Territorial needs assessment for the Port of Split

Final Version 13/05/2021

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Contents

1. Intoduction

Port area analysis

The City of Split is located in Split-Dalmatia county, and with a population of 178 102 citizens (dzs.hr; 2011 Census) is the second most populated city in Croatia. The city lies on the eastern shore of the Adriatic sea and is an integral transport hub as well as a popular tourist destination. Due to its favorable geographical positioning, the port of Split has been able to focus on both passenger and freight transport. The port of Split, according to its purpose is a port open for international traffic, and according to its size and importance, it's ranked as the port of special (international) economic interest for the Republic of Croatia. The port of Split ranks as the first port in Croatia in terms of passenger traffic, as presented by the following table.

Name of the port	Total passenger traffic	National passenger traffic	International passenger traffic
Port of Split	5.607.789	5.064.551	543.238

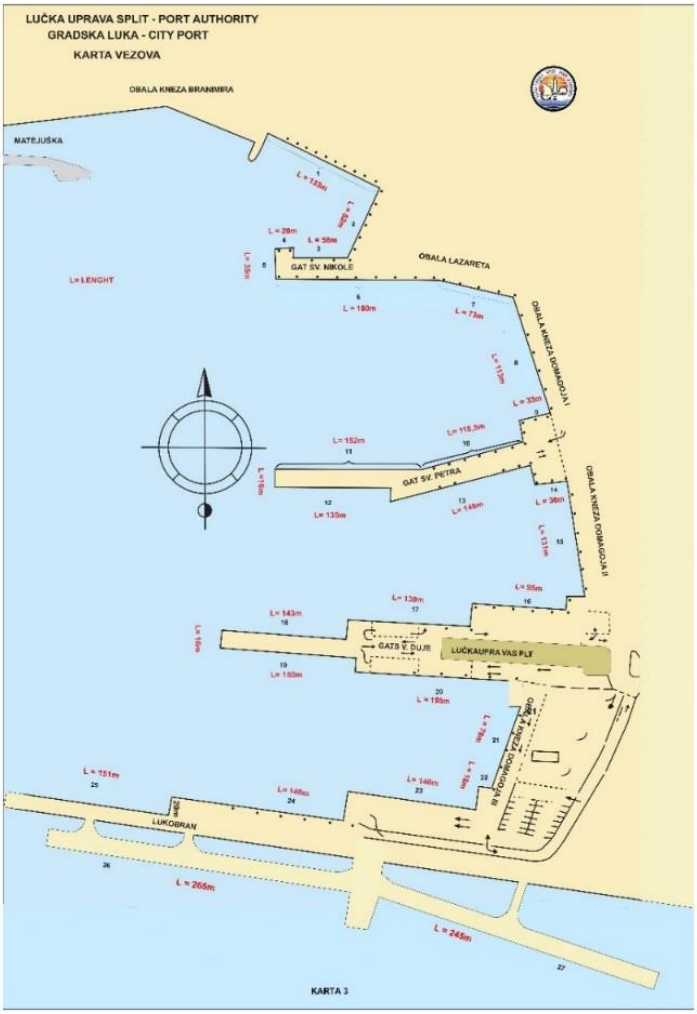
Table 1: Passenger trafic in the port of Split in 2019
Source: made by the author based on data from dzs.hr

Since its establishment, the Port of Split has been continously investing in port infrastructure with the aim of providing high-quality services and excellent conditions in passenger traffic, as well as increasing the competitiveness for freight transport. The Port of Split Authority manages the port area which includes the following multi-purpose ports:

- the City port of Split,
- Vranjic-Solin Basin
- Kaštel basins B, C and D.

The City port of Split is focused on passenger traffic while the Vranjic-Solin Basin and the Kaštel Basins are focused on freight transport. The city port of Split is located in the city centre and comprises the area from the west breakwater to the junction of Obala Lazareta and Obala Hrvatskog narodnog preporoda, offering a 3,64 kilometre long operative coast. With its 27 berths it handles the reception of passenger ships in both domestic and international traffic, including smaller vessels

intended for tourist traffic, public vessels, warships, reception of large and medium ships on cruises. The maximum depth inside the port reaches 10,5 metres, and the maximum length of the ship at berth is 320 metres.



Picture 1: Map of the berths in the City port of Split

Source: portsplit.hr

Picture 2: Overview image of the City port of Split with berth markings

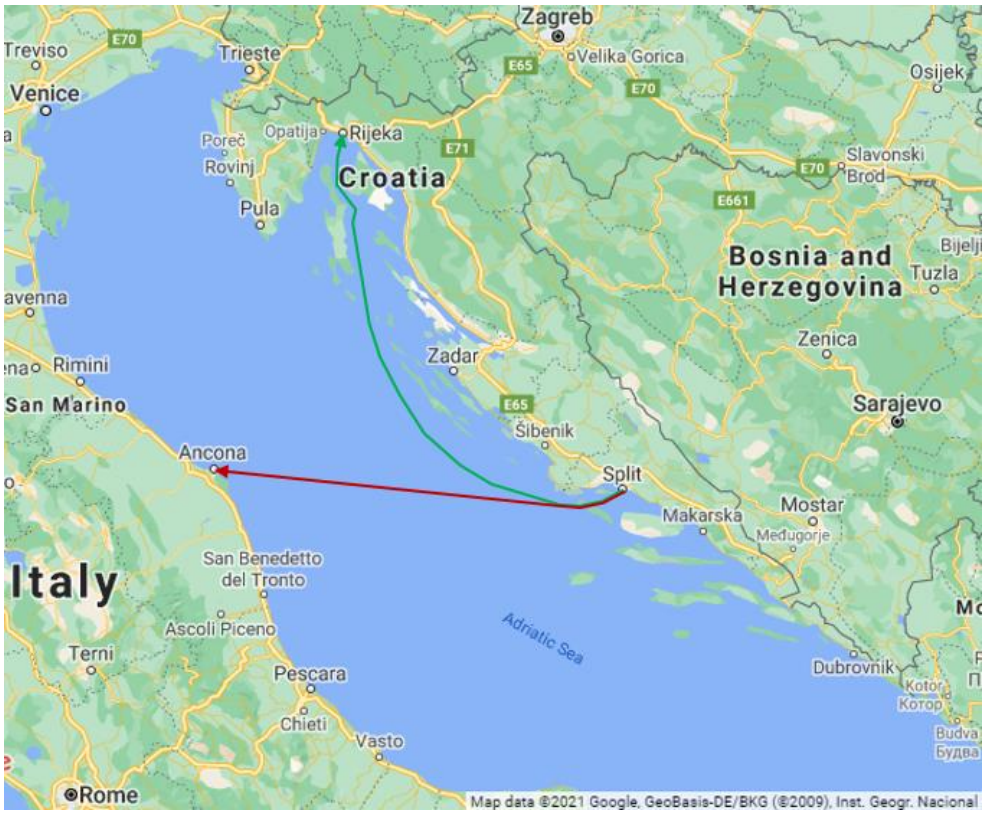
Source: portsplit.hr with edits by the author

The City port of Split is comprised of 8 terminals: Mandrač, Sveti Nikola Pier, Sveti Petar Pier, Sveti Duje Pier, Lazaret Quay and Kneza Domagoja Quays I, II and III, each of which handles different types of vessels. Their purpose is the following:

- Mandrač handles yachts, line shipping vessels and excursion vessels;
- Sveti Nikola Pier handles Navigation safety vessels, ship fuel supply, fast line shipping craft and transfer vessels;
- Sveti Petar Pier handles passenger ships and cruise ships as well as fast line shipping craft, cruise trip sailboats, yachts and ship fuel supply;
- Sveti Duje Pier handles International passenger ships and ferries and occasionally domestic line shipping transport;
- Lazaret Quay handles fast line shipping craft, excursion vessels, transfers in domestic transport, mooring for sailboats and large yachts;
- Kneza Domagoja Quay I handles cruise trip sailboats and yachts;

- Kneza Domagoja Quay II handles tugboats, passenger ships, cruise trip sailboats, large yachts and ship fuel supply;
- Kneza Domagoja Quay III handles loading ramps for minor ferries, mooring of sailboats, hydrofoils, vessels for cruise ship transfers and other purposes, passenger line ships, cruise ships, hydrofoils, international ferries, domestic and foreign warships and ship fuel supply.

