

D.3.2.1 Analysis of Marina Management System and Investments model

WP3. Framework Analysis

Document: <u>Public</u>/Confidential			
Responsible partner: University of Rijeka, Faculty of Maritime Studies (UniRi)			
Involved partners: All			
Version	Status	Date	Author
1.0	Final	31.10.2019	UNIRI
Notes:			

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Executive Summary

Analysis of marina management and investments model is part of nautical ports framework analysis and investment plans aggregated within WP3. Fundamental pillars for the best nautical ports managements are elaborated on the basis of European best standard and “Green port” policy. The analysis was based on infrastructure needs, quality of services, operational activities, operational requirements and other data collected from the ports/marinas in the Adriatic.

Basic data has been collected from the marinas participating in the questionnaire to get the information on several categories: ownership, number of employees and expert capacities, internal organization, collaboration with stakeholders, marina function and focus of action, economic activities in area, distance from the main traffic nodes, quality of infrastructure and funding sources and investment needs. Also, information regarding the environmental pressures, current practice in energy management, energy policies and energy monitoring are collected, analyzed and presented.

Both types of nautical ports, public ports and private marinas share the same responsibility to achieve management standards. Term “green port” in practice describe responsible behavior of all stakeholders in the port business with focus on long-term vision toward sustainable and climate friendly development of port’s infrastructure. Key elements in the green port management are elaborated based on PIANC recommendation.

Different certification standards exist to formally confirm that port/marina fulfill certain quality of services and standard criteria. Other instruments used for certification and quality assessment applicable to ports including EMS – environmental management system, PERS – port environmental Review System and SDM - Self Diagnosis Method. Besides general quality standards, there are business driven initiatives based on quality labels exist in the marina industry, like Blue Flag programme. Part of the green port policy include also development of Port Energy Management Plan proposed by European Sea Ports Organization. Process of development port EMP is shortly described that may be implemented in the nautical ports. The purpose of marina energy mapping process is to assess the existing port’s energy performance and helps to identify the existing gaps to be resolved in order to improve energy efficiency.

Finally multicriteria based model has been developed to assist decision makers in port authorities and marina administrations to support the implementation of pilot actions and to design the best scenario for development of energy efficient systems and services in Adriatic marinas.

1. Introduction and task description

This report is the Deliverable of the activity 3.2. Analysis of Marina Management System and Investment Model within WP3 Framework Analysis. The purpose of this activity is to define the fundamental pillars for best nautical ports management on the basis of European best standards and Green port policy, and to support the decision makers in future investment in efficient systems for mobility and environmental sustainable services.

The report include state of the art analysis of the best practice in port/marina management with focus on quality standards and green port management concept applicable to the port sector across the EU.

Furthermore, insight analysis of existing port management practice in project partner's region was carried out, that is actually Northern and Southern Adriatic but with strong focus on ports/marinas participating in the pilots.

Finally, multicriteria-analysis tool has provided for evaluation of investment opportunities, impacts of actions, and scenario developments applicable for each pilot sites to support decision making process in development of energy efficient mobility. This tool can be used for development of investment plans for energy efficient mobility at each project pilot site covered by the activity 3.4.

2. Methodology

The analysis of nautical port management system and core system elements such as infrastructure needs, quality of services, operational activities and others related to marinas mobility management has done in the first place. For this purpose the questionnaire has been developed and distributed to the target nautical ports. The primary target was pilot sites ports but the broader area including other ports/marinas has been investigated beyond the project partners. Received responses has been summarized and synthetized to get the proper information and to identify the nautical ports management practices in Adriatic region and pilot areas.

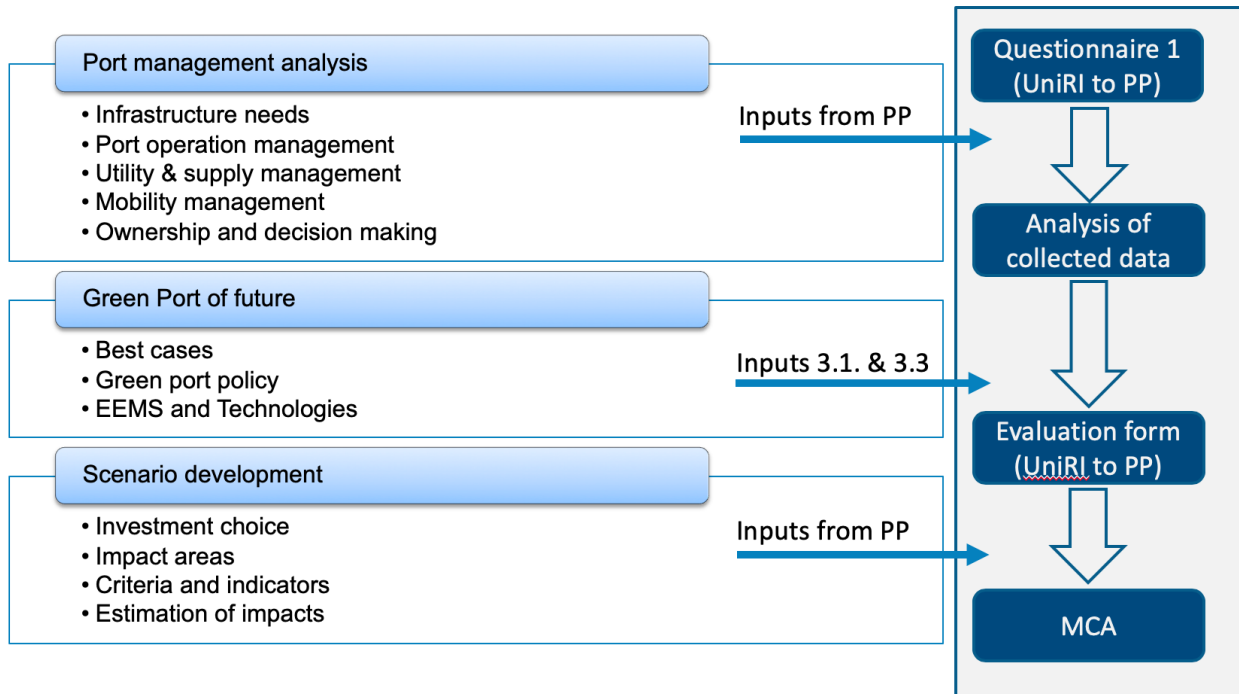


Figure 1. Methodology used in analysis of Marina Management System

Next, screening of thematic professional and scientific papers has been carried out together with state-of-the-art analysis of green port concept development. The existing standards and guidelines for port management, green energy policy, quality standards in marina management and operation as well as methods for development of port Energy Management Plan has been investigated and put together to get the whole picture of the possibilities and directions to achieve the common goals with best practice in green port development.

To get the final output – the best scenario for each pilot site, regarding the implementation of energy efficient mobility, the multicriteria analysis tool has been developed. This tool include selection of measures or actions, criteria and indicators for the evaluation of impacts of the chosen actions to be implemented in the pilot areas. Each pilot area and/or each port covered by the pilot area may chose the desired actions and estimated the impacts according to its strategic preferences. Different scenario may be generated for each pilot and expected results or opportunities may be compared to estimate the effects on implementation of specific action. For this purpose self-assessment evaluation form has been designed.

3. State-of-the art analysis of the best practices in nautical port management and Green port policy

3.1. EU legal framework affecting marina operations

In Europe at the end of the 20th century, the growth of marinas followed the rapid development of recreational marine activities. This trend has now slowed and today the creation of new marinas or the extension of existing marinas is less common due mainly to the enforcement of protective environmental regulations.

Most EU legislation applicable to marinas affects them indirectly, e.g. by regulating recreational boating the marinas indirectly need to facilitate the higher environmental standards required of boats. Due to the applicability of local rules large differences between regions can exist. Considering marina operations hardly any direct EU legislation can be found, with the exception of Port Reception Facilities Directive which explicitly mentions marinas and ports.

The most relevant directive which directly applies to marinas is aforementioned Port Reception Facilities Directive. The PRF Directive 2000/59/EC requires vessels to land the waste they produce during voyages to and between EU ports to port reception facilities. Furthermore it also requires ports or marinas to develop Waste Handling Plans and provide Port Reception Facilities to the ships using their port. (<http://www.emsa.europa.eu/implementation-tasks/environment/port-waste-reception-facilities.html>).

Another important directive that applies to marina construction and marina expansion is the Environmental impact assessment Directive. Directive 2011/92/EU of the European Parliament and of the Council has harmonized the principles for the environmental impact assessment of projects by introducing minimum requirements, with regard to the type of projects subject to assessment, the main obligations of developers, the content of the assessment and the participation of the competent authorities and the public, and it contributes to a high level of protection of the environment and human health.

A more indirect directive which influence marinas (both development and operation) is the Water Framework Directive. The purpose of this Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater which: prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the

aquatic ecosystems; promotes sustainable water use based on a long-term protection of available water resources (https://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=PDF).

The Urban Waste Water Treatment Directive 91/271/EEC is closely linked to the Water Framework Directive (WFD), as it is a basic measure under this Directive and therefore essential for the achievement of the objectives of the WFD. Its objective is to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors and concerns the collection, treatment and discharge of domestic waste water, mixture of waste water and waste water from certain industrial sectors (http://ec.europa.eu/environment/water/water-urbanwaste/index_en.html). Marinas are often located in sensitive areas in which no waste water can be discharged without proper treatment. Therefore, marinas have an obligation to collect the waste water and ensure that the water is treated and discharged of in an environmental friendly way.

Another directive relating to water quality is the Bathing water Directive. This Directive lays down provisions for the monitoring and classification of bathing water quality, the management of bathing water quality and the provision of information to the public on bathing water quality. The purpose of this Directive is to preserve, protect and improve the quality of the environment and to protect human health by complementing Directive 2000/60/EC. (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0007&from=en>). This directive refers to marinas that offer bathing opportunities. If the marina is also used by visitors to take a swim the water quality needs to be measured and information regarding the quality needs to be provided.

Fourth directive relating to water is Drinking water Directive 1998/83/EC. The Directive sets minimum quality standards for water intended for human consumption in order to protect us from contamination. The Drinking Water Directive applies to all distribution systems serving more than 50 people or supplying more than 10 m³ per day, but also distribution systems serving less than 50 people/supplying less than 10 m³ per day if the water is supplied as part of an economic activity, drinking water from tankers, drinking water in bottles or containers, water used in the food-processing industry, unless the competent national authorities are satisfied that the quality of the water cannot affect the wholesomeness of the foodstuff in its finished form (http://ec.europa.eu/environment/water/water-drink/legislation_en.html). Marinas supply water through tanks or they might have installation in place which can serve more than 50 people at the time. Therefore, marinas need to ensure that the drinking water quality is monitored and regularly tested on the 48 parameters defined in Drinking Water Directive 1998/83/EC.

The Marine Strategy Framework Directive 2008/56/EC is another directive which also indirectly refers to marinas operations. The Directive enshrines in a legislative framework the ecosystem approach to the management of human activities having an impact on the marine environment, integrating the concepts of environmental protection and sustainable use (http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm). The Marine Strategy commits Member State to develop marine strategy in which are marinas and nautical tourism development and operation carefully considered. Further development of marinas and nautical tourism must be in accordance with sustainable development of the marine environment. The directive raises awareness of the government according to involved stakeholders.

The Habitat Directive 92/43/EEC is another directive which refers to marinas operation indirectly. The aim of the directive is to protect threatened habitats and species in so called Natura 2000 areas. In aforementioned areas human activities are regulated by strict rules and conditions. (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043>)

Furthermore directive which refers to marinas operations is Environmental Noise Directive 2002/49/EC. The END gives a common approach intended to avoid, prevent or reduce the harmful effects of environmental noise. The main target is an integrated noise management. In the first step the competent authorities in the European member states had to produce strategic noise maps for major roads, railways, airports and agglomerations. The second step is to inform and consult the public. In the third step local action plans should be developed to reduce noise. Marinas are influenced by this directive when more functions are combined in the marinas. (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002L0049&from=EN>)

Two most relevant directives which indirectly refers to marinas is Renewable Energy Directive 2018/2001/EU and Energy Efficiency Directive 2012/27/EU. The Renewable Energy Directive requires the EU to fulfil at least 32% of its total energy needs with renewables by 2030 (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EN>).

The Energy Efficiency Directive establishes a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain, from production to final consumption. On 30 November 2016 the Commission proposed an update to the Energy Efficiency Directive, including a new 30% energy efficiency target for 2030, and measures to update the Directive to make sure the new target is met. <https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive>.

3.2. Key factors relevant for marina management

Many factors determine the successful management of marinas. Some of them are similar to any other type of sea ports at the same level. On the other hand nautical ports has some specific issues because of their specific function. According to Study on specific challenges for a sustainable development of coastal and maritime tourism in Europe (2016), there are six main factors relevant for marina management:

- Ownership structure
- Public-private cooperation
- Size and target group of a marina
- Programs and tools for marina management
- Cooperation between marinas
- Seasonality

3.2.1. Ownership structure

There are two main types of marina ownership or marina management: private and public. Both ownership structures exist across member states. In general, marinas in northern countries are mainly owned by private companies, while southern Member States often belong to municipalities. (European Commission, 2016.)

The ownership structure of marinas is also determining their business model. If owned by a region or municipal authority, in general marinas have a lower commercial orientation and lower interest in investing then when owned by private investors.

3.2.2. Public – private partnership

Building and constructing new marinas require in many cases significant investments in relation to the relatively low turnover and the short summer boating season. In addition, the running expenses for operating and maintaining existing marinas are considerable. Specialized knowledge and professionalism in each single step from planning to operating a marina are essential for its success and profitability. This requires alternative forms of financing, planning, designing and operating marinas such as Public- Private Partnership.

Public authorities and private operators follow diverging interests. While the public sector serves the interests of a region, the private operator aims at capturing and maximizing the value of its

operation. “Public-Private Partnership (PPPs) combines the resource of government with those of private agents (business or not-for-profit bodies) in order to deliver social goals” (Skelcher, 2005).

The PPP models can be classified into five broad categories in order of generally (but not always) increased involvement and assumption of risks by the private sector. The five broad categories are: Supply and management contracts, Turnkey contracts, Affermage/Lease, Concessions, Private Finance Initiative (PFI) and Private ownership (Rossi & Civitillo, 2014).

Management contracts allow private sector skills to be brought into service design and delivery, operational control, labor management and equipment procurement. However, the public sector retains the ownership of facility and equipment. For private sector there isn't a commercial risk. The private contractor is paid a fee to manage and operate services. Usually, the contract period is short (three-five years, normally) (Rossi & Civitillo, 2014).

Turnkey is a traditional public sector procurement model for infrastructure facilities. Generally, a private contractor is selected through a bidding process. The private contractor designs and builds a facility for a fixed fee which is one of the key criteria in selecting the winning proposal. In this case contractor assumes risks involved in the design and construction phases. This type of private sector participation is also known as Design-Build.

The difference between affermage and a lease is technical. Under a lease, the operator retains revenue collected from users of the facility and makes a specified lease fee payment to the contracting authority. Under an affermage, the operator and the contracting authority share revenue from consumers. In the affermage/lease types of arrangements, the operator takes lease of both infrastructure and equipment from the government for an agreed period of time. Generally, the government undertakes investment risks, but operational risks are transferred to the operator. Land to be developed by the leaseholder is usually transferred for a period of 15-30 years (Rossi & Civitillo, 2014).

Furthermore, another format of ownership is concession. Under a concession, the private partner (Concessionaire) bears overall responsibility for the services, including operation, maintenance, and management, as well as capital investments for rehabilitation and renewal of assets, and the expansion of services (Turina & Car-Pušić, 2006).

The concession period depends upon the country. In Croatia Concession contracts usually last for between twenty to thirty years, depending on the level of investments and the period required for the Concessionaire to recover its investments plus a reasonable rate of return (Turina & Car-

Pušić, 2006). Also the same format of concession is in Italy and Spain. Therefore, concessions are an attractive option where large investments are required. Concessions are administratively complex undertakings for governments, because they confer a long term monopoly on the Concessionaire and thus require rigorous monitoring and enforcement.

In private finance initiative contract models, the private sector is responsible for planning, construction and managing the infrastructure assets. In some cases, the public sector may cede its ownership of certain assets. According to the domains of these contracts, the public sector rents or buys a specific type of public goods or services from the private partner under long-term contracts. After the contract expires, the public sector repossesses assets (Oblak et al., 2013).

3.2.3. Size and target group of a marina

It is well-known that a big marinas have a bigger services offer and hire a large number of employees. All aforementioned requires more advanced management. In addition, bigger and deeper berths allow super yachts to enter the marina. Luxury yacht marinas have higher requirements regarding the available infrastructure and the employees, what makes marina management more complex.

Marinas have different target groups. For many marinas the residential customers, who keep their boats in the marina all year around, constitute the core business (ECORYS, 2015). Other marinas take advantages of the rental business, because they are more depending on frequent in and outgoing boaters. This is the case especially in Croatia, Greece and Spain, where the share of charter boats amounts even to 100% (European Commission, 2016).

3.2.4. Marina management programs and IT tools

There are many management programs and IT tools that can help marina managers to do their everyday tasks more efficiently. Some of the most relevant programs are : Blue Flag Programme, Blu Star, ISO certificate, Gold Anchor etc. On the following pages aforementioned programs will be described in more details.

IT tools in marinas refers to a different kinds of marina management software. In past ten years the most popular management software's are booking applications which are related to the marina berth management. Berth supervision is important for marina logistics management. It consists of two functions: berth occupancy control and boat identification (Krpetić et al, 2012).

