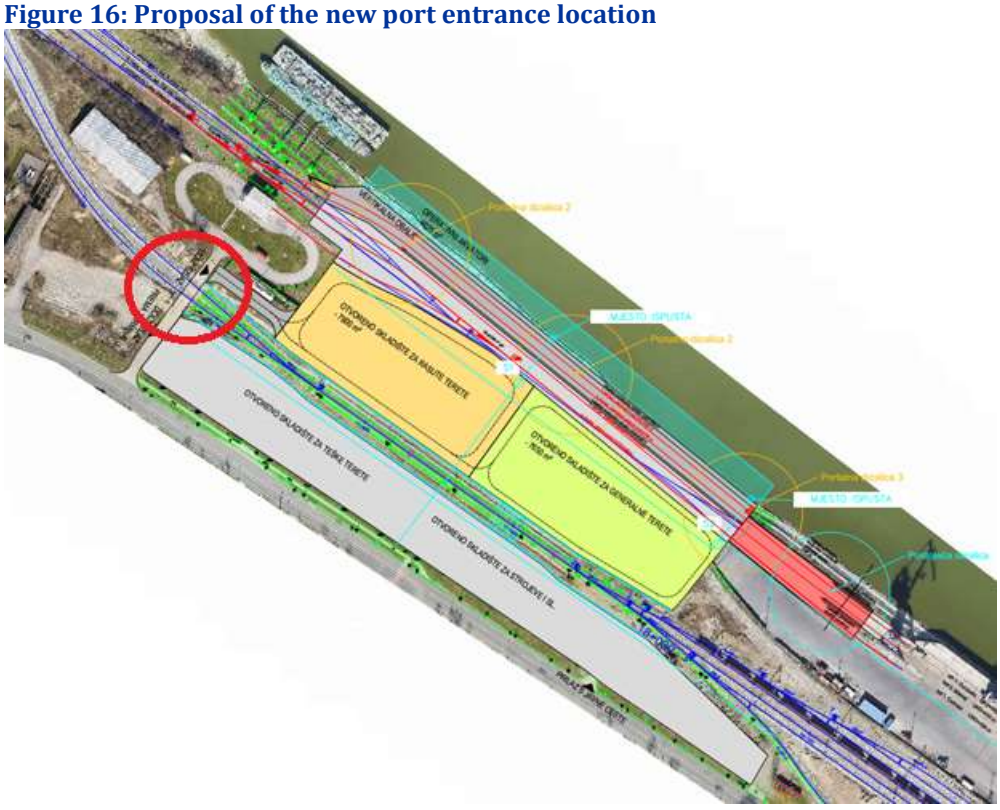
In the port area of the port of Vukovar, as a continuation of the abovementioned project, it is planned to prepare project documentation for the construction of port infrastructure in the part of the port area that is the only one left unregulated upstream of rkm 1335+500 in the length of approximately 200 meters, whereby the conditions for obtaining another connection would be met. The preparation of the project documentation refers to the continuation of the construction of the vertical coast and the associated road and rail infrastructure in such a way that the new facilities are integrated into the existing infrastructure, thus ensuring the connection with the hinterland. It is planned to build a connecting road that will connect the port in the east-west direction, and it will achieve a faster and better traffic connection between individual operators in the port and create preconditions for better use of the port area, it will achieve a faster and better traffic connection between individual operators in the port and create preconditions for better use of the port area.

Investments in the substation and equipping are, as a rule, the concessionaire's obligations and it is expected that each concessionaire will, based on the obligations arising from the concession contracts and annual work plans, execute all necessary investments in storage areas and transshipment machinery.

22.d.2 Proposal of a new mode of transport system through the port area of the port of Vukovar taking into account the current spatial plan, current occupancy of the port area and (passage of the Danube-Sava channel through the port area of the port of Vukovar)

Considering the current spatial plan, the current occupancy of the port area and the future passage of the Danube-Sava channel through the port area of the port of Vukovar, the road traffic system through the port area of the port of Vukovar should be reorganized in such a way that the access to the port is relocated to the entrance on the east side of the new terminal, by visiting the open warehouses for bulk and general cargo back to the exit on the east side of the terminal.

Figure 16: Proposal of the new port entrance location



The new entrance would be located directly next to the planned new authority building of the port, where all accompanying services of the port and other services necessary for the operation of the port would be located. At the same time, the immediate entrance to the City would be relieved, as well as providing direct access to the parking places for cargo and personal vehicles.

The existing roads within the port should be reconstructed in such a way as to connect them to the new main port entrance. By building a connecting road that will connect the port in an east-west direction, a faster and better traffic connection between individual operators in the port will be achieved and the preconditions for better use of the port area will be created.

22.d.3 Proposal of the solution of the video surveillance system of the port area of the port of Vukovar (proposal of the solution of video surveillance and the system of control of entry/exit/stay of vessels/trucks/wagons in the port)

In order to increase the security of the port area under the management of the Port Authority Vukovar and in order to enable better control of access to facilities and the possibility of reconstruction of events using video recordings and database of access control, it is necessary to implement a modern video surveillance system in the area of the port of Vukovar. The main feature of the modern surveillance system is the constant video surveillance of major checkpoints and the control of the access of vehicles and persons to the port area.

The project documentation of the video surveillance protection system must be made in accordance with the threat assessment and security study in such a way as to ensure continuous video surveillance of the facility with the storage of video in digital form for the purpose of detection, recognition and visual identification and subsequent reconstruction of the event. The project documentation should provide for modern equipment, whereby the proposed solutions should be in accordance with the latest world practice for the protection of this type of facilities.

The video surveillance system must be based on IP technology. All cameras must be able to connect via TCP/IP protocol. Network cameras should be colored, with day/night functionality, megapixel resolution with high magnification with the ability to control all parameters over the network.

The system must enable simultaneous recording, viewing of the recorded material, archiving, and remote network monitoring and viewing of records by several authorized users without loss in the quality of the recorded material.

The components of the video surveillance system must be interconnected using signal and power cables. Some locations of public areas need to be connected to optical rings that will be terminated at the central location (Monitoring Center).

Access control should be done in such a way as to ensure a controlled passage through certain supervised doors, and control of movement and retention of persons and vehicles in the port area should be carried out with the help of a modern system whose backbone consists of magnetic cards with associated software for the simple control of entry/exit of persons and vehicles into the port area.

Wheel entrances to the port area should be equipped with electric ramps that are activated by card readers/swallowers, while railway entrances should be equipped with metal doors that are also opened by card readers. In addition to road and rail entrances, the port area at pedestrian entrances should be equipped with so-called tripods, which are also activated by magnetic cards.

The access control system must be connected to the anti-theft system in such a way as to enable the removal and installation of partitions.

The control devices must be fully integrated with the central alarm unit.

The protection system should be complemented by an external communication cabinet at a remote location, which is protected from unauthorized access and protects key nodal equipment from

sabotage and alienation. The device must contain an authorization system over the cabinet, i.e. when opening the cabinet, the user must successfully authorize himself over the authorization element, through the appropriate authorization card, in order to prevent the activation of the alarm siren and forwarding the alarm to the central monitoring system. The local protection system must also have the possibility of monitoring the operating temperature inside the cabinet, as well as the possibility of detecting vibrations and shocks (shock detector), as a result of the vandalism over the cabinet. The communication cabinet monitoring device must be fully integrated with the central monitoring system.

The port area must be under constant video surveillance monitored from a modern monitoring center, which, with the cooperation of the car patrol (0-24 hours), enables rapid intervention in case of unforeseen events.

The introduction of such a monitoring system would significantly increase security in the port area.

22.e Tentative Investment Plan (measures for infrastructure, equipment, plants, digitization, automation)

The following investments are planned in the area under the jurisdiction of the Port Authority Vukovar:

Construction of a vertical coast in the port of Vukovar

The project for the construction of the vertical coast is described in point 22d and the previous points. In the near future, it is envisaged to expand the vertical coastline, in the length of 286 m, upstream of the existing location. The main concept of the planned state of the port of Vukovar is defined through the reorganization of the port infrastructure, i.e.:

- reconstruction of part of the operational coast in the length of about 300 m in terms of construction of the vertical coast, allowing more efficient access of cranes to moored vessels
- organization of appropriate storage space in the zone of construction of port buildings
- reconstruction, including reorganisation of other infrastructure so that the basic activities of cargo handling are not hindered and interrupted during the construction of the port

On the surface, it is envisaged to arrange a part of the port area together with a new vertical coast and a pier for ships. On the coast, as well as on the areas for transport and storage, the organization of bulk cargo terminals and general cargo terminals is envisaged.

It is envisaged that the bulk cargo terminal occupies most of the space on the vertical coast, while the general cargo terminal should occupy a smaller part of the space. However, in kind, it will be possible for a part of the horizontal operating surface to be used for the manipulation and disposal of cargo according to the current needs of the concessionaire, and the demarcation between the bulk and general cargo terminals will be flexible.

Part of the area will be intended for accompanying buildings and structures of transport and communal infrastructure. At the same time, the technical solution of the port road bypassing open

storage areas provides space for trucks waiting to be loaded/unloaded and reduces the required capacity of parking areas.

The construction of these terminals envisages obtaining:

- a new coastline of 286 metres in length which will serve to accommodate vessels with a carrying capacity of predominantly 1.000 tonnes
- new storage and handling areas of about 1,5 ha, which will be used for the above terminals, will enable the transshipment of an additional 600.000 tonnes/year under the assumption of equipping the terminals with three cranes

The land part of the port area is arranged as two separate functional units, within which two terminals are distinguished, where a certain type of construction and development of surfaces is envisaged:

- Bulk cargo terminal (about 9.450 m^2)
- Terminal for general cargoes (about 8.860 m^2)
- Automotive and truck parking (about 15.000 m^2)

For the needs of the new operational coast, it is planned to build four new port tracks on the part between the two existing track groups, as well as the connection of the industrial track to the new track situation. The new port tracks will be separated from the existing, passing track, and continue to the new coast. The first track closest to the coast is foreseen as a cliff and ends together with the new coastal structure, while the other tracks are foreseen as pass-through and fit into the existing tracks on the existing coast. The industrial track (Nautica) needs to be connected to the new track image, i.e. to the new main passing track (track 4).

Due to the height difference of the new vertical coast compared to the existing coast, it is planned to perform an elevation ramp on the part of the connection of new and existing tracks, all in order to maintain the continuity of runs between the new and the existing coast. The ramp is provided in the width of all three passing tracks together with a part of the crane paths.

All new tracks are provided as loading-unloading, with the following total useful lengths:

- 1st industrial track; operational tracks (306 m)
- 2nd industrial track; operational pass-through (765 m)
- 3rd industrial track; auxiliary passing track (725 m)
- 4th industrial track; main passing track (700 m)

Industrial tracks allow for a permissible mass per axle of 22,5 t and 8,0 t/m.

Between the two tracks along the coast, the installation of a crane path in the length of 238 m is planned, for the operational work of portal cranes.

Road traffic will take place by entering from the east side of the terminal, by visiting the open warehouses for bulk and general cargo back to the exit from the east side of the terminal. For the purposes of parking cars and trucks, the area south of the public railway will be used.

As part of the expansion of the vertical coastline, a new transformer station is planned to be built.

Construction of office building

The infrastructure part of the project includes the demolition of the existing Petrokemija Plc. building owned by the Republic of Croatia within the port area on cadastral plot 519/3 and the construction of an office building on the same cadastral plot and its equipping for performing port activities.

The building should have two floors, a total gross building of about 1.500 m^2 (approximately 500 m^2 per floor), and it would be intended for four users:

- Ground floor: police and customs
- 1st floor: office premises of the port
- 2nd floor: office premises of the Port Authority Vukovar

In front of the future building, it is also planned to create a parking places for employees.

Construction of a terminal for the collection of waste from vessels

It is planned to invest in the development of project documentation and the construction of a terminal for the disposal of waste from vessels, in accordance with the applicable environmental standards. The project will be implemented as part of a comprehensive approach to the disposal of waste from inland water vessels and the concept of a sustainable waste management system in inland water ports, which implies that on each of the three main waterways in the Republic of Croatia (Danube, Drava and Sava) there is an infrastructure for the disposal of various types of waste from cargo and passenger ships.

The basic construction elements of the terminal include the operational coastline, the traffic areas of the terminal, the administrative areas and the scale, the arrangement of the surface of the terminal, the accompanying line infrastructure, the tanks for separately collected municipal waste and the infrastructure for the reception of wastewater (sanitary, faecal, oily, etc.)

Expansion of the pier for passenger ships in Vukovar

In the coming ten-year period, it is planned to invest in the expansion of the existing passenger ship pier in Vukovar. This project envisages the formation of a pier for passenger ships parallel to the existing coastal fortress. The passenger pier does not provide for a permanent pier of the vessel, but only for the transshipment of passengers. This project does not envisage construction works, nor obtaining a building permit, since the pontoon and all its equipment are not subject to the Construction Law.

The project of expansion of the passenger pier is closely related to the project of Croatian Waters 'Regulation of the Right Bank of the Danube River from rkm 1333+000 to rkm 1331+000 and Urban Development of the City of Vukovar'. The project 'Regulation of the Right Bank of the Danube River from rkm 1333+000 to rkm 1331+000 and Urban Development of the City of Vukovar' designed berthing elements at the location of the existing pier and downstream for an additional three connections, while the project of expansion of the passenger pier refers only to the design of the floating facility and its placement in the area. For the project of regulation of the right bank of the Danube River, Croatian waters have obtained a building permit, and it is expected that the works will begin. The implementation of the passenger pier expansion project is planned in four phases. The first

phase is planned at the location of the existing passenger pier, while the remaining three phases, which include the construction of additional three downstream connections, are planned after the completion of the project 'Regulation of the Right Bank of the Danube River from rkm 1333+000 to rkm 1331+000 and Urban Development of the City of Vukovar'. Also, within the project of Croatian Waters downstream of the pier, it is planned to build a protective breakwater at the location of the existing communal pier 'Marina'. The construction of the breakwater achieves the formation of a protected port aquatorium for the accommodation of boats, and it is necessary to relocate the existing communal pier, i.e. to fit into the newly created aquatorium of the utility pier 'Marina'.

Given the upward trends in the circular travel services market, there is an increasing need to provide services that do not directly entail the tying of vessels for the purpose of disembarking and boarding passengers (e.g. vessel maintenance services). Such services will be provided only in piers that will be defined by the legislative framework and purposes that will be different from those that have passenger piers, and where it will be possible to perform small-scale maintenance on river cruise ships or other vessels. Also, the expansion of services would further increase the opportunity for profiling of the passenger pier Vukovar (and/or other piers on the Danube) for obtaining the status of the starting port for river cruise ships (so-called homeport). There are prerequisites for a departure port in terms of general transport connection and immediate proximity to the airport Klisa.

Construction of a new passenger pier Vučedol as part of the project 'Archaeological Park Vučedol'

The construction of the new passenger pier Vučedol is planned on the right bank of the Danube River at km 1328+000, immediately in front of the Museum of Vučedol Culture. It is necessary to ensure a simple and safe berth and the arrival and departure of tourist and excursion ships without the possibility of permanent berths. It is planned to form a 12x4 m pontoon jetty parallel to the existing coastal fortress. The project-technical documentation for the construction of the Vučedol pier was prepared in 2019. The construction of the pier is part of the strategic project 'Archaeological Park Vučedol', so funds from the Operational Programme Competitiveness and Cohesion 2014-2020 have already been provided for the project of construction of the pier.

Construction of communal and passenger pier on the Island of Sports in Vukovar

The project of construction of the communal and passenger pier on the Island of Sports in Vukovar continues on the project of Hrvatske vode 'Arrangement and Protection Against Flooding of the Island of Sports in Vukovar', which carried out construction works on the development of the coastal fortress. The old confluence of the Vuka River into the Danube has been converted into a pier for boat mooring. The port is now in operation for mooring vessels, but does not have the necessary facilities for mooring vessels and they are moored on improvised moorings. For the communal pier, three separate pontoons will be performed, on which the berth for 80 vessels will be enabled. A pontoon will be installed for the passenger pier to accommodate smaller ships. In addition to the pier of smaller boats, the pontoon will also serve as a berth for boats and yachts. The new location of the passenger pier is located in the northeastern part of the port of the Island of Sports.

Construction of a communal pier in Batina

In the next ten-year period, it is planned to implement the project of construction of a communal pier on the right bank of the Danube River from rkm 1425+400 to rkm 1425+300, downstream from the existing passenger pier in the Batina settlement. The communal pier would provide new berths for a minimum of 40 boats and vessels for sports and leisure up to 6 m long, and 10 berths for boats and vessels up to 10 m long. The project envisages the preparation of a preliminary design and updating of the existing main design and the preparation of technical documentation for the needs of the technical supervisory body responsible for supervision of the construction of the floating facility. In addition to the project-technical documentation, the project also envisages the construction of a pontoon marina and its installation on the site and the execution of construction works.

In addition to these piers, in the next ten-year period there may be a need for the opening and construction of additional piers on the Danube, in the area of smaller municipalities. The start-up of the investment will depend on the actual requirements for opening passenger ports, which the municipalities will possibly send to the Port Authority Vukovar, but also on the real needs for additional passenger ports. The opening of new piers is largely connected with the construction of the multi-purpose channel Danube-Sava – the project envisages the construction of some piers (Vinkovci, Cerna).

Construction of communal connections for the supply of alternative fuels

In the port of Vukovar, in the next ten-year period, it is planned to build four communal connections with the electricity charging station in the existing port area and a separate connection with all other alternative fuels (liquefied natural gas and hydrogen) in the future port area of Borovo.

Before these investments are approached, it is necessary to carry out all the assessments envisaged by the NOP, prepare project-technical documentation that will determine in detail the actual need, i.e. the necessary infrastructure and its technical and technological characteristics in accordance with the specifics of the location and type of fuel, and implement all the necessary procedures related to the protection of nature, the environment and the ecological network.

Construction of basic infrastructure in the area of Borovo

In 2019, as part of the DBS Gateway Region project within the Interreg Danube Programme, the Port Authority Vukovar had a Pre-Feasibility Study prepared for the expansion of the port area of Vukovar – with different scenarios. The study looked at all traffic-technological and spatial aspects and considered the options of extending the existing port of Vukovar to the area upstream of the existing port (direction west), which is the location of the factory Borovo Plc. and occupies approximately 18 hectares. This location is located in an existing commercial zone and is equipped with all communal infrastructure. The economic zone works in the background. The assumption is that the interest of the legal entity Borovo Plc. would be to sell part of the real estate that it does not use in order to carry out business restructuring.

The planned investment includes the preparation of project-technical and other study documentation (e.g. Preliminary Solution, Preliminary Project, Main and Executive Project with Budget Sheet,

Environmental Impact Study, Feasibility Study with Cost-Benefit aAnalysis and other measurements and permits) and construction of basic port infrastructure.

The planned infrastructure includes the construction of:

- vertical coasts with manipulative plateaus,
- road networks and areas of the container terminal and the RO-LA terminal (construction of an industrial road for vehicle traffic within the operational part of the port, manipulative plateau and railway tracks),
- public infrastructure network and equipment (electricity, telecommunications, water supply network, fire protection)
- weighing port house

The total eligible investment costs are estimated at HRK 393.000.000 with included VAT, divided into two phases.

Construction of biomass terminals

The biomass terminal construction project includes the construction of a vertical coast, track installations, water supply and sewerage, and electrical installations.

The minimum necessary equipment for the biomass centre includes a storage building, a minimum surface area for energy wood storage, a paved area for manipulation, equipment for regular moisture measurement for quality assurance, roadside bulletin boards and information boards.