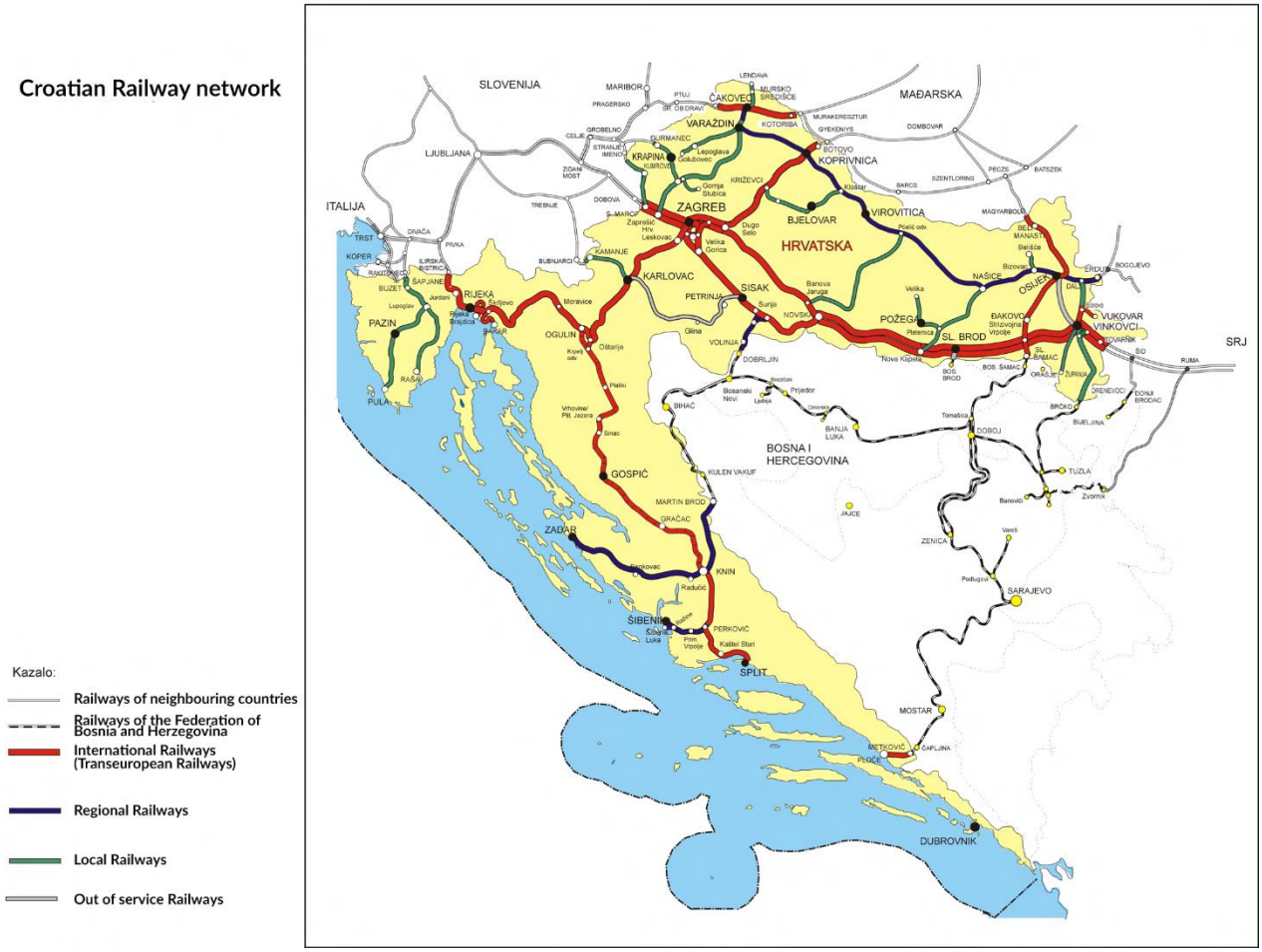
As a major port in Croatia, Split is connected with other parts of Croatia, as well as Italy by the Adriatic sea. It is also connected with the Mediterranean countries to the south via the Mediterranean sea.



Map 1: The port of Split's maritime connections with other parts of Croatia and Italy

Source: Google Maps, with edits by the author

The port of Split is connected with the Croatian mainland via railway leading north and north-west from Split. This railway is considered of international importance.



Map 2: Croatian Railway network and its connection to Split

Source: https://mmpi.gov.hr/UserDocsImages/arhiva/2008/RH-karta-pruga.pdf; translated by author

The port and the city of Split are also connected to the rest of Croatia through a well-developed road network which includes the A1 highway passing several kilometres away from the city itself, connecting Split with the capital city of Zagreb to the north, and with Ploče to the south. Along with the highway, the road network consists of state roads leading from the city in all directions.

Map 3: Croatian Road network and its connection to Split

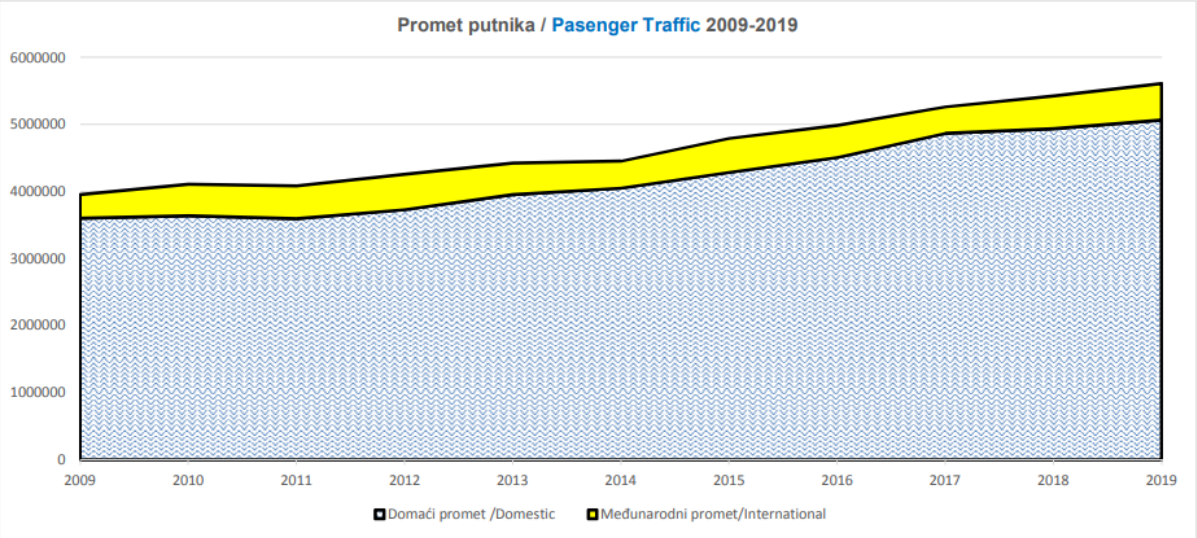
Source: http://www.propisi.hr/print.php?id=12731; Translated and edited by author

Port statistics

The number of passengers as well as the number of ships that have passed through and used the port of Split has been on a constant rise since 2012, with the majority of passenger transport being used for domestic travel. The total amount transported in 2019 equals 5.607.789 passengers.

Promet putnika / Pasenger Traffic 2009-2019

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Domaći promet /Domestic	3600846	3638863	3595049	3728872	3955790	4053441	4286316	4510166	4868980	4934534	5064551
Međunarodni promet/International	355000	471018	490482	524263	465778	398197	506910	472486	392186	488055	543238
Total	3955846	4109881	4085531	4253135	4421568	4451638	4793226	4982652	5261166	5422589	5607789



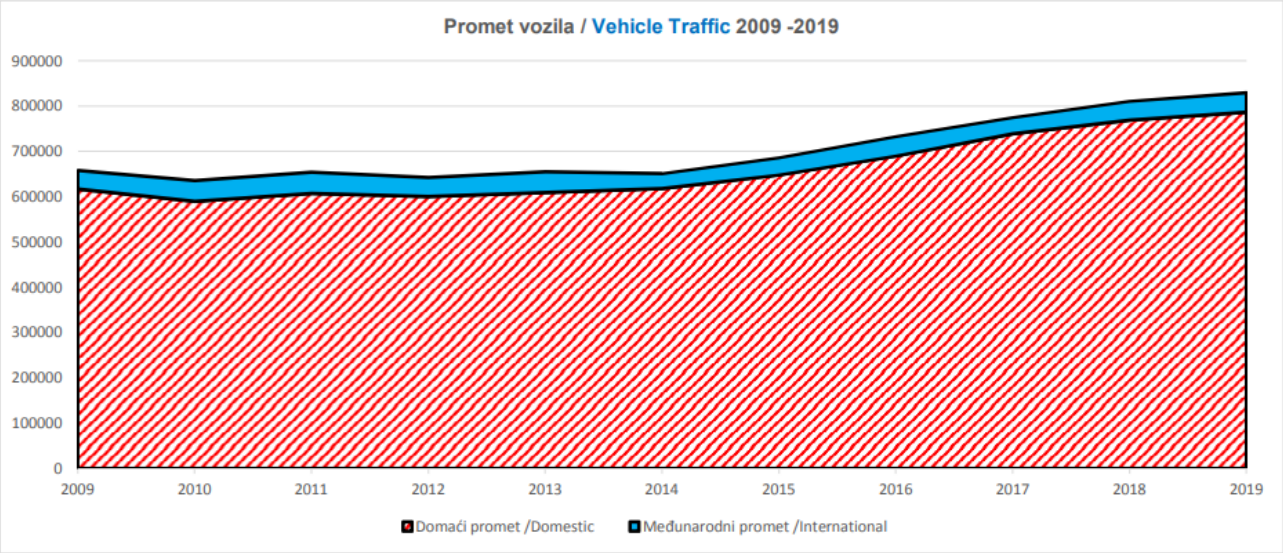
Graph 1: Passenger traffic in the Port of Split 2009 – 2019

Source: portsplit.hr

The same is true for the amount of vehicle traffic (counting both passenger and freight ships), with a rise occurring from 2015 onwards. The total amount of vehicles that used the Port of Split's services in 2019 equals 829.594 vehicles.