3.2.5. Cooperation between marinas

Marinas may cooperate between each other through the clusters or other forms of organization. Clusters may generate synergies from different stakeholders engaged in tourism industry. Smaller stakeholders may consequently benefit from such organizations to attract more target groups and offer large scale of services to nautical tourist, e.g. marinas, restaurants, hotels, charter providers, transport service providers, etc.

Other form of organization include networking of selected marinas offer similar quality of service, marina access or discount arrangements. Example is TransEurope Marinas initiative. Croatian public marinas are organized through the ACI (Adriatic Croatia International Club) company join together 22 marinas at the eastern Adriatic coast. ACI has central management structure but each marina has own operational management and autonomy regarding business strategy, marketing philosophy and mode of operation.

3.2.6. Seasonality

The big question in marina in Adriatic region is how to cope with seasonality or how to “extend” the demand throughout the year. However, seasonality has more effects on marina services provided by concessionaries, or services offer to the nautical tourists, than on marina itself and services offer to boats. During the winter long-term berth management arrangements, maintenance work, training programs, or some social events may be in focus of business activities.

3.3. Green port management concept overview

Both types of nautical ports, public ports open for international traffic, and private marinas, share the same responsibility to achieve acceptable management standards. That means that both targets, business and industry growth and social and environmental acceptability, should be achieved through the sustainable development. Ports are not just service providers, but energy consumption and, potential energy production centers.

Term “green port” relate to the sustainability in the context of the maritime industry. In general, this term means production of the long-term strategy for the sustainable and climate friendly development of port’s infrastructure (Pavlic et al. 2014). However, in practice green port is synonym for responsible behavior of all stakeholders in the port business, from the individual employee and port managers to port users and local population. According to PIANC, the concept

of green port and green energy policy means “shift of thinking” away from reactive to a proactive approach with focus on long-term vision rather than on short-term thinking.

Key elements in the concept of green port management are (PIANC, 2014):

- Long-term vision towards an acceptable footprint on environment and nature
- Transparent stakeholder participation and stakeholder approved strategies
- Shift from sustainability as a legal obligation to sustainability as an economic driver
- Active sharing of knowledge with other ports and stakeholders
- Continuous striving towards innovation in process and technology

One of the key issues of this elements is energy efficiency or the process of shifting from fossil fuels toward clean fuel sources and renewable energy sources. That influence on different players in nautical tourism sector to act accordingly, namely:

- Port authorities (including local and/or regional administration act as a port authority) – to make a shift from traditional to proactive green port & green energy approach
- Public authorities – to recognize the need of port managing authorities to support the change
- Marina operators – to plan and incorporate the sustainable design principles and technologies in development projects and innovative energy efficient services
- Financial institution – to support the development of green port infrastructure and green services in marina development projects
- NGOs – to disseminate the idea and validate the results of implementation
- Researchers – to share the knowledge about innovative technologies, their application and benefits for community.

Ports aim to achieve “green-port” status should establish the system for monitoring energy consumption as well as overall environmental quality monitoring. Sustainable development also requires change or upgrade of current port policy and port strategy to understand the new opportunities in exploitation of alternative fuels and renewable energy sources. That is very important to know that new approach or shift to green-port solutions may also require some changes in traditional management of the ports. These changes address to join effort of all stakeholders of the ports, marinas and local community. Different stakeholders may have different approach or priorities, so it is necessary to set up decision-making criteria and recommendations of actions for each of them. Implementation of green-port concept must be followed by implementation of energy and environmental management system to enable the

port's management to follow accepted decisions, monitor performance and adapt the implementation strategies (Pavlic et al. 2014).

3.3.1. Port management roles and responsibilities

No matter of the various type of ports and their function, different roles in port management exist within specific framework of port organization. For each role applicable, green port concept can be in focus of the action. Here is some key roles in port management applicable in a broad way through port and marinas in the project area:

Management of Port Areas: In the broad sense it is one of the key roles of the port management. The main instrument for actions is strategic planning implementing through Master plan or similar documents. The planning and development of infrastructure may have significant impact on environment but may also have impact on energy consumption and production.

Landlord based management: This role is one of the basic tasks of port management where the property and protection of ownership is of primary concern. Maritime domain, its protection and economic exploitation is managed by the responsible public organization where concession/lease agreements are the main tool. Concession contract could be a good tool to move the focus of action toward the implementation of green port concept.

Traffic and mobility management: In every port, management of the waterborne traffic include berth management, coordination of arrival/departure of vessels/boats, maintenance of water basin and fairway. The safety issues are very important part of that role. Mobility management includes transfer of people, crew, visitors and passengers inside the port and establishment of connection with the transportation system outside the port border. Green port action may be focused in improvement of the air pollution generated by the port traffic (both sea-bound and inland-bound traffic) or in reduction of fuel consumption from the boats and vehicles (e.g. control of the traffic flow, reduction of the speed, etc.)

Pricing and enforcing: This role include pricing policy and regulation of the overall activities in the port. For public ports, port dues are the main source of the income in order to maintain certain level of the infrastructure quality. The power of the establish the pricing and enforcing policy depend on type and importance of the port. However, whatever entity has this power they are good instruments for support the green port actions, encouraging port users to use environmentally friendly power systems, port energy supply facilities or any other systems or solution that may produce less environmental impact or generate more sustainable services to them.

Port operation: Various port operation and services provided for the port users may be improved through implementation of the green port policy. The big issue is how to stimulate private operators to focus and invest in green port technologies and services where there is conflict of interest due to higher costs of such services or technologies. However quality standards and quality awards for those operators implementing green port policy should improve their business and market position.

Community partnership: Ports are not closed system, but public open and therefore one of important role in port management is continuous mutual interchange of ideas and concerns between port-based entities, management bodies and local community. For tourism-oriented ports which is traditionally local oriented this role is of the vital importance because ports are the main generator of the local and regional development. Implementation of green port concept may have significant impact on local community such as using of LED technology for lighting public areas, using alternative energy sources for vehicles, access to renewable energy and development of microgrid systems.

3.3.2. Pressures and response measures

Generally maritime industry generates about 3% of worldwide CO₂ emissions. Boats, yachts, other pleasure crafts and cruisers as well as maritime tourism activities contribute to these emissions to some extent. The pressure to coastal area and sea-water is extensive during the summer season on both coast of the Adriatic Sea. Consequently, reducing Greenhouse gas (GHS) emissions and dependences on fossil fuel and shift to renewable energy sources is big challenge for the sector. Marinas and nautical public ports are isolated in this matter and should follow common strategy for reducing this impact.

The major issues is how to reduce energy consumption and energy costs through increase of efficiency of port activities and how to develop long-term renewable energy sources. The marine activities have seasonal characteristics with peak-traffic and energy consumption pressure during the summer months. On the other hand, renewable energy sources like solar and wind are unlikely to provide continuous and secure energy supply. Developing of smart grid networks with buffers such as energy storage utilities, can contribute to efficient energy production and bring flexibility in balance between energy supply and demand.

In order to cope with these challenges, it is necessary to understand what response options from the port management perspective are. These options include actions contribute to better environmental and energy management and actions to use available technologies and services.

When management is concerned, it is necessary to set-up good source of information based on identification of source and quantity of GHG emissions and energy consumption. Then, measurement and control system should be established. Some ports prepare so called inventory on emission and consumption as first action in achieving their goals. Another area of action on the management level may be improvement on port traffic management. Reduction of boat speed, reduction of waiting time for boat services, control of inbound and outbound traffic and introduction of smart berth management systems, may contribute to efficient use of energy and less air pollution. Furthermore, Energy Management Plan should be prepared and adopted, acting as roadmap for implementation of the green port strategy to achieve energy efficient port system.

3.3.3. Social responsibility and cooperation with stakeholders

Every stakeholder group should participate in port development projects on certain way. The same rule applies for the strategy aim to improve ecological and energy footprint in the port and surrounding area to support sustainable port development. Following stakeholder groups may be identified related to port/marina development:

- Public administrations and port authorities
- Port operators and concessionaries
- Nautical tourists – marina users
- Contractors and Technical Experts
- Financial institutions
- NGOs

Public administrations and port authorities has often different but similar tasks. Both may have at some extend responsibilities for port development. Public administrations have more power ruled by laws and regulations and are key decision makers for development policy. Public administrations may include local, regional or national bodies and management bodies representatives of port authorities. While management of the port is primary concern of the port authority, public administrations concern is more social wide oriented and motivated by the interest of national, regional or local community. Public administrations and port authorities should be creators and driving forces for implementation of green-port policy.

Port operators and concessionaries are beneficiary of the port development. Each new initiative or action toward improvement of port infrastructure, energy supply facilities or installation of equipment generate opportunity for the operators to improve the quality of existing services,

extend their services or offer new services and to strengthen their position on the market. The key point is to find reasonable share of the risk between public and private interest when invest in ecologically friendly facilities, energy efficient technologies or services. Cooperation with public administration and public authorities is therefore necessary from the beginning of the planning process to the end of project lifetime.

Nautical tourists – marina users may benefit from the better quality of service and from the new service offered by the operators. They can benefit from the time savings, from the better organized public transportation and improved mobility. The purpose of their visit is pleasure staying and leisure comfort, so green-port approach is completely in line with their expectations.

Contractors and Technical Experts are main pillars for the project implementation. That includes design, construction of infrastructure and facility, purchase, installation and maintenance of the equipment and consult services to investors. It is important that new technologies and solutions must be incorporated in sustainable design of the target projects. Thus, cooperation between contractors and investors, decision makers and management bodies should be established in early stage of planning. Technical design that supporting green-port solution must be focused on energy saving, resource conservation and sustainable port planning, or in other words, design must follow rules on system engineering with focus on social, economic and environmental targets.

Financial institutions include international banks, regional and national funds and private funds of capital. They are main source of capital to make such investments possible and reliable. Social and risk assessments on investment should be made prior any development project starts.

NGOs is non-governmental organizations acting as independent associations or group of people on voluntary basis. Some NGO are focused on specific issues, like environment protection, cultural heritage protection, biodiversity protection or protection of human health. NGOs are generally supporters of any “green” initiative and their participation in development project may affirm the project and their goals among citizens and community.

3.4. Quality standards in Marina port management

3.4.1. Certification standards

Different certification standards exist with the same purpose: to formally confirm that port/marina fulfil certain characteristics of the quality of services according to requirements of

the standard criteria. Certification procedures include review, evaluation, assessment and audits on regular basis, some of that provided by external auditors and evaluators. The following common quality standard are relevant for ports:

- ISO9001 (Quality Management System)
- ISO 14001 (Environmental Management System)
- ISO26000 (Social Sustainability)

ISO9001 is designed to help organizations meet the needs of their customers while at the same time meeting statutory and regulatory requirements. ISO9001 is suitable for a marina that wishes to consistently provide a product or service that meets customer requirements and to enhance customer satisfaction through the effective application of the quality system (The Marina manual, 2015).

Other instruments used for certification and quality assessment applicable to the port/marinas are:

- EMS – Environmental management system – meeting the requirements of ISO14001 it is a management tool enabling an organization to identify and control environmental impact of its activities, to continually improve its environmental performance and to implement systematic approach to setting environmental objectives.
- SDM – Self Diagnosis Method – methodology for identifying environmental risk and establishing priorities for action. It is checklist based on self-assessment of environmental management programme of the port.
- PERS – Port Environmental Review System (PERS) – represents port specific environmental management standard. It is designed to help port authorities to deliver the goals of sustainable development. PERS incorporate general requirements from the ISO14001 standard but adapted to the port management needs and port objectives.
- EMAS – European Union’s Eco-Management and Audit Scheme, is voluntary instrument of acknowledgment validating that organisation (e.g. port or port operator) is continually improve their environmental performances. The requirements is stricter than requirements of ISO standard.
- Port-Index – developed by ESPO (European Sea-Ports Organisation) is a benchmark tool based on port environmental achievements. The port-index is implemented in Clean Baltic Sea Shipping project.

Besides general quality standards and certification system targeting impacts of activities, there is business driven initiatives aim to evaluate the quality of operation and services of marina industry. Compliance with such schemes is optional and involves various quality standards (e.g. water quality, safety and services, tranquility, respect of the environment, energy consumption, etc.). Participation in certification and quality labels increase the number of visitors and distinguish a marina from others by ensuring that services or locations are of a particular quality.

Following initiatives of quality labels exist in the marina industry:

- The Blue Flag programme
- Gold Anchor scheme
- Blue Star Marina Certification
- ADAC Ship's Wheel marina rating system

3.4.2. The Blue Flag programme

The Blue Flag Programme for marinas started in France in 1985 and has been operating in Europe since 1987 (Blue Flag Marina Criteria and Explanatory Notes, 2018). Blue Flag Programme defines 36 criteria and requirements for the implementation covering water quality, environmental management, environmental education and information, safety and services, which marina needs fulfil in order to be awarded with Blue Flag. This programme challenges local authorities to achieve high standards in predefined criteria. Over the years, the Blue Flag initiative has become highly recognized eco-label for sustainable development of nautical tourism.

Blue Flag criteria for marinas are categorized as either imperative or guideline. Most criteria are imperative, which means that the marina must comply with them in order to be awarded Blue Flag accreditation. If they are guideline criteria, it is preferable but not mandatory that they are complied with (Blue Flag Marina Criteria and Explanatory Notes, 2018.). There are slight variations for some criteria in different regions of the world. The Blue Flag marina criteria are the minimum requirements and national program can choose to have stricter standards (Heron & Juju, 2014). In table 1 are listed only criteria categorized as imperative.

Table 1. Blue Flag imperative marina criteria in 2018

<p>WATER QUALITY</p> <p>1) The water in the marina must be visually clean without any evidence of pollution, e.g. oil, litter, sewage or other evidence of pollution.</p>	<p>ENVIRONMENTAL EDUCATION AND INFORMATION</p> <p>1) Information relating to local eco-systems and environmental phenomena must be available to marina users.</p> <p>2) A code of conduct that reflects appropriate laws governing the use of the marina and surrounding areas must be displayed at the marina .</p> <p>3) Information about the Blue Flag marina programme and/or the Blue Flag marina criteria and other FEE eco-label must be displayed in the marina.</p> <p>4) The marina is responsible for offering at least three environmental education activities to the users and staff of the marina</p> <p>5) The individual Blue Flag for boat owners is offered through the marina.</p>
<p>ENVIRONMENTAL MANAGEMENT</p> <p>1) The marina must have an environmental policy and an environmental plan. The plan must include references to water management, waste and energy consumption, health and safety issues, and the use of environmentally-friendly products wherever possible.</p> <p>2) Sensitive area must be managed.</p> <p>3) Adequate and properly identified, segregated containers must be in place for the storage of hazardous wastes. The wastes have to be handled by a licensed contractor and disposed of at a licensed facility for hazardous wastes.</p> <p>4) Adequate and well-managed litterbins and/or garbage containers must be place. The wastes are handled by a licensed contractor and disposed of at a licensed facility.</p> <p>5) The marina must have facilities for receiving recyclable waste materials, such as bottles, cans, paper, plastic, organic material, etc.</p> <p>6) Toilet tank waste reception facilities must be present in the marina.</p> <p>7) All buildings and equipment must be properly maintained and be in compliance with national legislation. The marina must be well integrated into the surrounding natural and built environment.</p> <p>8) Adequate, clean and well sign-posted sanitary facilities, including washing facilities must be in place</p>	<p>SAFETY AD SERVICES</p> <p>1) Adequate and well signposted lifesaving, first-aid equipment and fire-fighting equipment must be present. Equipment must be approved by national authorities.</p> <p>2) Emergency plans in case of pollution, fire or other accidents must be produced.</p> <p>3) Safety precautions and information must be posted at the marina.</p> <p>4) Electricity and water is available at the berths, installations must be approved according to national legislation.</p> <p>5) A Map indicating the location of the different facilities must be posted at the marina.</p>

<p>and provide drinking water. Sewage disposal is controlled and directed to a licensed sewage treatment plant.</p> <p>9) If the marina has boat repairing and washing areas, no pollution must enter the sewage system, marina land and water or the natural surroundings.</p> <p>10) Parking/driving is not permitted in the marina, except in specific designated areas.</p>	
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Source: (Blue Flag Marina Criteria and Explanatory Notes, 2018.)

All Blue Flags marinas are only awarded for one season at a time. According to Blue Flag Programme there are 72 Italian and 27 Croatian marinas awarded with Blue Flag in 2019. The award indicates that sea water is clean, provide an environmental management, perform certain activities to raise environmental awareness, have the equipment to meet the needs and ensure their safety. Therefore, the practice of blue flag is characterized as a brand or by “Eco-Label” (Font, 2002). If some of the imperative criteria are not fulfilled during the season or the conditions change, the Blue Flag will be withdrawn.

Apart from the mentioned criteria Blue Flag Programme for marinas recognize significance of Corporate Social Responsibility in marinas and defined two guideline criteria as follows: „The marina management has a CSR policy, covering the areas of Human Rights, Labour Equity Environmental Education and Anti-corruption” and “The marina management takes at least two measures to encourage sustainable relationships in the immediate environment and to fulfil its commitment to perform better on social fields” (BlueFlag Marina Criteria and Explanatory Notes, 2018.)