22.f Tentative Investment Plan for Connection to the Port Hinterland, Access to the Port by Rail and Road

The favorable geographical position of the Vukovar-Srijem County enabled the development of railway traffic and the development of the city of Vinkovci as one of the main state passenger and cargo transport hubs. However, Vinkovci, and indirectly Vukovar, have not yet reached the pre-war level of importance despite progress and investments in infrastructure reconstruction.

Considering the fact that significant investments are being made and further investments are planned in the reconstruction of the railway on the route of the main corridors at the level of the Republic of Croatia, it is expected that further increase of traffic and strengthening of the County as a railway and logistics center, which should also contribute to a stronger integration of the railway and the use of the Danube for the transport of goods, i.e. intermodal forms of transport.

The upgrading and electrification of the railway line from Vinkovac to Vukovar with a length of 18,71 km, sections important for international traffic, will enable an increase in the volume of railway traffic and transshipment of goods in the port of Vukovar and a better connection of railway passenger transport of the Vukovar-Srijem County with the main transport corridors and other counties, and in particular will have a positive impact on the comfort and safety of travel as part of daily passenger migration. The modernization of the Vinkovci – Vukovar section will enable the speed of trains of maximum 120 km/h, which will reduce the travel time by about 50% and the duration of the journey

in passenger transport will be 20 minutes, and in cargo transport 30 minutes. Electrification of the section will ensure economically and energy-efficient and environmentally sustainable rail transport. The capacity of the section will be increased and access to the port of Vukovar will be improved, thus it will be well connected to the Corridor RH1, the former X. Pan-European Corridor, located on the TEN-T Rhine-Danube Corridor. The modernisation of the railway line from Vinkovac to Vukovar will contribute to the economic development of the local community and the recovery of the eastern part of Slavonia. The total value of the investment amounts to HRK 677 million.

Further investments in the railway corridor TEN-T Rhine-Danube are expected on the sections Okučani – Vinkovci and Dugo Selo – Novska, whose modernization would completely complete the investments on the corridor. The realization of the investment is expected in the period of 10 years, and the estimated value of the investment amounts to EUR 1,2 billion.

Despite investments in the network of county and local roads in the past period, the quality of roads in Vukovar-Srijem County is still worse than in other more developed parts of Croatia, and it is necessary to build the remaining sections of county and local roads in order to increase the share, i.e. the percentage of paved roads in the total length of the road network in the County, while at the same time providing funds for investments in sections of paved roads that require reconstruction and modernization. State roads also require reconstruction and extraordinary maintenance of individual sections. The problem of passage of corridors of state roads through city centers is emphasized, which leads to an increase in the traffic of cargo vehicles, so due to the faster flow of vehicles in transit and increased traffic safety, it is necessary to move the routes of state roads through the construction of bypasses of the cities of Vinkovci and Vukovar, which is partly already in progress or in preparation.

The problem is also the poor traffic connection of the peripheral parts of the County (especially the city of Ilok) with the county centers and the highway, so the construction of fast roads (Srijem border transversals) is necessary, which would reduce travel time.

In accordance with the state of road infrastructure in the area of LSW and the stated need, the following priority interventions of road-traffic construction can be defined:

- Srijem border transversal Ilok - Šarengrad - Bapska - Tovarnik - Nemerci - Lipovac - Strošinci,
- Podravina high-speed road Virovitica - Osijek - Ilok with fortified connecting route Osijek - Vukovar - Vinkovci - Županja and section Nuštar - Vukovar,
- Vukovar bypass,
- relocation of the D55 state road route - eastern bypass of the town of Vinkovci
- relocation of the state road D46 - southern bypass of the town of Vinkovci (continuation of construction),
- construction and reconstruction of the state road D537, section Slakovci - Island.

In this moment, it is not possible to estimate the total value of the proposed investments or the time period for their construction.

The overall growth potential of the port of Vukovar should also be supported by adequate development of transport infrastructure, so that growth can be supported in the long term. The construction of transport infrastructure is not the responsibility of the port of Vukovar, but it should be lobbied for its construction.

22.g Tentative Investment Plan for Communal Services, etc.

In accordance with the European Agreement on the International Carriage of Dangerous Goods by Inland Waterways, separate storage, treatment and disposal of non-hazardous and hazardous waste in ports as well as the reception of waste from ships should be ensured.

Waste from vessels means solid and liquid waste arising from the exploitation of vessels and the maintenance of vessels, including oil and fat liquids, and solid and liquid waste originating from the cargo carried by the vessel. In accordance with the Regulation on Technical and Technological Conditions for Ports and Conditions of Safety of Navigation in Ports and Inland Waters (32/09), a port open to domestic or international traffic, in order to meet the technical conditions, must have permanent facilities on coast for the reception of waste from vessels and separation of oily liquids or mobile facilities for the same purpose and equipment for the prevention of pollution of water from vessels located in the port. Different practices and rules exist in European countries regarding waste management, but the use of permanent facilities in ports and the use of external services for the collection and removal of waste from vessels are highlighted.

In some countries, there are so-called green terminals that allow the collection of waste from vessels (including oil and fat fluids), but also the sorting, treatment or recycling of waste in the terminal itself or in its immediate vicinity.

At the level of the Republic of Croatia and in the port of Vukovar, it is planned to invest in the preparation of project documentation and construction of a terminal for the disposal of waste from vessels, in accordance with the applicable environmental standards. The project will be implemented as part of a comprehensive approach to the disposal of waste from inland water vessels and the concept of a sustainable waste management system in inland waterw ports, which implies that on each of the three main waterways in the Republic of Croatia (Danube, Drava and Sava) there is an infrastructure for the disposal of various types of waste from cargo and passenger ships.

The indicative cost of this investment is estimated at HRK 4.750.000 and the duration and implementation period of 48 months.

In the area of competence of the Port Authority Vukovar, investments in communal and passenger piers are planned, and among the priority projects are the following:

- Construction of a communal and passenger pier on the Island of Sports in Vukovar

The project of construction of the communal and passenger pier on the Island of Sports in Vukovar continues on the project of Hrvatske vode 'Arrangement and Protection Against Flooding of the Island of Sports in Vukovar', which carried out construction works on the development of the coastal fortress. The old confluence of the Vuka River into the Danube has been converted into a pier for boat berthing. The port is now in operation for berthing vessels, but does not have the necessary facilities for berthing

vessels and they are berthed on improvised berths. For the communal pier, three separate pontoons will be performed, on which the berth for 80 vessels will be enabled. A pontoon will be installed for the passenger pier to accommodate smaller ships. In addition to the pier of smaller boats, the pontoon will also serve as a berth for boats and yachts. The new location of the passenger pier is located in the northeastern part of the port of the Island of Sports.

The indicative cost of this investment is estimated at HRK 7.000.000 and the duration and implementation period of 24 months.

- Construction of a communal pier in Batina

In the next ten-year period, it is planned to implement the project of construction of a communal pier on the right bank of the Danube River from rkm 1425+400 to rkm 1425+300, downstream from the existing passenger pier in the Batina settlement. The communal pier would provide new berths for a minimum of 40 boats and vessels for sports and leisure up to 6 m long, and 10 berths for boats and vessels up to 10 m long. The project envisages the preparation of a preliminary design and updating of the existing main design and the preparation of technical documentation for the needs of the technical supervisory body responsible for supervision of the construction of the floating facility. In addition to the project-technical documentation, the project also envisages the construction of a pontoon marina and its installation on the site and the execution of construction works.

The indicative cost of this investment is estimated at HRK 5.200.000 and the duration and implementation period of 12 months.

In addition to these piers, in the next ten-year period there may be a need for the opening and construction of additional piers on the Danube, in the area of smaller municipalities. The start-up of the investment will depend on the actual requirements for opening passenger ports, which the municipalities will possibly send to the Port Authority Vukovar, but also on the real needs for additional passenger ports. The opening of new piers is largely connected with the construction of the multi-purpose channel Danube-Sava – the project envisages the construction of some piers (Vinkovci, Cerna).

The indicative cost of these investments is estimated at HRK 7.275.000, excluding VAT, and the duration and implementation period of 48 months.

22.h Clean Fuels Development Plan ('AFID'): LNG/CNG, OPS, hydrogen, powertoliquid, biomethane

In the next ten-year period in the port of Vukovar, it is necessary to ensure the development that will lead to an increase in energy efficiency and environmental sustainability, while respecting the measures envisaged by European and national strategic documents. The Plan lists the investments that will need to be made as a minimum in order for the port of Vukovar to meet all the conditions arising from the strategic guidelines in terms of infrastructure, but also from the regulatory framework such as the Regulation on Technical and Technological Requirements for Ports and Navigation Conditions in Ports and Inland Waters (OG 32/09), the Law on the Establishment of Infrastructure for Alternative

Fuels (OG 120/2016) and its future amendments, and the National Policy Framework for the Establishment of Infrastructure and the Development of the Market for Alternative Fuels in Transport (OG 34/2017).

At European and national level, one of the key measures to reduce the negative impact of transport on the environment is the transition from diesel and petrol propulsion of vehicles/ vessels to vehicles/ vessels with low and zero emissions of harmful gases. It is therefore also necessary to provide infrastructure for supplying vessels with alternative energy sources.

- **Development of LNG distribution network**

In order to enable the use of vessels using natural gas as propellant, it is possible to build LNG drives for storage and transport of gas as well as LNG filling stations (examples - construction of LNG distribution network on the Rhine River on the section from Marseille to Dijon; project *Breakthrough LNG deployment inland waterway transport*).

- **Electric river craft and solar powered craft**

PortLiner and H2-Industries enterprises have built the first electric river craft based on LHOC technology (*Liquid Organic Hydrogen Carrier*). Such vessels make a significant contribution to reducing emissions of harmful gases to zero, as they represent an adequate alternative to diesel-powered vessels. The vessels themselves and the developed technology are applicable in both cargo and passenger transport.

Different versions of electric river craft are in use or under development in European countries. The port of Vukovar should aspire for projects modelled on European practice, such as inland water passenger transport via electric water buses (Germany), high-speed electric passenger craft (Urban Water Shuttle concept, joint project of Norway, Ireland and Belgium) or solar-powered electric ferry (transport between Germany and Luxembourg on the Moselle river).

In the Republic of Croatia, there are also examples of development and use of alternative-powered passenger vessels. These are the so-called iCat vessels created in cooperation with iCat, the University of Zagreb, the Končar Institute and other associates, which use electric and hybrid motors, solar power plants integrated into the roof structure and LiFePO4 batteries. Such vessels are already used in the Republic of Croatia, for example in the Mljet National Park.

- **Hydrogen as an alternative fuel in inland navigation**

The use of hydrogen as a fuel in inland navigation has been analysed for several years, and the completed Studies have determined that it is not enough to set up charging stations on the waterway, but it is also important to provide such an energy network that enables an efficient and environmentally friendly supply of this type of fuel to charging stations, and therefore to vessels.

The use of hydrogen as an alternative fuel in inland navigation requires adjustments to existing vessel engines or the construction of new vessels powered by this fuel, which implies the installation of internal combustion engines to convert hydrogen into mechanical or electrical energy. By using

hydrogen powered engines or hydrogen and electricity powered hybrid engines, it makes a significant contribution to reducing emissions of harmful gases, since only water emissions occur.

In the Republic of Croatia, shipowners are already encouraged to buy new vessels or build electrically powered and hydrogen powered vessels. For example, in 2020, the Environmental Protection and Energy Efficiency Fund published a public call for direct co-financing to encourage shipping on alternative fuels, which co-finances the purchase of new vessels or the construction of vessels on these types of plants (electricity and hydrogen), and the funds are allocated in the form of aid to local and regional self-government units, state administration bodies, budget and extra-budgetary users and in the form of subsidies to companies and craftsmen.

- **Establishment of alternative fuels supply infrastructure**

For the use of alternative fuels in inland navigation to be possible, it is not sufficient to replace the existing fleet, which mainly uses diesel, with a fleet adapted to the use of alternative fuels. For the functioning of the system, it is necessary to provide adequate infrastructure for both refueling and delivery of fuel to users (it is necessary to provide charging stations in ports and on waterways, as well as an energy infrastructure network for fuel delivery to charging stations).

Three key options for inland navigation are considered for the delivery or supply of alternative fuels to vessels:

- 'truck-to-ship' means the delivery of fuel to trucks to the waterway where the vessel is then refuelled. This option is used, for example, in Germany, in the ports of Bremerhaven and Mannheim.
- 'ship-to-ship' means the delivery of fuel to vessels from which refueling is then carried out. An example of such a way of supplying alternative fuels is the port of Hamburg in Germany.
- 'coast-to-ship' means a fixed infrastructure, i.e. an energy network for delivering fuel to the waterway. Such infrastructure exists in some European countries, such as the Netherlands and Norway.

Consequently, and in accordance with the provisions of the National Policy Framework for the Establishment of Infrastructure and Development of the Alternative Fuels Market in Transport (OG 34/2017), investments in the construction of communal connections for the supply of alternative fuels (charging station for electricity, liquefied natural gas, biodiesel and hydrogen) are envisaged in the next ten-year period in the port of Vukovar.

Before these investments are approached, it is necessary to carry out all the assessments envisaged by the NOP, prepare project-technical documentation that will determine in detail the actual need, i.e. the necessary infrastructure and its technical and technological characteristics in accordance with the specifics of the location and type of fuel, and implement all the necessary procedures related to the protection of nature, the environment and the ecological network.

22.i Analysis of potential related to recyclability, green energy, energy master plan of the entire port and port environment

For the period up to 2030 and 2050, the European Commission focuses on achieving the sustainability of the EU economy through green policies, reducing pollution, applying concepts such as circular economy, decarbonisation. The proposal for a plan for achieving climate goals emphasizes the goal of reducing greenhouse gas emissions by 55% by 2030 compared to 1990 levels and reaching the zero rate of greenhouse gas emissions by 2050. In accordance with the Energy Development Strategy of the Republic of Croatia until 2030, with a view to 2050, in the period until 2030 in the transport sector, the emphasis will be on the construction of new infrastructure for the use of alternative forms of energy in transport (liquefied natural gas, compressed natural gas, natural biomethane, electricity and hydrogen). It is envisaged to increase the share of alternatively powered vehicles, especially electric ones, as well as to increase the use of liquefied natural gas.

In the context of energy efficiency and environmental sustainability, it is also important to consider the measures envisaged by the National Policy Framework for the Establishment of Infrastructure and Development of the Transport Alternative Fuels Market (OG 34/2017) (hereinafter: NOP). Two types of alternative fuels are particularly important for the inland navigation sector:

- Liquefied natural gas: liquefied natural gas is recognized as an alternative fuel for use in maritime and inland waterway transport due to its favourable price and lower harmful emissions than conventional petroleum fuels. One of the goals of the NOP is that by 31 December 2030 the infrastructure for the transshipment and supply of liquefied natural gas will be available in the ports of internal waters of Vukovar and Slavonski Brod, unless a complete lack of demand for this form of fuel is shown by 2025.
- Electricity: The NOP provides that onshore charging stations for inland waterway vessels must be available in the port of Vukovar/Slavonski Brod by December 31, 2025, unless there is no demand and the costs are disproportionate to the benefits, including environmental benefits.

Inland navigation is one of the key modes of transport that can significantly contribute to the goals of the EU and the Republic of Croatia in the field of green transition and energy efficiency, because this is the mode of transport with the least negative effects on the environment. The next ten-year period should certainly also focus on investments in vessels and alternative fuel infrastructure. Only such comprehensive investments that emphasize the contribution of common European policies and objectives will the inland navigation sector in the Republic of Croatia be able to develop in line with European and global trends and participate in the realization of a unified European approach to transport. Below are examples of investments and results derived from individual projects, which may be considered and applicable in the Republic of Croatia for the improvement of the inland navigation system in the next ten-year period.

Waste from vessels means solid and liquid waste arising from the exploitation of vessels and the maintenance of vessels, including oil and fat liquids, and solid and liquid waste originating from the cargo carried by the vessel. In accordance with the Regulation on Technical and Technological Conditions for Ports and Conditions of Safety of Navigation in Ports and Inland Waterways (OG 32/09),

a port open to domestic or international traffic, in order to meet the technical conditions, must have permanent facilities on coast for the reception of waste from vessels and separation of oily liquids or mobile facilities for the same purpose and equipment for the prevention of pollution of water from vessels located in the port. Different practices and rules exist in European countries regarding waste management, but the use of permanent facilities in ports and the use of external services for the collection and removal of waste from vessels are noteworthy.

In the port of Vukovar, it is planned to invest in the preparation of project documentation and the construction of a terminal for the disposal of waste from vessels, in accordance with the applicable environmental standards. The project will be implemented as part of a comprehensive approach to the disposal of waste from inland waterway vessels and the concept of a sustainable waste management system in inland water ports, which implies that on each of the three main waterways in the Republic of Croatia (Danube, Drava and Sava) there is an infrastructure for the disposal of various types of waste from cargo and passenger ships.

22.j Indicative financial plan (based on financial indicators of pre-feasibility) for all envisaged investments

In accordance with the results of the framework pre-feasibility and strategic calculations underpinning the strategic decisions, the indicative financial plan for all envisaged investments is as follows:

Table 33: Indicative financial plan for the implementation of planned investments – port of Vukovar

Planned project/ investment	Indicative duration and implementation period	Year											Total	Source of funding		
		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032		State budget	City/ municipal Budget	EU funds
Construction of a vertical coast in the port of Vukovar	102 months	4.194.630	4.194.630	4.194.630	55.600.000	50.400.000	50.400.000	50.400.000	50.400.000	57.800.000			327.583.890	49.137.583		278.446.307
Construction of a terminal for the collection of waste from vessels	48 months		1.200.000	1.100.000	1.100.000	1.350.000							4.750.000	712.500		4.037.500
Construction of the passenger pier Vučedol	36 months		375.000	900.000	1.225.000								2.500.000	375.000		2.125.000
Expansion of the pier for passenger ships in Vukovar	60 months		7.500.000	7.500.000			15.000.000	15.000.000	15.000.000				60.000.000	60.000.000		
Construction of communal and passenger pier on the Island of Sports in Vukovar	24 months	3.500.000	3.500.000										7.000.000	7.000.000		
Construction of smaller piers for local and tourist ships	48 months		775.000	1.500.000		2.500.000	2.500.000						7.275.000	3.637.500	3.637.500	
Project for the construction of a communal pier in Batina	12 months		5.200.000										5.200.000	5.200.000		
Construction of communal connections for the supply of alternative fuels	36 months			7.000.000	20.493.656,25	20.493.656,25							47.987.312,50	7.198.096,88		40.789.215,62
Construction of basic infrastructure in the area of Borovo	120 months		15.250.000	11.980.000	4.770.000	80.250.000	40.100.000	40.100.000	40.100.000	40.100.000	40.100.000	80.250.000	393.000.000	58.950.000		334.050.000
Construction of office building	24 months		270.000	6.730.000									7.000.000	7.000.000		
Construction of biomass terminals	36 months					18.000.000*	18.000.000*	18.000.000*					54.000.000			

* Estimated in accordance with the total projected value of the investment

The aforementioned projects and investments are crucial for the development of the port of Vukovar in the next ten-year period.