Promet vozila / Vehicle Traffic 2009 -2019

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Domaći promet /Domestic	616669	589593	607322	600199	609573	617810	647867	689992	738463	769102	786399
Međunarodni promet /International	41202	46361	46340	41904	45371	33340	38182	43277	36933	42112	43195
Total	657871	635954	653662	642103	654944	651150	686049	733269	775396	811214	829594



Graph 2: Vehicle traffic in the Port of Split 2009 – 2019

Source: portsplit.hr

Brodovi na kružnim putovanjima od 2009.g. do 2019.g. – Cruise traffic 2009 - 2019

	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019	
	ticanja/calls	pax.	ticanja/calls	pax.	ticanja/calls	pax.	ticanja/calls	pax.	ticanja/calls	pax.	ticanja/calls	pax.	ticanja/calls	pax.	ticanja/calls	pax.	ticanja/calls	pax.	ticanja/calls	pax.	ticanja/calls	pax.
siječanj/Jan.			7	294	6	299	1	51	2	94	3	147	3	118	4	136	4	184	4	2897	3	2642
veljača/Feb.			5	242	6	301	3	141	6	295	5	237	6	262	5	166	4	181	5	246	6	858
ožujak/Mar.	1	116	3	199	4	205	2	98	6	4091	6	255	6	622	11	4767	7	2565	10	5946	8	3651
travanj/Apr.	13	5511	19	13001	11	9729	14	11480	10	6535	21	19501	14	12478	18	17318	12	15068	9	12012	23	31326
svibanj/May	39	23873	33	22290	26	17765	36	24469	27	25414	35	22955	43	51442	35	32125	28	24443	36	40376	34	48040
lipanj/Jun.	30	15928	34	23163	37	25329	46	39242	32	29959	32	26803	32	34259	37	37805	26	28131	40	44018	34	48272
srpanj/Jul.	36	19197	26	21584	35	31496	32	41557	26	17029	26	28698	29	35421	34	44794	26	31643	29	41750	37	51680
kolovoz/Aug.	29	16255	41	31249	37	31074	36	38027	28	30815	32	29122	30	34208	37	44161	32	28552	40	47962	38	54112
rujan/Sep.	36	24696	33	22684	41	32284	42	39953	36	32394	39	36503	43	45233	46	42621	33	34288	34	42946	39	49492
listopad/Oct.	31	20578	37	28331	29	25750	42	41948	32	27093	23	19373	28	30736	34	32932	39	37148	27	38361	40	54461
studeni/Nov.	12	5568	13	9043	16	6302	9	8220	12	14757	4	179	21	26405	16	20000	13	16204	17	20416	14	15211
prosinac/Dec.	5	111	6	298	4	1429	6	265	8	631	7	289	6	261	9	1434	10	10837	10	10218	6	210
Total	**232**	**131833**	**257**	**172378**	**252**	**181963**	**269**	**245451**	**225**	**189107**	**233**	**184062**	**261**	**271445**	**286**	**278259**	**234**	**232244**	**260**	**367148**	**282**	**359955**

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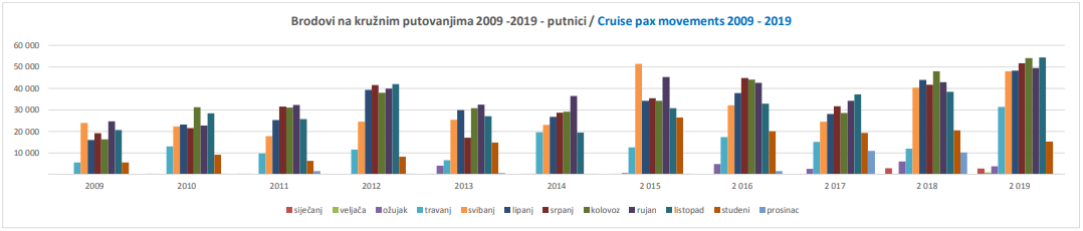
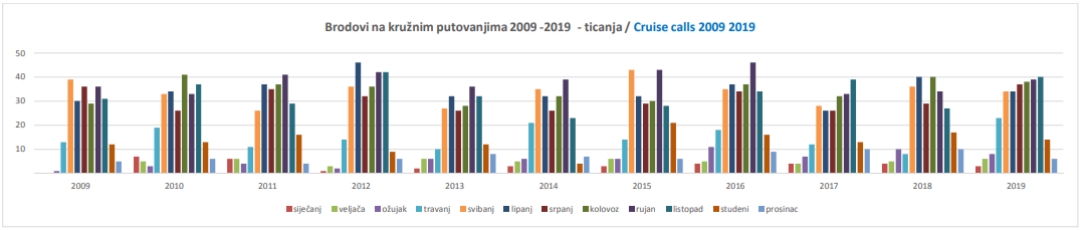




Graph 3: Cruise traffic in the Port of Slit 2009 – 2019

Source: portsplit.hr

Current works, future plans and environmental policy

Representing Croatia's largest passenger port as well as one of the largest in the Mediterranean, the vibrant Port of Split is a vital link to Croatian islands and provides top quality service for cruise ships. Port of Split recently completed the construction of two new cruise berths on the outer side of the breakwater. The berths accommodate cruise ships with a maximum length of 350 metres and 270 metres respectively, with 10.5 metres maximum draft, significantly increasing the capacity to handle large ships and raise the level of service, safety and security for passengers. Additionally, the Port of Split Authority is planning major investments to improve and add to its passenger terminal facilities, as well as to construct a new passenger port area.

The investments into the Port of Split's facilities and infrastructure are closely related to a steady increase in the number of passengers travelling through the port.

Project "Reconstruction and extension of the Coast of Kneza Domagoj I and II in the City Port of Split"

The project plans to upgrade the Coast of Kneza Domagoj I and II in order to enable quality catamaran mooring, and at the same time will enable the expansion of the passenger corridor and better flow of passengers and other pedestrians who use the Coast of Kneza Domagoj. From 2016 to 2019, the number of passengers transported by catamarans increased by 60%. In 2016, 714,034 passengers were transported, and in 2019, 1,145,818 passengers were transported. Following the implementation of the project, four catamaran berths will be put into operation, which are currently out of operation. The deadline for the execution of works is nine months.

The upgrade will enable the functioning of the operational shore for mooring and unmooring of catamarans by separating the operational shore into the part for mooring, loading and unloading, and the supply of ships from the part that serves for pedestrian communication. At the same time, a part of the operating area used by cars and trucks for boarding ferries will be separated by a green belt.

Reconstruction of the existing Coast of Kneza Domagoj I and II is planned in such a way that the existing operational coast will be extended five and a half meters towards the sea, all for the purpose of improving the existing service, port functionality and increasing the safety of port users. The current operational shore is about four meters wide, and the extension will provide an operational shore nine and a half meters wide. The length of the Coast of Kneza Domagoj I that would be extended is 135 meters, and the Coast of Kneza Domagoj II 125 meters. The newly created area of

the operational coast will amount to around 1,400 m2. The shore will be paved with stone and equipped with utilities, lighting, supply cabinets for supplying ships with electricity and water, and additional green areas and decorative floor slabs that will visually separate the part for mooring, loading and unloading and supply of ships from the part used for pedestrian communication. It is important to note that the project envisions ensuring accessibility for people with disabilities and people with reduced mobility. Thus, the project enabled unhindered communication throughout the location, as well as access to the public traffic area - all without barriers.

The Project of Institutional Strengthening and Assistance for the Implementation of Environmental Management System for Port of Split Authority

The Project of Institutional Strengthening and Assistance for the Implementation of Environmental Management System for Port of Split Authority was initiated by the European Bank for Reconstruction and Development (EBRD) to „provide support and advice to key employees and management of the PSA in achieving International Financial Reporting Standards (IFRS) compliance, preparing its first five year business plan and implementing an environmental management system, as required under the EBRD Loan Agreement“(Deloitte, 2016). The final report of this project recommends four key future activities in order to maintain and improve the implemented Environmental Management System (EMS) in the Port of Split Authority. Those four activities include:

- EMS application for certification;
- Continuous monitoring and EMS improvement;
- Raising awareness of Port of Split Authority employees and area users;
- The establishment and implementation of new systems and tools (Deloitte, 2016).

The Port of Split Authority aims to enhance environmentally friendly mobility by reducing energy consumption and saving on costs with the ultimate goal to finalize the Environmental Management System which will be submitted for PERS (Port Environmental Review System) certification as an effective tool for managing environmental impact in order to further support the reduction of pollution, amount of unseparated waste, energy consumption and other negative impacts on the environment (espo.be, 2020). PERS system is a specific environmental management system intended for the port sector, and has been recognised as needed in the Port of Split as sources of different kinds of emissions, including air and sea emissions, emissions of noise and environmental impact related to waste management have been identified in the city port of Split. Apart from the

area managed by the Split Port Authority, emissions to the sea also come from the city's wastewater system and the large amount of road traffic due to the port being located in the city centre (Vukadin, 2015). Based on the Annual report on air quality testing in the area of the measuring station at the Port of Split Authority, performed by the Teaching institute of public health of Split-Dalmatia County from 15th July 2017 to 15th July 2018, the air quality in the area has been declared as Category I quality, which would, simply put, mean slightly polluted air.

New passenger terminal

The Port of Split Authority plans to build a new international passenger terminal building. It will directly service the cruise and international passenger transfers from the two berths constructed on the outer side of the breakwater of the City Port basin.

The terminal building will also serve as a location for various smaller businesses such as agencies, souvenir shops, cafes and restaurants. A former industrial building, which is a protected heritage, consisting of ground floor with three stores above it, with a part of the fourth used as a terrace overlooking the city and the nearby islands, will be turned into a hotel with conference facilities.