According to questionnaire used in the Verde come Vela Project in 2011, it is established that out of total 30 Croatian marinas which have completed questionnaire, 30% of marinas declare that they have social responsibility or sustainable development in their vision and also have a person in charge for sustainable development (Klarić et al., 2015). Namely, the majority of Croatian marinas have a relevant strategy for the environment in marinas (80%) and environmental management policies (93.3%). As many as 66.7% of Croatian marinas systematically monitor the impacts of their business on the environment and the results of such measurements and monitoring are most frequently used for the purposes of lowering harmful impacts and for environmental protection, sea quality improvement, securing the Blue flag, planning of future marine capacity extension, as well as for the reasons of inspection supervision and legal acts (Klarić et al., 2015).

3.4.3. Gold anchor scheme

The Gold Anchor scheme was developed by the marina industry with the purpose of raising standards and providing customer centric services. The Scheme provides a template for customer friendly marina development. The Scheme also assists marinas to more effectively position and differentiate themselves in the market place. Participation provides global performance benchmarking that contributes to continual business improvement. For consumers, Gold Anchor helps their evaluation and selection of marinas aligned with their needs (<https://www.marinas.net.au/industryprograms/global-gold-anchor-scheme>).

This Global Scheme is jointly administered by The Yacht Harbour Association (TYHA) and the Marina Industries Association (MIA). TYHA delivers the Scheme in the United Kingdom, Europe, Middle East, Africa and the Caribbean (<https://www.which-marina.com/gold-anchor-scheme/what-is-the-gold-anchor-scheme>). MIA delivers the Scheme in Asia, India, Sri Lanka, Pacific Regions including Australia and NZ, while in the Americas the Scheme is jointly delivered by TYHA and MIA. Marinas entering the Gold Anchor scheme can choose to self-assess against the core scheme criteria or be independently assessed by one of the expert assessor team. The Scheme is based on self-assessment and site assessment of specific items across six evaluation categories:

1. Ambiance
2. Planning, Policies and Procedures
3. Customer Service
4. Environmental
5. On Water facilities and infrastructure
6. On Shore facilities and infrastructure

To arrive at the Gold Anchor accreditation a berth holder survey is also conducted. Once the assessor has completed their evaluation and report an accreditation recommendation is put to either TYHA or MIA Gold Anchor Standards Panels for approval. Mystery shopper checks are used during the three year validity period to ensure the accreditation remains valid as well as providing valuable additional information to the marina. Marinas can apply for one to five gold anchors and for a two to five gold anchor marina must pass through four stage process (see Table 2).

Table 2. Description of a stage processes for Gold anchor award

STAGE	DESCRIPTION
Stage 1	Self-assessment
Stage 2	Marina assessment against schedule
Stage 3	Mystery shopper visit
Stage 4	Berth holders questionnaire

Source: http://www.marina-publications.com/prev/MARINAS_Book_Preview.pdf

A minimum of 48 points are required to attain one gold anchor; 55 points for two; 65 points for three gold anchors; 75 points for four anchors; 85 points for five gold anchors and 95 points for platinum gold anchor. In Italy there are three marinas awarded with Gold anchor and these are Marina di Pescara (Pescara), Sudcantiere Marina (Capri) and Marina di Brindisi (Apulia) whilst there is two Croatian marina awarded with Gold anchor and these are marina Punat (island of Krk) and D-Marin Mandalina (Sibenik). Italian Marina di Pescara (Pescara) has 1028 berths and has been awarded with four gold anchors whilst Sudcantiere Marina (Capri) has 380 berths and has been awarded with five gold anchors. Marina di Brindisi (Apulia) has 1038 berths and has been awarded with two gold anchors. Marina Punat (island of Krk) has 1500 berths and has been awarded with five gold anchors. Marina D-Marina Mandalina (Sibenik) has 462 berths and has been awarded with five gold anchors.

The link between the Blue Flag, ISO standards and Gold Anchor Scheme is to provide all environmental aspects of the marinas activities, using a logical objective methodology to rank such aspects by their impact on the environment.

3.4.4. Blue Star Marina Certification

The IMCI Blue Star Marina Certification Program is water based tourism and recreational boating, which is provided by the International Marine Certification Institute (IMCI), which is an EU based, independent non-profit association notified by the EU Commission for the CE certification of recreational crafts (<http://www.bluestarmarina.org/>).

This certification program uses a range between 1 and 5 stars to indicate the quality of certified marinas. Certification topics include external presentation, sanitary installation and hygiene, service facilities, food and chandlery supplies, leisure facilities, environmental protection and

waste management practices, security and safety. Certification is granted after a positive assessment by an IMCI Inspector.

A mandatory re-assessment assures the continuous reliability of the certification and the marina's quality. There are two Italian ports awarded with Blue Star Marina Certification, marina Porto di Santa Teresa di Gallura (Sardinia) which has been awarded with 4 stars and Marina di Varazze (Liguria) which has been awarded with 5 stars (<http://www.bluestarmarina.org/>).

3.4.5. ADAC rating system

The ADAC Ship's Wheel is self-developed classification system of groups of marinas. The ratings help skippers distinguish between simple and superior marinas within the group or alliance. ADAC rating system has two main categories of evaluation: technical & service as first and catering, provisioning & leisure as second. The system of evaluation rate the level of service offered by the marina and award ship's wheel symbols accordingly. The greater number of wheels awarded, the better level of service and more varied services are offered.

Within first category – technical & service the more attention is given to services oriented toward the boat. Refueling and repairing of the motorboats is considered very important, therefore ability of boatyard, service station and fuel supply are important for evaluation. Also, boat crane or slip facilities at the marina and parking facility for boat trailers are valuable elements for evaluation. Furthermore, supply of electricity and freshwater at the berth and availability of disposal facilities (e.g. holding tank, hazardous waste) and sanitary facilities are another important criterion for award.

In second category – catering, provisioning and leisure the aim is to rate level of added value services and services offered by the marina operators and service providers to make more comfort sojourn of the nautical tourist. This include: shopping, restaurants, rental services (e.g. bicycle rental services), playgrounds, sport and wellness facilities. All these facilities and services making the stay of the crew and visitors more comfortable allows more points to be scored by the marina.

3.5. Planning of environmental and energy efficient port/marina

3.5.1. Links between port functions and greening goals

In section 3.1 port management roles and responsibilities are explained and elaborated briefly. It is interesting to see relation between those roles and planning process for improvement the environmental and energy efficiency. The relation may be observed through three main function of the nautical ports/marinas: landlord function, regulatory function, operation function and community function. For each function, according to Acciaro et al. (2014), connected green objectives are identified and grouped together. The relevant output from these elaborations are presented in the following tables (Table 3.)

Table 3. Relation between port function and environmental objectives

	<i>Green objectives</i>	<i>Explanation</i>
LANDLORD FUNCTION	Protect the port ecosystems	Access channels, dredging, integral water management, soil, beaches, nature areas
	Ensure environmental sustainability of the port activities	Limit the negative environmental effects of port activities
	Create optimal space allocation and green recreational areas	Manage the balance between port activities and areas aimed for natural preservation
	Pay attention on construction methods when building infrastructure	Include specific provisions in the construction specification of infrastructure
	Include environmental consideration in the connectivity policy	Development of congestion traffic management and entrance control.
	Provide waste reception facilities	Provision of waste reception facilities and waste management
REGULATORY	Regulate environmental matters within the port	Regulation concerning pollution, energy efficiency and other environmental issues
	Monitor pollution, noise and emissions	Monitor external effects of port activities such as air pollution, noise, water

	pollution, energy consumption, congestion, etc.
Allow/prohibit activities within the port	Regulation prescribing what activities can be performed within the port area
Reward/punish port operators performing against specific environmental goals	Incentives and penalty schemes within lease contracts or as voluntary actions
Share information with reference to environmental compliance	Regulatory requirements to publish environmental reports or to make such information available to public

Table 3 (continue). Relation between port function and environmental objectives (based on Acciaro et. al, 2014)

	<i>Green objectives</i>	<i>Explanation</i>
OPERATION FUNCTION	Minimize impacts from operations	Minimising the external impacts from operations such as air and water pollution, congestion, etc.
	Improve energy efficiency and energy conservation within the port	Reducing the energy consumption within the port or shift towards renewable forms of energy
	Ensure operators include environmental considerations in management of subcontractors	Contractual terms and conditions that aim to limit the impacts from subcontractor'
COMMUNITY FUNCTION	Share information/increase visibility of green activities	Any action aiming at improving visibility of green project or action
	Market the port as green	Marketing and communication activities in favour of environmental sustainability
	Stimulate and facilitate port users in adopting green practices	Guidelines, handbooks, workshops, etc, stimulating the adoption of new technologies and/or practices

3.5.2. Tools and instruments for port policy fulfilment

Environmental Management System (EMS) provides a systematic way of managing of port environmental affairs. Many sea ports implement EMS to manage a port in systematic and sustainable manner. A major concern in environmental management of marina infrastructures is minimizing consumption, especially water and electricity and preventing a water and air pollution. The goal is the to reduce the consumption without affecting the level of comfort of users. The basic requirements of EMS for marinas come out of standards such as ISO 14001, EMAS and PERS methodology. Monitoring is one of the important aspects in EMS.

Port development strategy is one of the key issues in planning. When greening concept of port development is chosen as a direction in strategy development, the effectiveness and success depend on tools adopted by the port authorities and/or administrations. According to Lam (2014), each management authority may choose one or several tools among the following:

- Charging & pricing
- Monitoring and measuring
- Market access control and environmental standard regulation

Charging and pricing may be set up in two direction: to motivate users to use environmentally friendly technologies, arrangements, methods or practices, that is incentive pricing policy, or to discourage or penalize use of non-friendly technologies, systems or practices, that is penalty pricing policy. Instruments for incentive pricing is discount on port dues and for penalty pricing it may be a surcharge to docking fee.

Another tool important for effectiveness of EMS is continuous measuring and monitoring of GHG emissions and energy consumption and record performance according to benchmark of environmental sustainability in line with EMS.

Different modes of marina management and diversity in marina establishment, organization and management impose differences in objectives, functions, market position, competences and investment capabilities. That is also a case with environmental and energy considerations, depend on the specific location and characteristics of each marina.

There are three levels of potential intervention of a port/marina authority/administration with different scope of effects regarding environmental consideration (Boile et al. 2016):

- Intervention under the responsibility of the port authority – high influence, limited effect

- Other interventions within the port area – reasonable influence and effect
- Interventions at the sectoral level (tourism and maritime industry) – limited influence, high effect

Influence and effect may vary from the port to port, but environmental and energy strategies and plans have better chance for success when implemented on larger scale than on single management body.

3.6. Development of Port Energy Management Plan – EMP

The European Sea Ports Organisation (ESPO) in order to improve environmental and energy performance in the ports, lay down group of actions structured on 5 pillars (ESPO Green Guide, 2012). That may be used as a guideline for small public nautical ports and marinas as well. The 5 pillars for actions are show in the Figure 2.

Ports are developing EMPs at a port authority level or a terminal operator level. This action is part of their green port policy. Port Energy Management Plan is done before the certification standard procedure. The outcome of the plan are set of energy-efficient measures to be identified for implementation in the specific port area in order to improve energy efficiency and sustainability.

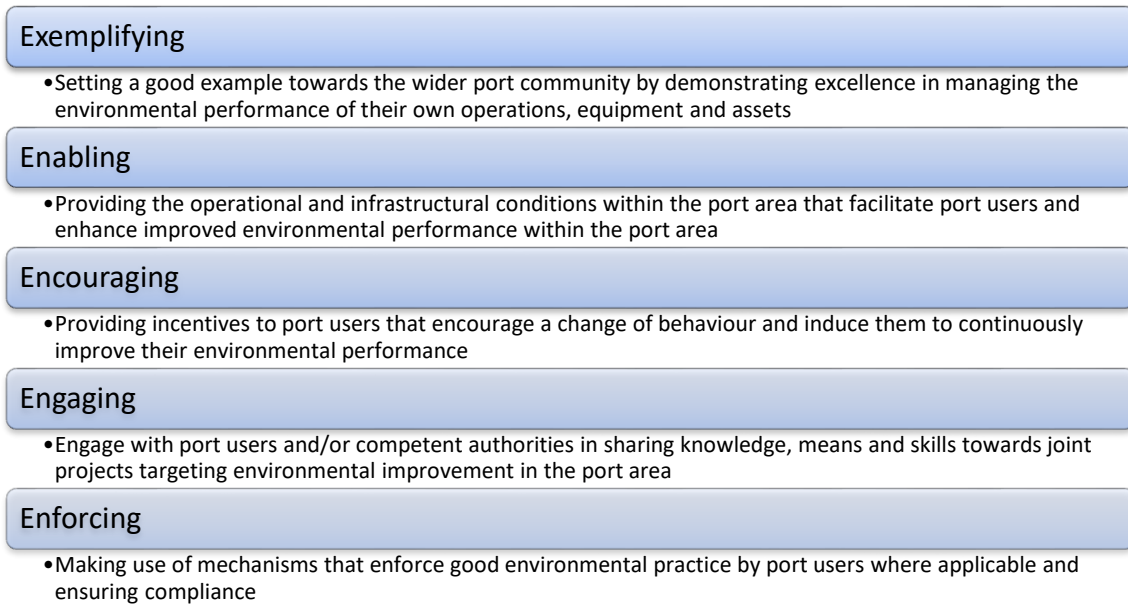


Figure 2. Focused action towards improving port environmental port performance (ESPO)

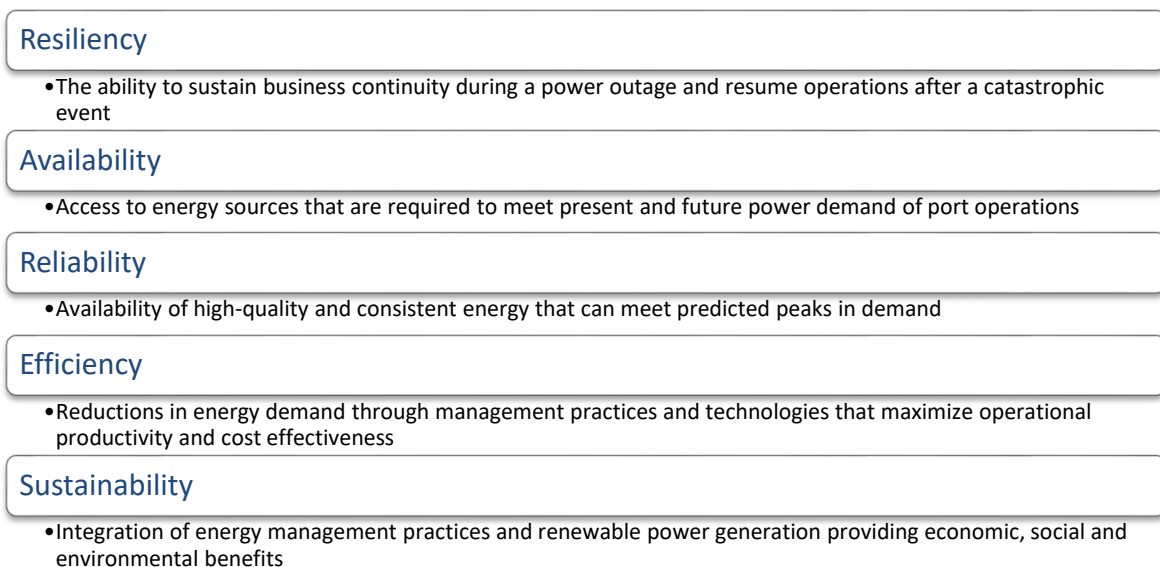


Figure 3. Energy pillars for development of port EMP

Each port/marina must establish a development model with a specific time horizon, define its strategic objectives and focus of actions. The objectives, target actions and solutions depend on current market position, business vision and strategy and in certain cases obligation to preserve public interest and concern of local community. Besides, 5 pillars of actions for port authorities proposed by ESPO, port’s EMP should address the 5 energy pillars (Boile et al. 2016) shown in Figure 3.

Further step is mapping of overall energy consumption including direct fuel consumption and purchased electricity or heat costs. That may be done on monthly, quarterly or annually basis. Consumption data should be collected for each port services or sub-system: nautical operations, boat supplies, maintenance and service activities, general purpose facilities, etc. (Figure 4).