For those investments and projects for which co-financing from EU funds is foreseen in the 2021-2027 programming period, an EU fund co-financing rate of 85% of the total estimated costs was applied (in accordance with the conclusions on the recovery plan and the multiannual financial framework adopted by the European Council for the 2021-2027 programming period on July 21, 2020), and the remaining 15% of the total estimated costs were distributed to long sources – mainly the state budget. For investments included in the draft National Recovery and Resilience Plan (equipping ports and piers with waste management infrastructure), 100% EU funding from the Recovery and Resilience Mechanism is foreseen. For projects for which there is a call application plan that will be open in the upcoming period within the 2014-2020 programming period, an EU co-financing rate of 85% of the total estimated costs has been applied. Actual EU co-financing rates will depend on the terms of each call for projects to be notified.

Historical data and estimates submitted by the port authority resulting from the prepared project-technical documentation, such as conceptual solutions, were used for pricing.

The multicriteria analysis carried out identified key projects and investments. Multicriteria analysis was performed following 6 criteria. The criteria on the basis of which the multi-criteria analysis was carried out are:

- Criterion 1 – Project maturity,
- Criterion 2 – Impact on economic growth,
- Criterion 3 – Environmental impact of the project,
- Criterion 4 – Source of financing,
- Criterion 5 – Contribution to the achievement of strategic objectives,
- Criterion 6 – Cross-border projects.

Table 34: Results of multicriteria analysis for the port of Vukovar

Planned project/investment	K1 - Project maturity	K2 - - Impact on economic growth	K3 - Environmental impact of the project	K4 - Source of funding	K5 - Strategic goals	K6 - Cross-border projects
Construction of a vertical coast in the port of Vukovar	3	3,33	2,08	4	5	5
Construction of a terminal for the collection of waste from vessels	1	2,67	3,08	4	4	5
Construction of the Vučedol pier	4	2,83	1,92	4	5	5
Expansion of the pier for passenger ships in Vukovar	5	3,5	2	1	5	5
Construction of communal and passenger pier on the Island of Sports in Vukovar	4	3,33	1,58	3	4	5
Construction of smaller piers for local and tourist ships	2	3,33	1,75	3	5	5
Construction of a communal pier in Batina	5	2,92	1,42	1	5	5
Construction of communal connections for the supply of alternative fuels	1	2,92	3,29	4	3	5
Construction of basic infrastructure in the area of Borovo	1	3,33	2,08	4	5	5

Source: Mid-term plan for the development of inland waterways and ports of the Republic of Croatia for a period of ten years, 2021.

Descriptions of individual criteria are shown below:

Criterion 1: Project maturity – this criterion refers to the fulfillment of phases important for the implementation of the project, which includes the preparation of study and project documentation and obtaining permits as prerequisites for the beginning of works or other types of investments (such as equipping, procurement of vessels). The study documentation includes feasibility studies, conceptual solutions, cost-benefit analyses, etc. Project documentation includes the preparation of studies and projects depending on the type of project (e.g. architectural, electrical, mechanical design, traffic studies, occupational health and safety study, geodetic study, geotechnical study, waste management study, etc.). International certificates refer to cross-border projects that may require cross-border cooperation, the signing of an agreement or other documentation in the preparation of which a neighbouring country must also participate.

If the project does not need project documentation, location and construction permits and international certificates, and has all other documentation and permits ready for implementation, it receives the highest rating.

Criterion 2: Impact on economic growth – this criterion refers to the impact expected from the project on achieving economic growth (traffic growth, unemployment reduction, GDP, etc.) of the entire project implementation area.

Criterion 3: Environmental impact of the project – this criterion refers to the positive impact of the project on the environment (e.g. reducing emissions of harmful gases by diverting traffic from the road to LNG). The criterion is evaluated with regard to four main components: pollutant emissions, greenhouse gas emissions, improving biodiversity and climate resilience.

Criterion 4: Source of funding – this criterion evaluates projects with regard to the type of project financing.

Criteria 5: Contribution to the achievement of EU strategic goals – this criterion refers to the impact of the project on the achievement of goals from EU level transport policies. The following strategic documents shall be taken into account:

- White Paper on a Single European Transport Area
- European Green Deal
- TEN-T Regulation
- EU Inland Navigation Action Programme – NAIADES II

NAIADES III and the new TEN-T Directive were included in the review of the objectives.

From those strategic documents, all objectives relevant to the inland navigation sector are taken into account. The objectives are divided into the main categories of general objectives in order to optimize the scoring system (since there are a large number of objectives). Goal categories are the main topics in which improvement is measured. Topics are:

- Reducing the harmful impact of transport on the environment and promoting low-carbon transport;
- Removal of bottlenecks,
- Ensuring the prescribed classes of navigability and network development,
- Modernization and expansion of the capacity of the infrastructure needed for transport within the port area,
- Increase security
- Increasing competitiveness
- Increasing intermodality.

Criterion 6: Cross-border projects – this criterion applies to projects implemented in the border area with other countries, which makes their implementation more difficult due to the bigger complexity of the projects due to the required international cooperation.

For each criterion, a weighting value was assigned as follows:

Criteria	Weight value
Criterion 1: Project maturity	16%
Criterion 2: Impact on economic growth	24%
Criterion 3: Environmental impact of the project	21%
Criterion 4: Source of financing	10%
Criterion 5: Contribution to the achievement of strategic objectives	20%
Criterion 6: Cross-border projects	8%
TOTAL	100%

Weight values were obtained on the basis of estimates of 16 surveyed experts, where the values given for each criterion by each expert were averaged.

Pre-calculation of the feasibility of port development projects is most important to be carried out at the level of each project as part of the preparation of the study documentation of each project, since this is the most appropriate level of detail of the project development in every sense (technical-technological, spatial-geographic, functional, environmental, financial-economic).

In accordance with the internal PAV Law, the development of inland navigation, waterways and inland water ports are of economic interest to the Republic of Croatia and have its particular protection. Therefore, when considering projects and investments in the inland navigation sector, it is not only the cost-effectiveness that is important, but also the broader social benefit and public good arising from transport and port activities that are important.

22.k Concept of activities related to the certification process (ISO, EMAS system)

The standard HRN EN ISO 9001 provides a number of conditions for the operation of the quality management system and represents the best international practice for quality management. The implementation of the quality management system according to the standard HRN EN ISO 9001 is a complex process that lasts between 6 months and a year, and takes place in the following phases:

1. Introducing the company's management to the basic principles of HRN EN ISO 9001 and
2. making a decision on the introduction of the system.
3. Selection and appointment of leaders and team members for the implementation project.
4. Selection of external consultant and educational organization.
5. Analysis of the current situation in the company.
6. Preparation of the project plan with defined terms and persons responsible for implementation
7. activities.
8. Education of management and all employees, training of internal auditors.
9. Documentation of the quality management system.

10. Implementation
11. Conducting an internal audit and making a system assessment by the company's management.
12. Selection of the certification body (certification company) and conducting of the previous certification audit by the selected certification company.

According to HRN EN ISO 19011 (Guidelines for Conducting Management System Audits), an audit is defined as a systematic, independent and documented process to collect evidence and evaluate it objectively in order to determine the degree to which the audit criteria are met. The audit criteria are defined by the established management system being audited, in the case of the quality management system this is the standard HRN EN ISO 9001, and by the internal documentation of the management system of the company being audited.

EMAS (Eco-Management and Audit Scheme) is an eco-management and independent evaluation system intended for all public and private organisations performing a particular economic or service activity with a certain environmental impact in order to assess the environmental impact of their activity and improve it.

EMAS has been developed by the European Commission to encourage organisations to apply high environmental standards and to constantly measure and control their impact on the environment and climate.

By registering with EMAS, the organisation agrees to apply higher environmental standards than required by law, to constantly control the harmful impact of its activities on the environment and to provide relevant information to the public and all interested parties.

It guarantees EMAS organisations an independent and scientifically based assessment (verification) and confirmation (validation) of their eco-management system.

EMAS is a kind of upgrade of the international standard - the environmental management system ISO 14001. The basic technical requirements for certification are set out in section 4 of HRN EN ISO 14001:2009. Registration to EMAS shall take place as follows:

- Implementation of the internal environmental review - which takes into account all significant environmental impacts in the organisation's activities
- Establishment of an effective eco-management system - according to ISO 14001 and additional EMAS requirements
- Implementation of an independent audit – verification and validation of the established system
- EMAS registration application – submitted to the competent authority (AZO), contains a validated environmental report
- Verification of compliance with legal provisions in the field of environmental protection (ISI compliance report)
- Registration – preceded by the payment of the prescribed fee
- Publication of the environmental statement

Organisations already certified according to ISO 14001 are significantly facilitated to register with EMAS, provided they meet certain specific EMAS requirements.

The port of Vukovar should set the conditions and initiate the procedures of compliance with the ISO standard and EMAS system.

22.m Concept for improvement of water elements (vessel service, stormwater drains, diffuse emissions, drainage system)

According to Article 5 Of Directive (EU) 2019/883), ports individually or in a regional environment must develop waste reception and handling plans. The integration of port reception facilities into the wider context of waste management requires the adoption and monitoring of port reception and waste management plans taking into account the national waste management plans set out in Article 28. Of the Waste Tentative Directive (Panteia and PWC 2015).

Port authorities have initiated certain actions to bring wastewater management in line with the guidelines.

Due to the specificity of the area as a port terminal where different types of goods and cargo are manipulated and a stricter protection regime, it is envisaged to build a closed drainage system with rainwater treatment before entering the water recipient, the Danube River.

The investment in the new vertical cargo provides for the installation of drainage between the tracks in the drainage trench, which collects rainwater and then leads by a connecting pipeline to the main collector provided in the zone of open warehouses. A waterproof membrane (geomembrane) in the width of the fuselage of the track group must be placed under the track and drainage.

On the operational part of the new coast, the drainage system is provided with one of the following elements:

- catchment areas (track and manipulative areas)
- drainage elements from surfaces (line ducts and drainage shafts)
- closed collectors for collecting precipitation with inspection shafts
- buildings for the treatment of collected water, oil and grease separators, so-called separators

By the transverse slope of the track and manipulative surfaces, precipitation water flows to the line channels (channels without built-in fall or with a drop of 0,5%), from which the precipitation water reaches the catchment shafts longitudinally, from where it is drained to the main collector by transverse drainage pipes. The main collector leads to the separators for treatment of collected water before discharge into the water recipient (Danube River).

Drainage of the part of the track that is installed in the ramp is foreseen by installing line ducts between the track and along the walls of the concrete bed, which collect it and drain it to the planned new outlet via the separator.

It is envisaged that there will be two rainwater treatment facilities in the area in question, i.e. oil and grease separators. The separator must meet the requirements of DIN EN 858 for the coalescing extraction of light liquids (petroleum products – motor fuels and oils) from collected waters. There is a coalescing element in the separator chamber that increases the purification efficiency and a safety

float that prevents the separation of light liquid from the separator if the maximum capacity of the separation of light liquid is reached. The operation of the separator is completely independent, so the separator does not require any special activities of the personnel in charge of its maintenance for its normal function, but only its periodic control and, if necessary, cleaning. Separator discharge intervals depend on the amount of sediment and cleaning effect, once every 6 months separator control should be performed, and discharge at least once every 5 years.

Two discharge structures are foreseen, which, in addition to the discharge function, should provide protection against the return of water from the Danube River to the rainwater drainage system when the water levels are high.

This principle of arrangement of the drainage system should be applied to all future investments and the existing systems in the area of the port should be reconstructed.

In order to avoid and minimise the potential impacts of waste generated from ships and ports, the following good practices may be applied:

- encourage responsible waste management, including minimisation and recycling, at the point of origin on board ships, port reception, transport and disposal;
- ensure that port employees and users dispose of waste responsibly in the designated facilities and report any spillage or observed large floating pieces of waste to the port authority;
- undertake a thorough risk assessment of the port area and surrounding areas, paying particular attention to the sensitive environmental features and the necessary response time to minimise possible adverse effects on them;
- prepare, test and practice contingency plans for oil spills in accordance with navigation regulations;
- provide onshore reception facilities for discharging waste water from ships and carry out regular consultations with vessel users on the adequacy of these facilities;
- encourage the use of storage tanks where fitted and the disposal of waste at coast pumping facilities whenever possible;
- discourage or, where deemed necessary, prohibit the discharge of wastewater if this would affect water quality and damage river features in the port and surrounding waters.

Given the lack of space in the port, there are currently no realistic conditions for organising a significant service for vessels, and the port can also provide the service through the engagement of external service providers or by encouraging a private initiative that would deal with such a business.

22.n Concept of noise protection measures

Noise pollution is due to the large volume of activities that take place simultaneously in the port. Negative impacts are felt primarily by residents in the vicinity of the port, through discomfort and sleep disorders, and noise can significantly affect health.

There are several sources of noise, however, the most common sources are:

- Operating machinery such as cranes, forklifts or tractors;
- Traffic of goods vehicles and cars;
- Rail transport, especially when stacking compositions;
- Ship's pier if metal or concrete ramps are used;
- Cargo handling;
- Ships, i.e. operation of engines, ventilation and hydraulic systems, pumps.

The issue of noise is regulated by the European Union's Environmental Noise Assessment and Management Directive (END), issued in 2002. Directive 2002/49/EC is aimed at agglomerations with more than 100.000 inhabitants and at transport and network centres, roads, railways, airports or ports with a certain number of movements per year. The purpose of this Directive is to provide a synthesis of management options to avoid, prevent or reduce the harmful effects of noise, including unpleasant ones.

Port authorities and other organisations involved in the maritime transport industry may implement various noise abatement measures:

- Arrangement within the port - optimal location of different port functions can significantly reduce noise pollution;
- Arrangement of traffic - changing the way vehicles enter the port can reduce noise, e.g. creating a sufficient number of parking spaces to avoid queues or diverting traffic outside urban areas;
- Pier design - the installation of rubber linings and insulation can reduce noise;
- Quieter methods of cargo handling – reducing the speed of manipulation can reduce noise, but it is also an unpopular measure since it implies a longer time for performing port operations;
- Procurement of quieter working machines - in general, the newer the machines, the less noise they generate. Electrical and hybrid models can significantly reduce noise;
- Walls and sound barriers - strategic placement of sound barriers can significantly reduce noise from the port;
- The criterion for the allocation of berths - the noisiest vessels should be located as far away from residential areas as possible

In order to reduce noise, other solutions may be applied, such as using slots to regulate the stay of ships, limiting working hours to avoid working at night disturbances or imposing speed limits on vehicles.

It is particularly important to pay attention to cruise ships because of their proximity to urban areas in relation to other types of vessels, and since they never shut down all auxiliary engines, services such

as cooking or maintenance require constant power supply. For this reason, silencers are usually used on ships, so it is also necessary to inspect the technical functionality of the ships themselves.

The first step in noise control is to know the noise emission level, for which it is necessary to install sensors at strategic positions in order to make a strategic noise map. Based on the measurements, it is necessary to develop an action plan that will primarily be aimed at identifying the exceedance of any significant limit value and specifically apply to the most important areas identified in the strategic noise maps.

The second step is to establish measures to reduce the impact of noise, according to the abovementioned guidelines.

In addition to direct measures, cooperation is also needed between shipping companies, the city and the port, which must work together to develop effective measures that make maritime transport more sustainable and environmentally friendly.

22.l Pre-feasibility analysis for CO2 neutral – rough concept for 2030 targets

As part of the EU, Croatia shares the climate ambition expressed in the European Green Deal of the European Commission (2019) to make the EU climate neutral by 2050. Guidelines for low-carbon development related to the transport sector according to the 'Proposal of the Low-Carbon Development Strategy of the Republic of Croatia until 2030 with a view to 2050', which are applicable to the port area of the port of Vukovar are:

- The development of integrated transport should be encouraged;
- Rail transport needs to be encouraged to become competitive with other modes of transport. One of the prerequisites for achieving this is to improve the infrastructure:
- it is necessary to improve and modernise lines (including electrification), signalling and control systems in order to enable higher traffic speeds;
- it is necessary to invest in the renovation of the locomotive and wagon stock;
- a network of logistics intermodal platforms needs to be developed, with these platforms to be built in ports and major consumer centres. The same is necessary due to the inclusion of the origin of supply chains in Croatian ports that compete with other ports in this area;
- Systematic work is needed to improve inland waterways when it comes to organisation, fleet modernisation, education, infrastructure construction (waterways and ports), maintenance and safety of navigation, as well as improving cooperation with neighbouring countries. The possibilities for expanding inland waterways should be examined;
- It is crucial to provide infrastructure for alternative fuels;

In accordance with the 'Proposal of the Low-Carbon Development Strategy of the Republic of Croatia until 2030 with a view to 2050', the following traffic-related measures are defined:

- Development of alternative fuels infrastructure - The aim of this measure is to facilitate the acceptance of alternative fuels by users/consumers by strengthening the infrastructure for the distribution of alternative fuels and implementing common technical specifications for this

infrastructure. The measure follows Directive 2014/94/EU on the Establishment of Alternative Fuels Infrastructure, the Law on the Establishment of Alternative Fuels Infrastructure (OG 120/16) and the National Policy Framework for the Establishment of Infrastructure and Development of the Transport Alternative Fuels Market (OG 34/17; NOP) and encourages the construction of charging stations in accordance with those documents. This infrastructure measure will not directly affect the reduction of fuel consumption in transport, but the development of infrastructure is a necessary prerequisite for the development of the market of vehicles and vessels using electricity, LPG and LNG and hydrogen in Croatia. Infrastructure co-financing incentives will focus primarily on alternative fuels for which the assessment of the current situation has shown insufficient infrastructure development and will be limited in time until the monitoring of the situation shows minimal infrastructure coverage. The minimum infrastructure coverage will be the one corresponding to the objectives of the minimum infrastructure from the NOP

- Encouraging the development of sustainable integrated transport at the national level - The measure follows the general and specific objectives defined in the Transport Development Strategy of the Republic of Croatia (2017-2030) in the context of energy efficiency of rail, road, maritime, inland waterway and urban, suburban and regional transport (modernization of railways, signalling systems, renewal of locomotives, wagons, vessel fleets, integrated logistics platforms, integrated public passenger transport, etc.). Railway and multimodal infrastructure in general are lagging behind in development compared to highway infrastructure in terms of quality and connectivity. Investments are planned to develop a sustainable, integrated and climate-resilient trans-European transport network. In maritime and inland waterway transport, the Republic of Croatia, in consultation with the other member states, will analyse the possibilities of introducing appropriate mechanisms to ensure the transition towards low-carbon solutions, especially in terms of the application of alternative energy sources for navigation. In this context, an action plan for shipping will be defined, which will, among other things, define the appropriate emission standards for the upcoming period.
- Encouraging shipping on alternative fuels - In accordance with the National Plan for the Development of Coastal Line Shipping and given that the Republic of Croatia is a maritime country with developed long-distance line shipping, and in addition has navigable river routes and lakes, this measure would co-finance projects of gradual transition of the existing obsolete shipping fleet to alternative and/or hybrid solutions and new construction. Ships using alternative fuels are generally more expensive than ships using conventional fuels, so there is no expressed interest of shipowners to invest in such ships. Therefore, in the initial period, it is necessary to financially support the conversion/construction of such ships to the extent that the purchase price is equalised or puts such a shipowner in the same position as a shipowner using conventional fuel ships. This measure builds on the measure related to the development of alternative fuels infrastructure in terms of permanent users/consumers on that infrastructure, while at the same time significantly affecting the potential reduction of pollution of seas, rivers and lakes.

The port of Vukovar should improve transport infrastructure within the port area in order to encourage the development of integrated transport as well as infrastructure for the distribution of alternative fuels and participate as a partner within initiatives for fleet modernisation, education, infrastructure construction (waterways and ports), maintenance and safety of navigation, as well as improving cooperation with neighbouring countries.