2. Stakeholder mapping

		Power of influence			
		Low		High	
Interest	Low	Braniteljska zadruga Legio Quarta; Customs Administration; Marine Police; Čistoća ltd; Cian ltd; IND EKO ltd; D.V.D. Kaštel Gomilica ltd; Dezinsekcija ltd; A.M.E.C. Rijeka Tekstil ltd; METRO Cash & carry ltd; PIK Vrbovec plc; Prehrambeno industrijski Kombinat plc; Vaporetto ltd; Velpro-Centar ltd; Crodux Derivati Dva ltd; Apios ltd; Diners ltd; EFT Usluge ltd; Južna Uvala; Obrt za mjenjačko poslovanje „Porat“; OTP bank plc; Rental ltd; Seven Stables ltd; Venula ltd; Zagrebačka banka plc; Extra Old ltd (j.d.o.o);	INA – Industrija Nafte plc; Adria Oil ltd; Rijekatank ltd; Petrol ltd; Eko Servis Matić; Pecto ltd; Adria Alfa ltd; Ben Ship Supply ltd; Omnis ltd; Navis Supplementum ltd; Lintea ltd; Adriainspekt ltd; Cargo Control ltd (j.d.o.o); Euroinspekt Croatia Kontrola ltd; Inspectorate (Croatia) ltd; Maris Ispectio ltd; Sordes ltd; Bila Strana ltd; Corpo Morto; Imprimis ltd; Obrt za ugostiteljstvo i usluge „Tin“; Privredna banka Zagreb plc; Slatke brige ltd (j.d.o.o); Tisak Plus plc; Viator ltd; Zadvarac ltd (j.d.o.o); Zusammen ltd.	Adriatik Servis ltd; Jadroagent ltd; Bandić Maritime ltd; Adriatic Destination Management Company ltd; Rea Dubrovnik ltd; Brodsko Upravljanje ltd; BWA ltd; L.P. Pomoć Jahtama ltd; Tranzitagent ltd; Global agent ltd; Pomorski Peljar ltd; Alianca ltd; Capris Croatia ltd; M.M.Coffe ltd; Mater ltd (j.d.o.o);	Maja – Jahtaške usluge; Servis brodova NENO ltd; In Capita ltd; CYC Yachting ltd; Katarina Line ltd; Elite Travel ltd; Amathus Travel ltd; Applicon Tours ltd; Apodos Ltd; Atlas plus ltd; Calvados Club Travel Agency ltd; Dubrovnik Travel ltd; Grand Circle Dubrovnik ltd; Gulliver Travel ltd; Zajednica Ponuditelja

High	Brodospas plc; Europlakat ltd; Ventum Split ltd.	Split Port Control; Harbour Master's Office; Port Control Supervisors; Jadrolinija plc; Kapetan Luka – Krilo; MSC Krstarenja; Celebrity Cruises; Costa Cruises; Viking Ocean Cruises; Grand Circle Cruise Line; Aida Cruises; FTI Cruises; Croisi Europe Cruises; Holland America Line; P&O Cruises; Phoenix Reisen; Fred Olsen Cruise Lines; Scenic Cruises (MJ);	TUI – Marelly Cruises; Royal Carribean Cruises; Windstar Cruises; TUI Cruises; Ponant; Oceania Cruises; Regent Seven Seas Cruises; Variety Cruises; Azamara Club Cruises; Sea Cloud Cruises; Norwegian Cruise Line; Crystal Cruises; Silversea Cruises; Div Cruises; Voyages Antiquity; Sea Dream Yacht Club; Majestic Cruises

Table 2: Stakeholder mapping due to importanc

Stakeholder	Role	Importance	Contribution to the project	Potential benefits	Conflicts	Current support	Strategies to improve support
Split Port Control	Responsible for supervising all operations within port Works with the harbour master	High	No contribution	Improvement of port services quality, enabling a higher level of environmental protection and improvement of knowledge and learning from other ports' best practices.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for High level of support	Ensure regular feedback with the stakeholder. Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Harbour Master's Office	Monitoring and ensuring all laws and directives are respected within the port.	High	No contribution	Improvements of knowledge and learning from other ports' best practices	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for High level of support	Ensure regular feedback with the stakeholder. Introduce the energy efficient solutions to them, and involve them in the project through

					put off investments		dissemination and communication.
Port Control Supervisors	Port Control Supervisors	High	No contribution	Improvement of port services quality, enabling a higher level of environmental protection and improvement of knowledge and learning from other ports' best practices.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Ensure regular feedback with the stakeholder. Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Jadrolinija plc	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

					put off investments		
Kapetan Luka – Krilo;	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
MSC Krstarenja;	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

					put off investments		
Celebrity Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Costa Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

					put off investments		
Viking Ocean Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Grand Circle Cruise Line	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

					put off investments		
Aida Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
FTI Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

					put off investments		
Croisi Europe Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Holland America Line	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

					put off investments		
P&O Cruises	Shipping line	High	No contribution	They will benefit from and improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Phoenix Reisen	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

				learn ways to transfer those solutions for their own usage.	put off investments		
Fred Olsen Cruise Lines	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Scenic Cruises (MJ)	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

				learn ways to transfer those solutions for their own usage.	put off investments		
TUI – Marelly Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Royal Carribean Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

				learn ways to transfer those solutions for their own usage.	put off investments		
Windstar Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
TUI Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

				learn ways to transfer those solutions for their own usage.	put off investments		
Ponant	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Oceania Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

				learn ways to transfer those solutions for their own usage.	put off investments		
Regent Seven Seas Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Variety Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

				learn ways to transfer those solutions for their own usage.	put off investments		
Azamara Club Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Sea Cloud Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

				learn ways to transfer those solutions for their own usage.	put off investments		
Norwegian Cruise Line	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Crystal Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

				learn ways to transfer those solutions for their own usage.	put off investments		
Silversea Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Div Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and	The level of investment to introduce certain energy efficient solutions can be high and	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

				learn ways to transfer those solutions for their own usage.	therefore put off investments		
Voyages Antiquity	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Sea Dream Yacht Club	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and	The level of investment to introduce certain energy efficient solutions can be high and therefore	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

				learn ways to transfer those solutions for their own usage.	put off investments		
Majestic Cruises	Shipping line	High	No contribution	They will benefit from improved port competences as well as the improved quality of port services which wil be present in all the ports of the programme area. They will also be able to learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Adriatik Servis ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Jadroagent ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient	High likelihood	Low/non-existant	Introduce the energy efficient

				solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	that they don't see any value in participating in the project		solutions to them, and involve them in the project through dissemination and communication.
Bandić Maritime ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Adriatic Destination Management Company ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Rea Dubrovnik ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in	High likelihood that they	Low/non-existant	Introduce the energy efficient solutions to them,

				the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	don't see any value in participating in the project		and involve them in the project through dissemination and communication.
Brodsko Upravljanje ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
BWA ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
L.P. Pomoć Jahtama ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to	High likelihood that they don't see	Low/non-existant	Introduce the energy efficient solutions to them, and involve them

				transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	any value in participating in the project		in the project through dissemination and communication.
Tranzitagent ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Global agent ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Pomorski Peljar ltd	Pilot	High	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their	High likelihood that they don't see any value in	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project

				own usage, such as using LED lighting to reduce power consumption.	participating in the project		through dissemination and communication.
Alianca ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Capris Croatia ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
M.M.Coffe ltd	Travel agency and retail	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project		dissemination and communication.
Mater ltd (j.d.o.o)	Travel agency and retail	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Maja – Jahtaške usluge	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Servis brodova NENO ltd	Ship servicing and repairs	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project		dissemination and communication.
In Capita ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
CYC Yachting ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Katarina Line ltd	Ship's agent	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project		dissemination and communication.
Elite Travel ltd	Travel agency	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Amathus Travel ltd	Travel agency	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Applicon Tours ltd	Travel agency	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project		dissemination and communication.
Apodos Ltd	Travel agency	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Atlas plus ltd	Travel agency	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Calvados Club Travel Agency ltd	Travel agency	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project		dissemination and communication.
Dubrovnik Travel ltd	Travel agency	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Grand Circle Dubrovnik ltd	Travel agency	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Gulliver Travel ltd	Travel agency	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project		dissemination and communication.
Zajednica Ponuditelja	Sale of tickets for excursions and transfers	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Brodospas plc	Towage	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Europlakat ltd	Billboard advertising	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in	The level of investment to introduce	None, has potential for	Introduce the energy efficient solutions to them,

				the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	certain energy efficient solutions can be high and therefore put off investments	Medium level of support	and involve them in the project through dissemination and communication.
Ventum Split ltd.	Billboard advertising	Medium	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	The level of investment to introduce certain energy efficient solutions can be high and therefore put off investments	None, has potential for Medium level of support	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Braniteljska zadruga Legio Quarta	Lines (Vez/Odvez)	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to	High likelihood that they don't see	Low/non-existant	Introduce the energy efficient solutions to them, and involve them

				transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	any value in participating in the project		in the project through dissemination and communication.
Customs Administration	Customs	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Marine Police	Police	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project or fear losing importance and/or control in	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

					day to day operations		
Čistoća ltd	Solid waste collection	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Cian ltd	Liquid waste and sea pollution cleaning	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
IND EKO ltd	Liquid waste and sea pollution cleaning	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

					in the project.		dissemination and communication.
D.V.D. Kaštel Gomilica ltd	Liquid waste and sea pollution cleaning	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Dezinsekcija ltd	Liquid waste and sea pollution cleaning	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
A.M.E.C. Rijeka Tekstil ltd	Ship Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project.		dissemination and communication.
METRO Cash & carry ltd	Ship Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
PIK Vrbovec plc	Ship Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Prehrambeno industrijski Kombinat plc	Ship Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project.		dissemination and communication.
Vaporetto ltd	Ship Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Velpro-Centar ltd	Ship Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Crodux Derivati Dva ltd	Bunker Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project.		dissemination and communication.
Apios ltd	Bunker Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Diners ltd	Providing information, promotion and selling of authentic, certified products and services	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
EFT Usluge ltd	ATM	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using energy	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				efficient LED lighting for the machines.	in the project.		dissemination and communication.
Južna Uvala	Sale of beverages	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage which can reduce consumption of electric energy and water.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Obrt za mjenjačko poslovanje „Porat“	Currency exchange	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
OTP bank plc	ATM	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their	High likelihood that they don't see any value in	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project

				own usage, such as using energy efficient LED lighting for the machines.	participating in the project.		through dissemination and communication.
Rental ltd	Vehicle rental	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage such as using using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Viator ltd	Vehicle rental	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage such as using using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Seven Stables ltd	Preparation and sale of hot beverages	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their	High likelihood that they don't see any value in	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project