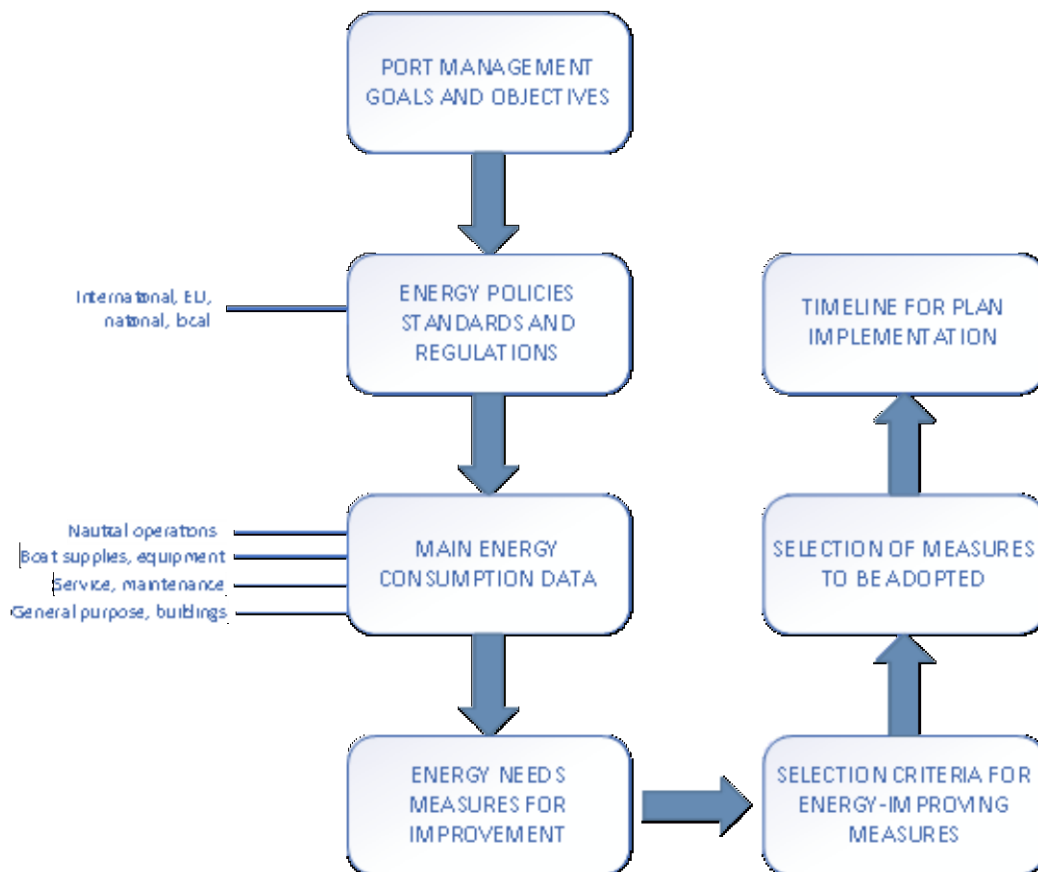


Figure 4. Process of Port energy management plan development

The purpose of marina energy mapping process is to assess the existing port's energy performance and helps to identify the existing gaps that should be resolved in order to improve energy-efficiency. For assessment of the port energy performance, some benchmarks or performance indicator have to be established. Through this port needs and measures for improvement are identified, following the solutions and technologies that best fit the identified requirements. Next, the choice of measures is made according to some criteria and analysis of their impacts, technical and economic feasibility and implementability. Evaluations are made against selected criteria and criteria groups (targets). Targets may be different for different group of stakeholders, therefore different weights may be assigned in this evaluation by ports and/or stakeholders based on their priorities or preferable targets.

4. Insight analysis of existing port management practice in project partner's region

4.1. The objective and methodology

The objective of this part of task 3.2 “Analysis of Marina Management System and Investments model” is to give overall picture of existing port management practice in project partner's region with emphasis on project pilot area. For this purpose, the questionnaire is developed to collect all relevant information about port management practice and standard applicable in Italian and Croatian marinas in the Adriatic. According to information received, insight state-of-the art analysis of the nautical ports with respect to implementation of green port management concept and energy efficient mobility is carried out. Thy results are presented through description and simple graphics depending of the type and amount of data.

Questionnaire consist of the following segments:

- General data
- Service quality indicators
- Environmental impact/pressures
- Energy indicators
- Investments needs and priorities

The questionnaire was sent to all PP pilots and to project stakeholders. The list of stakeholders and project partners provide the relevant information is stated in the following table (Table 4). Different type of nautical ports (private, public) from two countries are included in the analysis. Also, ports located in the northern and southern part of Adriatic are represented.

Table 4. List of nautical port participating in the questionnaire

	Port/Marina	Country	Region
1.	Porto Turistico Rodi Garganico	Italy	Puglia/Southern A.
2.	Marina del Gargano Manfredonia	Italy	Puglia/Southern A.
3.	Porto San Rocco	Italy	Venezia-Giulia/Northern A.
4.	Shipyard & Marina Sant'Andrea	Italy	Venezia-Giulia/Northern A.
5.	Darsena Porto Vecchio (Porto Lignano)	Italy	Venezia-Giulia/Northern A.
6.	Marina Punta Verde	Italy	Venezia-Giulia/Northern A.
7.	Marina Punta Faro	Italy	Venezia-Giulia/Northern A.
8.	Marina Hannibal srl	Italy	Venezia-Giulia/Northern A.
9.	Darsena San Marco srl	Italy	Venezia-Giulia/Northern A.
10.	Marina San Giusto	Italy	Venezia-Giulia/Northern A.
11.	County Port Authority of Krk	Croatia	Kvarner/Northern A.
12.	Porat	Croatia	Kvarner/Northern A.
13.	ACI marina Vrboska	Croatia	Dalmatia/Southern A.
14.	Marina Martinis Marchi	Croatia	Dalmatia/Southern A.
15.	ACI marina Trogir	Croatia	Dalmatia/Southern A.
16.	ACI marina Split	Croatia	Dalmatia/Southern A.

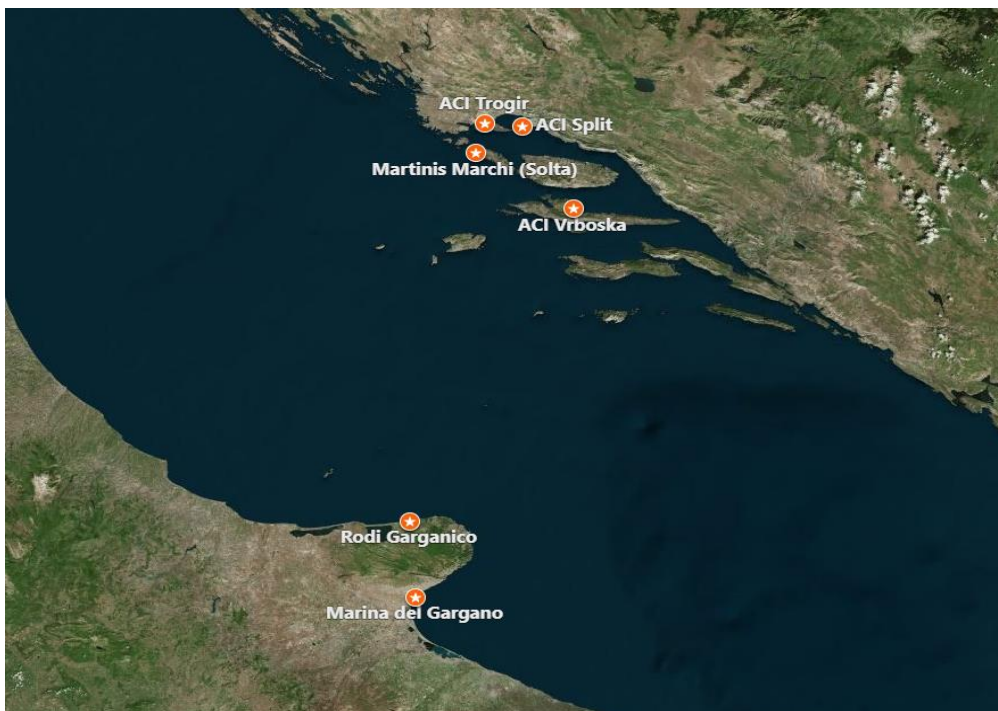
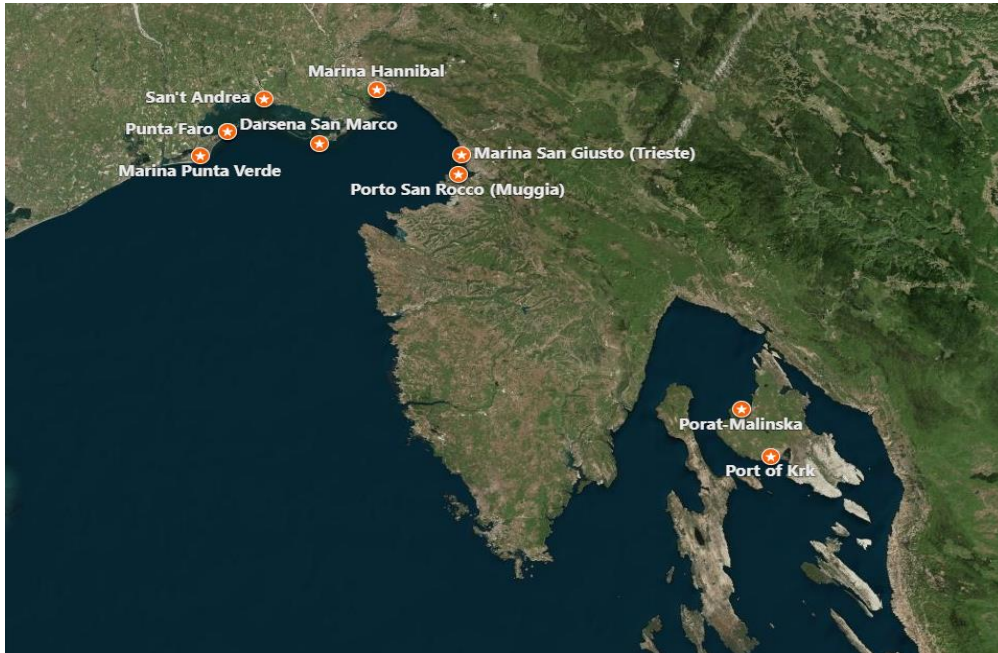


Figure 5. Location of selected nautical ports in Northern and Southern Adriatic

4.2. General data

Basic data has been collected from the marinas participating in the questionnaire to get the insight information on several categories which has been identified as relevant for the analysis of the project management and business policy, practice and future development. Those categories are:

- Marina categorization,
- Ownership structure,
- Number of employees,
- Internal organization,
- Education of employees and expert capacities,
- Collaboration with public and private stakeholders and other organizations,
- Marina function and focus of action,
- Economic activities nearby marina area,
- Distance from main traffic nodes and quality of traffic infrastructure,
- Funding source

Marina categorization, ownership structure, number of employees and internal organization

The marina categorization differs in Italy and Croatia. In Croatia marina categorization is prescribed by “Regulation on Classification and Categorization of Ports for Nautical Tourism; Rules on marinas categorization”, but that is not applicable to public ports offering public service on short-term staying basis.

Number of employees in marinas varies from 7-30 depending on categorization, size and internal organization.

The most common departments in marinas are management department (managers and captains), administration (finance, accounting) reception, accommodation, maintenance, cleaning, nautical yard, restaurants and stores. Some marinas which are owned by a public authority and municipalities have also department for EU projects and single administration department.

The marinas are mostly owned by private company (56%) and public authority (31%). Other marinas (13%) are owned by a regional authority or municipality.

Education of employees and expert capacities

Marinas are aware of importance of continuous education of their employees to improve their service level, so they provide various form of education regarding following topics:

- Financial issues,
- Customer service relationship and marketing,
- Manager activities,
- Operational activities,
- Safety at work,
- Languages,
- Data protection regulation,
- Mandatory courses.

In order to maintain service quality marinas should dispose with enough experts in various areas as regular personnel or “ad hoc” personnel engaged in the case of projects and similar activities. Marinas were asked to declare if they lacked experts, and if answered yes what kind of experts they lack. The 56% of marinas do not have enough, or do not have at all, energy/ecology experts, port experts and quality experts. This is significant information because without expert capacities in these field ports and marinas would not be able to meet expectation in improvement of environmental and energy efficiency. Therefore, education and specialization of experts in these fields should be part of future measures to achieve green policy targets.

Collaboration with public and private stakeholders and other organization

According to received responses, the 75% of marinas continuously collaborate with public and private stakeholders. Collaboration modes are different and include round tables, coordination meetings, workshops, conferences, industry fairs, collaboration with hotels, nautical syndicate and public bodies.

There are also collaboration of advisory type indicated on daily basis such as contacts with inspection services, custom service, harbor master offices, employment offices, local self-government, tourist office, environmental protection, etc.

On the management level, constant collaboration with Ministry of Tourism and Ministry of Transport has been reported.

Almost 2/3 of the marinas cooperate with scientific organization, professional associations or similar 3rd party organizations. They reported cooperation with Maritime faculties, Employers Association, Chamber of Commerce, Assonautica Italiana, Lege Navale Italiana, CMAS, FIPS, as well as cooperation with professional consultants to get administrative and technical assistance and external expertise for the EU project implementation.

Marina functions, focus of action and economic activities nearby

Marina function depend on port type, dedicated role in the national port system or on business strategy. Generally, every port should be able to accommodate certain type of vessels depending on the main port function. There are 4 main port function proposed and customized for ports accommodate nautical vessels and small crafts:

- Nautical function with short-term berth arrangements - transit berths available in marinas but in other public ports as well
- Nautical tourism function with long-term berth arrangements – typically for marinas
- Port in function of community and local citizens – typically for local (community) ports
- Public port function with public service berthing priorities – typically for public ports with regular shipping service (for connection with islands)

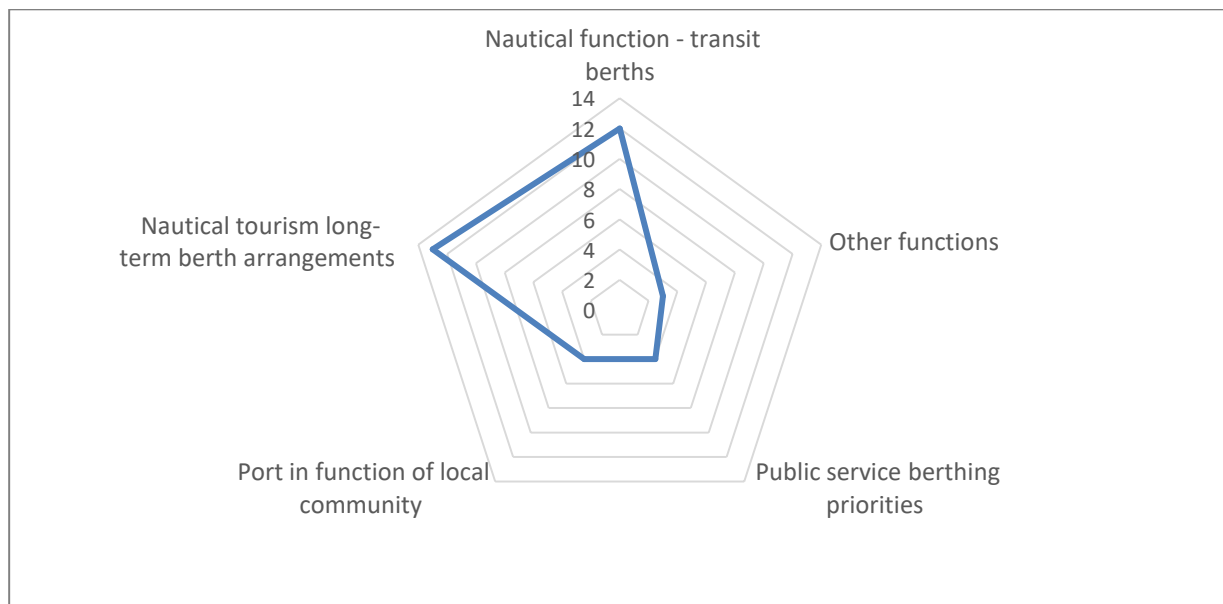


Figure 6. Marina functions

When focus of action is considered, that should be in close relation with port function. Focus of action for public and local ports should be public service to serve local community and to ensure public services for users. On the other hand, it is expected that commercial activities is primary focus of private ports/marinas.

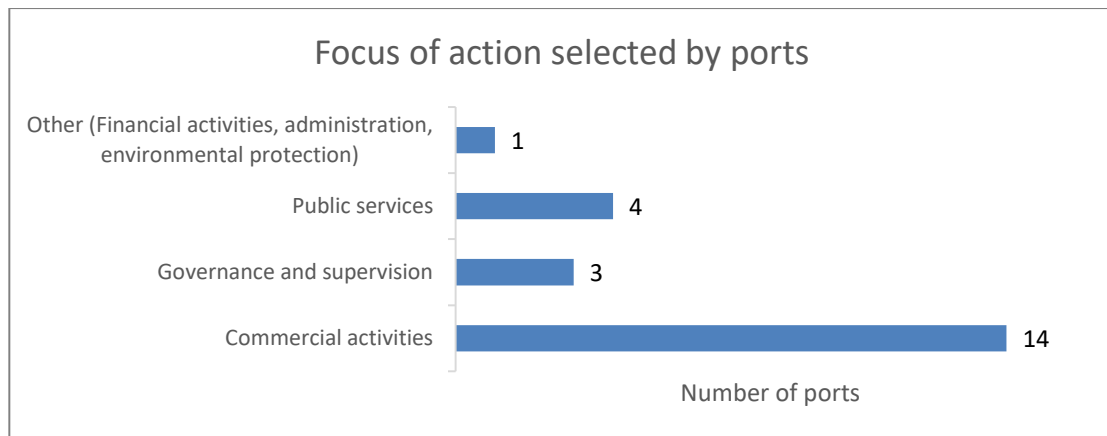


Figure 7. Marina focus of action

The results (Figure 6) is quite predictable according to dedicated role of the chosen ports participating in the questionnaire. Most sample ports are nautical ports where nautical tourists and skippers are only users of the port, so nautical function is dominated. But it is interesting to compare relation between port function and port focus of action. Normally, focus of action (Figure 7) should match the port function which is the case. Very limited number of marinas see a public service or governance as a focus of action. Almost every marina participated in the questionnaire gave voice to commercial activities as focus of action.

Economic activities nearby port area

Tourism is, as expected, strong dominated and common activity in surrounding area of all marinas. About half of sample ports have selected shipbuilding and servicing, fishing and diving activities nearby port area. Couple of ports selected other industrial and agriculture activities. The result of analysis is presented in the Figure 8.