22.o Concept of operation in the environment of other management systems

As ports drive the economic growth of the cities and regions in which they are located, the more successful the ports, the more competitive the cities and regions are. For this reason, the port needs to achieve a high level of efficiency and efficiency, it needs to be able to adapt to the dynamic needs of customers (existing and potential), all with the need to secure new investments and to work on increasing competitiveness by reducing operating costs.

All this has a critical impact on the competitiveness of ports, forcing ports to be more exposed to the market and to cooperate with other ports in matters of common interest or even national interest.

In port cooperation, ports must thoroughly investigate and clearly define in which segments of operations and markets they should compete, and in which segments they can cooperate. Preferred competition should be mandatory in services, cargo, concession contracts, rental contracts, marketing strategies, pricing strategies, etc. However, the space for cooperation between ports at national and regional level is spacious and includes associations, port community systems, legislation and regulation, security and safety issues, knowledge sharing, expertise sharing, training, lobbying for common interests, common hybrid logistics zones, integration into supply chains, hinterland connections and research and development.

For this reason, the port authorities should continue to cooperate on joint projects, strategies and work in joint organizations with ports along the Danube, and it is necessary to consider the possibility of specialization for certain port services, in agreement with ports in the immediate vicinity.

22.p Concept of cooperation with national/regional authorities (ministries, etc.) in relation to future possibilities of financing investments and activities

Regardless of how they are managed and the operational implementation of management (concessions, leases, external management contracting/operations, operating permits, corporate ports, etc.), and taking into account all the positive externalities and socio-economic benefits generated by ports, ports should receive the necessary attention in legislation and are usually treated as facilities of national transport infrastructure of the highest strategic importance.

For the above reasons, the Ministry of Sea, Transport and Infrastructure should be involved in all activities, starting from the definition of state policy towards this goal to the implementation of defined measures.

One of the primary issues to be resolved is the issue of resolving land ownership in the port area of interest, which should also be addressed through changes to the Law on Navigation and Inland Waters Ports. For part of the land, this will mean the potential acquisition, expropriation or even revision of

the privatization process of part of the port land. Finding financial or other means to compensate the current land owners should be ensured through direct participation of the Ministry of the Sea, Transport and Infrastructure, which is also one of the prerequisites for initiating further investments.

Cooperation with national and regional authorities is also needed to develop good development strategies and realistic port development plans, which are the basis for further port infrastructure construction. Development plans and strategies are key to achieving the objectives and should be based on sound and quality studies and the work of qualified staff. Port authorities should actively participate in the development of plans, such as e.g. Mid-Term Plan for Development of Inland Waters and Ports of the Republic of Croatia, in order to ensure that strategic goals as well as planned port projects are included in them.

The development plans should anticipate the future development of the port and the financing models for its implementation. Financing models can be public (state) investments, investments by port operators in port suprastructure during the concession period and public-private partnerships.

In order to adequately prepare port authorities, as well as authorities at regional and national level, for the preparation and implementation of projects, it is necessary to educate the staff of the institutions involved in these activities. This means that they should attend trainings and seminars to learn about opportunities and sources of funding and to be able to implement them. Specific measures include competence analysis, individual training plans, use of online platforms, practical trainings, knowledge transfer within the institution and among stakeholders.

Since preparatory activities are an important part of the project implementation, it is important to anticipate the costs of preparation and make them available to the Port Authority or the Ministry.

From all of the above, it is evident that synergy between the activities of the Ministry and port authorities is necessary not only in ensuring the financing of investments and activities, but also in the preparatory phase thereof, which is why a constant exchange of information and obtaining the necessary feedback is necessary.

The Ministry should support the port authority in finding other models of financing the development of port infrastructure, with financing from the state budget (EU funds, loans, public-private partnership, various incentives and subsidies for local self-government units and users of port services), and also participates in the realization and implementation of infrastructure and other projects financed from the European Union.

In addition to cooperation with the Ministry at the strategic and financial level, it is necessary to jointly encourage private investments by concessionaires or through public-private partnerships and through the use of loans and financial instruments. State budget funds certainly provide security for the operations and investments of port authority, but it is necessary to strive for financing models that will enable faster investments, but also the financial sustainability of the ports themselves. The Ministry of Sea, Transport and Infrastructure can intervene with a more flexible definition of concession award rules so that concession contracts can be adapted to rapid changes in the market.

The port authority independently plans funds for its activities in the state budget, in accordance with certain limits, and has an obligation to monitor and report on the execution, and in this respect a certain simplification of administrative procedures is expected, where the role of the state, as the enacting entity of the legal framework, is again crucial.

22.q Concept of cooperation with regional authorities (Chamber of Commerce) in order to create new directions for the movement of goods

Port authorities, port operators and other stakeholders, such as regional authorities and the Chamber of Commerce, must work together to create new routes for the movement of goods.

The Croatian Chamber of Commerce is the largest business network within the Republic of Croatia, and its tasks are to promote the interests of its members before state authorities and to connect key sectors of the Croatian economy through the system of county chambers, communities and associations, international representative offices and membership in international chambers.

One of the potentially new directions can be taken from the Belt and Road Initiative (BRI), also known as the One Belt and One Road Initiative (OBOR) - a development strategy proposed by THE Chinese government that focuses on connectivity and cooperation between Eurasian countries, which aims to develop an economic partnership between China and countries and regions along the landfill silk route and plans to strengthen the construction of infrastructure along that route. One belt connects the Asia-Pacific region and Europe, such as China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan along the Silk Road, as well as three other five observer states and dialogue partners. The maritime connection encompasses economic cooperation between China and Southeast Asia, South Asia, the Middle East, North Africa and Europe along the Silk Shipping Route.

Given the huge cargo potentials, Danube ports in general, including the port of Constanta as its main sea gate, can be used as hubs for goods flowing from/to the mainland of China not only using water transport, but also rail transport.

Given the necessity of cooperation at the international level, it is desirable to involve institutions with a branch network, such as the CCC, which can establish direct connections with organizations and entrepreneurs abroad, but also to actively promote port plans and projects in order to attract potential partners and thus open new routes of movement of goods.

The promotional activities should be stepped up by using annual visibility and promotion plans, which will identify concrete activities (adequate marketing mix), budget, target audience and messages that want to be transmissed through joint cooperation with stakeholders at all levels – the Ministry, other port authorities, operators, local and regional self-government units and the local and regional tourist board. It is necessary to jointly prepare plans for promotional activities, as well as cooperation on their implementation - joint organization of conferences, sharing information on their own websites, joint production of information materials, joint participation in fairs or conferences at the EU and international level.

22.r Concept of operation within port areas or nearby associated economic zones

Since the centres of distribution of cargo are in/from their hinterland via, in most cases, three modes of transport (road, rail, river), ports are not only transshipment points, but also centres of various economic activities related to the handling of cargo, including the widest possible range of value-added services related to cargo, vehicles and vessels, including their crews. As dynamic centres of economic activity, ports are ideal magnets for various manufacturing and logistics industries, provided that such industries are offered the right conditions for settlement in the port area or in areas nearby ports.

Consequently, in order to reduce costs and benefit from spatially centralised logistics activities, ports offering value-added services can attract port users to move at least part of their facilities to or near port areas, contributing to the concentration of both logistics and production activities in the immediate vicinity of ports. Spatial concentration of economic activities and cargo often leads to the creation of critical masses of cargo quantities suitable for inland waterway transport and for the containerization of appropriate cargoes.

In order to maximise this potential, it is necessary to establish a joint commission of port authorities with spatial planning institutions to ensure that port land is expanded or reserved for expansion and that the land becomes available to industrial and logistical operators, and not only to the port/terminal.

Since the area of the port of Vukovar lacks land intended for port areas, the available land in the immediate vicinity of the port should be considered for these purposes. Taking into account the fact that land along the river banks is a limited resource, and in most cases is considered a public good, its use should be carefully planned and optimised. Instead of dispersing various logistical and production activities, their concentration should be planned whenever possible, for a number of spatial, transport, logistical, economic, environmental and socio-economic reasons.

Mixed committees with spatial planning institutions, assisted by logistics operators, should agree on planning and regulatory aspects in such a way as to allow/simplify the establishment of hybrid logistics zones with logistical, processing and production content in ports or in their immediate vicinity. This will contribute to the spatial concentration of activities and cargo, allowing the creation of the critical mass of goods needed to drive a significant and relatively stable demand for inland waterways and intermodal transport.

Alternatively, in the event that the base of logistical and/or production activities within port areas is not possible, i.e. economically justified, it is necessary to lobby for land areas in the immediate vicinity of ports to be reserved for logistic and production (industrial) zones.

22.s Analysis of different options/decision tree/risk identification

The port infrastructure of the port of Vukovar does not meet the criteria defined in the strategic documents and there is a need to carry out activities related to the improvement of port functions. Investments aim to satisfy the economic, environmental, spatial and planning interests of local government and the general public. Better infrastructure would create a predisposition to provide

more efficient and quality port services, increase competitiveness and increase the number of transshipments.

Investments in port infrastructure are needed to create conditions that support overall development, in line with development plans at European, national, county and local level.

Although a list of potential investments in infrastructure in the port of Vukovar was created, various technical solutions were also considered, as well as the cost-effectiveness of continuing to maintain the port standard in an unchanged form.

No change (eng. BAU, Business As Usual)

The port of Vukovar would continue to use the existing capacities for the reception of ships and river traffic. However, this solution cannot ensure that the set goals are met for several reasons:

1. The existing infrastructure is not satisfactory and is insufficient for all activities (increase of traffic, strengthening of the County as a railway and logistics centre, intermodal transport) that the port of Vukovar envisaged for its economic development.
2. The current solution does not fit into local, national and European development plans and strategies.
3. The storage, handling and cargo handling area in the port of Vukovar is insufficient and cannot meet the development needs of the port of Vukovar.
4. The current equipment and technology used in the Port is outdated.
5. The port entrance is not adequately arranged, which affects the creation of bottlenecks when goods are received by road.
6. Transport infrastructure in the port of Vukovar and its surroundings does not support the growth potential expressed by the port of Vukovar or the achievement of an intermodal solution in transport.
7. The circular travel services market is growing and there is an increasing need for vessel maintenance services, for which port infrastructure is lacking.
8. The port of Vukovar does not fully meet the criteria of the Decree on the conditions to be met by ports and other regulations.
9. The port infrastructure is not satisfactory for the storage, treatment and disposal of non-hazardous and hazardous waste.

Without investment, the integration of the port into the wider transport network is not improved and the key obstacles to local economic growth are overcome.

To Minimum

This solution includes limited minimum investment options to increase the standard of service provision. Certainly, the port of Vukovar would benefit more from this solution than from the option of no changes. However, this solution does not resolve all the issues raised in the previous paragraph.

Investing in one part of the project would lead to savings and a partial increase in standards, however, many weaknesses of these solutions have been discovered:

1. The aforementioned interventions would not enable the planned economic development;
2. Partial investments would not significantly increase the storage, handling and cargo transshipment space;
3. A partial investment would not sufficiently modernise existing equipment and technology that is outdated;
4. Partial investments do not improve the port's integration into the wider transport network and overcome key obstacles to local economic growth;
5. A partial investment would not allow a full resolution of the problem of creating bottlenecks in port traffic;
6. The solution would not make it possible to achieve an intermodal transport solution;
7. The solution would not fully meet the criteria of the Regulation on the conditions to be met by ports and other regulations;
8. The investment would not fully address the lack of infrastructure for the storage, treatment and disposal of non-hazardous and hazardous waste;
9. Such a solution does not fit into local, national and European development plans and strategies;
10. Stakeholders will not recognise the efforts that have been made to increase standards due to the reduced ability to present the results achieved;
11. Such an investment would not give a positive incentive to create new jobs in the city of Vukovar and its surroundings and has no direct effects on the economy.

Do something

This solution aims to increase standards while at the same time having positive environmental and economic effects and achieving indirect effects on the economy.

The investments were analysed from the point of view of the necessary investments needed to achieve the objectives of local, national and European strategies, from the point of view of the annual operating costs that the investment will entail, and the possibility of combining them with other business problems that could potentially be solved in the long term. Many advantages of this solution have been observed:

1. The proposed investments enable the planning of the development of the city of Vukovar and the Vukovar-Srijem County and further economic development in the same area;
2. Investments enable complete resolution of the problem of the lack of storage, handling and cargo handling space and outdated equipment and technology;
3. The port of Vukovar would fully meet the criteria of the Regulation on the conditions to be met by ports and other regulations;

4. The investment would fully address the lack of infrastructure for the storage, treatment and disposal of non-hazardous and hazardous waste;
5. Investments improve the port's integration into the wider transport network and overcome key obstacles to local economic growth;
6. The implementation of investments would enable the improvement of the functions of the port of Vukovar;
7. The new infrastructure would enable the intermodal transport solution to be achieved and the problem of creating bottlenecks to be solved;
8. Investments fit into local, national and European development plans and strategies;
9. Investments provide an incentive to create new jobs in the city of Vukovar and its surroundings and have direct effects on the economy;
10. Proposed investments show optimal economic indicators;

Despite its favourable geographical location, the potential of the port of Vukovar has not been fully exploited. Outdated and insufficient infrastructure and accompanying infrastructure directly affect the operation of the port of Vukovar. Given the amount of demand, the port of Vukovar is efficient in terms of cargo transshipment, but from a technical and technological point of view, the equipment did not reach the intended level. The port needs equipment modernisation as well as infrastructure investment to ensure unrestricted port operating conditions both in relation to current traffic demand and future traffic demand and traffic trends.

There is currently no strong economic and entrepreneurial zone in the vicinity of the port, which would develop together with the port as its immediate hinterland. The possibilities of developing such economic and entrepreneurial zones are currently untapped, and the potential is big – inland waterways can transport a very large amount of cargo at a low cost, especially compared to road transport. Given the inland waterway layout in the Republic of Croatia, a measure is already being considered that could increase the competitiveness of waterways and connect maritime ports (especially the port of Rijeka) with inland water ports, namely the establishment of the national corridor Danube – Adriatic.

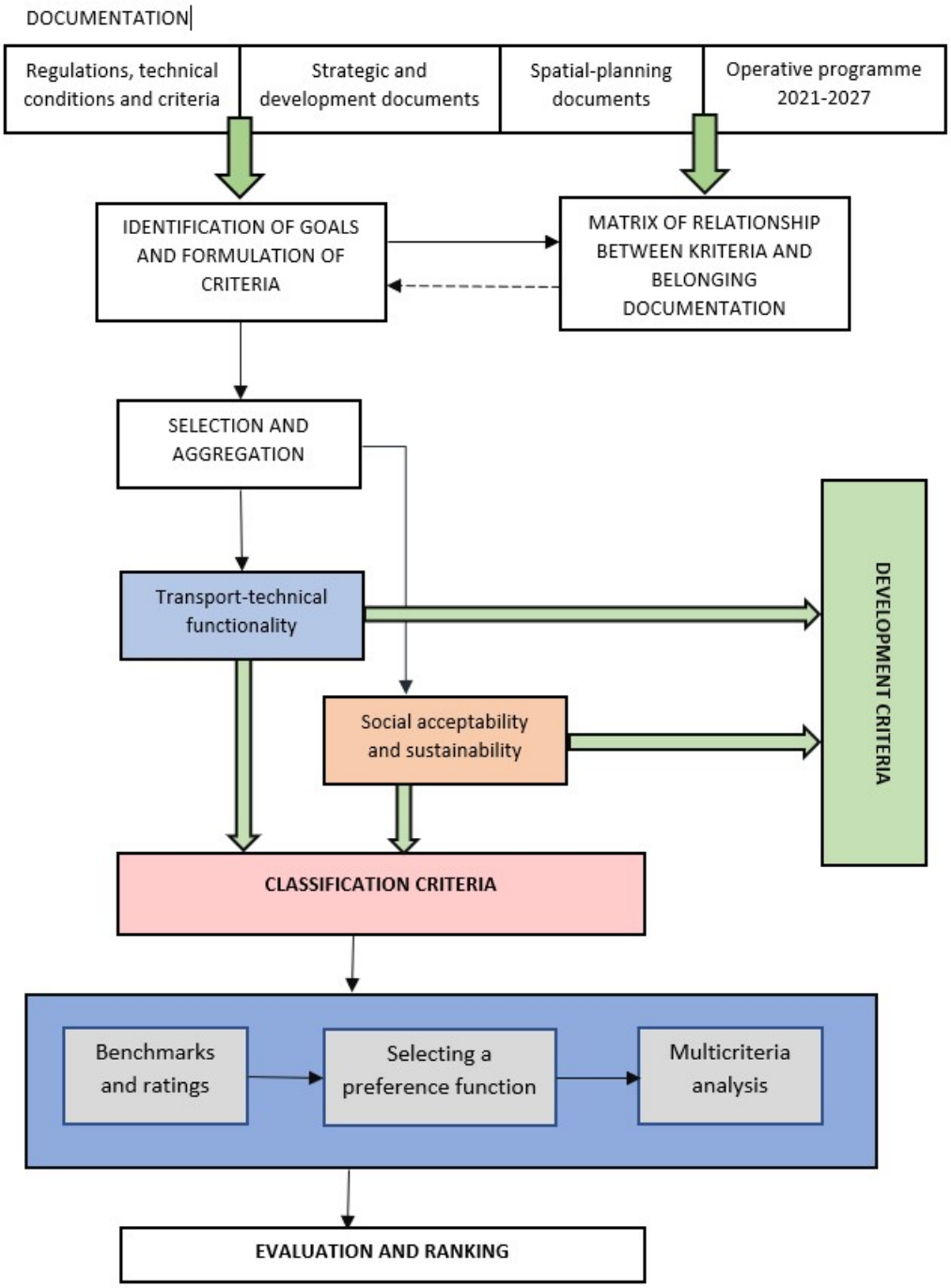
All of the above has an impact on lower demand for port services and lower competitiveness compared to the surrounding ports.

The planned investments in the port of Vukovar will enable the sustainable development of the port, especially at a time when the world-wide goal is to reduce greenhouse gas and CO2 emissions while strengthening the market and demands for better and faster connectivity and a very high level of reliability, efficiency and safety of traffic of goods and passengers. Inland water transport, with its extremely favourable characteristics, is a necessary alternative to other modes of transport, especially road transport.

The planned investments in the development of the port of Vukovar will contribute to the realization of the mission, vision and policies defined in the strategic – planning documents. The vision of the development of waterways in the Republic of Croatia is to achieve the highest safety standards, a high level of environmental and energy sustainability and to ensure navigability on international waterways throughout the year, which will make the most of the potential of Croatian ports and piers. In the coming period, issues of energy efficiency, environmental and nature protection and climate change have a significant place in the general development of the European Union. For the transport sector, these issues are of paramount importance and in the coming ten-year period, it is necessary to undertake such investments in the inland navigation sector that, in addition to improving connectivity, safety, cohesion, transport efficiency, will also contribute to achieving the goals of decarbonisation, increasing the share of sustainable energy sources and alternative fuels and resilience to climate change.

In the elaboration of the project evaluation criteria, it is necessary to distinguish between the criteria for project categorization and the criteria for evaluating development opportunities. This stems from the very methodology applied for the purpose of a realistic and systematic analysis of the functionality of the port system.

Graph 9: Methodological approach to determining criteria



In accordance with the presented methodology, it is necessary to take a position to choose separate sets of criteria, which according to their basic characteristic are called classification criteria and development criteria.