				own usage which can reduce consumption of electric energy and water.	participating in the project.		through dissemination and communication.
Venula ltd	Self-service beverage machine provider	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using energy efficient LED lighting for the machines.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Zagrebačka banka plc	ATM	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using energy efficient LED lighting for the machines.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Extra Old ltd (j.d.o.o)	Provider of information	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in	High likelihood that they	Low/non-existant	Introduce the energy efficient solutions to them,

				the port, and learn ways to transfer those solutions for their own usage which can reduce consumption of electric energy.	don't see any value in participating in the project.		and involve them in the project through dissemination and communication.
INA – Industrija Nafte plc	Bunker Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Adria Oil ltd	Bunker Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Rijekatank ltd	Bunker Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to	High likelihood that they don't see	Low/non-existant	Introduce the energy efficient solutions to them, and involve them

				transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	any value in participating in the project.		in the project through dissemination and communication.
Petrol ltd	Bunker Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Eko Servis Matić	waste cleaning, fumigation and deratization	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Pecto ltd	waste cleaning, fumigation and deratization	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to	High likelihood that they don't see any value in	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project

				transfer those solutions for their own usage.	participating in the project.		through dissemination and communication.
Adria Alfa ltd	Ship Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Ben Ship Supply ltd	Ship Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Omnis ltd	Ship Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project.		dissemination and communication.
Navis Supplementum ltd	Vessels' fuel Supply	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Lintea ltd	Washing ant transport of laundry from vessels	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage which can reduce consumption of electric energy and water.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Adriainspekt ltd	Goods quantity and quality control	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project.		dissemination and communication.
Cargo Control ltd (j.d.o.o)	Goods quantity and quality control	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Euroinspekt Croatia Kontrola ltd	Goods quantity and quality control	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Inspectorate (Croatia) ltd	Goods quantity and quality control	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

				lighting to reduce power consumption.	in the project.		dissemination and communication.
Maris Ispectio ltd	Goods quantity and quality control	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Sordes ltd	Collection and transport of animal origin by-products	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using LED lighting to reduce power consumption.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Bila Strana ltd	Unloading of bulk stone	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage.	High likelihood that they don't see any value in participating	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through

					in the project.		dissemination and communication.
Corpo Morto	Selling of souvenirs	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using energy efficient LED lighting inside the store.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Imprimis ltd	Self-service beverage machine provider	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using energy efficient LED lighting for the machines.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Obrt za ugostiteljstvo i usluge „Tin"	Caffe bar	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their	High likelihood that they don't see any value in	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project

				own usage which can reduce consumption of electric energy and water.	participating in the project.		through dissemination and communication.
Privredna banka Zagreb plc	ATM	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using energy efficient LED lighting for the machines.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Slatke brige ltd (j.d.o.o)	Ice cream sale	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using energy efficient LED lighting for the machines.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Tisak Plus plc	Newsstand	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in	High likelihood that they	Low/non-existant	Introduce the energy efficient solutions to them,

				the port, and learn ways to transfer those solutions for their own usage, such as using energy efficient LED lighting inside the newsstand.	don't see any value in participating in the project.		and involve them in the project through dissemination and communication.
Zadvarac ltd (j.d.o.o)	Food and drink serving	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage which can reduce consumption of electric energy and water.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.
Zusammen ltd	ATM	Low	No contribution	Learn more about environmentally friendly and energy efficient solutions that have been applied in the port, and learn ways to transfer those solutions for their own usage, such as using energy efficient LED lighting for the machines.	High likelihood that they don't see any value in participating in the project.	Low/non-existant	Introduce the energy efficient solutions to them, and involve them in the project through dissemination and communication.

Table 3: Stakeholder Involvement Strategy

3. Carbon Footprint

With the rising awareness of global warming and increasing efforts to mitigate global warming consequences, it is important for every significant CO_2 producer (direct and indirect) to evaluate its carbon footprint and analyse possible CO_2 emission reductions.

In this document, Greenhouse gases (GHG) emissions for port of Split are evaluated. The calculation is based on *Methodology for the implementation of the territorial needs assessments* developed by SUSPORT project. While the methodology was strictly followed in general, in some instances input data was inadequate and/or missing, therefore additional assumptions and changes to the model were made to obtained results as close as possible to real emissions. Assumptions, input data and calculations are explained in detail for every GHG source.

It is important to note that other emissions associated with ship traffic and port operation such as NO_x, SO_x, etc. we're not investigated in this study, but could be of importance in future port related decision making. Under the revised MARPOL, the global Sulphur cap has initially been reduced to 3.5% (from the current 4.5%), effective from the 1st January 2012 and then progressively to 0.5 %, effective from the 1st January 2020. One of the possibilities is flue gas scrubbing. On current price differentials between 3.5% and 0.5% fuels, the manufacturers of scrubbing units forecast a payback in just two years. But there is one crucial problem: disposal of residuum.

The main challenge in ports is to prevent pollution in all aspects, primarily air in correlation to expected traffic increase in the port. The analysis of air pollution caused by luxury passenger cruise ships in European waters shows that the luxury cruise brands owned by Carnival Corporation & PLC emitted in 2017 in European seas alone 10 times more disease-causing sulphur oxide than all of EU passenger vehicles (more than 260 million of cars). Croatia is considered to be in a good position despite the fact that Croatian ports are very interesting destination for cruisers.

Rank	Country	Ship CO_2 (Mt)	Comparison	CO_2 from passenger cars (Mt)	
1	Netherlands	19.9	larger	16.7	Total national car fleet
2	Spain	17.1	larger	12.2	Cars from Top 30 cities (municipalities)
3	UK	14.2	larger	13.9	Cars from Top 17 cities (incl. Greater London area)
4	Italy	13.7	larger	13.5	Cars from 4 large provinces (Rome, Milan, Turin, Bologna)
5	Germany	12.3	larger	9.4	Cars from Top 10 cities (incl. state of Berlin and Hamburg)
6	Belgium	10.0	comparable	11.7	Total national car fleet
7	France	9.8	larger	9.6	Cars from Top 10 cities and 1 large region (Grand Est)
8	Greece	6.6	Equal to 2/3	10.7	Total national car fleet
9	Sweden	6.0	larger	4.3	Cars from Top 30 cities (communes)
10	Norway	5.4	comparable	5.4	Total national car fleet
11	Finland	3.9	larger	2.3	Cars from Top 10 cities
12	Denmark	3.6	Equal to 2/3	5.0	Total national car fleet
13	Portugal	2.9	larger	2.8	Cars from Top 8 cities
14	Poland	2.9	larger	2.7	Capital region (Warsaw)
15	Ireland	1.6	comparable	1.7	Cars from three large cities (Dublin, Cork, Limerick)
16	Latvia	1.5	larger	1.4	Total national car fleet
17	Lithuania	1.4	Equal to 1/2	2.6	Total national car fleet
18	Estonia	1.4	larger	1.4	Total national car fleet
19	Croatia	1.3	Equal to 1/3	3.2	Total national car fleet

Table 4: CO2 from ships vs emission from the national car fleet

Source: Transport&environment, December 2019

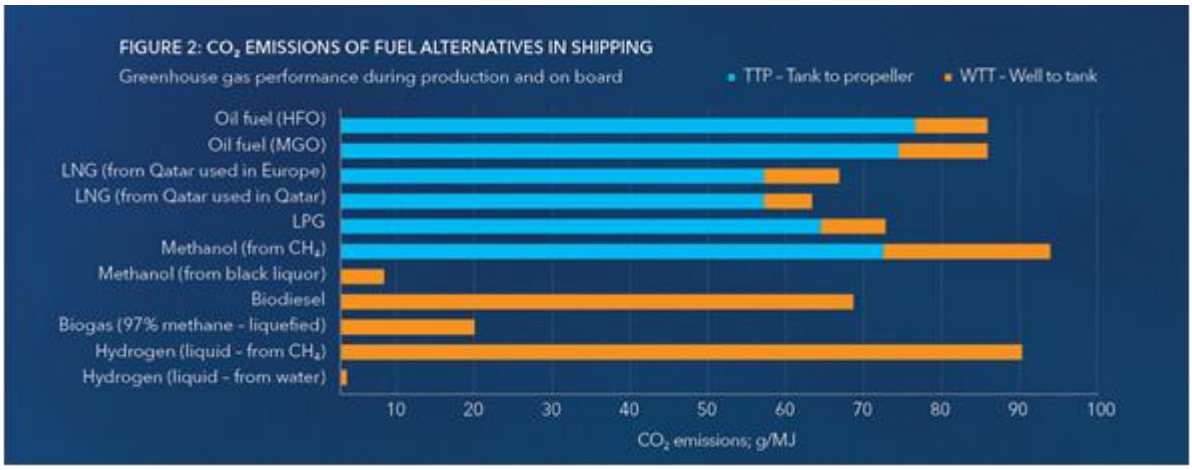
Spain, Italy, Greece, France and Norway are the most exposed countries to cruise ship air pollution in Europe. Among major cruise ports, Barcelona, Palma Mallorca and Venice are the most polluted ones. Analysis also reveals that even in sulphur emission-controlled areas (SECAs), where the most stringent marine sulphur fuel standard is mandated, air pollution from cruisers still exists. In Denmark, for example, whose coast is entirely within SECAs, cruise ships emitted 18 times more SOX in 2017 than all 2.5 million passenger vehicles in a year. This is a reflection of both the effectiveness of the fuel quality directive for road transport fuels and of the failure to implement equivalent standards for the shipping industry. Ships SOX will still remain considerably large compared to passenger car fleets even after the introduction of the global 2020 marine sulphur cap. When it comes to nitrogen oxide (NOX) emissions, cruise ships are also problematic. In Denmark again, 107 cruise ships analyzed emitted as much NOX in the Danish maritime economic exclusive zone (EEZ) as half the passenger cars operating in the country itself.