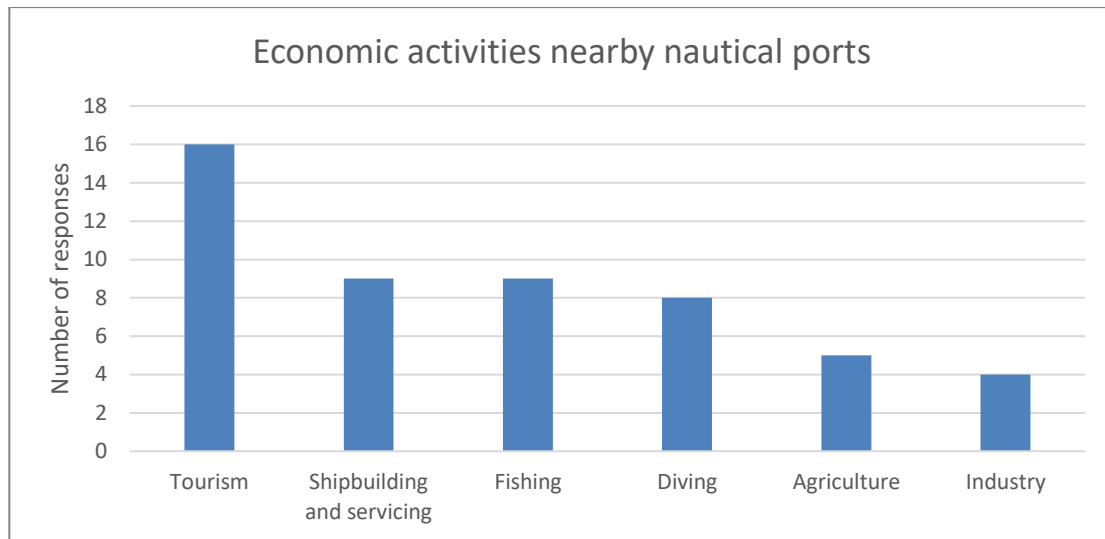


Figure 8. Economic activities located in the vicinity of the port area selected by ports

Distance from main traffic nodes and quality of transport infrastructure

Ports from the sample are well connected to the main traffic nodes. All transport modes are accessible within reasonable distances. The most distant traffic nodes are airport and ferry terminals, but from many nautical ports, airport is below 100 km away. Bus terminals are in the nearest reach from ports, up to 40 km in the worst case (Figure 9).

Ports have also rated the quality of transport infrastructure by reach of transport mode. The results are shown in Figure 10. Ports are generally rated quality of transport infrastructure as satisfactory or very good. Although, some marinas reported shortcomings in infrastructure for the given transport mode.

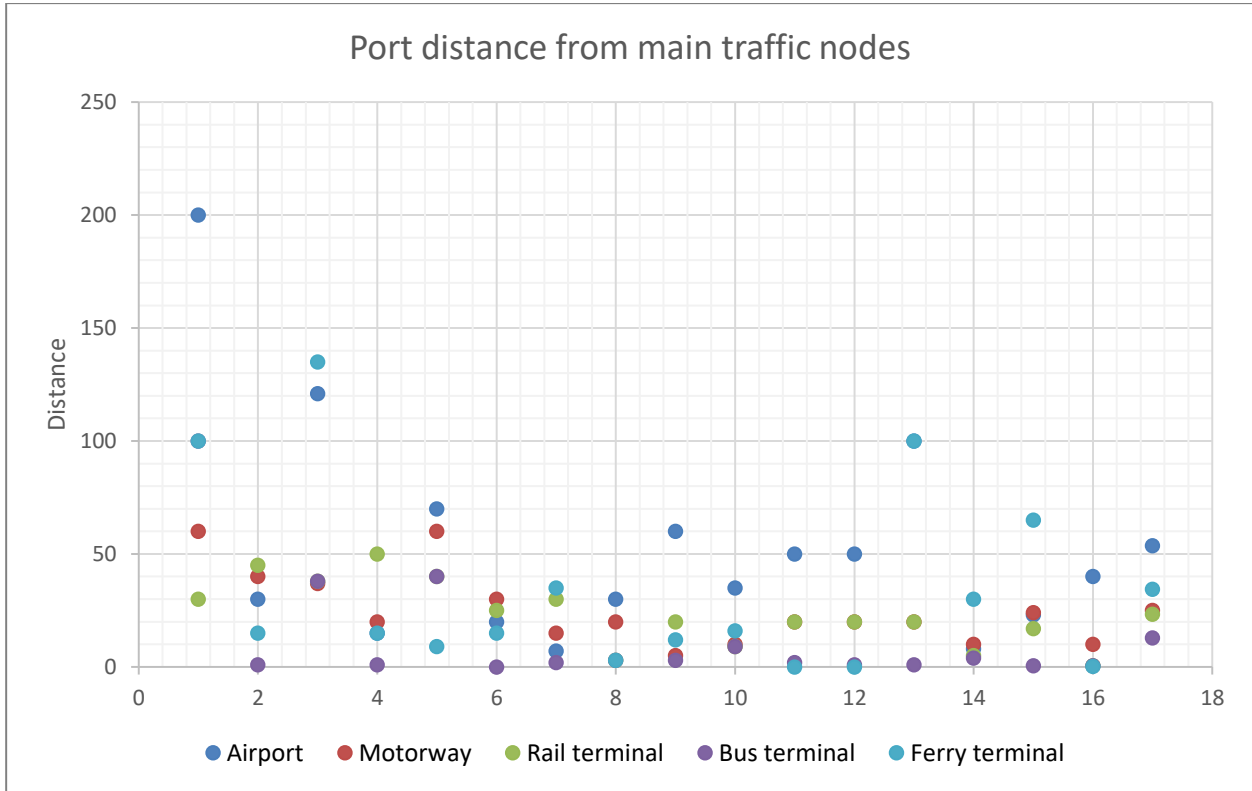


Figure 9. Distance from selected ports to the main traffic nodes

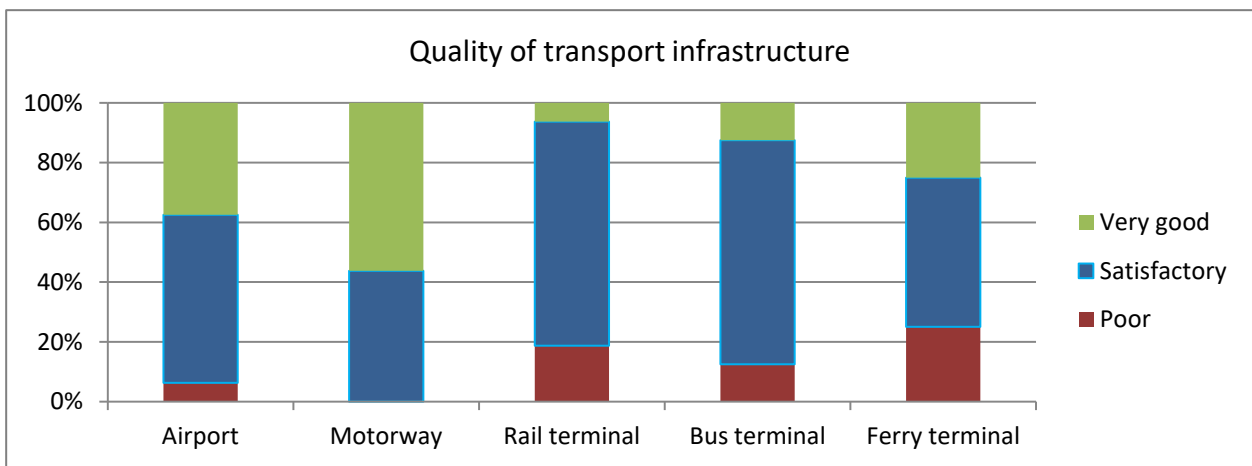


Figure 10. Quality of transport infrastructure reported by ports

Funding source

The marinas use own income (63%) and loans (17%) as a main funding source. Furthermore, marinas combine own sources with other funding sources, mostly EU funds and regional funds (8%). The least used funding sources are national funds (4%). However, national funds are the main source of financing for Croatian public ports. The main sources of funding in marinas are shown in the Figure 11.

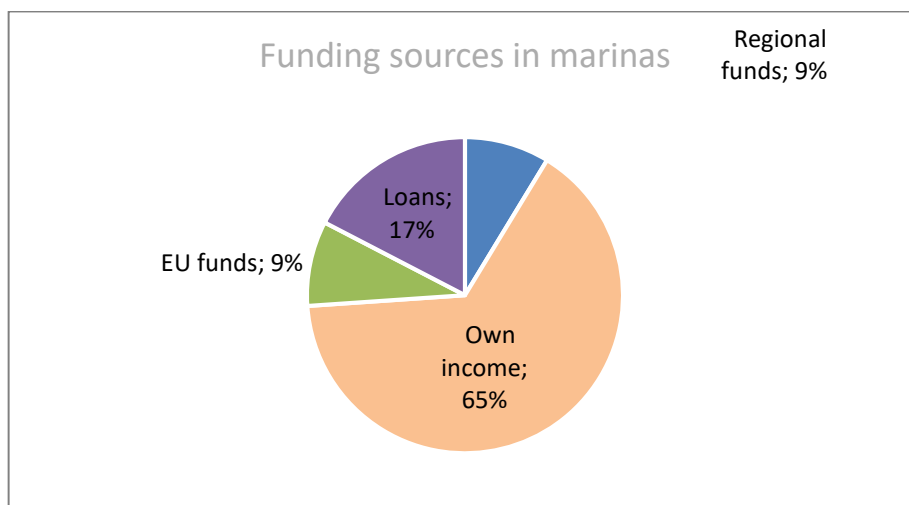


Figure 11. Funding sources

4.3. Service quality indicators

The purpose of this part of the analysis is to get the insight in the capacities of marinas regarding to service quality from the aspect of quality management, quality standards, quality documents and infrastructure.

The results show that 31% of marinas have “The Quality Management Plan” and 44% marinas comply with ISO standards and have ISO certificates, which indicates awareness of marinas of importance in increasing and maintain quality of service. The requested ISO certificates and quality standards included in the results are:

- ISO 9001: Quality management systems – Requirements

- ISO 14001: Environmental management systems - Requirements with guidance for use
- ISO 140001: Environmental management
- ISO 50001: Energy management systems - Requirements with guidance for use
- Blue flag

Service quality may be measured in different way, the most effective one is to use some performance indicators based on the satisfaction of the end-users. However, for the purpose of the project, the focus is given to infrastructure and services availability. Therefore, the indicators and aggregated around three main groups: berth capacity, electricity and water supply connection availability and availability of the services to marina users. The following service quality indicators are considered:

Berth capacities:

- Mooring berths by the boat length
- Dry berths (land storage) by the boat length
- Transit berths by the boat length
- Marked berths (marked with letters and numbers)
- Berths for yacht load line length of 24 meters and above
- Online berth booking
- Lighting of berths

Electricity connection and water supply connection:

- Electricity connection for vessels by number of berths, 220V power supply
- Electricity connection for vessels by number of berths, 380V power supply
- Water supply connection for vessels by number of berths

Other service quality indicators:

- Reception facility
- Multilingual personnel
- Video surveillance – security systems
- Wi-Fi internet access
- Computer corner
- Sanitary facility

- Parking area for boat owners
- Food and beverages
- Grocery store
- Boat rental service
- E-vehicles rental service
- Gas station
- Vessel equipment storage space
- Maintenance service
- Transportation of vessels
- Handling equipment (travel lift)
- Waste disposal

The results of the analysis is presented in the table below (Table 5).

Table 5. Service quality indicators in nautical ports

BERTH CAPACITIES							
Marina	Mooring berths (number by the boat length)	Dry berths for land storage (number by the boat length)	Transit berths (number by the boat length)	Marked berths with letters and numbers	Berths for yacht load line length of 24 meters and above	Online berth booking	Lighting of berths
Porto turistico Rodi Garganico	7m-12m =150 12m-18m= 120 18m-24m=30 24m and more=10	X	X	Ö	Ö	Ö	X
Marina del Gargano Manfredonia	Up to 8m=100 Up to 10m=77 Up to 12m=132 Up to 14m=124 Up to 16m= 108 Up to 18m= 50 Up to 21=46 Up to 25m=32 Up to 30m=14 Up to 40m=9 Up to 50m=2	Ö	Up to 50m=70	Ö	Ö	Ö	Ö
Porto San Rocco	546 berths	Ö	Ö 0-60m	Ö	Ö	Ö	Ö
Shipyard & Marina Sant'Andrea	300	400	10	Ö	Ö	X	Ö
Darsena Porto Vecchio	5m-18m= 430	shed storage only	10% of total berths 5/18	Ö	X	X	Ö

Marina Punta Verde	6m-m20=320	shed storage only	10% of total from 6 to 20	Ö	X	Ö	Ö
Marina Punta Faro	7m-40m=1200	0m-25m=300	0m to 40m=100	Ö	Ö	X	Ö
Marina Hannibal srl	6m-45=298	6m-45m=200 (up to 300 t displacement)	6 to 45m=30	Ö	Ö	X	Ö
Darsena San Marco srl	117	Ö (number by the length n/a)	11	X	X	X	Ö
Marina San Giusto	Up to 9 m=66 Up to 10m=53 Up to 11m=29 Up to 12 m=33 Up to 13 m=4, Up to 15 m= 19, Up to 17 m=3 Up to 20m=3 Up to 30=5 1 pier up to 120 m Mega yachts	X	depending on available berth not used for seasonal or annual mooring	Ö	Ö	Ö	Ö
County Port Authority of Krk	4m-9m= 3478	X	4m-15m=822	Ö	Ö	Ö	Ö
Porat	n/a	n/a	n/a	X	X	X	X

ACI marina Vrboska	6m-8m=8 8m-10m=14 10m-12m=26 12m-14m=41 14m-15m=20 15m-19m=4 19m-35m=9	5m-10m=12	8m-10m=6 10m-12m=10 12m-14m=10 14m-17m=6 17m-20m=3 20m-25m=3 25m-35m=3	Ö	Ö	Ö	Ö
Marina Martinis Marchi	10m-35m=50	X	10m-35m=50	Ö	Ö	Ö	Ö
ACI marina Trogir	5m-22m=174	5m-13m=30	5m-22m	Ö	X	Ö	Ö
ACI marina Split	Up to 90m=318	1m-10m=30	30 berths (length data not specified)	Ö	Ö	Ö	Ö

OTHER SERVICE QUALITY INDICATORS (continued)

Marina	Grocery store	Boat rental service	E-vehicles rental service	Gas station	Vessel equipment storage space	Maintenance service	Transportation of vessels	Handling equipment (Travel lift)	Waste disposal
Porto Turistico Rodi Garganico	Ö	Ö	X	Ö	Ö	Ö	X	Ö	Ö
Marina del Gargano Manfredonia	Ö	Ö	X	Ö	Ö	Ö	Ö	X	Ö
Porto San Rocco	Ö	X	X	Ö	X	Ö	X	X	Ö
Shipyard & Marina Sant'Andrea	X	X	X	X	Ö	Ö	X	Ö	Ö
Darsena Porto Vecchio	Ö	Ö	X	Ö	Ö	Ö	Ö	Ö	Ö
Marina Punta Verde	X	Ö	X	X	Ö	Ö	Ö	Ö	Ö
Marina Punta Faro	Ö	Ö	X	Ö	Ö	Ö	X	Ö	Ö
Marina Hannibal srl	X	X	X	X	Ö	Ö	X	Ö	Ö
Darsena San Marco srl	Ö	X	X	Ö	Ö	Ö	X	Ö	Ö
Marina San Giusto	Ö	X	X	X	X	Ö	X	X	Ö
County Port Authority of Krk	Ö	Ö	X	Ö	Ö	Ö	Ö	Ö	Ö
Porat	Ö	Ö	X	Ö	X	X	X	X	X
ACI marina Vrboska	Ö	X	X	Ö	Ö	Ö	X	Ö	Ö
Marina Martinis Marchi	Ö	Ö	X	Ö	X	X	X	X	Ö
ACI marina Trogir	Ö	Ö	X	X	Ö	Ö	Ö	Ö	Ö
ACI marina Split	Ö	Ö	Ö	Ö	Ö	Ö	X	Ö	Ö

ELECTRICITY CONNECTION AND WATERSUPPLY CONNECTION

Marina	Electricity connection for vessels (220V for every 20 berths)	Water supply connection for vessels (for every 20 berths)	Electricity connection for vessels (220V every 10 berths)	Electricity connection of vessel (380V for 1% of berths)	Water supply connection of vessel (for every 10 berths)	Electricity connection of vessel (380V for every 3 berths)	Electricity connection of vessel (380V for 2% of berths)	Water supply connection of vessel (for every 5 berths)
Porto Turistico Rodi Garganico	Ö	Ö	Ö	Ö	Ö	X	X	Ö
Marina del Gargano Manfredonia	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö
Porto San Rocco	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö
County Port Authority of Krk	X	X	X	X	X	X	X	X
Shipyard & Marina Sant'Andrea	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö
Darsena Porto Vecchio	Ö	Ö	Ö	X	Ö	X	X	Ö
Marina Punta Verde	Ö	Ö	Ö	X	Ö	X	X	Ö
Marina Punta Faro	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö
Marina Hannibal srl	Ö	Ö	Ö	Ö	Ö	X	Ö	Ö
Darsena San Marco srl	Ö	Ö	Ö	X	Ö	X	X	Ö
Marina San Giusto	Ö	Ö	Ö	Ö	Ö	X	X	Ö