In order to put both sets of criteria in relation to strategic and other influential documents and commitments, it is necessary to analyse the relevant strategic documents and regulations in the field that regulate: maritime and transport system, ports and port activity, development and spatial planning documents, operational programmes for the use of structural and investment funds that are still in preparation, etc. Based on the analysis of these documents, the criteria that best describe and connect the key conditions and objectives set out in these documents are defined individually within each of them. Below is an individual overview of the developed criteria based on each of the above documents:

CLASSIFICATION CRITERION:

- TRAFFIC-TECHNICAL FUNCTIONALITY - transport connectivity, traffic capacity, availability of basic port infrastructure, quality of basic port infrastructure, capacity of additional port facilities

- SOCIAL ACCEPTABILITY and SUSTAINABILITY - safety and security of the port area, environmental equipment, location

DEVELOPMENT CRITERION:

- TRAFFIC-TECHNICAL FUNCTIONALITY - increasing/improving the capacity of the operational part of the port, increasing/improving the capacity of the communal part of the port, increasing/improving the capacity of the fishing part of the port, increasing/improving the capacity of the nautical part of the port, improving traffic connectivity, improving the protection against negative natural impacts and limitations of the location of the port, improving the quality of the port service

- SOCIAL ACCEPTABILITY and SUSTAINABILITY - improvement of environmental protection, safety and energy efficiency, potential for the development of the gravitational area of the port, improvement of the protection of natural, cultural-historical and ambient values of the port, assessment of the level of investment and technical complexity of the planned requirements

Based on the set sub-criteria and sub-criteria assessments for each of the previous criteria, it is possible to perform the final project ranking, i.e. through the decision tree, direct the project to meet all the necessary criteria, both legal, planning, functional and socially developmental.

Fundamental financial analyses present an 'estimate', but in quantitative terms also look at the following aspects:

- 'How good is the assessment?' - recognizing the unreliability of the basic analysis.
- 'What is the range of possible variation?' - quantifying uncertainty.
- 'What is the range of possible results?' - identifying potential impacts on different variations of assumptions and input variations of key output indicators.

As stated in the following text, the steps in the risk analysis are recommended:

- sensitivity analysis

- probability distribution for critical variables,
- analysis of risk
- assessment of acceptable risk,
- prevention of risks.

Sensitivity analysis should be carried out in such a way as to determine critical variables whose variations (positive or negative) mostly affect the project performance in financial and economic terms. Common variables are:

- **Variables of supply/demand** – possibility and ability to generate earnings or manage expenditures, which are a potential critical variable to be included in the sensitivity analysis
- **Human Resources** - business and key personnel performance are an important part of performance
- **Time and implementation variables** – if the project is also multiannual, implementation-related variables (time, costs, functional capability of the equipment, obtaining the necessary permits) can be translated into critical variables.
- **Financial variables** – availability of funding sources
- **Economic variables** - macroeconomic variables (GDP growth, inflation) can influence the price of investments and the need for services
- **Political factors** - the implementation of projects in the public sector is under special public tracking, so it is necessary to ensure transparency, functional public procurement and sufficient information to the public throughout the duration of the project.
- **Positive externalities** – a positive financial return on investment may not be the only criterion for the justification of the project, since the project can produce sufficient positive externalities (based on social benefits and non-monetary benefits).

The analysis of variable values should indicate the variables according to which the project is the most sensitive.

The first step in conducting a risk analysis is to determine the distribution function for each of the influential variables. Regular selection of probability functions is based on statistical processing of actual data, however, when the relevant data are not available and the actual distribution cannot be determined with certainty, 3 types of probability distribution functions are most often used:

- normal distribution
- uniform distribution
- triangular distribution

For each of the critical variables, it is necessary to determine the parameters of probability distribution, after which the best- and worst-case scenarios are estimated using probability distributions and input factors – investment costs, operating expenses and operating revenues.

The ultimate goal is to determine the viability of the project in scenarios when it is not achieved as planned.

Due to the implementation of the project, unexpected situations may arise that could affect the timely implementation of the project or delay it completely, such as wrong cost estimation, obtaining the necessary permits, difficulties in conducting the public procurement procedure, lack of interest, political factors, legal risks, environmental risks, etc.

The identified risks need to be categorised (general, investment, business), probability (low, medium, high) and impact (low, medium, high). In order to achieve positive externalities that affect feasibility, it is necessary to set out basic risk mitigation procedures and determine their impact. Risk mitigation measures are implemented to reduce the possibility of risks, monitor costs and ensure positive externalities from the project.

For each identified risk, samples must be identified, measures prevented and the expected impact of the measures.

In planning the implementation of the project, it is necessary to incorporate risk prevention mechanisms and measures and to separately plan budget items that ensure transparency, timely implementation of the project and the cost-effectiveness and financial sustainability of the project.

This principle of risk recognition should be incorporated into specific feasibility and investment studies that will arise from this basic plan for the development of the port of Vukovar.

22.t Concept of work on applications related to funding programmes (regional, national, international) for the most important selected activities from the development plan (investments)

As investments in port infrastructure are considered capital investments (capital intensive), port authorities are often unable to finance port projects on their own. As a result, the use of public funds (regional, national, international, etc.) is often unavoidable. The use of such funds requires strict rules in the procurement and monitoring of projects. On the other hand, public funds are increasingly accompanying private sector investment in so-called 'public-private partnerships' (PPPs) from which ports can benefit significantly. It is therefore necessary to make bigger use of the funds available for the development of inland water ports.

The success of projects and their chances of obtaining funding from the relevant EU funds largely depend not only on the technical quality and justification of the projects, but also on the sound preparation of project proposals. For this reason, the preparation of project proposals in line with the requirements of the financing instrument is of big importance and a big deal of attention should be paid to this.

In order to exploit the potential of external financing, the following measures are proposed:

- **Develop a list of projects and prioritize**

In order to systematize port investments, it is necessary to create a list (inventory) of port projects. This is commonly done in national port development strategies and strategic plans, but in order to increase the degree of concreteness of the same can be systematized at the level of individual ports. Projects that are planned to be financed from EU funds are included in the so-called 'Operational programmes' of the EU Member States. The programmes shall be prepared by each Member State and/or region and shall be financed by the European Regional Development Fund (ERDF) or the Cohesion Fund (CF). In addition, the list of projects is also developed in the studies of the transport network corridors and serves, inter alia, as an input for the preparation of the budget for the next funding period. Each State or each port authority should prioritise its projects according to their importance, maturity or any other criterion adopted. This helps to secure national or supranational funding for port development.

- **Ensure the highest level of relevance, maturity and impact for priority projects to apply for EU co-financing**

When applying for co-financing from different EU funding instruments (e.g. CEF), port authorities should ensure that only high-quality projects with the highest level of relevance, maturity and impact are reported. In this way, the application of port authorities (or other relevant organisations) will not only save time, effort and resources, but will also have a better chance of obtaining the necessary funding. Good projects must be relevant to the programme and priorities of the call for project proposals and must be advanced (mature) in terms of preparation. Mature projects are those projects that are ready for implementation, which means, for example, projects that already have their preparatory and design studies, building permits have already been obtained or will be obtained soon, contracting and procurement issues have been completed or are progressing well, etc. High-impact projects are those port projects justified by existing or projected demand, projects that result in important socio-economic gains such as increasing capacity, reducing congestion, modal shift, reducing negative externalities, increasing competitiveness, creating jobs, etc. A high quality project includes a well justified and detailed cost estimate or cost breakdown and sound risk management.

- **Influence the Directorate-General for Mobility and Transport (DG MOVE) to ensure a sufficient budget for priority investments in inland waterways and ports**

Although very limited as the European Commission (EC) only takes data from member states (not any other level of government or public/private organisations), this measure is very important and requires an indirect approach. This indirect approach first requires national lobbying, as the EC asks member states to prioritise calls in the CEF committee. Therefore, individual port authorities should be very active in national lobbying and can assist them through joint efforts and knowledge sharing between members of the Danube Ports Network.

- **Engage external experts to assist in the preparation of project proposals**

Due to limited budgets, not all projects submitted can be funded, but must withstand fierce competition from other projects at national and EU Member State level. If it is assessed that the port

authority (or any other competent organisation) does not have sufficient experience in writing project proposals, the possibility of engaging external experts in project preparation should be exploited.

22.u Expected impact of selected investments, projects, activities on all parameters (transshipment, figures, revenues, environment, quality of services, social impact)

There is a strong public interest in ensuring that ports operate efficiently and safely, that fair and competitive services are provided, and that ports support and foster economic development at local and national level. The public interest in ports stems from the vital role that ports play as an access door to economic trade.

Almost all planned projects of the port of Vukovar have an impact on economic growth, and a more significant environmental impact is the construction of a terminal for the disposal of waste from vessels and the construction of a communal connection for the supply of alternative fuels.

After the realization of the primary strategic projects, higher transshipment figures are expected, as well as the variety of goods transshipped, which makes progress on diversification and removal of seasonality, and the increase in transshipment figures will have a direct impact on the realized revenues, as well as the investment potential of the port.

Multiplicative effects are expected on the economic impact, job creation capacity and economic development of the wider region. The work of the concessionaire within the port implies the existence of the need for a bigger amount of traffic and logistics services, and thus for generating revenues from business entities that perform these services. The concessionaires directly and indirectly generate their revenues in the port area, producing at the same time a multiplier effect on the entire national economy.

The effects that the port generates through its operations are expressed in two ways. The direct effect is all those entities that have a direct impact on the operations of the port, such as shippers, land carriers, cargo forwarders, agents, etc., while the indirect effect refers to all companies that generate their revenues through the operation of the port itself (e.g. HEP, INA, trade, hospitality,...)

The positive shift towards investments in environmental protection is in line with the public interest in terms of the positive and negative environmental effects that ports can cause.

With the realization of the planned investments, projects and activities, the port of Vukovar will realize the planned mission, vision and set policies.

22.v Selecting preferred options

In accordance with the previously conducted multicriteria analysis for key projects and investments (project maturity, impact on economic growth, environmental impact of the project, source of financing, contribution to the achievement of strategic goals, cross-border projects), according to maturity, only the project of expansion of the pier for passenger ships in Vukovar achieved the highest number of points since it has all the documentation ready and is in the process of obtaining the location permit and it is expected to start the works.

Almost all projects of the port of Vukovar have the same effect on economic growth (Criterion 2) in the range of 3 to 4, the only projects that have a rating of less than 3 are the construction of a terminal for the disposal of waste from vessels and the construction of the Vučedol pier.

In the environmental context, experts assessed through a survey that the biggest positive impact on the environment is the project of building communal connections for the supply of alternative fuels. The project rated lowest is the construction of a communal pier in Batina.

In addition to the state budget, the indicative financing plan for six projects also envisages co-financing from EU funds, while only the projects of expansion of the pier in Vukovar and construction of the pier in Batina achieved a minimum number of points, since their financing is foreseen exclusively from the state budget, i.e. from PA's own revenues.

Of the seven defined thematic areas to which the projects contribute, the majority of the projects contribute to the achievement of five or all seven thematic areas. Only a communal connection construction project for the supply of alternative fuels contributes to three of the seven defined thematic areas.

Since they are not located in the border area, all projects achieved the same result with the criteria K6 – Cross-border projects.

From the foregoing, projects have emerged that give the best investment/return ratio:

- Construction of the vertical coast and other port structures
- Construction of the passenger pier Vučedol
- Expansion of the pier for passenger ships in Vukovar

22.w Conclusions and recommendations

Taking into account the economic and social component, it is estimated that the potential of inland navigation in the Republic of Croatia is underutilized. The problem relates not only to the low utilization of transshipment capacities in ports, but also to the lack of economic and entrepreneurial zones near ports and to the still low utilization of the tourist potential of inland navigation. Investments in the transport and technological component will increase the attractiveness of inland navigation as a mode of transport, so it can be expected to increase the number of users of port services, but also the so-called spill-over effect on the creation and strengthening of economic zones, entrepreneurship, industry, increase the supply of tourist services. This also opens up opportunities for job creation and strengthening of the economy, and even demographic reconstruction of the Vukovar-Srijem County.

The port of Vukovar is not currently functional to the extent and in the way it could be, but the potential for development is big and there is a vision of its realization.

Investments in port infrastructure, transport and technology aspects, strengthening human resources and information and communication technologies, while removing procedural barriers, will result in

the creation of competitive, high-performance and modern ports, fully integrated into the European transport network and operating on the principles of economic and environmental sustainability.

22.x Defining strategic projects/roadmaps

Although the realization of all projects is expected in the next ten-year period, the following projects have been identified as a priority for the future development of the port of Vukovar, i.e. they show:

Table 35: List of strategic projects – port of Vukovar

Planned project/investment	Indicative duration and implementation period	Total	Source of funding		
			State budget	City/ municipal budget	EU funds
Construction of a vertical coast in the port of Vukovar	102 months (2022-2030)	327.583.890	49.137.583		278.446.307
Construction of the Vučedol passenger pier	36 months (2023-2025)	2.500.000	375.000		2.125.000
Expansion of the pier for passenger ships in Vukovar	60 months (2023-2029)	60.000.000	60.000.000		

Projects and investments envisaged shall be assessed as feasible only on the condition that an adequate combination and availability of funds from different sources is achieved, where it is particularly important to provide sufficient funds from the state budget and to provide programmatic and strategic preconditions for access to EU co-financing, primarily through the national operational programmes for the programming period 2021 – 2027.

22.y Action plan, activity plan, PCDA-planning, timeframe

Taking into account the specifics of the port in terms of the previous development, geographical and spatial characteristics and the expected traffic trends and demand, an operational plan for the modernization and development of the port infrastructure was previously given, which presents the envisaged direction of the development and vision of the port in the next ten-year period. The plan also takes into account the vision of development at the port level, as well as the vision resulting from the European and national strategic framework.

Particular emphasis has been taken on increasing energy efficiency and environmental sustainability, which implies the use of alternative fuels in inland waterway transport and meeting the infrastructure requirements for alternative fuels and waste management in the port.

Although the Republic of Croatia is a country of considerable water resources and potential, in terms of inland navigation this potential has not been sufficiently exploited. In addition to the potential in cargo transport, the traffic of passenger ships should not be neglected, in which the Vukovar pier is the leader in the number of calls and the number of passengers. It also states that it is necessary to develop additional services and content, but also to connect these services and content to content from other sectors.

In addition to a description of the direction of development of the port, an indicative financial and timetable for the implementation of key investments has been prepared and possible options/sources

of financing of these investments have been preliminarily identified. The assumptions on the basis of which the financial plan for each port was prepared are:

- the financial plan was prepared for the period from 2023 to 2032.
- appropriations refer to the planned funds within the division of the Ministry of the Sea, Transport and Infrastructure.
- for those investments and projects for which co-financing from EU funds is envisaged, a co-financing rate of 85% of the total estimated costs was applied, and the remaining 15% of the total estimated costs were distributed to long sources – mainly the state budget. For investments included in the draft National Recovery and Resilience Plan (equipping ports and piers with waste management infrastructure), 100% EU funding from the Recovery and Resilience Mechanism is foreseen. Actual EU co-financing rates will depend on the terms of each call for projects to be notified.
- for investments related to the substation, financing by the concessionaire is envisaged, in accordance with its concession contracts and investment plans.
- historical data and estimates provided by port authorities resulting from the prepared project and technical documentation, such as conceptual designs, were used for pricing.

The operational development plans represent the vision of development, and the list and scope of projects and the financial and timetable are indicative. Actual investments and project implementation dynamics will largely depend on strategic and programming documents that have yet to be adopted for the period 2021 onwards, and this is particularly true of the European strategic and regulatory framework that will regulate EU funds for the programming period 2021-2027 and future national operational programmes for the use of EU funds.

Previously, points 20e and 22.x list projects and investments that are crucial for the development of the port of Vukovar in the next ten-year period. They contribute to EU and national policies and are in synergy with projects and investments in the environment.

In the next ten-year period, the goal is to achieve the development of the port of Vukovar in a way that will enable:

- Necessary extensions of the port area and maximum use of port capacity for cargo transshipment;
- Further strengthening of the competitiveness of international passenger ports in the provision of passenger ship reception services on the Danube River and strong positioning of Vukovar and the municipalities of Batina, Aljmaš and Ilok as a destination of arrivals of river passenger ships/cruise ships.

Below is the timeframe for the implementation of the planned projects:

Table 36: Indicative plan for the implementation of planned investments on an annual basis – port of Vukovar

Planned project/ investment	Indicative duration and implementation period	Year										
		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Construction of a vertical coast in the port of Vukovar	102 months											
Construction of a terminal for the disposal of waste from vessels	48 months											
Construction of the passenger pier Vučedol	36 months											
Expansion of the pier for passenger ships in Vukovar	60 months											
Construction of communal and passenger pier on the Island of Sports in Vukovar	24 months											
Construction of smaller piers for local and tourist ships	48 months											
Project for the construction of a communal pier in Batina	12 months											
Construction of communal connections for the supply of alternative fuels	36 months											
Construction of basic infrastructure in the area of Borovo	120 months											
Construction of office building	24 months											
Construction of biomass terminals	36 months											

In addition to infrastructure investments, it is necessary to undertake additional activities in order to develop the port:

Table 37: List of proposed activities – port of Vukovar

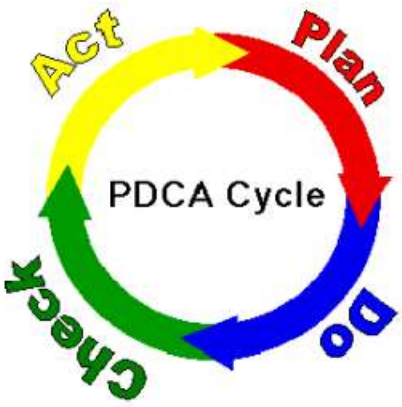
Area	Activities
Procedures	• exploit the possibilities of digitization and automation of business processes in operation • digitalize business processes

Area	Activities
Human resources	• conduct a competency analysis on an annual basis and define training or employment plans based on it • develop training plans for each employee individually in such a way as to enable the acquisition of specific, professional and technical knowledge, taking into account the results of the competence analysis and the requirements of each position • provide education in the field of investment and development project management, including knowledge related to the preparation and implementation of EU co-financed projects • leverage learning opportunities through online platforms • encourage the involvement of employees and institutions in projects (nationally and internationally) and participation in practical trainings, in order to enable the acquisition of as much knowledge as possible and the strengthening of competences through practical experience, which also contributes to visibility in general • transfer the acquired knowledge within the institution or to a wider range of stakeholders in the inland navigation system • encourage the development of professional staff in water transport
Communication and information management	• improve the sharing of information with the public by sharing information on the state of waterways, ports, projects, services and the like more frequently on websites • reinforce promotional activities by using annual visibility and promotion plans that will identify specific activities (adequate marketing mix), budget, target audience and messages to be conveyed) • collaborate with stakeholders in designing and implementing publicity activities (e.g. joint organisation of conferences, sharing information on their own websites, joint production of information materials, joint participation in fairs or conferences at EU and international level) • ensure the presence of information on the inland navigation sector in the media and on social networks
Strategic management	• strengthen the monitoring of the implementation of the activities envisaged in the strategic documents and regularly and transparently report on progress to the public • consider short-term planning options to enable clearer targeting of priorities on an annual basis as well as defining investment criteria • carry out evaluations during and after the implementation period, in order to assess performance and impacts and achievements in relation to the planned and performance factors
Funding	• increase the use of EU funds to finance the development of project documentation and the construction and modernization of infrastructure • for investments, try to find other financing opportunities - financial instruments, loans and private investments • increase direct revenues in order to finance part of the investments from own resources, in addition to current costs • use the possibility of leasing/renting the use of real estate in the port area in the short term and temporarily, and emphasize the granting of concessions for performing port activities and earning as much revenue as possible from concessions and port activities