Electrification of Ferries and vehicles has started very aggressively. Today's leading technologies are now making it possible for ocean-going vessels to go electric. In these ships, the diesel engines are replaced with large battery packs that function as electric propulsion while in motion. The batteries can be recharged directly from the grid when off-loading, thus saving vast amounts of fuel and reducing turnaround times. The pure battery-powered solution is suited for ferries and smaller vessels travelling relatively short distances. The solution can even be used for fishing vessels. For longer routes, a higher capacity is needed, and a hybrid solution is more suitable. Hybrid solutions

use a combination of battery power and a diesel-driven propulsion system and engines can be set to optimal speeds and should the ferry be moving slower than the optimal speed excess energy can be stored within batteries for later use. Reducing the ferry's fuel demand results in decreasing of carbon emissions.

Stimulation of infrastructure for alternative fuels is necessary and there are plenty of funds supporting such projects. For LUS it is very important that lack of infrastructure in case of expansion activities in the port (passenger terminal as well as economic activities) could be complementary with investments in the infrastructure for alternative fuels. The crucial fact for investors is the turnover of all kind of fuels because of costs per unit.

Port of Split as all other ports need to think about ensuring power supply of ships (cold ironing) that are moored in the port for more than 1 day. This will open up the problem of connected power for EE in the LUS area. Currently, shipowners are not legally obliged to do so, so ships generally do not yet have the ability to supply EE from the shore and use MGO or HFO to power their generators (this is especially a problem of large cruisers with 3000-5000 guests where the connection power for EE up to 12 MW).



Graph 4: CO2 emissions from different fuels

GHG emissions

GHG from combustion

Direct (stationary) combustion (for heating, industrial and process heat) represents one of the major GHG sources worldwide. While in passenger port areas significant emissions from heating office buildings and passenger terminals are expected, Split port is primarily heated by heat pumps. There are also no other known direct combustion GHG sources.

There are no GHG emissions associated with direct stationary combustion.

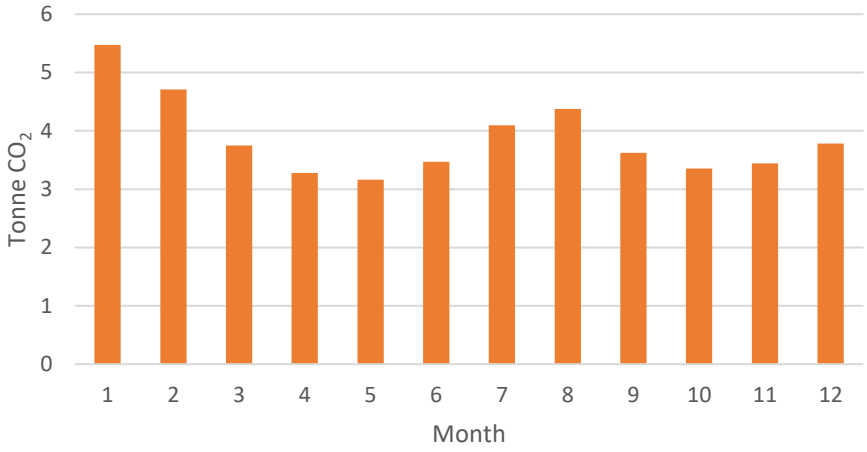
Other direct emissions of GHG

Other direct GHG emissions in port areas are generally related to GHG leaks from refrigerant systems, cooling/heating devices and fire extinguishing systems. As previously stated, most of the heating/cooling is based on heat pumps, specifically split systems.

Unfortunately, there is no data on refrigerant gasses refilling and leakages in port of Split, while the share of different refrigerant gases in cooling devices is also unknown. Considering the average age of installed split systems, 70-30 share of R410A and R32 is assumed. While refrigerant gas emissions are low in quantity, they have a very large global warming potential of 2,088 GWP and 677 for R410A and R32 respectively, therefore it would be important to acknowledge and calculate those emissions in future reports.

GHG from electricity consumption

Electrical consumption in port of Split for the year 2019 was obtained from electricity bills, electricity meters were read on monthly basis, therefore it is possible to obtain precise electrical consumption profiles through the year. Carbon intensity of electrical energy was obtained from annual energy report *Energy in Croatia 2018* (Ministry of Environment and Energy 2018). Since the report for 2019 was not published at the time of writing this document, the report for 2018 was used. Specific CO_2 emission factor per total electricity consumption in Croatia was 0.106 kg/kWh and specific CO_2 emission factor per total electricity production in Croatia was 0.148 g/kWh. Emission factor per total electricity consumption considers electricity imports in Croatia (as Croatia is a significant net importer) and is more adequate factor for emissions calculation. The monthly profile of the CO_2 emissions that can be associated with Port of Split electricity consumption is presented in Table 4. Overall GHG emissions from electricity consumption in 2019 were **46.52 tonne**.



Graph 5: CO2 from electricity consumption profile

GHG from freight traffic (Road vehicles emissions)

Being a passenger port, freight traffic is practically non-existent in port of Split, however considering the large number of road vehicles transported via ferries, it is important to estimate road vehicles emissions inside the port area. Since the only available data on car traffic is the overall number of transported cars, average distance for cars in port was estimated as middle distance between shortest (*gat sv. Petra*) and longest (*breakwater*) approach inside the port area. This average distance is a good approximation for both arriving and departing cars as their share is also unknown. The average distance per car is 0.58 km.

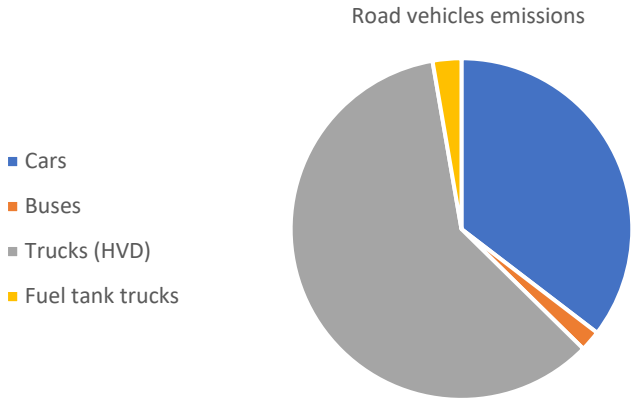
In 2019 829,594 road vehicles passed through port of Split, 786,399 in domestic travel and 43,195 in international travel. Of those 635,755 were personal vehicles (cars, vans and bikes), 4,242 were buses and 189,597 trucks.

Specific CO2 emissions were assumed as 160 g/km for personal vehicles, 1323 g/km for buses and 900 g/km for trucks (HVD). Considering s very small percentage of electric cars in Croatia, all cars were treated as ICE.

The last category of road vehicles are fuel tank trucks supplying the ships with the fuel. Emissions from these trucks can be divided into two categories: driving emissions inside the port and emissions during the ship refuelling. Specific driving CO2 emissions are the same as for HVD trucks, while specific pumping emissions were estimated assumed as idle engine operation with consumption of 4 kg_{CO2}/h. Fuel trucks are separated into two categories by length: less than 10m and less than 18m.

It takes 20 min to unload the former and 40 min to unload the latter (including time to connect the pipes and start the refuelling).

Overall emissions resulting from vehicle transport inside the port area in 2019 are 164.4 tonne. Shares of road vehicle emissions are shown in Graph 4.



Graph 6: Share of road vehicle emissions inside port area

	Domestic	International	Total	GHG (t_{CO2})
Number of cars	599237	30673	629910	58.2
Motorbike		5845		
Number of buses	3089	1153	4242	3.2
Number of trucks	184073	5524	189597	98.5
Vehicles	**786399**	**43195**	**829 594**	**159.9**
18m	492			1.6
10m	1566			2.9
Fuel tank trucks	**2058**			**4.5**
Total				**164.4**

Table 5: overall of GHG emissions for road vehicles transfering and operating inside port area

GHG from ship traffic

Port of Split is a relatively busy port serving all kinds of vessels, from large cruisers and ferry boats to small tourist boats with lengths of less than 10 meters. As of 2017, the port ranks as the largest passenger port in Croatia, the largest passenger port in the Adriatic, and the 11th largest port in the Mediterranean, with an annual passenger volume of approximately 5 million (wikipedia.org).