ELECTRICITY CONNECTION AND WATERSUPPLY CONNECTION								
Marina	Electricity connection for vessels (220V for every 20 berths)	Water supply connection for vessels (for every 20 berths)	Electricity connection for vessels (220V every 10 berths)	Electricity connection of vessel (380V for 1% of berths)	Water supply connection of vessel (for every 10 berths)	Electricity connection of vessel (380V for every 3 berths)	Electricity connection of vessel (380V for 2% of berths)	Water supply connection of vessel (for every 5 berths)
Porat	X	X	X	X	X	X	X	X
ACI marina Vrboska	Ö	Ö	Ö	Ö	Ö	X	Ö	Ö
Marina Martinis Marchi	Ö	Ö	Ö	Ö	Ö	X	Ö	Ö
ACI marina Trogir	Ö	Ö	Ö	X	Ö	X	X	X
ACI marina Split	Ö	Ö	Ö	X	Ö	X	X	Ö

OTHER SERVICE QUALITY INDICATORS

Marina	Reception (information office)	Multilingual personnel	Video Surveillance (security cameras)	Wi-Fi internet access	Computer corner	Sanitary facility	Parking area for boat owners	Food & Beverage
Porto Turistico Rodi Garganico	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö
Marina del Gargano Manfredonia	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö
Porto San Rocco	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö
Shipyard & Marina Sant'Andrea	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö
Darsena Porto Vecchio	Ö	Ö	Ö	Ö	X	Ö	Ö	Ö
Marina Punta Verde	Ö	Ö	Ö	Ö	X	Ö	Ö	Ö
Marina Punta Faro	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö
Marina Hannibal srl	Ö	Ö	Ö	Ö	X	Ö	Ö	Ö
Darsena San Marco srl	Ö	Ö	Ö	Ö	X	Ö	Ö	Ö
Marina San Giusto	Ö	Ö	Ö	Ö	X	Ö	Ö	Ö
County Port Authority of Krk	Ö	Ö	Ö	Ö	X	Ö	Ö	Ö
Porat	X	X	X	X	X	X	X	Ö
ACI marina Vrboska	Ö	Ö	Ö	Ö	X	Ö	Ö	Ö
Marina Martinis Marchi	Ö	Ö	Ö	Ö	X	Ö	Ö	Ö
ACI marina Trogir	Ö	Ö	Ö	Ö	X	Ö	Ö	Ö
ACI marina Split	Ö	Ö	Ö	Ö	Ö	Ö	Ö	Ö

4.4. Environmental impact/pressures

The environmental impact generally have negative sign caused by human activities. The same may be considered in the nautical ports where port activities put the pressures to environment. The purpose of this part of the analysis is to collect the information about the stakeholder opinion on the intensity of impacts in their area. The following type of impacts on environment has been considered:

- noise from the boats
- air pollution from the boats/cars in the port area and surroundings
- energy consumptions and supply needs
- risk of accident during fuel supply
- discharges from boats
- traffic in the port area and approaching roads
- parking issues in the port area
- others (non-specified)

Some of above types have direct impact on environment like noise, pollution or discharges, some of them has indirect impact on environment. For example, traffic congestion and lack of parking places contribute to higher consumption and pollution, sub-standard fuel supply facilities may have increased risk of accident with harmful consequences on environment, etc.

The outcome of the analysis is presented in the following figure (Figure 12). The results show that nautical ports didn't experience safety or environmental issues (e.g. risks, accidents...) in the last 5 years. From the information received they rated the elements of impacts/pressures as follows:

- Noise from boats and lack of gas stations are affecting minimal in respect to other elements
- Energy consumption and supply needs, discharges from boats and parking issues are rated as the elements which can extremely influence marinas
- Other elements: air pollution from the boats/cars, risk of accidents during fuel supply, traffic in the port area, all are rated as slight to moderate influencing elements.

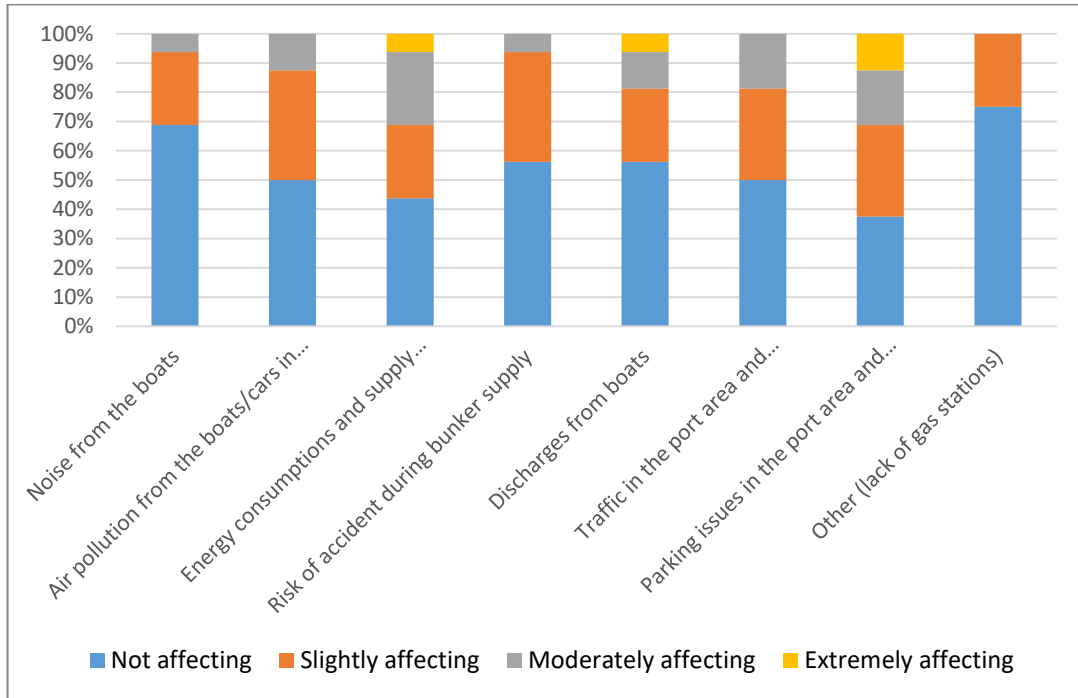


Figure 12. Environmental impacts and pressures in marinas

It should be noted that this is self-evaluation of the impacts, that are in generally made by marina operators itself. One may conclude that marina itself are not aware enough on effects on environment because “not affecting” mark dominated across the scale for each impact element. On the other hand, moderate and high affects are recognized in energy consumption, energy supply needs and affect related to traffic and mobility. This is good sign because it shows that nautical ports addressed the problem which is actually in focus of the DeepSea project.

4.5. Energy indicators

In this part of the analysis the goas was to get the insight in current capacities of marinas regarding to energy form, the aspect of energy management, energy policies, energy monitoring and energy infrastructure.

All detailed data are shown in detail in the Table 6 and described briefly below.

Table 6. Energy indicators

ENERGY INDICATORS									
Marina	Energy plan or Energy policy	Availability of the Energy plan or Energy policy to the public	Energy standards beyond required	Annual energy review or report	Designated personnel	Energy management system	Energy consumption monitoring	Energy indicators to monitor energy performance	Led or conventional lighting
Porto Turistico Rodi Garganico	X	X	X	X	X	X	Ö electric column	Ö display on the electric cabin	X
Marina del Gargano Manfredonia	Ö	X	Ö	X	X	X	Ö electricity consumption control meters	Ö 41/5000 pre-loaded electricity and water consumption at boat stations	Ö conventional lighting
Porto San Rocco	Ö	X	X	X	X	Ö	X	X	Ö LED
Darsena Porto Vecchio	X	n/a	n/a	X	X	X	X	X	X
Marina Punta Verde	X	n/a	n/a	X	X	X	X	X	Ö PL/PLE lightning
Marina Punta Faro	X	n/a	n/a	X	Ö	X	X	X	Ö
Marina Hannibal srl	X	X	n/a	X	Ö	X	Ö electricity counter	X	Ö both led and conventional
Darsena San Marco srl	X	X	X	X	X	X	X	X	No

Marina San Giusto	X	n/a	n/a	X	X	X	Ö bigger boats are charged for actual consumption of energy	X	Ö trying to replace conventional lighting with led where possible
County Port Authority of Krk	X	n/a	n/a	X	X	X	X	X	Ö conventional lighting
Porat	X	n/a	n/a	X	X	X	X	X	X
ACI marina Vrboska	Ö	Ö	Ö Energy saving devices	X	Ö	X	Ö e-monitoring of electric energy and water consumption	Ö Continuous monitoring of consumption	Ö Mostly LED, other changeable
Marina Martinis Marchi	X	n/a	n/a	Ö	X	X	Ö consumption history monitoring	X	Ö led where possible
ACI marina Trogir	Ö	X	X	Ö	X	water and electricity monitors Ö	Ö On monitor on TV above reception	Ö (not specified)	Ö conventional lighting
ACI marina Split	Ö	Ö	Ö	Ö	Ö	Ö Internal management in Rijeka	Ö (not specified)	Ö (not specified)	Ö (not specified)

ENERGY INDICATORS

Marina	Solar power on roof tops on the buildings	Air conditioner and ventilation energy reduction measures	E-document software	Energy from renewable resources	Electric equipment for handling operation	Promotion of ride share or shuttle bus or e-vehicles for rent	Charging station for e-cars	Solar bench charger	Shore power for vessels with electric power	Energy efficiency control system	Promotion of Green port concept for community	Micro-grid
Porto Turistico Rodi Garganico	X	X	Ö Electronic invoicing	X	X	X	X	X	X	X	X	X
Marina del Gargano Manfredonia	X	X	X	X	X	X In progress	X	X	Ö Pedestal at the berths	Ö Counter	Ö Promotion activities for the issue of certification (Blue Flag)	X
Porto San Rocco	X	Ö improved	Ö	Ö	Ö	X	X	X	X	X	X	X
Shipyard & Marina Sant'Andrea	Ö	Ö Green energy	X	Ö pv system	X	X	Ö 3kw	X	Ö 90 electrical power units on docks and land with portals	Ö electrical measuring system	Ö social media and educational	X

									220V and 380V			
Darsena Porto Vecchio	X	X	X	X	X	X	X	X	X	X	X	X
Marina Punta Verde	Ö	X	X	Ö solar power for hot water and photovoltaic power	X	X	Ö	X	X	X	X	X
Marina Punta Faro	X	X	X	X	X	X	Ö	X	X	X	X	X
Marina Hannibal srl	Ö	X	Ö Plus Marine	X	Ö	X	X	X	Ö FROM 16Amp TO 125Amp	X	X	X
Darsena San Marco srl	Ö	X	X	X	X	X	X	X	Ö	X	X	X
Marina San Giusto	X	X	X	X	X	Ö renting e-bikes	X	X	X	X	X	X
County Port Authority of Krk	X	X	X	X	X	X	Ö 7	X	X	X	X	X
Porat	X	X	X	X	X	X	Ö	X	X	X	X	X
ACI marina Vrboska	Ö	X	X	Ö Solar system for	X	X	Ö 1	X	X	X	X	X

				water warming								
Marina Martinis Marchi	Ö	X	Ö Office 365	X	Ö	X	X 2	X	Ö (not specified)	X	X	X
ACI marina Trogir	Ö	X	X	X	X	X	X	X	X	X	X	X
ACI marina Split	Ö	Ö UNP	X	X	X	X	Ö Tesla and other el.cars	X	X	X	Ö	X

The Energy plan or Energy Policy has 37% of marinas which is relatively low rate. Within marinas which have Energy plan or Energy Policy only half of them provide public availability of Energy Plan or Energy Policy.

Only 25% of marinas publishes annual Energy review or report. Designated personnel are employed in 37% of marinas. The Energy management system is the part of business providing in 19% of marinas and it's mostly provided through water and electricity monitors.

Energy consumption monitoring is provided by of 56% marinas through electricity consumption control meters, E-monitoring of electricity and water consumption and similar.

Energy indicators to monitor trends in energy performance is used in 37% of marinas and it's provided through display in electric cabins, pre-loaded electricity and water consumption at boat stations, continuous consumption monitoring with alarm system for limits.

The 31% marinas have solar power on roof tops on the buildings. Air conditioner and ventilation energy reduction measures has implemented in 19% of marinas. The 25% of marinas have e-document software (electronic invoicing).

Regarding the energy form renewable resources 25% marinas has some resources (e.g. solar system for water warming) and 19% has electric equipment for handling operation.

Shore power for vessels with electric power have 31% while charging station for e-cars have 44%. Only some of marinas carry out promotion activities of Green port concept for community. Energy efficiency control system have 19% marinas, 6% marinas have promotion of ride share.

None of reported marinas have solar bench charger or shuttle bus or e-vehicles for rent or microgrid facilities.

4.6. Investment needs and priorities

The purpose of this part of the questionnaire is to get the insight in the most important investment needs of marinas as well as in the most priority investments of marinas. As the investment needs marinas identified: Energy saving investments, environmental protection, nautical capacities and infrastructure and improvement of the services for end-users.

The following investment needs are identified as the priority investment:

- Reduced energy consumption: microgrid, e-charges, LED lighting
- Renewable energy resources: solar power
- Sustainable mobility: e-bikes, e-boats, e-vehicles
- Environmental protection and Green port concept
- Infrastructure
- More services for users

The analysis of investment needs and investment priorities of marinas point out the focus on sustainability issues: energy resource, environment protection and sustainable mobility. Marinas prioritize the investments in energy saving devices (microgrid, e-charges, LED, solar power...). Getting more e-bikes, e-boats, e-vehicles is a priority in goals of sustainable mobility. Marinas are decisive to become "Green marinas". Also, marinas would like to improve their infrastructure and provide more services for users.

5. Multi-criteria analysis tool for evaluation of opportunities, impacts and scenario development of energy efficient mobility

Implementation of energy efficient mobility requires definition of strategy and scenario development – action plan for each pilot site and ports/marinas participated in the pilots. To achieve this outcome the evaluation tool has been developed in order to estimate the impacts of the actions to be carry out. Those actions are defined in the project and include activities, investment in facilities, equipment and e-mobility services in each pilot site during testing. Therefore, the Multi Criteria Decision Analysis (MCA) is used as ex-ante evaluation of the opportunity and impacts estimated by the stakeholders and marina experts.

5.1. Methods and Methodology

Multi- criteria decision making is a branch of operation research models and well know field of decision making. The most common multi-criteria decision methods used in energy planning literature are: Analytic Hierarchy Process (AHP), Weighted Sum model (WSM), PROMETHEE, ELECTRE, MAUT, fuzzy methods and decision support systems (DSS) (Pohekar and Ramachandran, 2004.). These methods can handle both quantitative as well as qualitative criteria and analyze conflict in criteria and decision makers.

For the purpose of this project multi- criteria analysis is conducted using PROMETHEE (Preference Ranking Organization Method for the Enrichment of Evaluations) and the accompanying GAIA (Graphical Analysis for Interactive Aid) method. Also WSM model is used as a simple method because the units that describe the indicators are the same for all alternatives. The PROMETHEE and GAIA methods are among the most widely used multi- criteria decision aid methods. The PROMETHEE method was developed by J. P. Brans and B. Mareschal in 1983. Model was developed in Visual Promethee software.

Delphi method may be used along with MCA tool for assessment of the impacts across the proposed criteria. The evaluation grid is developed to help the evaluators to asses the impacts. The board of experts should discuss and assign weights to each element along with justification. Other board members can evaluate, accept or modify the weighting performed. In the discussion, board of experts should give the final score of the evaluation eventually. for each pilot site/marina and for each scenario this can be done separately.

MCA tool provide decision makers considering different area of impacts of certain actions. The impact area include environment, economy, transport-mobility and society. For each area of impacts criteria has been developed with indicators for estimation of impacts if the action would be implemented.

For the purpose of the project the actions are considering according to those focused during the pilot activities as follows:

- Electric charging stations (ECS) for boats/vessels
- Electric charging stations (ECS) for cars
- E-mobility & sharing services
- Micro-grid systems

However, any new action with the purpose to improve or develop energy efficiency and mobility services in a port/marina may be added and evaluated through the tool, according to interest of port/marina stakeholder. The purpose of the tool is rather to show the opportunity and direction of the impacts than to choose the only one action with the best score. The most valuable result is achieved when what-if scenario is performed against different weighting values according to the strategy and objectives of the port or marina operator or according to common port policy defined by the port authority.

5.2. Criteria selection, indicators and weighting scales

The used criteria for evaluation and comparison of proper actions, identified by the pilot sites, are divided into four criteria groups or impact areas: environmental, economic, technical and social.

The first group of criteria refers to environmental criteria and includes: GHG emissions reduction, noise reduction, spatial impact on nearby area and reduction in energy consumption.

The second group of criteria refers to economic criteria and comprises: Investment and operational costs, cost effectiveness, seasonal dependency, development of business activities in the zone of influence, profitability levels and funding opportunities.

Technical group refer to technical and port service issues relevant for the action evaluation: Mobility benefit, impact on quality of service, technical feasibility and implementability.

Social criteria group comprises four criteria: Contribution to local and/or regional development, stakeholder's acceptance, social consciousness and enforceability or legal framework issues.

To evaluate the opportunity of the action (or its performance) in respect of its contribution to the stakeholder objectives, the evaluator uses the qualitative scale of indicators with ratings from 1 to 5, and assign the value for each criterion in the group. The value should be assigned by the pilot site evaluators (or the board of evaluators). The criterion description and indicators are presented in Table 9.