Area	Activities
Traffic safety and supervision	• regularly maintain the RIS system and ensure the operation of all its functionalities • participate in international projects dealing with the RIS system and its upgrades • implement the proposal of the solution of the video surveillance system of the port area
Environmental aspects	• plan a terminal for the reception and disposal of waste generated on board ships • provide devices for processing the waste to be collected • work on lobbying to modernise the river fleet in the context of technological innovation
Security incident	• There is currently no security service in passenger ports, but its deployment in all international passenger ports needs to be considered • make threat assessment and safety study • ensure continuous video surveillance of the facility with storage of video in digital form for the purpose of detection, recognition and visual identification and subsequent reconstruction of events • enable access control in such a way as to ensure a controlled passage through certain supervised doors, and control of the movement and retention of persons and vehicles in the port area should be performed with the help of a modern system whose backbone consists of magnetic cards with associated software for the simple control of entry/exit of persons and vehicles into the port area • wagon entrances to the port area should be equipped with electric ramps that are activated by card readers/swallowers, while railway entrances should be equipped with metal doors that are also opened by card readers • access control system must be connected to the anti-theft system in such a way as to enable the removal and placement of partitions
Public services	• carry out planning in the space and preparation of projects for the construction of infrastructure for alternative fuels • in accordance with the specificities and market requirements, consider expanding the existing port services (e.g. in cruise liners offer the possibility of overhauling ships outside the berthing season). • outside the port area, ensure the possibility of berths or spaces where vessels in international traffic could berth. Piers would be used for the supply of water/electricity/groceries, i.e. for crew rest and would constitute an additional public service. • in cooperation with the Ministry, plan the construction and provision of winter school services on inland waters • to introduce quality control systems for services and to test customer satisfaction with the services provided. • consider opportunities and models of specialization through focused market analyses
Commercial activities	• lobby for changes to the Law on Concessions and generally simplification of the rules in order to provide conditions for easier adaptation to market requirements and conditions for a more dynamic system of port operations • undertake activities (e.g. lobbying, negotiations, promotion, provision of infrastructure for the provision of overhaul services to cruise ships, winter shift services) in order to make the port of Vukovar a starting port for cruise ships, which

Area	Activities
	would have a significant impact on local tourism, the overall economy, but also other branches of traffic • enable the performance of ancillary activities in the port • develop plans for connecting the port with the economic and entrepreneurial zones in the surroundings
Port and pier management	• lobbying the competent Ministry in the context of finding solutions for privately owned real estate and infrastructure in the port • expand the port area (expansion of the port into the area of Borovo Plc.) • determine the procedures and amounts of fees for letting real estate, leasing, granting easement rights and building rights
Legislative activities	• lobbying for the adoption of the necessary legislative acts and amendments to the existing regulations/provisions in the field of inland navigation with the aim of further developing the economy and river shipping
International collaboration	• continue to cooperate with international organisations in the field of inland navigation • intensify cooperation through interstate commissions/commissions and expert working groups as part of the implementation of bilateral agreements on inland navigation and their technical maintenance

Activity management and planning should be guided by a PDCA (or PDSA) cycle, a model that provides a framework for process or system improvement. The PDCA cycle is created for use as a dynamic model. The end of one cycle is the beginning of the next. Building on the spirit of continuous quality improvement, the process can always be reanalysed and new testing of change can begin, leading to continuous improvement and bigger complexity of projects.



- Plan – change or test with the aim of improving.

At this stage, port authorities need to analyse what is intended to be improved, looking for areas that have the potential for change. The first step is to select the area that offers the highest return for the efforts you need to make – the highest return on your investment.

- Make – implement the change.

Port authorities should implement the changes that have been identified in the planning phase.

- Check results

This is the most significant step of the PDCA cycle. Once the change has been implemented, it is necessary to assess how successful it is and whether it leads to improvement as planned. In order to be able to assess the improvement, benchmarks need to be set.

- React – Accept the change, discard it, or go through the cycle again.

After planning the change, implementation and verification, it is necessary to decide whether it is worthwhile to proceed with this change. If it takes too much time, is not cost-effective or has not even led to improvement, it is necessary to consider rejecting the change and planning a new one.

However, if the change has led to the desired improvement or result, it is necessary to consider extending it to other areas or increasing the complexity, which brings the process back to the planning stage and becomes the beginning of the slope of the improvement.

The improvement slope is a schematic representation of the use of PDCA cycles in the improvement process. As each complete PDCA cycle ends, a new and slightly more complex project can be launched. This continuous process is an integral part of the continuous improvement process.

The port of Vukovar will apply PCDA planning in the management of its projects. The implementation of evaluations is essential for the formulation of new policies, strategic objectives and measures or the redefinition of existing ones if identified as necessary.

23 Impact on target groups (level II)

The realization of development projects in the area of the port of Vukovar will be reflected in the increased operations of the port of Vukovar, and consequently, the increase in revenues and expenditures of the Port Authority Vukovar, as a public institution that manages the area of the port of Vukovar. As the Port Authority's revenue movement is related to capacity and traffic in the port area, consequently, the revenue from concessions and revenue from port charges can be expected to increase.

The port authorities should continue to cooperate on joint projects, strategies and work in joint organisations with ports along the Danube and in particular consider the possibility of specialising in certain port services, in agreement with ports in the immediate vicinity.

Cooperation with national and regional authorities should be continued, primarily in order to develop good development strategies and future port development plans. Port authorities should actively participate in the development of plans, such as: Mid-term Plan for Development of Inland Waterways and Ports of the Republic of Croatia, in order to ensure that strategic goals and planned port projects are included in them.

It follows from the above that there is a necessity in achieving synergy between the activities of the Ministry and port authorities not only in ensuring the financing of investments and activities, but also in the preparatory phase thereof, which is why a constant exchange of information and obtaining the needed feedback is necessary.

In addition to cooperation with the Ministry at the strategic and financial level, it is necessary to jointly encourage private investments of concessionaires through public-private partnerships and through the use of loans and financial instruments. State budget funds represent security for the operations and investments of port authorities, but it is necessary to strive for financing models that will enable faster investments, but also the financial sustainability of the ports themselves. The Ministry of the Sea, Transport and Infrastructure can influence more flexible setting of concession rules, for the purpose of faster adaptation to market conditions.

Port authorities, port operators and other stakeholders, such as regional authorities and the Chamber of Commerce, must work together to create new routes for the movement of goods.

In this sense, the concessionaire Port of Vukovar Ltd. actively cooperates with the Croatian Chamber of Economy – Vukovar County Chamber, one of the most important activities being the organization of the meeting between port Constanta and port Vukovar. With the realization of development projects, the aforementioned meetings will be able to emphasize even more the advantages in the transport of goods using river transport, a bigger offer of port services and the intention to establish and improve cooperation between businessmen along the Danube river navigation route.

It can be concluded that the realization of development projects in the area of the port of Vukovar will generally benefit the entire local community, which will be particularly evident through the increase of indicators closely related to the economic activities of the city of Vukovar and the Vukovar-Srijem County.

24 Integration of other results of activities within DIONYSUS projects: in particular D.T2.1.1., D.T2.1.2., D.T4.1.1., D.T3.1., as well as other activities

Within the other activities of the DIONYSUS project, certain results were generated that are integrated into the Port of Vukovar Development Plan, as follows:

D.T2.1.1 Multimodal infrastructure and suprastructure facilities and services

The analysis of multimodal facilities located at various locations along the Danube River shows the existence of a pronounced imbalance between the upper and partly middle flow of the Danube. This is reflected not only in the characteristics of multimodal facilities, but also in the services related to establishing a connection between seaports and river ports.

Ports located on the upper and middle course of the Danube (below Budapest) have a favourable geographical position, given their relative proximity to ports located on the North and Adriatic seas. This fact gives them bigger opportunities in the realization of benefits arising from economies of scale. In addition, it should be noted that river ports from the area of the upper and partly lower Danube stream are predominantly located near high-tech industrial centres, which contribute to the movement of high-value goods, which are predominantly transported by containers and have a perfect connection to the railway network.

The high economic development of the countries where the river ports are located serves as a perfect generator of incoming and outgoing flows of goods, suitable for container transport, and therefore for intermodal supply chains.

River ports play a significant role in the multimodal transport chain, as they represent intermodal nodes and connections to multiple modes of transport. In addition, river ports are connected to logistics centres, industrial areas, agricultural areas or broad consumption centres, such as urban zones.

Croatia has a very favourable geographical position with regard to access to the Adriatic Sea, with particular emphasis on the location of the container terminal of the port of Rijeka. Containers originating from, or having a destination, towards the eastern parts of the country are predominantly transported by rail or road.

In the past years, there was very little demand for intermodal container transport that could be realized via the Danube, through the port of Vukovar. Although the port does not have a container terminal, it is able to manipulate containers with existing equipment, in the existing area.

Due to the global containerization of transport, it is expected that a significant part of world trade will be diverted to the internal waters of the lower Danube region, which is why it is expected that traffic will spill over to all ports along the Danube, including the port of Vukovar.

The additional expansion of the vertical coastline, in addition to the development of the existing part, envisages the opening of new capacities that will primarily serve as a terminal for bulk and general cargo. The new storage and handling areas of about 1,5 ha, which will be used for these terminals, will

allow the transshipment of an additional 600.000 tonnes/year under the assumption of equipping the terminals with three cranes.

Part of the terminal for general cargoes will be able to be re-purposed for the needs of container cargoes, if the need arises.

In addition to the above, it is also necessary to highlight the plan of modernization and electrification of the railway, which represents an additional contribution to a better connection between the port of Vukovar and the seaports on the Adriatic coast, especially the container terminal of the port of Rijeka.

D.T3.1.1. Analysis of regional economic development strategies, policies and programmes, with reference to the Danube ports

In addition to the strategy papers at national level, which define national priorities, it is also necessary to highlight the importance of the strategy papers at regional level, which stem from the previous ones, and relate to the elaboration of general or specific parts.

Many regional strategies are currently about to expire, or have expired, while new strategies are not yet ready. Certain documents are still in the drafting stage, and the publication of certain documents is two or more years late.

By analysing various economic documents that are not directly related to the transport sector, and may be relevant for the same, the main shortcomings are manifested through insufficient cross-sectoral harmonization in terms of justification of strategic documents that are not uniform and no methodology for projects of specific projects has been developed for them. Sometimes there is overlap between individual projects, which should be avoided by stronger cross-sectoral cooperation and involving all relevant entities in the preparation of strategic documents.

It should also be noted that the importance of river transport is not sufficiently recognized and used for the purpose of the overall economic development of the Republic of Croatia. It is also necessary to highlight the importance of agricultural activity, since the transport of agricultural products is closely connected to river transport.

The same is the case in the area of spatial planning, highlighting that the development of river ports should be supportive and that documents from that level should not be an obstacle to their development.

River tourism, especially river cruising and nautical tourism, represent a big opportunity and should be taken into account when preparing strategic documents.

At the regional level, among the strategic and spatial documents that are closely related to the development of the port of Vukovar, it is possible to highlight the Development Plan of the Vukovar-Srijem County for the period from 2021 to 2027 and the spatial plan of the Vukovar-Srijem County, the detailed content of which is explained under item 10.f, i.e. 13.

D.T4.1.1 Operational and business development model for regional Danube ports

Given the differences between countries, whether legal, economic, geographical or political, and related issues, such as public-private partnerships and the conditions for their implementation, it is

necessary to adapt to the local situation in Danube ports. Today, ports are becoming dynamic industrial centres that create an extensive logistics network that enables trade and flow of information between different stakeholders through intermodal transport connections and digital and IT solutions. The main areas of the future and the general trends seen in the development of port operations are focused on multimodality, automation, digitisation and sustainability, as well as on the offer of a wide range of value-added services, aimed at the customer.

The development of ports should focus on:

- improvement of port infrastructure, suprastructure and equipment;
- modernization of the rolling stock;
- digitisation (LYNX, smart dispatch);
- improving and streamlining services;
- economic growth and competitiveness;
- ecological solutions (use of clean fuels, use of machines using alternative fuels, use of solar energy, waste management);
- education and training.

Danube ports are different in size, location, condition of infrastructure, suprastructure and equipment, availability of warehouses, how they are managed and operated.

The business development model should reflect the strategies defined in the strategic plan of the port. In order to set up a business development strategy, the port should define the current situation, market, competition and future developments. The steps to define a business model are:

1. Analysis of the current state
2. Market and business opportunity analysis
3. Further developments
4. Stakeholder identification
5. Marketing and advertising

Business development opportunities can be identified within the existing customer base or within the port catchment areas or may arise as a result of cooperation with other ports or inland waterway organisations. Traditional segments of industry, such as agriculture, metallurgy, petrochemicals, construction and the automotive industry, are expected to continue to be the main and dominant burden of inland waterway transport over the next few years. Also, there appears to be an increase in the transport of heavy and oversized cargoes and Ro-Ro cargoes on waterways, as well as a gradual shift towards new segments of industry, such as waste and recycling, renewable materials, LNG, hydrogen and other alternative fuels and biomass. The transport of empty containers on the Danube is also projected to grow.

Ports should regularly monitor, analyse and evaluate their position on the market, identify opportunities and adapt to external developments (legal, regulatory), as well as promote their services to achieve business growth.

D.T3.1. Analysis of European and national transport policies, strategies and programmes with reference to the Danube ports

It is necessary to define effective procedures for the preparation of strategic documents in order to make such documents of quality. It is important to identify the stakeholders of the strategic document and involve them in its preparation. In the course of preparation, strategies are available for public consultation, but feedback is often lacking or not effective.

When preparing strategies in the field of transport, all transport branches within the same ministry must be taken into account in order to avoid overlapping projects. There should be no projects that have been in the strategy papers for many years and are not being implemented and it is uncertain when they will be implemented. Such projects limit the implementation of other projects.

Strategic documents that are not long-term should be able to be adapted or modified. Project criteria and priorities should be clearly defined. The same applies to the risks for their realization.

Regional and local strategy papers must be prepared in cooperation with transport institutions in order to obtain accurate data and align priorities with national strategy papers.

25 Adjustment of the PCDA cycle for future document updates

In accordance with the PDCA cycle model described above, the port development plan should be seen as a dynamic model in which continuous improvements and additions are required as each cycle is completed.

Further to the spirit of continuous quality improvement, the process can always be reanalysed and new testing of change can begin.

After each improvement, it is necessary to check the results and whether they have met the expectations, and after that the individual components of the Plan should be determined and corrected. If the action has not led to an improvement, the rejection of the change and the planning of a new one must be considered.

However, if the action has led to the desired improvement or result, an extension to other areas or an increase in complexity must be considered, which brings the port back to the planning phase and can be the beginning of an improvement slope.

The improvement slope is a schematic representation of the use of PDCA cycles in the improvement process. As each complete PDCA cycle ends, a new and slightly more complex project can be launched. This continuous process is an integral part of the continuous improvement process.

Thus, the Port Development Plan needs to be continuously adjusted.

Interreg

EUROPEAN UNION

Danube Transnational Programme

DIONYSUS

Integrating Danube Region into Smart & Sustainable Multi-modal & Intermodal Transport Chains

Port Development Plan of Port Bulmarket

Summary

[Version 0.2]

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Port Bulmarket EAD

1 Introduction (Dionysus-framework)

The Danube and its navigable tributaries offer significant free capacity for freight and passenger flow. A prospering waterborne transport sector contributes to a sustainable transport system and regional growth. Besides better fairway conditions, a more modern, energy-efficient fleet, better management of the transport system through comprehensive infrastructure planning and investment solutions are required. The investment needs to refer to port infrastructure and superstructure and multimodal connections to port hinterlands.

The project focuses on addressing transnational and regional challenges in transport infrastructure planning and governance in order to ensure proper framework conditions for more effective, coherent and integrated public investment in the next EU programming period benefitting Danube Region ports.

To this end, it carries out key actions across levels of governance (local, national and regional) in line with relevant specific objectives of EU policies (Transport, TEN-T and Cohesion) to ensure scope and development priorities alignment among port planning, overall transport infrastructure planning and Regional Economic Development Plans (REDP).

Such challenges are generated by:

(1) Lack of coherence, insufficient coordination between transport planning, policies and approaches including regulatory frameworks at different governance levels.

(2) Limited convergence and consistency of objectives resulting from different investment objectives and transport infrastructure development priorities pursued at the national level, being detrimental to ports development as connecting points and intermodal centres for regional economic development.

(3) Operational programs developed in parallel i.e., transport, regional development, environment, often lacking transnational perspective and leading to different investment objectives pursued at the national level; hence generating gaps in port infrastructure planning and development.

(4) Difficulty in setting up a coordination mechanism at the regional level which could ensure coherent inter-disciplinary planning of port development at regional and transnational levels.

The project focuses on addressing main regional challenges in infrastructure governance and planning, highlighting key actions needed to support Danube transport, port infrastructure planning. It builds on the results of the DAPhNE project on port infrastructure development and Danube Ports Network cooperation.

DIONYSUS results will feed into the elaboration of transport corridor development policies by means of gap analysis reports and recommendations. It will provide a framework to identify shortcomings in rail & road access infrastructure of the Danube ports and consolidate investment needs based on Market Analyses. Matching port planning with transport infrastructure and Regional Economic Development Plans will deliver recommendations for their adaptations in line with sector priorities. Targeted and niche-specific case studies for Container Liner Services and Agricultural

Products will be developed. Also, an Infrastructure Master Plan for the River Cruise Industry will be elaborated.

Essential outputs will consist of Port Development Plans and Operational and Business models to support quality, sustainable development, and investment decisions. All project outputs will ensure alignment with specific EU Transport, TEN-T and Cohesion Policy objectives for the period 2014 - 2020 and beyond, including the next Multiannual Financial Framework (2021 - 2027), making DIONYSUS a key instrument to contribute to the EUSDR implementation.

Project DIONYSUS, in which the Bulgarian-Romanian Chamber and **PORT BULMARKET EAD** are the Bulgarian partners, aims to facilitate the integration of the Danube region into the intelligent and sustainable multimodal transport chains. In line with the project aims where all consortium partners join forces to do in-depth research, prepare analyses and reports and make recommendations for eliminating the identified shortcomings and boost developments, the Port Bulmarket as part of the group Bulmarket DM EOOD is gradually realizing its company goals, which will be beneficial to both the city and the entire Danube region.

2 Objectives of this document

A growing consensus recognizes the need for a smart and sustainable Danube port development planning corroborated with overall national transport infrastructure planning and regional economic development plans.

Consequently, investment needs in ports and hinterland (rail and road) connections will be aligned with transport infrastructure and regional development plans.

Relying on the feedback received from stakeholders in the Danube Region (port users, port authorities, ship owners, etc.) regarding the need for development of transport corridors crossing the Danube Region with the countries included in the EU Eastern. Partnership and the riparian countries of the Black Sea Region, the connectivity among the transport means used in these corridors (IWT, maritime, rail, road) and the synergies to be boosted between Port Development Plans and Regional Economic Development Plans.

The overall development of a region should be planned in accordance with transport development plans and especially with port development plans.

Port development is a strong instrument to reach a catalyst function for stimulating economic growth and create jobs in the Danube Region. The main objective of this document is to create concrete port development plan as well as operational and business development plan and model for strategically relevant Port Bulmarket in order to facilitate its integration into multi-/intermodal transport chains as well as improve port transport connections/links towards the hinterland.

The development of the plan has been based on consultation with a wide variety of internal and external stakeholders.