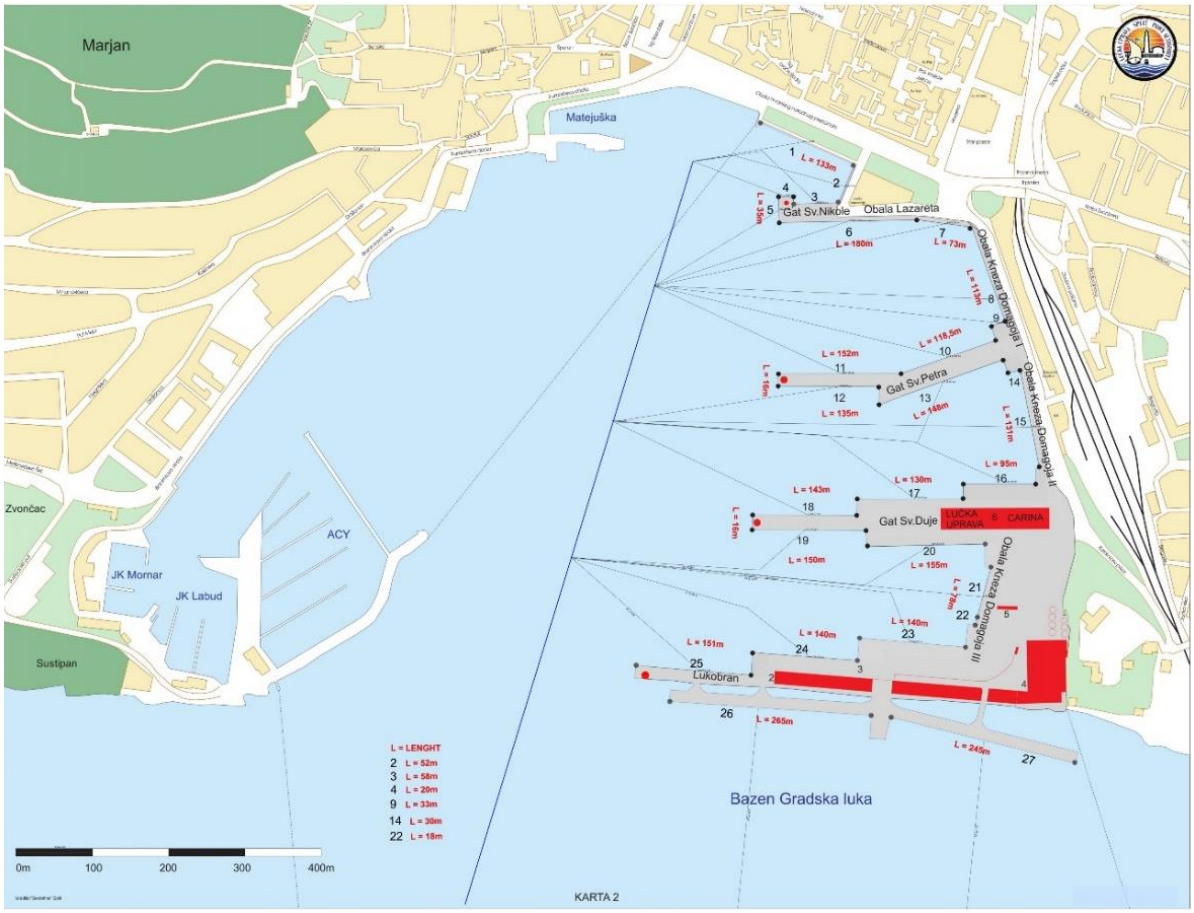
In 2019. There were 20,371 arrivals at Split Port of which the majority were liners (ferries and catamarans) with 14,522 arrivals. Tourist and excursion boats were the second most common category with 5,414 arrivals, where all other ships accounted for only 435 arrivals. For this reason, all emissions were separated into those three categories.

GHG emissions were evaluated using a bottom-up approach, by estimating anchor, manoeuvring and moored emissions for each arrival of each ship. Due to the insufficient available data concerning ship engines, propulsion power, speed and draught modified Tier 1 methodology was used.

Manoeuvring phase emissions

Available information for each arrival/departure was ship name, dock location, ship length and duration of the stay while manoeuvring time was unknown. According to the literature, the typical manoeuvring time for different types of ships and typical ports is between 0.7 hours and 1.5 hours for fishing ships and oil vessels respectively (ENTEC, 2002). However, those numbers are very far from real numbers in port of Split, as it is a relatively small port by port area, most of the ships are relatively small and large cruise ships are generally docked on outer docks. Therefore, it was necessary to develop some other methodology for manoeuvring time estimation.

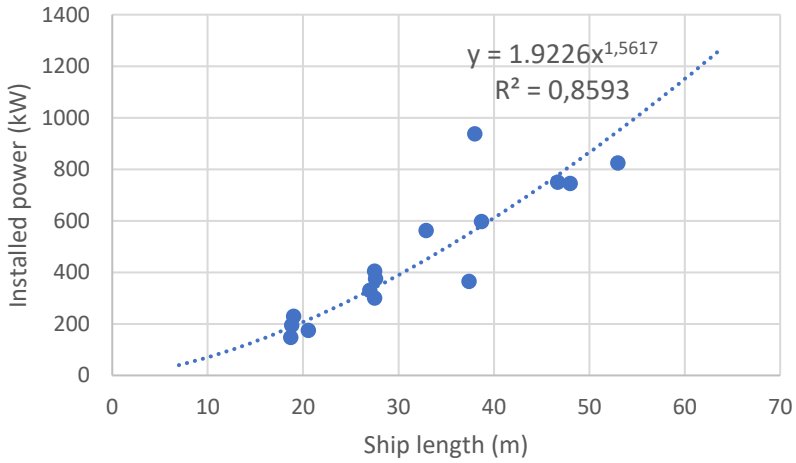
Manoeuvring time (t_m) was approximated by calculating manoeuvring length for each dock as shown in Graph 5 and dividing it by maximum allowed speed inside the port area (6 knots). Assumed manoeuvring durations, depending on the dock, were between 6.5 minutes and 3 minutes. Actual power during manoeuvring was assumed as 20% of installed power for all ships (Knežević, 2018). Installed power was obtained with thorough internet research for all liners (ferry and catamaran), while installed power for only 15 tourist and excursion ships was obtained. As there were 331 distinct ships in this category it was necessary to approximate the nominal power of other ships.



Picture 3: Port of Split with approximated manoeuvring lines for all docks

Most of these ships are very similar with lengths around 20-45 m, therefore it was possible to make a good approximation of power-length relation using power regression analysis. Available data with plotted regression curve is shown in Graph 6. For all boats with unknown power in this category installed power was calculated as

$$P = 1.92 \cdot l^{1.56}.$$



Graph 7: Power vs length data for tourist and excursion boats with regression curve

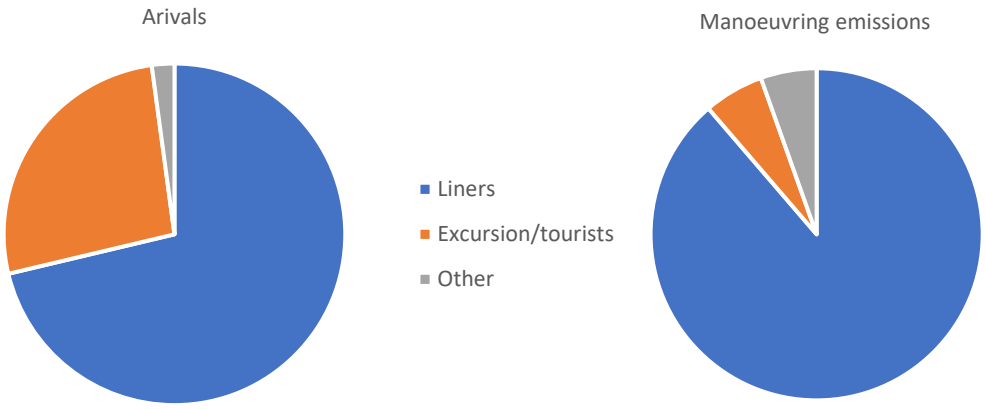
The large majority of ships in all three categories use regular diesel fuel, with a small percemtage using Marine Diesel Oil. Specific engine consumption (SFOC=195 g_{Diesel}/kWh) was extracted from IMO documents for medium speed engines produced between 1984-2000, while specific emissions were extracted from the same source as 3.2 kg_{CO2}/kg_{Diesel}.

Finally, overall GHG emissions for each arrival/departure was calculated as:

$$GHG(kg) = \frac{l_{d,i}(m)}{v_{man}\,(m/s) \cdot 3600} \cdot P(kW) \cdot c_{man} \frac{SFOC(g_{Diesel}/kWh)}{1000} \cdot c_{GHG} \cdot (kg_{Diesel}/kWh),$$

Where $l_{d,i}$ is manoeuvring length of each arrival/departure, v_{man} manoeuvring speed, $P(kW)$ installed engine power, c_{man} manoeuvring power factor, c_{GHG} specific emissions per kilogram of fuel.

Overall manoeuvring GHG emissions in 2019 for all liners were equal to 871 tonne, and for all tourist and excursion boats 57 tonne, and for all other vessels 53.6 tonne. Of all other vessels 48.12 (89%) tonne CO2 was released by large cruisers with only 285 arrivals/departures.



Graph 8: Share of arrivals and manoeuvring GHG emissions by ship category

Mooring phase emissions

The port authority monitors and documents mooring time for each vessel and each arrival. The data is measured in days. Mooring emissions are the primary function of mooring time and generator load rate. The same categorisation was used for mooring GHG emission calculations, as it was for manoeuvring.

For all liners the mooring time for emission calculation was limited to one day, if mooring time was longer it is assumed that the ship is not operating and only minimal power supply is active. The mooring time limit for tourist ships was set to half a day. Mooring time for large cruise ships, cargo ships and yachts was not limited, while for service and other ships it was limited to half a day. Since no data on generator power was provided nor it could be found for most of the ships, generator power was based on total propulsion power, where generator power equals 27.8% of maximal propulsion power for cruise ship and 26.6% for ferries (US Environmental Protection Agency, 2009). Using available data on tourist and excursion boats, auxiliary power was estimated to be equal to 10% of installed propulsion power for this category. The load factor of auxiliary engines in hotelling mode was specified in the same article as 30% for RORO ships and 64% for cruisers. The auxiliary load factor for tourist boats was estimated to be 30%. All assumptions related to mooring phase emissions are shown in **Error! Reference source not found.**.