5.3. Weighting process

Weighting is the process of comparing different criteria and criteria groups and assigning them the value of importance – weight in accordance to development strategy, business priorities or strategic objectives. Two tasks of weighting process is needed:

First, impact areas are weighted in relation to each other to get the relative importance of the group. The relative importance of the criteria group corresponds to the site strategy objectives. By combining the weights, different scenario development may be compared, targeting the different focus groups.

Second, the criteria are weighted each other within the respective impact area. After normalization, the sum for all criteria weights belonging to the same criteria group should be equal to 1 (or 100).

Template with evaluation scoring tables are presented in the Appendix 1.

5.4. Evaluation and scenario set-up

Each pilot compare chosen actions against to impacts that are expected or opportunity that may be recognized if the action is implemented. Then, weighting coefficients should be assigned for each criterion and for criteria groups (impact areas).

In the next step, all defined criteria have to be evaluated by the pilots, according to qualitative scales to estimate the effects of the action. Qualitative scale has five values where 1 is the lowest value and 5 is highest value. If the preference function is set up to maximum, then the score with higher value has greater positive effect. If the preference function is set up to minimum then the score with lower value has greater positive effect (or less negative effect).

After the initial result, the sensitive analysis can be performed. Sensitive analysis may be performed according to a scenario best fit the marina/port strategy and development objectives. In this process the weights for criteria groups are adjusted to user preferences and effects of the changes to the results are monitored. In Table 8, two scenarios are shown just for the example.

Table 7. Adjustable weight scenario examples

	<i>Criteria group</i>			
<i>Scenario</i>	Environmental	Economical	Technical	Social
Scenario 1	30%	10%	20%	40%
Scenario 2	30%	40%	20%	10%

Scenario 1 refers to ports managed by public operators, where greater importance has been given to social criteria group, while less importance has been given to economic criteria group. In scenario 2, greater importance has been given to economic criteria group than to social, that is better fit for private operators.

The final output should be interpreted as an indicator of the strength of the impacts among the actions for different development options.

5.5. Example case

The example of MCA tool application is shown for Port of Malinska. The result is presented in the Appendix 2.

Table 8. Criteria explanation and indicators

<i>Impact area</i>	<i>Criteria</i>	<i>Abb</i>	<i>Description</i>	<i>Ratings</i>
Environmental	GHG emission reduction	ER	Criterion reflects on the potential of CO ₂ emissions reduction as a result of the implementation of a specific action. It analyses the difference in the emissions level before and after the action has been implemented.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Noise reduction	NR	Criteria reflects on the reduction of noise as the result of the action, mostly caused by the maritime or road traffic and operations.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Spatial impact	SI	Criterion express the impact of the action on land usage, layout occupancy requirement, space limitation, conflict with other activities and similar issues that may complicate the implementation of the action.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Reduction in energy consumption	CR	Criterion considers the reduction in energy consumption as the result of the action, mostly as the result of the implementation of the new source of energy or savings resulted from implementation of new technologies in energy production.	Impact ratings (1-5): 1-lowest value, 5-highest value
Economic	Cost levels	CL	Criterion considers the overall costs required for the construction and implementation of specific action. It focuses on cost levels to be estimated according to expectation and complexity of the investment.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Cost effectiveness	CE	Cost effectiveness is evaluated according to the relationship between monetary inputs and the expected outcome with respect to the specific objectives.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Seasonal dependency	SD	This criterion measure the seasonal dependency of the action. It is general better than the benefits are equally distributed through the year and not limited to the seasonal period.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Development of business activities	BA	Criterion express the possibility of the expansion of economic activities in the nearby zone as the result of the action. The action may contribute more or less to the surroundings and may trigger some business activities with benefit to marina stakeholders.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Profitability levels	PL	This is the estimation of the profitability levels resulting from the action, or at what extend the action may result in increment of the profit.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Funding opportunities	FO	This criterion aims at considering the potential to support the action with feasible source of funding. If the indicator is low than the action may have financial constraints.	Impact ratings (1-5): 1-lowest value, 5-highest value

Technical	Mobility benefit	MB	This criterion measure the benefits in improved mobility resulting from the action. It may be improved by introducing new services or by facilitating the traffic movements.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Quality of service impact	QS	Different impacts on service quality may resulted from the implementation of the action. Target group are nautical tourist and other marina end-users.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Technical feasibility	TF	Technical feasibility considers the technical aspects of the action, where it is assumed that the feasibility is in co-relation with complexity of the investment, less complex action means higher technical feasibility. Contextual condition of the area may also contribute to technical feasibility of the action.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Implementability	IM	Criterion refers to capacity of the stakeholders involved in the implementation of the action. It considers potential difficulties, barriers or conflicts that may occur during the implementation of the action.	Impact ratings (1-5): 1-lowest value, 5-highest value
Social	Contribution to local/ regional development	RD	Criterion focuses on the effect on local and regional socioeconomic life activities. It aims at considering the change of dynamics in the mean of increasing potential for socioeconomic growth increase in the future.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Stakeholder acceptance	SA	Criterion reflects the overview of opinions related to the energy efficient systems and e-services by the local stakeholders and expectations from the action.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Social consciousness	SC	This criterion measure the opportunity to change the social awareness toward the energy efficiency and e-services resulting from the action.	Impact ratings (1-5): 1-lowest value, 5-highest value
	Enforceability	LE	Criterion focuses on the legal basis for enforcement of the implemented action. It aims to evaluate whether the action is supported by an existing legal framework, whether there is an authority responsible for implementing the action. The lack of legal framework may have negatively effect on the implementation or may postpone the implementation of the action.	Impact ratings (1-5): 1-lowest value, 5-highest value

Appendix 1. Evaluation scoring tables

Table A1-1. Assignment of weights to each criterion

CRITERIA GROUP	CRITERION	Value ¹
Environmental	Greenhouse gas emission reduction	
	Noise reduction	
	Spatial impact	
	Reduction in energy consumption	
		100
Economic	Investment and operation cost levels	
	Cost effectiveness	
	Seasonal dependency	
	Development of business activities	
	Profitability levels	
	Funding opportunities	
		100
Technical	Mobility benefit	
	Quality of service benefit	
	Technical feasibility	
	Implementability	
Social	Contribution to local/regional development	
	Stakeholder's acceptance	
	Social consciousness	
	Enforceability	

¹ The value of each criterion should be assigned in order that the sum within each criteria group amounts to 100%.

Instruction: Input proper value between 0 and 100 for each criterion field. The sum of assigned values should be equal to 100 for each criteria group. The value for each criterion indicates the importance of the selected criterion in relation to others in the group.

Table A1-2. Assignment of weights to each criteria group

CRITERIA GROUP	Value ²
Environmental impacts	
Economic impacts	
Technical impacts	
Social impacts	
	100

Instruction: Assign weights according to development scenario and target goals/objectives to be achieved by implementation of a measure. Input proper value between 0 and 100 for each criteria group. The sum of assigned values for all group of criteria should be equal to 100. The value of the weight indicates the relative importance of the category impacts for each pilot site and should correspondent to policy objectives.

² The value of each criteria group should be assigned in order that total sum of impacts should be 100%.

Table A1-3. Evaluation of impacts score for the action

Action 1: _____	<i>Preference function</i>	1 = zero 2 = low impact 3 = moderate 4 = high 5 = very high				
<i>Impact evaluation criteria</i>						
Environmental impacts						
Greenhouse gas emission reduction	higher is better	1	2	3	4	5
Noise reduction	higher is better	1	2	3	4	5
Spatial impact	lower is better	1	2	3	4	5
Reduction in energy consumption	higher is better	1	2	3	4	5
Economic impacts						
Investment and operation cost levels	lower is better	1	2	3	4	5
Cost effectiveness	higher is better	1	2	3	4	5
Seasonal dependency	lower is better	1	2	3	4	5
Development of business activities	higher is better	1	2	3	4	5
Profitability levels	higher is better	1	2	3	4	5
Funding opportunities	higher is better	1	2	3	4	5
Technical impacts						
Mobility benefit	higher is better	1	2	3	4	5
Quality of service benefit	higher is better	1	2	3	4	5
Technical feasibility	higher is better	1	2	3	4	5
Implementability	higher is better	1	2	3	4	5

Social impacts						
Contribution to local/regional development	higher is better	1	2	3	4	5
Stakeholder's acceptance	higher is better	1	2	3	4	5
Social consciousness	higher is better	1	2	3	4	5
Enforceability	higher is better	1	2	3	4	5

Appendix 2. Port of Malinska development case

The result of the evaluation process based on multi-criteria analysis (PROMETHEE) are preference flows of the pairwise comparison of the actions. Computation technic measures positive preference flow (Phi+) that is how much the action 1 is better than the action 2. In the same time, negative preference flow (Phi-) is measured, or how much the action 2 is better than action 1. The negative preference measures the weaknesses of the action to be implemented, that means the smaller Phi- the better the action.

Ranking

For graphical presentation of the results, the Partial ranking diagram (Figure A2-1 left) is used. It consists of two different rankings on the set of action, showing positive and negative preference flow based on pairwise comparison. The partial ranking is the intersection of these two rankings.

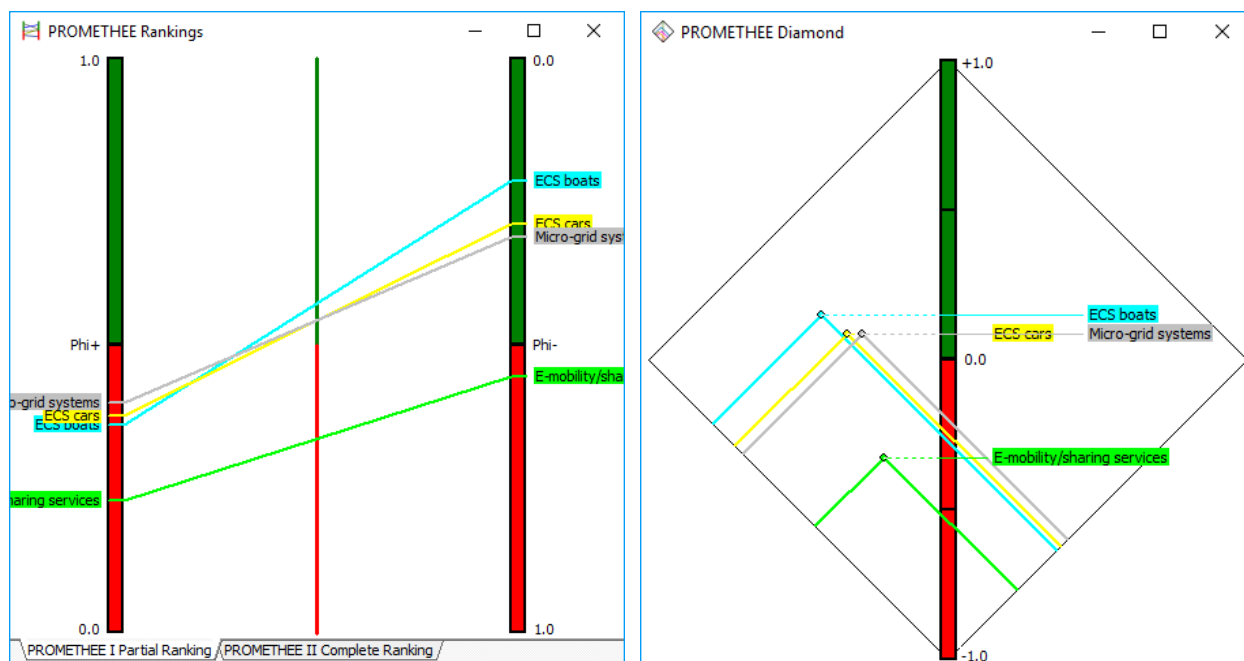


Figure A2-1. Ranking of the actions – case Malinska port

The PROMETHEE diamond (Figure A2-1 right), is another view of the result presentation. Each action is represented by the point positioned somewhere on the plane. Vertical scale shows the Phi net flow (difference between Phi+ and Phi-) for the particular action. Positive scores increase

from the left to the top corner (or from bottom to the right corner) while Negative scores increase from the left to the bottom corner. Intersecting of the action lines means incomparability at certain level.

From both view it can be concluded that there is no strong preferences between ECS boats, ECS cars and Micro-grid systems as there are conflicts between positive and negative flows for each pair of those 3 actions. Only certain conclusion is that E-mobility services has no feasible option for the Malinska port.

Weighting distribution

Ranking between action and weighting distribution between measurable criteria are shown on the figure below. Walking weights option allows to change the weights of the criteria and therefore to simulate different scenarios to see the impacts on the result. In the upper part the ranking chart is shown, while in the lower part are the weighting bars of the criteria.

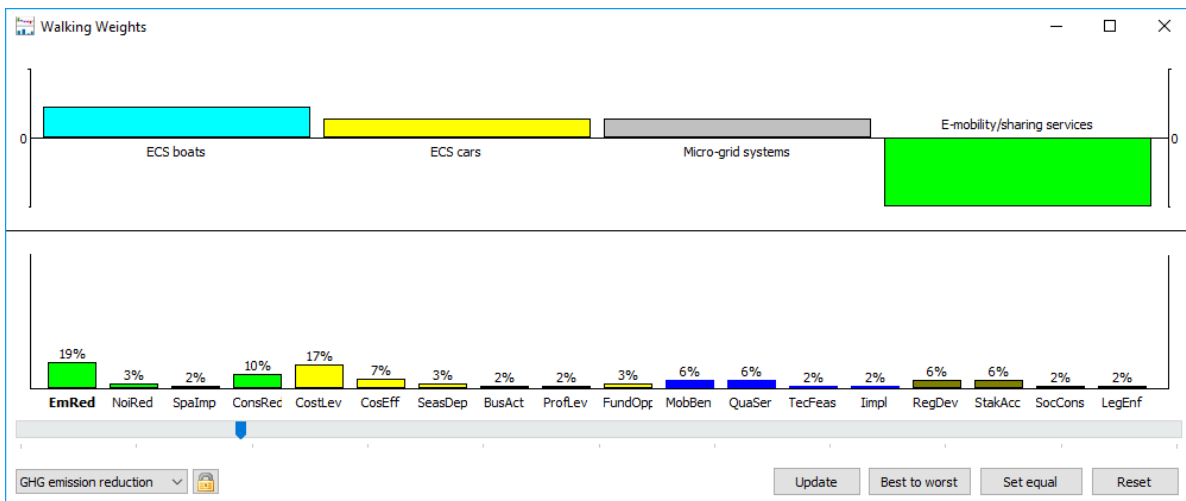


Figure A1-2. Weighting analysis – case Malinska port

GAIA plane

In this diagram actions are represented by the points while criteria are represented by axes. Position of the action shows their similarity. If the points are close to each other that means the actions with similar profiles. If the points are far away from each other that means that actions have different profile. The results shows a quite difference between action profiles. Only ECS cars and ECS boats shows similarity.

Criteria are represented by the axes, those close to each other have similar criteria preferences. Conflicting criteria have opposite direction of their axes. On the picture below the reference line is constructed for the criteria “reduction of energy consumption”. Position of orthogonal projection of the action on reference line shows estimated impact of the action. From the figure below it may be concluded that micro-grid system would have the strongest impact on reduction of energy consumption, while e-mobility/sharing services has the lowest.