The plan response has the following key objectives:

- ✓ Identify opportunities to maximize the use of The Port.
- ✓ Improve the image and community perception of The Port.
- ✓ Conserve, protect and enhance heritage features and places.
- ✓ Improve gateways and entry points, open spaces and streetscapes to enhance the presentation, and accessible amenity for residents, businesses and visitors.
- ✓ Optimize economic development opportunities; and
- ✓ Consider the impact of climate change on Port assets and the development and use of The Port.

The objectives of this document are providing of purposeful and detailed guidelines by implementing of uniform policies for development of the transport corridors along the Danube. The document includes an extensive information about the development of **PORT BULMARKET EAD**, operational business model for quality and sustainable growth, as well as mechanisms of attracting investments. Moreover, GAP analysis and recommendations are carried out.

An important outcome of the project DIONYSUS is the elaboration of concrete Port Development Plans, including Port Bulmarket - in order to facilitate their integration

into multi-/intermodal transport chains. The selection of the port was based on several decision criteria such as potential in terms of location, operation, transhipment infrastructure, hinterland connections as well as on factors such as regional economic development, freight flows outlook, business community profiles, etc. This Port Development Plan complies with National, Regional Economic Strategies and Regional Development Plans of the relevant areas and be deployed in line with the Business Strategies of the port owner. The plan contains particular development projects which have a real chance for execution until 2030.

The elaborated plan is integrated into the normal business papers of Port Bulmarket and prepared in a way that a yearly update is possible.

The Port Development Plan is a necessary tool, which could provide specific measures and directions for investment and improvement that could support EU transport connectivity aims. Its realization is in line with the implementation of Bulgaria's transport strategy 2020-2030 to be supported by the forthcoming multiannual financial framework of the EU.

The development plan will be integrated in the port strategic documents and will be developed in a way allowing its annual update. It will become a central strategic document on which basis the annual SWOT and financial analysis of the port will be prepared.

2.1 Executive Summary

Inland waterways consists of two equally important elements: links and nodes. For an efficient and reliable functioning of the transport network both elements must be equally developed and harmonized. For the purposes of transforming into efficient and reliable logistics node, infrastructure gaps need to be dealt with in a coordinated manner, which needs to be embedded in the resulting common strategy and Port development plan of **PORT BULMARKET EAD**.

PORT BULMARKET EAD offers its customers port activities and related commercial services, maintenance and other activities in accordance with the requirements of the Executive Agency "Port Administration", Bulgaria and Bulgarian legislation.

The main processes in the port are the provision of port services:

- ✓ handling of general cargo, bulk cargo and oil products.
- ✓ ship bunkering and supply of ships with electricity.
- ✓ cargo storage.

Main port activities are fully in compliance with port mission and vision namely:

"To ensure the efficiency of the port infrastructure managed and the services provided by the Company, taking into account the balance of interests for the development of the port, the needs and expectations of customers, stakeholders and society as a whole."

The above mission is implied by the responsibilities set out in the Maritime spaces, inland waterways and ports in the Republic of Bulgaria Act and the Statutes of the Company.

Achievement of this ambitious goal bears regional and national importance and is constantly followed by preparation and fulfilment of programmes for construction, reconstruction, rehabilitation, maintenance, development and management of the infrastructure of the Port Bulmarket.

"Through appropriate business planning, in compliance with national and international regulatory requirements, and taking into account the available human and material resources, contribute to the effective and efficient development of the transport system in the region."

Bulgarian inland ports and Port Bulmarket are part of the national transport system. Their development is part of a wider national strategy.

The port is situated on the bank of the Danube River from km 484.150 to km 484.800 with total length of the coastline - 825 m. The total area **of PORT BULMARKET EAD** is 37,645 m², as are isolated 7 piers in 4 different terminals, together with the related infrastructure – 16,000 m. together with the developed railway infrastructure. A terminal for dangerous goods is built at the eastern part of the port (berth 7): propane - butane, crude oil, petroleum products (diesel, gas oil, oils), with an area of 3,177 m². The terminal has a floating overload facility with a pump-compressor station to carry out transloading operations. All possibilities for ship-shore transloading and vice versa are provided. The processing of petrol and petroleum products and other liquid cargoes is carried out by two pumps each at a rate of 100 m3/hour situated at the transloading facility. At berth No 6 is situated a second pontoon, which is registered in "Maritime Administration", Ruse, with statute of floating-transloading facility to process petroleum liquid cargoes, vegetable oil and biodiesel from specialized ships (tankers) in licensed customs warehouses and vice versa. **PORT BULMARKET EAD** is equipped with its own manoeuvre pusher 'STELLA', as well as substitution group for the provision of better and more comprehensive services to its clients. The overall manoeuvre operations of the vessels and servicing of crewless vessels in the region of the port and in particular of the other ports are carried out by the crew of manoeuvre vessel and the team of the substitution group. Powered pusher "STELLA" is certified for the handling of dangerous goods, which allows for the manoeuvre, servicing and provision of crewless vessels carrying dangerous goods. The port is connected through the industrial branch with the railway lines in Ruse and is the owner of this branch - 6 km from Ruse North railway station to Bulmarket railway station and 11 km tracks in the industrial area.

This plan is elaborated as a part of the joint development plans of the Danube ports for operating business models for quality and sustainable development of the region, as well as mechanisms for attracting investments in it. All project results will be in line with the specific transport objectives of the EU, TEN-T and the Cohesion Policy, turning DIONYSUS in a main tool for implementing the European Union Strategy for the Danube Region (EUSDR).

The Port Development Plan aims to stimulate reflection on the future development and sustainability of PORT BULMARKET EAD. It describes and analyses the current strains placed on port, and highlights areas of innovation and change that the port industry will have to tackle in the future. This topic has been chosen in light of current trends and the need to develop new strategies to keep port in the region competitive. As the DIONYSUS' is a continuation of project DAPhNE, it aims to solve the basic

regional challenges in the planning and managing of port infrastructure, facilitate the integration of the Danube region towards the smart and sustainable multimodal transport chains. DIONYSUS will help with drafting policies for the development of the Danube transport corridor. The team analyses the existing railway and road infrastructure for access to Danube ports, marks the disadvantages in it and give recommendations for their elimination.

The plan response has the following key objectives:

- ✓ Identify opportunities to maximize the use of The Port.
- ✓ Improve the image and community perception of The Port.
- ✓ Conserve, protect and enhance heritage features and places.
- ✓ Improve gateways and entry points, open spaces and streetscapes to enhance the presentation, and accessible amenity for residents, businesses and visitors.
- ✓ Optimize economic development opportunities; and
- ✓ Consider the impact of climate change on Port assets and the development and use of The Port.

2.1.1 Objectives of the plan

The objectives of this document are providing of purposeful and detailed guidelines by implementing of uniform policies for development of the transport corridors along the Danube. The document includes an extensive information about the development of **PORT BULMARKET EAD**, operational business model for quality and sustainable growth, as well as mechanisms of attracting investments. Moreover, GAP analysis and recommendations are carried out.

An important outcome of the project DIONYSUS is the elaboration of concrete Port Development Plans, including Port Bulmarket - in order to facilitate their integration into multi-/intermodal transport chains. The selection of the port was based on several decision criteria such as potential in terms of location, operation, transhipment infrastructure, hinterland connections as well as on factors such as regional economic development, freight flows outlook, business community profiles, etc. This Port Development Plan complies with National, Regional Economic Strategies and Regional Development Plans of the relevant areas and be deployed in line with the Business Strategies of the port owner. The plan contains particular development projects which have a real chance for execution until 2030.

The elaborated plan is integrated into the normal business papers of Port Bulmarket and prepared in a way that a yearly update is possible.

The Port Development Plan is a necessary tool, which could provide specific measures and directions for investment and improvement that could support EU transport connectivity aims. Its realization is in line with the implementation of Bulgaria's transport strategy 2020-2030 to be supported by the forthcoming multiannual financial framework of the EU.

In order to foster the company effectiveness, the management team of **PORT BULMARKET EAD** with expertise in the shipping and logistics business has a clear understanding of how the entire supply chain functions, including governmental aspects (customs, immigration, health, and so on), the operations of the private multimodal transportation sector, the required workforce, both technical and

operative characteristics (including the maintenance of equipment and infrastructure), as well as aspects of the logistics business (costs, freight, employment, environment, community, etc.).

The Port Development Plan is intended to become a common guideline for all future development decisions of the Port Bulmarket and its users. Therefore, it aims to benefit the company in carrying out its daily activities, as well as to determine its strategic development.

To achieve this result, outputs are as follows:

- Report - comprising all analyses, recommendations, etc.
- Project-Profiles - giving clear definition of Priority Projects.
- Map-folder - providing a number of different diagrams and maps.
- Assessment – overview of the current situation, assessment of the infrastructure condition and its suitability, impact on the environment, assessment of the legal framework, actual and future plans, market analysis, mission, vision and company's policies and their compliance with the current project.

The Plan consist status quo of European context with the relevance to the port with the main aim to analyse and give an overview on the current status of the transport system, identify the gaps related to the current cargo flows, identify possible solutions and issuing recommendations meant to overcome key bottlenecks in the transport system in particular in relation to the better use and integration of the Danube waterway system and to give recommendation of how these identified gaps could be closed and by whom.

PORT BULMARKET EAD is the largest private port for public transport on the Danube River in Bulgaria. It offers a wide range of services and a great deal of flexibility at the application of complex solutions that may satisfy even the most demanding clients.

The port is for public transport of regional importance, according to the Maritime Space, Inland Waterways and Ports of the Republic of Bulgaria Act. **PORT BULMARKET EAD** is a port operator and on the basis of Order No 3-76/05.03.2014 of the Maritime Administration Agency, Sofia city, it has been granted access to the market of port services - as a public transport port of regional importance Port Bulmarket, with a reg. code 421100.

It is situated on the bank of the Danube River from km 484.150 to km 484.800 with total length of the coastline - 825 m.

2.1.2 Hinterland connections (road, rail and IWW)

The Location of Ruse Municipality defines it as important national transport and commercial node with border crossing points on the Danube River. Ruse has both railway and river core transport nodes as per the classification of TEN-T. The distance by road from Ruse to Sofia is 331 km, to Varna – 203 km, to Plovdiv – 293 km, to Pleven – 153 km, to Veliko Tarnovo – 107 km and to Silistra – 124 km. The bridge on the

Danube River between Bulgaria and Romania connecting the Romanian capital Bucharest stands at 72 km distance. There is railway connection to Bucharest, Kiev, Moscow, Budapest, Bratislava, Prague, Berlin, Warsaw, Sofia, Varna and Bourgas. The flow of vehicles through the bridge is constantly increasing.

Nearby ports:

- **Port Ruse**, -the biggest Bulgarian river port on the Danube;
- **Port terminal Svishtov** is the most southern Danube port and is located in the middle of the Bulgarian stretch of the river.
- **Port Tutrakan -** with local importance and zero cargo volumes over the last years.

Planned industrial and economic developments in the port's hinterland

Strategic plans for the region are focused on acute social problems on a national scale –demographic crisis, aging of the population, emigration of young educated and initiative people, insufficient qualification and weak employment of the population of working age. Plans for future development are based on strategic documents as Strategy Europe 2030, EU Strategy for the Danube Region, Project Ergo mater plan Ruse-Giurgiu, National Development Programme Bulgaria 2030, National strategy for regional development 2012-2022, etc. Some possible positive economic developments are connected with further growth of the Industrial zones, servicing cargo flows for the Romanian capital Bucharest and other Romanian cities, building new open and covered storage areas and establishing new offices of big logistic companies. Some plans were discussed during the years for exploiting the potential and investment in improvement of the railway link between Ruse and Varna. That would generate additional transit cargo flows.

Potential users

Potential users could be importers or companies for transit cargo. Port Bulmarket is working below capacity and could handle additional cargo flows for direct or indirect transhipment. Such cargo types could be vehicles and/ or new automobiles, ro-ro cargo, trailers, dangerous cargo. Lot of possibilities have been discussed for attracting potential users.

Key stakeholders

Main actors of the port sector are: Ministry of transport, information technologies and communication (MTITC), Bulgarian Ports Infrastructure Company (BPICo), Executive Agency Maritime administration (EAMA), Executive agency for exploration and maintenance of the Danube River (EAEMDR). These are the main state structures that participate directly in the development and define the conditions for development and operation of the maritime and river ports in Bulgaria. For the development of Bulgarian ports some other authorities are relevant, such as: Ministry of Finance (Customs), Ministry of Interior (Firefighting Authorities, Civil Protection Authorities), Ministry of Environment and Water (Basin directorates, Regional environment and water inspections), etc.

Competitors

In the region, **PORT BULMARKET EAD** has the following competitors: Port Complex Ruse AD, Giurgiu Port S.A, Zimnicea Harbor and Port of Oltenita, Lom port.

2.1.3 Target groups involved in the Port Development Plan

In the broad view, target groups are described as any individual or group having an interest in or being affected by the project and the Port Development Plan of **PORT BULMARKET EAD** .

- ✓ **Internal players –** top management, shareholders and employees.
- ✓ **External players –** different port organizations and supporting industries, terminal operators, stevedoring companies, carrier/terminal operators, other economic interested target group players and trading companies (importers and exporters)
- ✓ **Public policy players -** branch organizations, syndicates, civil society organizations, the press, the general public, Customs, State agencies, Ministries, public-private partnerships, Branch cameras and others affected by the port activity.

2.1.4 Port Infrastructure

The port owns seven berths, quay mechanization, equipped with five electric portal cranes and one pneumatic unit for grain discharging, rear and specialized mechanization and warehouses, detailed described in point 10 g. The terminal already disposes of facilities for the storage and refuelling of LNG-operated river vessels.

PORT BULMARKET EAD is equipped with its own manoeuvre pusher 'STELLA', as well as substitution group for the provision of better and more comprehensive services to its clients. The overall manoeuvre operations of the vessels and servicing of crewless vessels in the region of the port and in particular of the other ports are carried out by the crew of manoeuvre vessel and the team of the substitution group.

Port Bulmarket is also equipped with two specialized forklifts - Kalmar, one is 25-ton and the other 16-ton Kalmar. There is also a 40-ton bridge crane for handling general cargo under the "Customs warehousing" mode and two gantry cranes with a capacity of 20 tons (for general cargo) and 10 tons (for bulk).

The **PORT BULMARKET EAD** is connected through the industrial branch with the railway lines in Ruse and is the owner of this branch - 6 km from Ruse North railway station to Bulmarket railway station and 11 km tracks in the industrial area.

Most of the equipment is obsolete and there is a need for modernization to effectively run the port operations and to avoid work interruptions due to accidents and repairs.

A critical point for shipping is the water discharge of the Danube into the Bulgarian section, which is an average of 6000 m^3/s. This discharge has declined significantly in recent years and for the period 1982- 2002, it is 465 m^3/s at Novo Selo and 610 m^3/s at Silistra lower, which is 10%. This is **due to global climate change** on a world scale. Global warming has also led to an increase of the average water temperatures with 0.6 ° - 0.7 °.

Another factor that influences the depth of the navigable part of the river is the sediment transport. After the construction of the Iron Gate Hydrotechnical Complexes, the amount of sediment discharge decreased from 40 to 50%, which led to increased erosion processes and reduced depths in fairway. Generally, from a

hydrological point of view, 2019 can be considered as a low water year. Throughout almost the whole period, water levels were below the average annual. There were 316 days with water levels below the average annual level and the average water level was 225 cm.

Clean fuels for green economy

The company has a great faith in the development of alternative fuels, which is why it became a member of an international consortium of 33 companies from 17 EU Member States at the beginning of 2013.

The consortium has applied for a common project "LNG Masterplan" to supply liquefied natural gas (LNG) in the Rhine, Main and Danube rivers in order to improve the environmental standards of water transport. The project is part of the European Transport Commission's major project 17 and is of the utmost importance for the whole of the European Union. The cost of the project is more than EUR 80 million and is supported unconditionally by the Commission.

PORT BULMARKET EAD has successfully participated in the LNG Masterplan project and has organization and availability of special facilities for reception and treatment of liquid and solid wastes. All actions are according to the plan for management of shipping wastes and ship cargo wastes.

As part of the above-mentioned project, in 2017 **PORT BULMARKET EAD** completed the construction of a liquefied natural gas (LNG) terminal with capacity of 1000 m3 (4 vertical cryogenic tanks of 250m3 each) on the coast of the Danube River in the territory of Port Bulmarket, in the town of Ruse. The same is to bunker river LNG vessels, to load heavy goods vehicles powered by LNG and to distribute to regions that do not have access to the gas pipe network in the country. In addition, the company purchased several “Iveco” heavy goods vehicles, powered by liquefied natural gas (LNG), as well as semi-trailers for LNG transport and storage. The total investment exceeds 4.5 million Euro.

2.1.5 Environmental and energy KPIs, CO2-situation

The development of shipping needs to be planned in the future, inter alia, in the context of adaptation to climate changes. Inland waterway transport can make a significant contribution to the achievement of environment protection goals, for example reduction of greenhouse gas emissions as set out in the Kyoto Protocol.

With regard to environmental impact, logistical activities in ports are not separated in a single legislative document. Ports are accepted as industrial points, similar to every production company and are obliged to comply with the national and international legislation in force. Policy framework is formed by many laws and by-laws in the Bulgarian legislation.

CO2 Situation

Port Bulmarket has a waste management plan, which covers as follows:

- ✓ Grounds for elaboration of the document, including legal background.
- ✓ Geographical location of the port.
- ✓ Description of the port – general characteristics and size.
- ✓ Number and types of ships visiting the port.
- ✓ Assessment of the need for waste management.
- ✓ Waste disposal procedures.
- ✓ Reception facilities.
- ✓ Procedures for acceptance, storage, treatment and transport of waste.
- ✓ Applicable fees.
- ✓ Procedures of reporting of non-compliance.
- ✓ Procedures for collaboration with port users and stakeholders.

It is critical to understand the potential impacts on air pollution, greenhouse gases (GHGs), and the people living, working, and recreating near ports.

Port Bulmarket developed a scale assessment to:

- ✓ Examine current and future emissions from a variety of diesel sources operating in port areas.
- ✓ Explore a range of available strategies to reduce emissions from port-related trucks, locomotives, cargo handling equipment, harbor craft, and vessels; and
- ✓ Provide an assessment tool for the government, port and port operators, communities, and other stakeholders to:
  - Inform their priorities and decisions for port areas; and
  - Achieve more emission reductions across Bulgaria.

2.1.6 Digitalization and automatization

In today's global logistics system, a large amount of **data** and **information** are needed to ensure that all phases of logistical activity are accurate and fast. The development of information and communications technology has dramatically improved the sharing and exchange of information and data needed for trade and transport, and new technologies that affect business processes and the business environment are emerging from time to time. This evolution is particularly striking in the maritime transport sector, which is responsible for the carriage of around 90% of world trade. Efficient processing of logistics information at ports that are the starting and ending point of import and export logistics activities is critical to enhancing efficiency and securing the reliability of the global supply chain. Digitalization can have a dramatic impact on the shipping industry in terms of improved productivity and safety, and the creation of new business and services. A smart port should not be considered as just an application of digital technology. Smart ports integrate digitalization and the 4IR technology, playing a key role in widening and strengthening global trade.

Due to the growing volume of global trade and a consequence of vessel sizes and cargo volumes, **PORT BULMARKET EAD** has become interested in **smart solutions** (digital platform) which use the advanced technologies to optimize operations, promote efficiency, and reduce logistics costs. Port Bulmarket is willing to improve operations or facilities for several other reasons including the fact that:

- Port is complex operational environments and is comprised of various stakeholders.
- They want to maximize efficiency for the supply chain.
- Port authorities are taking a more active role in optimizing operations.
- By redefining the mission and role of each stage of a vessel's arrival, Port Bulmarket can significantly improve its efficiency, security, and environmental impact.