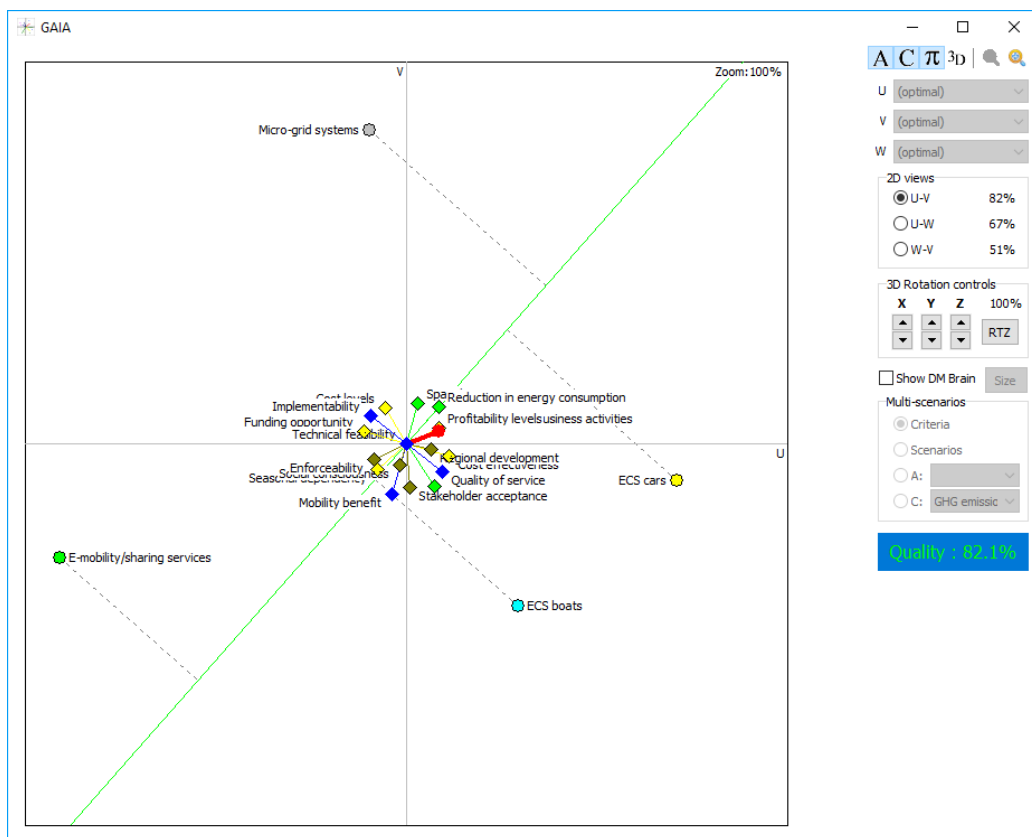
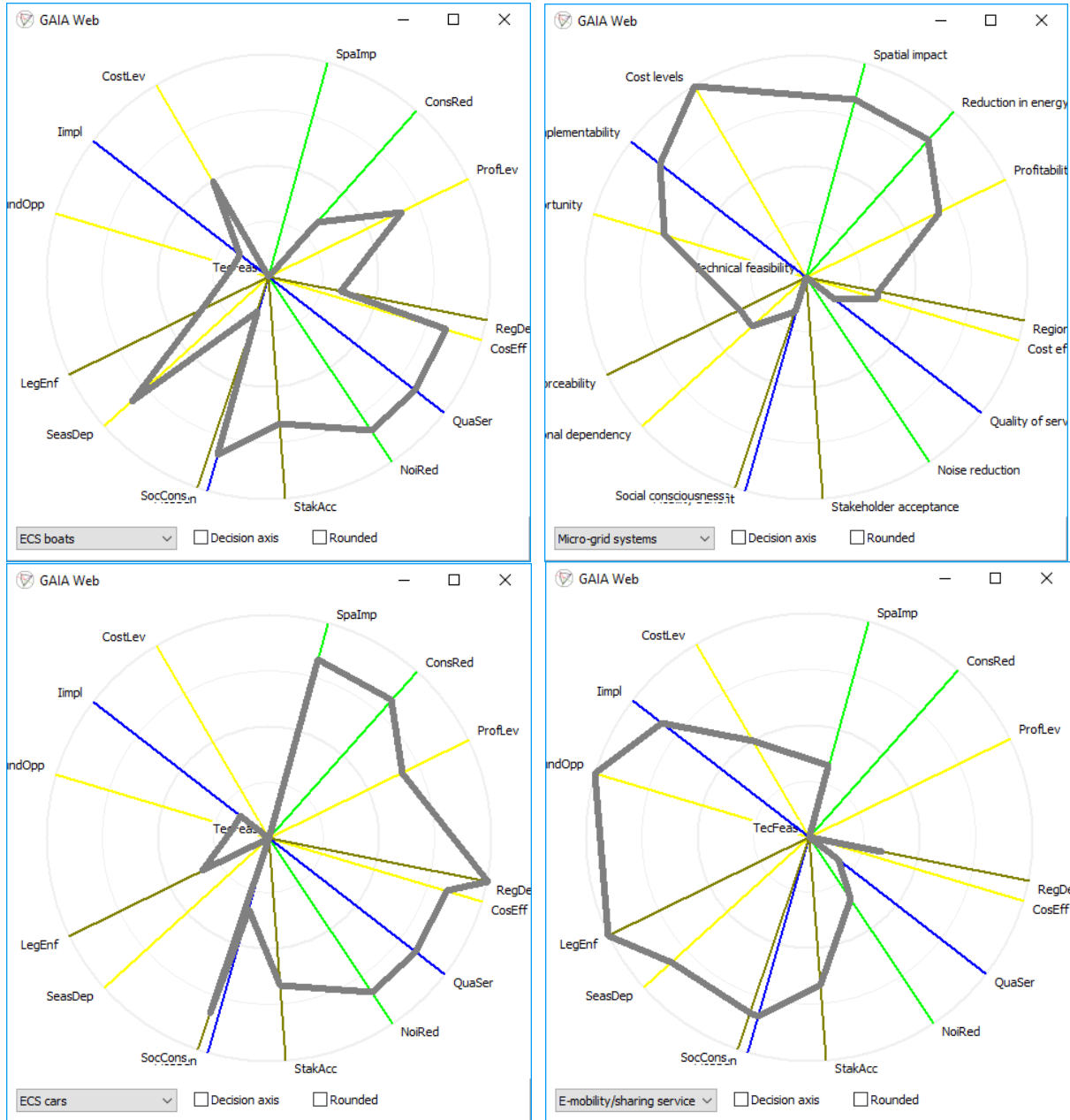


Figure A1-3. Gaia plane result of the actions – case Malinska port

Impact of criteria and criteria groups on result for each particular action to be implemented in the Malinska port are shown in the following charts.



Spider diagram shows a graphical representation of the unicriterion net flow scores for the selected action. The radial distance corresponds to the net flow score, that means the positive impact (better result) are that toward the edge and worse toward the center.

For specific case e-charging stations, both for boats and for cars, are recognized as the measure for improvement of quality of service of the port, but funding, cost levels and implementation are subject of concern by the local authority.

Appendix 3. Questionnaire on Port Management

PURPOSE OF THE QUESTIONNAIRE AND INSTRUCTIONS HOW TO FILL IN

Purpose of this questionnaire is to collect all relevant information about marina management standard (general data, service quality indicators, environmental impact, energy indicators, investment priorities).

Information collected via this questionnaire will be the basis for multicriterial analysis and creation investment plan and scenarios for each pilot site.

Please follow the instructions below every set of the questions as well as below each question in order to fill the questionnaire correctly.

You can find the questionnaire at the following link: _____

GENERAL DATA	
<p><i>Please fill in requested information or choose the answer applicable for you. If you consider appropriate and applicable you can choose few answers on some questions.</i></p>	
Marina/port name	
Marina categorization	_____
Ownership structure	<input type="checkbox"/> Public authority <input type="checkbox"/> Private authority <input type="checkbox"/> Authority of Region or Municipality <input type="checkbox"/> Other _____ _____
Please describe briefly your internal organization and department activities.	
Number of employees	
Do you lack of experts needed to provide your activities? (If your answer is yes please specify which experts)	<input type="checkbox"/> Yes <input type="checkbox"/> Port expert <input type="checkbox"/> Ecology/energy experts <input type="checkbox"/> Quality expert <input type="checkbox"/> Traffic expert <input type="checkbox"/> Other _____ _____ <input type="checkbox"/> No

<p>Do you provide any education for your employees? (If your answer is yes please specify which education)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Specify _____ _____</p>
<p>Do you provide collaboration (consultations) with other public or private stakeholders? (If your answer is yes please specify what kind of collaboration-e.g. coordination meetings, workshops, round tables etc.)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Specify _____ _____</p>
<p>Are there other organizations (e.g. scientific institutions, faculties, associations...) that you collaborate with? (If your answer is yes please specify which and describe briefly how they participate)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Specify _____ _____</p>
<p>Main focus of action</p>	<p><input type="checkbox"/> Commercial activities <input type="checkbox"/> Public services <input type="checkbox"/> Governance and supervision <input type="checkbox"/> Other _____ _____</p>

<p>Marina/Port function</p>	<p>Nautical function with short-term berth arrangements (transit berth)</p> <p>Nautical tourism function with long-term berth arrangements</p> <p>Port in function of community and local citizens</p> <p>Public port function with public service berthing priorities</p> <p>Other _____</p>																				
<p>Economic activities nearby marina/port area</p>	<p><input type="checkbox"/> Tourism</p> <p><input type="checkbox"/> Shipbuilding & servicing</p> <p><input type="checkbox"/> Fishing</p> <p><input type="checkbox"/> Industry</p> <p><input type="checkbox"/> Diving</p> <p><input type="checkbox"/> Agriculture</p> <p><input type="checkbox"/> Other _____</p>																				
<p>Traffic connectivity</p>	<p>Distance from main traffic nodes (in km):</p> <p>Airport _____</p> <p>Motorway _____</p> <p>Rail terminal _____</p> <p>Bus terminal _____</p> <p>Ferry terminal _____</p> <p>Quality of infrastructure</p> <table border="0"> <tr> <td>Airport</td> <td><input type="checkbox"/> Poor</td> <td><input type="checkbox"/> Satisfactory</td> <td><input type="checkbox"/> Very good</td> </tr> <tr> <td>Motorway</td> <td><input type="checkbox"/> Poor</td> <td><input type="checkbox"/> Satisfactory</td> <td><input type="checkbox"/> Very good</td> </tr> <tr> <td>Rail terminal</td> <td><input type="checkbox"/> Poor</td> <td><input type="checkbox"/> Satisfactory</td> <td><input type="checkbox"/> Very good</td> </tr> <tr> <td>Bus terminal</td> <td><input type="checkbox"/> Poor</td> <td><input type="checkbox"/> Satisfactory</td> <td><input type="checkbox"/> Very good</td> </tr> <tr> <td>Ferry terminal</td> <td><input type="checkbox"/> Poor</td> <td><input type="checkbox"/> Satisfactory</td> <td><input type="checkbox"/> Very good</td> </tr> </table> <p>Do you have shuttle service?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	Airport	<input type="checkbox"/> Poor	<input type="checkbox"/> Satisfactory	<input type="checkbox"/> Very good	Motorway	<input type="checkbox"/> Poor	<input type="checkbox"/> Satisfactory	<input type="checkbox"/> Very good	Rail terminal	<input type="checkbox"/> Poor	<input type="checkbox"/> Satisfactory	<input type="checkbox"/> Very good	Bus terminal	<input type="checkbox"/> Poor	<input type="checkbox"/> Satisfactory	<input type="checkbox"/> Very good	Ferry terminal	<input type="checkbox"/> Poor	<input type="checkbox"/> Satisfactory	<input type="checkbox"/> Very good
Airport	<input type="checkbox"/> Poor	<input type="checkbox"/> Satisfactory	<input type="checkbox"/> Very good																		
Motorway	<input type="checkbox"/> Poor	<input type="checkbox"/> Satisfactory	<input type="checkbox"/> Very good																		
Rail terminal	<input type="checkbox"/> Poor	<input type="checkbox"/> Satisfactory	<input type="checkbox"/> Very good																		
Bus terminal	<input type="checkbox"/> Poor	<input type="checkbox"/> Satisfactory	<input type="checkbox"/> Very good																		
Ferry terminal	<input type="checkbox"/> Poor	<input type="checkbox"/> Satisfactory	<input type="checkbox"/> Very good																		

Funding source	<input type="checkbox"/> National funds <input type="checkbox"/> Regional funds <input type="checkbox"/> Own income <input type="checkbox"/> EU funds <input type="checkbox"/> Loans <input type="checkbox"/> Other _____ _____
----------------	---

SERVICE QUALITY INDICATORS

Please answer the following questions with Yes or No.

If your answer is Yes and if it is required please fill the "Specify" as prescribed below each question.

Some questions don't have the "Specify" because it's not applicable or it is not necessary, so please answer just with Yes or No.

Do you have Quality Management Plan?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Do you comply with any of the ISO standards? Do you have any ISO certificate? (If your answer is yes please specify which one?)	<input type="checkbox"/> Yes <input type="checkbox"/> No Specify _____ _____
Sea berths (number of berths by the boat length). (Please specify number and length from-to)	_____ _____
Berths marked with letters and numbers	<input type="checkbox"/> Yes <input type="checkbox"/> No
Berths for yacht load line length of 24 meters and above	<input type="checkbox"/> Yes <input type="checkbox"/> No
Berths for land storage (Please specify number and length from-to)	_____ _____
Transit berths	_____ _____

(Please specify number and length from-to)		
Online berth booking	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Lighting of berths	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Electricity connection of vessel (220V for every 20 berth)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Water supply connection of vessel (for every 20 berths)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Electricity connection of vessel (220V every 10 berths)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Electricity connection of vessel (380V for 1% of berths)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Water supply connection of vessel (for every 10 berths)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Electricity connection of vessel (380V for every 3 berths)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Electricity connection of vessel (380V for 2% of berths)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Water supply connection of vessel (for every 5 berths)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Reception (information office)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Multilingual personnel	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Video Surveillance (security cameras)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Wi-Fi internet access	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Computer corner	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Sanitary facility	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Parking area for boat owners	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Food & Beverage	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Grocery store (within or at the nearest point)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Boat rental service	<input type="checkbox"/> Yes	<input type="checkbox"/> No
E-vehicles rental service (If your answer is yes please specify- type of vehicles, how many, near marina or in marina area)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specify _____ _____	
Gas station	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Vessel equipment storage space	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Maintenance service	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Transportation of vessels	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Handling equipment (Travel lift)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Waste disposal	<input type="checkbox"/> Yes	<input type="checkbox"/> No

ENVIRONMENTAL IMPACT/PRESSURES					
Have you experienced safety /environmental issues (e.g. risks, accidents...) in the last 5 years? (If your answer is yes please specify which)	<input type="checkbox"/> Yes <input type="checkbox"/> No Specify _____ _____				
How do you think the following issues are affecting in your area?	Noise from the boats	Not affecting <input type="checkbox"/>	Slightly affecting <input type="checkbox"/>	Moderately affecting <input type="checkbox"/>	Extremely affecting <input type="checkbox"/>
	Air pollution from the boats/cars in the port area and surroundings	Not affecting <input type="checkbox"/>	Slightly affecting <input type="checkbox"/>	Moderately affecting <input type="checkbox"/>	Extremely affecting <input type="checkbox"/>
	Energy consumptions and supply needs	Not affecting <input type="checkbox"/>	Slightly affecting <input type="checkbox"/>	Moderately affecting <input type="checkbox"/>	Extremely affecting <input type="checkbox"/>
	Risk of accident during bunker supply	Not affecting <input type="checkbox"/>	Slightly affecting <input type="checkbox"/>	Moderately affecting <input type="checkbox"/>	Extremely affecting <input type="checkbox"/>
	Discharges from boats	Not affecting <input type="checkbox"/>	Slightly affecting <input type="checkbox"/>	Moderately affecting <input type="checkbox"/>	Extremely affecting <input type="checkbox"/>
	Traffic in the port area and approaching roads	Not affecting <input type="checkbox"/>	Slightly affecting <input type="checkbox"/>	Moderately affecting <input type="checkbox"/>	Extremely affecting <input type="checkbox"/>
	Parking issues in the port area and surroundings	Not affecting <input type="checkbox"/>	Slightly affecting <input type="checkbox"/>	Moderately affecting <input type="checkbox"/>	Extremely affecting <input type="checkbox"/>

	Other <hr/> (If not mentioned in previous impact, please write and assess)	Not affecting <input type="checkbox"/>	Slightly affecting <input type="checkbox"/>	Moderately affecting <input type="checkbox"/>	Extremely affecting <input type="checkbox"/>
--	---	---	--	--	---

ENERGY INDICATORS	
<p>Please answer the following questions with Yes or No or n/a if not applicable for you.</p> <p>If your answer is Yes, where required and if it is applicable for you please fill the "Specify" with briefly description.</p>	
Do you have Energy plan or Energy policy?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If you have the Energy plan or Energy policy, are they available to public?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a
If you have the Energy plan or Energy policy, does it improve your energy standards beyond required under legislation? (If your answer is yes please specify how improves.)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a Specify _____
Do you publish annual energy review or report?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Do you have designated personnel?	<input type="checkbox"/> Yes <input type="checkbox"/> No

<p>Do you have Energy management system?</p> <p>(If your answer is yes please specify-describe briefly.)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Specify _____</p>
<p>Do you provide energy consumption monitoring?</p> <p>(If your answer is yes please specify-describe briefly.)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Specify _____</p>
<p>Energy indicators to monitor trends in energy performance</p> <p>(If your answer is yes please specify-describe briefly)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Specify _____</p>
<p>Led or conventional lighting</p> <p>(If your answer is yes please specify-describe briefly)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Specify _____</p>
<p>Solar power on roof tops on the buildings</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>Air conditioner and ventilation energy reduction measures</p> <p>(If your answer is yes please specify-describe briefly)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Specify _____</p>
<p>E-document software</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Specify _____</p>

(If your answer is yes please specify-describe briefly)	
Energy from renewable resources (If your answer is yes please specify-describe briefly)	<input type="checkbox"/> Yes <input type="checkbox"/> No Specify _____
Electric equipment for handling operation (If your answer is yes please specify-describe briefly)	<input type="checkbox"/> Yes <input type="checkbox"/> No Specify _____
Promotion of ride share or shuttle bus or e-vehicles for rent (If your answer is yes please specify-describe briefly)	<input type="checkbox"/> Yes <input type="checkbox"/> No Specify _____
Charging station for e-cars (If your answer is yes please specify with number)	<input type="checkbox"/> Yes <input type="checkbox"/> No Specify _____
Solar bench charger (If your answer is yes please specify with number)	<input type="checkbox"/> Yes <input type="checkbox"/> No Specify _____
Shore power for vessels with electric power	<input type="checkbox"/> Yes <input type="checkbox"/> No Specify _____

(If your answer is yes please specify-describe briefly)	
Energy efficiency control system (If your answer is yes please specify-describe briefly)	<input type="checkbox"/> Yes <input type="checkbox"/> No Specify _____ _____
Promotion of Green port concept for community (If your answer is yes please specify-describe briefly)	<input type="checkbox"/> Yes <input type="checkbox"/> No Specify _____ _____
Micro-grid (If your answer is yes please specify-describe briefly)	<input type="checkbox"/> Yes <input type="checkbox"/> No Specify _____ _____

INVESTMENT PRIORITIES	
Which are your investment needs? (Please define which areas in your business you would like to invest in)	

<p>From the above mentioned investment needs please define what the investment priorities are. (list of priorities)</p>	
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