2.2 Port Bulmarket Strategic Project

2.2.1 Need to prepare a master plan incorporated into the Port Development Plan

The Master Plan of a port for public transport determines its long-term development, substantiated by technological and marketing conclusions in accordance with the Integrated Transport Strategy for the period until 2030, approved by Decision № 336 of the Council of Ministers of 2017.

The need for the preparation of a Master Plan is related to port properties based on the analysis of the expected cargo turnover. It is planned to build a grain terminal and a terminal for agricultural fertilizers with covered warehouses. Along with the expansion of the port areas, the equipment of the existing 7 berths will be renewed.

The objectives of the Master Plan are determined by the Terms of Reference and are based on the results of the preliminary study for the development of the port. For Port Bulmarket these are reduced to:

- ✓ Opportunities for development of the existing port activities and services with optimization of the areas in which they are performed.
- ✓ Improvement of transport, technological, infrastructure projects related to the organization of port activities.
- ✓ Making justified decisions for the navigation provision of the port water area - boundaries and design depths.
- ✓ Finding generalized parameters for future investment initiatives for the construction of new elements of the port infrastructure, such as extension of crane routes, new ship berths, construction of new warehouses and terminals for specific cargoes.

The scope and content of the preliminary studies and the elaboration of a General Plan shall be in accordance with the requirements of Ordinance № 10, published in the State Gazette, issue 32 of 08-04-2014, amended in the State Gazette, issue 2 of 09-01-2015.

Compliance of the investment initiative with the Integrated Transport Strategy in the period up to 2030 approved by the Council of Ministers and with the General Master Plan for Transport of Bulgaria

The Integrated Transport Strategy for the period until 2030, approved by Decision № 336 of the Council of Ministers of 2017 outlines the most important guidelines for the development of the transport system, based on the priorities and measures defined in it, the medium and short-term programs and plans. Based on the multifactor analysis

of the state of the transport sector in the Republic of Bulgaria, the guidelines for the development of the transport policy of the European Union and the emerging trends, the Strategy defines the main priorities and measures that need to be implemented by 2030. The vision is for Bulgaria 2030 to have a modern, safe and secure transport system that meets the needs for quality and safe transport.

The outlined strategic goals of the policy in the transport sector are:

- ✓ increasing the efficiency and competitiveness of the transport sector.
- ✓ improving transport connectivity and accessibility (internal and external).
- ✓ limiting the negative effects of the development of the transport sector.

Bulgaria's transport sector is extremely important for increasing the competitiveness of the national economy and for serving the population. The development of the transport sector is also essential for the strengthening of the country's foreign trade relations. In recent years, the need for freight transport services and quality of service has increased.

With the adoption of Ordinance № 10 of 2014 on the scope and content, development, approval and amendment of master plans of public transport ports, the state administration, represented by the Minister of Transport, Information Technology and Communications and the Minister of Regional Development, created regulatory conditions guaranteeing the possibility to provide public transport services through the construction of the relevant infrastructure to meet the expectations of users.

Port Bulmarket with its diverse port activities and location aims to achieve sustainable development and competitiveness in the European market. This objective coincides with the priorities of the transport sector set out in the Strategy, namely:

- ✓ effective maintenance, modernization and development of the transport infrastructure.
- ✓ improving the management of the transport system.
- ✓ development of intermodal transport.
- ✓ improving the conditions for applying the principles of liberalization of the transport market.
- ✓ reducing fuel consumption and increasing the energy efficiency of transport
- ✓ improving the connectivity of the Bulgarian transport system with the single European transport area.
- ✓ providing good quality and affordable transport in all regions of the country.
- ✓ limiting the negative impact of transport on the environment and human health.
- ✓ increasing the security and safety of the transport scheme.

The Strategy identifies as weaknesses of the country's port system: insufficient specialization of terminals, the unsatisfactory condition of the port facilities and transhipment equipment, which does not correspond to the modern tendencies in the structure of the cargo turnover, insufficient depth of water areas and approaches to ports, an outdated organization that does not meet modern market requirements, the limited opportunities for development of some of the terminals located in the central urban parts of the respective settlements, the lack of modern logistics and information systems in ports.

Transport Corridor VII - Danube River, which is included as a priority of the Trans-European Transport Network obliges **PORT BULMARKET EAD** to develop a long-term development program. Thus, with the development of the Master Plan and the preliminary studies for it, an answer will be given, what are the possibilities and how the Port Bulmarket can meet the challenges of the increased demand for river transport services.

2.2.2 Territorial scope of the master plan

The territory of the Port Bulmarket according to the zoning plan of "TM" JSC - Ruse, valid as of 25-07-2018, includes the following properties:

1.1 LPR-LX with an area of 37645 m^2

- ✓ Sketch № UT-01-1420 / 25-07-2018, issued by the Municipality of Rousse
- ✓ Certificate № 280 of 02-09-2015 of the Registry Agency with attached contract for voluntary division.

Border with the Danube River:
- ✓ Quay wall - 515 m 'with 7 ship berths
- ✓ Shore fortification wall - 77 m '

1.2 Regulated plot - XLIX - PM with an area of 6550.42 m^2

- ✓ Sketch № UT-01-1419 of 25-07-2018, issued by the Municipality of Rousse with Notary Deed № 4, Volume II, Reg. № 2356, case 156/2015

1.3 Regulated plot - SPP - with an area of 3430 m^2

- ✓ Sketch UT - 01-1418 / 25-07-2018, issued by the Municipality of Rousse.
- ✓ Articles of Association 148, Volume 12, Reg. № 5146.

1.4 Regulated plot - XLVIII - with area 7410 m^2

- ✓ Sketch № UT-01-1417 / 25-06-2018, issued by the Municipality of Rousse.
- ✓ Notarial deed № 4, volume II, reg. № 4451.

1.5 Regulated plot - XXXVIII - with an area of 7550 m^2

- ✓ Sketch № UT-01-1416 / 25-07-2018, issued by the Municipality of Rousse.
- ✓ Notarial deed № 1, volume V, reg. № 10079, case 538 / 15-11-2016.

Properties UPI - XLVIII and UPI - XXXVIII are united in one property UPI - CXVIpch, with Order № RD 01-202 / 18-01-2019 of the Mayor of the Municipality of Rousse.

The sketches and notarial deeds of the above-mentioned properties are attached to the Application. For property LX - 37645 m^2, a contract for voluntary division from 01-04-2015 is attached.

For the land properties under items 3.4 and 3.5 we apply a preliminary contract for purchase and sale from 20-11-2019.

2.2.3 Content of the Master Plan

The scope and the content of the draft master plan of the port for public transport of regional importance Port Bulmarket to be in accordance with current regulations, including the requirements of the Law on Maritime Areas, Inland Waterways and Ports of Republic of Bulgaria, needs to fully meet the requirements of Ordinance № 10 of 31 March 2014 on the scope and content, development, approval and amendment of general plans of public transport ports, issued by the Ministry of Transport, Information Technology and Communications and the Ministry of Regional Development and the current terms of reference.

The process of making a master plan includes:

Stage I - Preliminary (pre-investment) study

Stage II - Preparation of a draft master plan

The main guidelines and requirements that need to be considered and addressed in the development of the relevant stages are:

Stage I - Preliminary (pre-investment) study

Preliminary (pre-investment) study to include:

- **Analysis of the current situation and previous developments.**

This must include:

- ✓ description of the site - location, boundaries and dimensions of the land properties and of the port water area.
- ✓ findings for the presence of previous structural studies and developments and / or existing development plans - description and analysis.
- ✓ findings on the ownership regime of the affected territories.
- ✓ findings on the condition of existing buildings, networks and facilities.
- ✓ findings regarding the state of the existing navigation conditions in the port water area.
- ✓ findings regarding the presence of objects of cultural and historical heritage

- **Analysis of terrains, geological, hydrological and climatic conditions**

This must include:

- ✓ findings on climatic and meteorological conditions.

- ✓ findings on the performed geological and hydrological surveys - description and analysis
- ✓ findings for the presence of geodetic surveys - description and analysis.
- ✓ findings on available topographic maps, cadastral plans or maps, levelling plans, specialized maps, registers and specialized information systems in digital and graphical form.

➢ **Marketing analysis**

This must include:

- ✓ statistical review and findings regarding the structure and dynamics of the processed cargoes by types and by directions.
- ✓ forecast for the structure and dynamics of the different types of port activities and services, for the cargo turnover (volumes of cargo for processing by types), for the type and scope of the accompanying activities (if any), as well as for the factors that determine them.
- ✓ findings on the impact of the technologies and technical means used on the port activities and services performed.

➢ **Technical and technological analysis**

This must include:

- ✓ description and analysis of the existing and/or planned technological units and facilities.
- ✓ description and analysis of the used and/or envisaged technologies.
- ✓ existing and/or project capacity.
- ✓ technological assessment and conclusions.
- ✓ options for modernization of technical means and technologies in case of expansion and/or reconstruction of the existing port.

➢ **Environmental analysis**

This must include:

- ✓ findings for the existence of existing developments in environmental protection.
- ✓ preliminary own assessment of the impact on the environment during the commissioning of the designed capacities and of the measures by which its protection will be achieved.

Stage II - Preparation of a draft Master Plan

The master plan should be developed with the following volume and content in accordance with the current legislation and including the following text parts:

➢ **Characteristics and analysis of the existing situation.**

This must include:

- ✓ general provisions - a brief historical description of the site and general goals and objectives of the draft master plan.
- ✓ description of the territorial scope of the plan and the design object, which includes: summary of the results of the preliminary (pre-investment) study, description of the routes and technical parameters of the existing engineering networks in the neighbouring territories, conclusions about construction conditions and balance of the territory.
- ✓ conclusions based on the analysis of the existing situation, including the capacity of the port - general and specific problems.

➢ **Description and justification of the development proposals in the following parts:**

"Technological" part

This must include:

- ✓ the forecasts for the development of the different types of port activities and services.
- ✓ the offered technological solutions, including production and technological connections

"Communication and transport" part

This must include:

- ✓ the internal railway network of the port, the railway approaches and their connection with the republican railway infrastructure.
- ✓ the internal highways of the port, the road approaches and their connection with the national road network

Part "Technical infrastructure"

This must include:

- ✓ power supply networks and facilities.
- ✓ water supply and sewerage networks and facilities.
- ✓ networks and facilities of heat supply, ventilation and air conditioning.
- ✓ gas supply networks and facilities.
- ✓ electronic communications networks and facilities.
- ✓ networks and facilities for reception and treatment of waste - result of shipping activity and ship cargo residues.
- ✓ vertical planning and flooring.
- ✓ justified decisions for functional zoning, in compliance with the established easements in favour of third parties.

"Hydrotechnical" part

This must include:

- ✓ the methodology used to determine the parameters (boundaries and design depths) of the port area and each of the zones in it.
- ✓ the navigation provision of the port water area and of the separate zones in it - floating and stationary navigation signs and facilities.
- ✓ the navigation conditions in the port water area and the separate zones in it – one or two-way movement of the ships, turning circles, internal raids (respectively anchorages), etc.
- ✓ the need to use the manoeuvring area and the approach area and ships visiting other terminals of the same port for public transport and/or other ports, and the rationale for the proposed solution.
- ✓ a register with the coordinates of points along the boundaries of the water area and of each separate zone in it, of the construction lines of the future stationary hydrotechnical port facilities and of the area for deployment of floating hydrotechnical port facilities.

Part "Volumetric design of buildings and facilities" - architectural and structural

- ✓ "Ecological" part, which contains measures for environmental protection using various technologies, except in cases where an environmental assessment or an environmental impact assessment has been approved

2.2.4 Terms and stages of production

When drafting the Master Plan, the following activities should be included, which are planned to be implemented in the short term.

Stage I - until 2025

- ✓ Extension of the front crane road on the quay wall in a westerly direction for the formation of a new ship berth.
- ✓ Construction of a warehouse for storage of liquefied natural gas with modernization of the equipment in plot XLIX-Pch.
- ✓ Construction of an overloaded cereal complex on the 5th ship berth.
- ✓ Establishment of floating devices on the 1st and 5th ship berths.
- ✓ Renovation of the equipment of the port gantry cranes.
- ✓ Rehabilitation of the quay wall at all ship berths.
- ✓ Railway repair tracks and crane tracks in the port area.
- ✓ Reconstruction and modernization of the existing road approaches and railway crossings.
- ✓ Implementation of measures for environmental protection.
- ✓ Implementation of measures to ensure fire safety at the port.

Stage II - until 2030

- ✓ Expansion of the port with construction of a covered transhipment complex for bulk cargo in land property CXVIpch (combined UPIXXXVIII and LPR XLVIII) with the accompanying technical infrastructure - attached conceptual scheme.

The deadline for elaboration of the Master Plan is set at 6 months from the date of approval of the Terms of Reference of MTITC and MRDPW.

2.2.5 Means and methods for graphic execution and scales for making graphic parts

The master plan of a port for public transport was developed and approved as a plan for regulation and construction for the port territory and a plot plan for the port water area. The graphic parts of the project need to contain:

- ➢ **Reference-comparison plan**

It is made as a general drawing of the whole port showing:

- The port water area with the separate zones in it, the navigation conditions and the navigation provision in each of the zones.
- The functional zoning according to the technological and organizational differentiation of the port territory.
- The terrains for terminals, for zones under Article 103, para 6 of the LMPVVPPRB.
- The general technical infrastructure of the port.

- ✓ The communication and transport network and the other networks and facilities of the technical infrastructure of the port territory.

- ➢ **Plan for regulation and construction of the port territory together with a plan-scheme to it**

It is made on the basis of the digital model of the current cadastral map and/or specialized maps, and until the elaboration and entry into force of a cadastral map for the respective territory - of the available cadastral plans related to restoration of ownership of agricultural lands and lands and forests from the forest fund.

The plan for regulation and construction of the port territory is made on separate drawings - plan for regulation and plan for construction.

(The draft plan for regulation and construction of the port shall be prepared in accordance with the requirements of Ordinance № 8 of plans (promulgated, State Gazette, issue 57 of 2001; amended, issue 68 of 2004, issue 51 of 2005, issue 66 of 2008), as it also reflects:

- The internal roads of the port and the road approaches.
- The internal railway network of the port and the railway approaches.

- If necessary, a separate drawing will be prepared - a proposal for the connections of the port with the national road network, the national railway network and other networks of the technical infrastructure.
- The maximum height of the buildings, for the production and storage buildings and facilities the height is determined depending on the technological requirements.

In the draft development plan, the construction lines are displayed separately for each functionally separated area of the port.

A plan-schemes (electricity, water, transport, etc.), required by the assignment, are made to a plan for regulation and construction.

➢ **Plot plan for the port water area**

The draft plot plan reflects:

- The location of the existing hydro-technical port facilities (stationary and floating), including the facilities with shore protection, shore protection and geo-protection functions.
- The external lines of construction of the stationary hydrotechnical port facilities provided for construction.
- The lines delimiting the area for deployment of floating hydrotechnical port facilities.
- The boundaries of the port water area and the zones in it - operational water area, ship maneuvering area and approach area.
- The navigation provision of the port water area.
- For the carriers, the admissible scales and the technical design of the graphic parts of the plot plan the provisions of Ordinance № 8 of 2001 are applied accordingly for the volume and content of the development schemes and plans.

➢ **Technological drawings of the individual terminals and/or ship berths**

➢ **Type sections of:**

- The existing and offered constructions of the quay walls and the other stationary hydrotechnical port facilities for berthing of ships.
- The existing and offered constructions of floating hydrotechnical port facilities for berthing of ships.
- Access channels.

➢ **Other drawings and diagrams - if necessary**

In addition to those mentioned in the above points, the graphic part may contain other schemes in an appropriate scale.

2.2.6 Positive impacts of implementation of Port Development Plan:

- ✓ Will create opportunities for development of the existing port activities and services with optimization of the areas in which they are performed.
- ✓ Improvement of transport, technological, infrastructure projects related to the organization of port activities.
- ✓ Making justified decisions for the navigation provision of the port water area - boundaries and design depths.
- ✓ Finding generalized parameters for future investment initiatives for the construction of new elements of the port infrastructure, such as extension of crane routes, new ship berths, construction of new warehouses and terminals for specific cargoes.
- ✓ Increasing the efficiency and competitiveness of the transport sector and the port.
- ✓ Improving transport connectivity and accessibility (internal and external) of the port.
- ✓ Limiting the negative effects of the development of the transport sector.
- ✓ Positive environmental impact.
- ✓ Authorization to use a customs procedure with economic impact /specific purpose.
- ✓ ISO certification positive image impact.

Several steps are identified and need to be taken:

- ✓ **To reduce the administrative barriers -** Excessive administrative procedures and processes by many authorities work towards simplification, harmonisation and digitalisation of administrative procedures along the entire Danube waterway following the Pro Danube concept of “Same River – Same Rules” and administrations create significant competitive disadvantage for inland waterway transport on the Danube and its tributaries and result in time losses and unnecessary costs.
- ✓ **To embrace nature -** The Danube region needs smart, sustainable and inclusive growth based on an eco-efficient, reliable transport system. The Danube waterway can provide cost-effective logistics solutions to many industries to support their competitiveness and to ensure economic growth and the creation of jobs. The high economic potentials for turning the Danube into a core logistics axis are withhold by numerous shortcomings in infrastructure, unfavourable regulatory framework and structural problems of the IWT sector. A targeted, long-term cooperation of public and private sector with firm commitments is needed to break the vicious cycle of degradation of infrastructure and reduction of transport demand. The “Green Deal for Danube River transport” shall form a new policy and business framework consisting of reliable commitments and intensive coordinated cooperation between public and private stakeholders to improve efficiency and environmental performance of Danube waterway transport system ensuring tangible results and supporting sustainable economic growth. The Green Deal will restore trust into

the Danube as reliable and modern transport system in line with concrete improvements based on a coordinated activities and projects.

In relation to the need of improvement of the technical infrastructure some main challenges have been identified:

- Outdated cargo handling equipment, poor condition of berths and limited adaptability to market demand.
- There has been insufficient investment in specialised terminals to provide adequate throughput capacity, and cost-effective and competitive performance.
- Out-dated navigation security technologies.
- River guiding walls, groins and bottom sills in unsatisfactory state, which are partially or completely destroyed.
- Hazards to navigation, limited total channel availability to EU standard, resultant restricted vessel draft, restricted carrying capacity of river fleet.
- Under-developed intermodal connection between the ports and the railway network limit the potential for trade growth including transit trades.

Once the SWOT analysis is undertaken having its learning function in mind, the implementation of the SWOT (in the development strategy and its accompanying action plan) will be set as datum for the elaboration and further strategy execution of Port Bulmarket.

Sharing its expertise, as one of the main cargo transport centres, Port Bulmarket may play a significant role for sustainable transport in the EU Strategy for the Danube Region. Thanks to its excellent geographical position and proximity to the Black Sea (connects Black Sea to North Sea, via Rhine-MainDanube) channel, this synergy defines the port as a competitive unit for international goods and passenger transport.

The execution of the current project through the implementation of the Port Bulmarket Development Plan will generally support the recovery of **PORT BULMARKET EAD** and the sector by an **EU-wide harmonised approach. It is an** essential prerequisite to provide the sector with adequate financial actions and measures that pave the way towards the adaptation to the strict environmental legislative framework adopted by the Legislative.