Mooring phase emissions for each arrival was calculated as:

$$\mathrm{GHG(kg)} = \mathrm{t_m(h)} \cdot \mathrm{P(kW)} \cdot \mathrm{c_{aux}} \cdot \mathrm{c_{LF}} \cdot \frac{\mathrm{SFOC(g_{Diesel}/kWh)}}{1000} \cdot \mathrm{c_{GHG}} \cdot \mathrm{(kg_{Diesel}/kWh)},$$

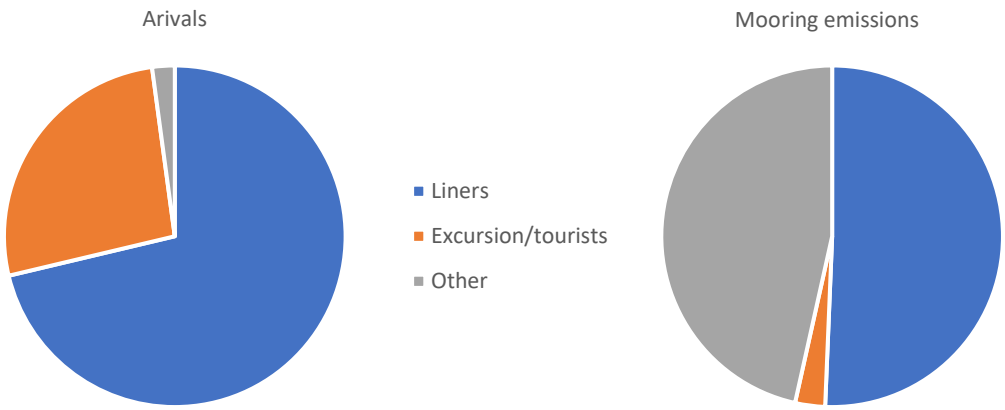
where $\mathrm{t_m}$ is mooring time, $\mathrm{c_{aux}}$ is generator power factor and $\mathrm{c_{LF}}$ is auxiliary generator load factor for each category.

Mooring time limits (h)	Liners	12
	Excursion/tourist	12
	Cruisers,yaht, cargo	-
	Other	12
Generator power coefficients	Liners	0.21
	Cruise	0.22
	Excursion/tourist	0.10
	Other	0.21
Generator load factor	Liners	0.30
	Cruise	0.64
	Excursion/tourist	0.30
	Other	0.30

Table 6: Mooring emissions assumptions

Mooring emissions were an order of magnitude larger than manoeuvring emissions. Emissions for liners were 6628 tonne (7.6 times larger than manoeuvring), for excursion/tourist boats 426 tonne (7.4 times larger) and for other ships 6997 (130 times larger) out of which 6936 are caused by large cruise ships. This extremely large emission ratio between manoeuvring phase for cruise ships is caused by very large emissions by cruisers in hoteling mode. Furthermore, cruise ships in Split port are typically moored on outer docks toward the open sea, as a result, manoeuvring distances for cruisers are very short.

The distribution of mooring emissions is shown in Graph 7.

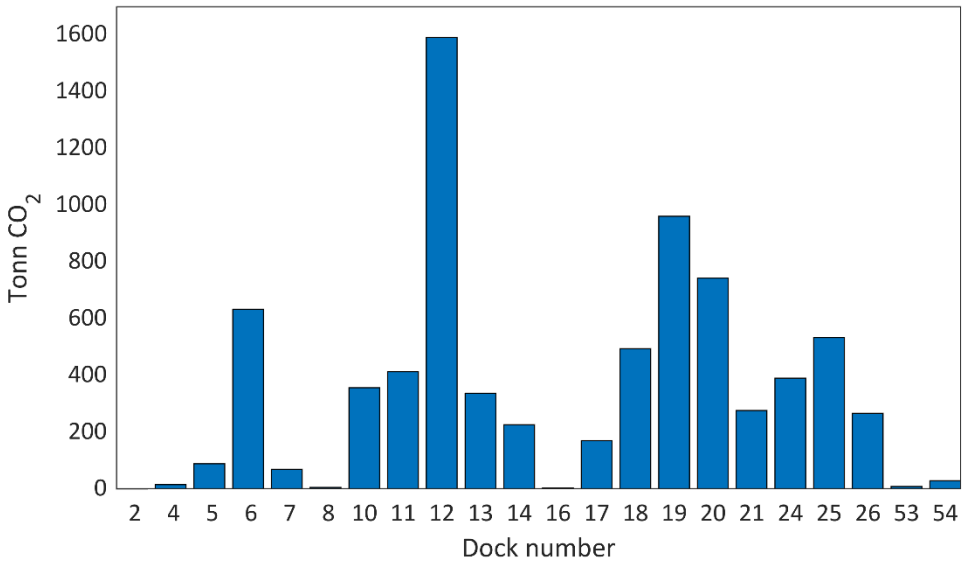


Graph 9: Mooring phase emissions

	Arrivals	Maneuvering	Mooring	At anchor	
Liners	14522	871.7	7621.9	0.0	
Excursion/tourists	5414	57.4	426.6	0.0	
Other	435	53.6	6997.5	6.8	
Sum (t_{CO2})		982.8	15046.0	6.8	**16035.5**
%		6.13	93.83	0.04	**100%**

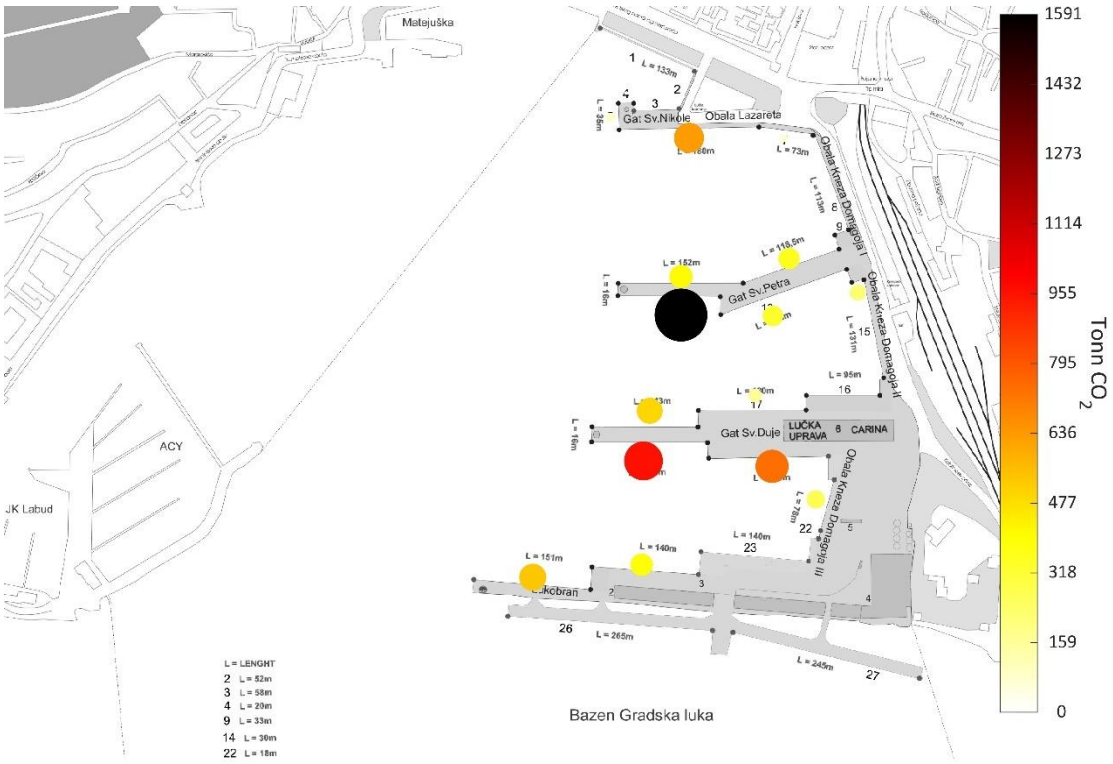
Table 7: Overall emissions by ship traffic inside port area

It is interesting to further analyse liners mooring emissions, as they are spatially spread over most of the port area. Liners emission for each dock are therefore shown in Graph 8. It can be seen that that emissions at dock 12 are significantly larger than emissions at other docks, probably due to the larger ships and longer mooring time for lines departing from dock 12.



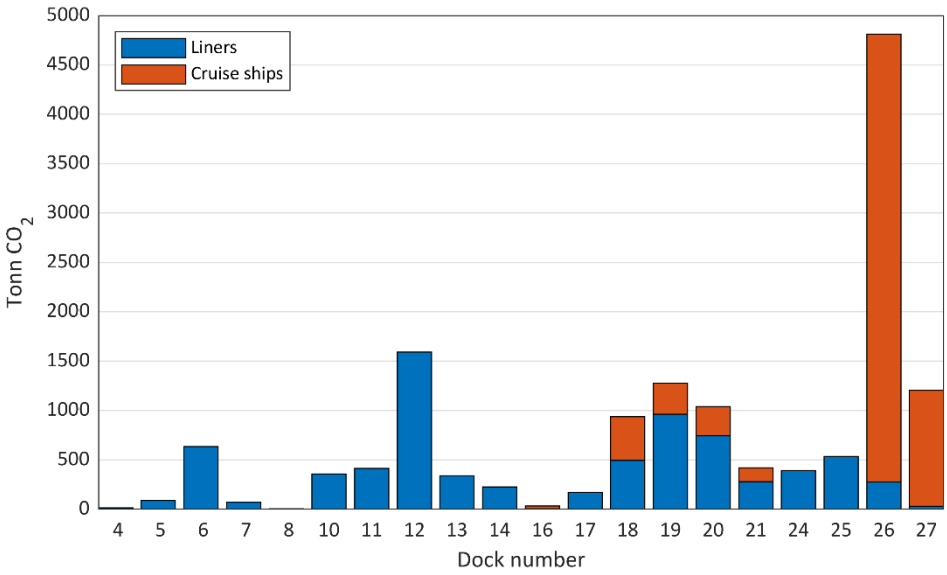
Graph 10: Liner emissions in mooring phase for each dock

The same data is mapped and shown in Graph 9 where colour intensity and size of the circle are proportional to the produced emissions.

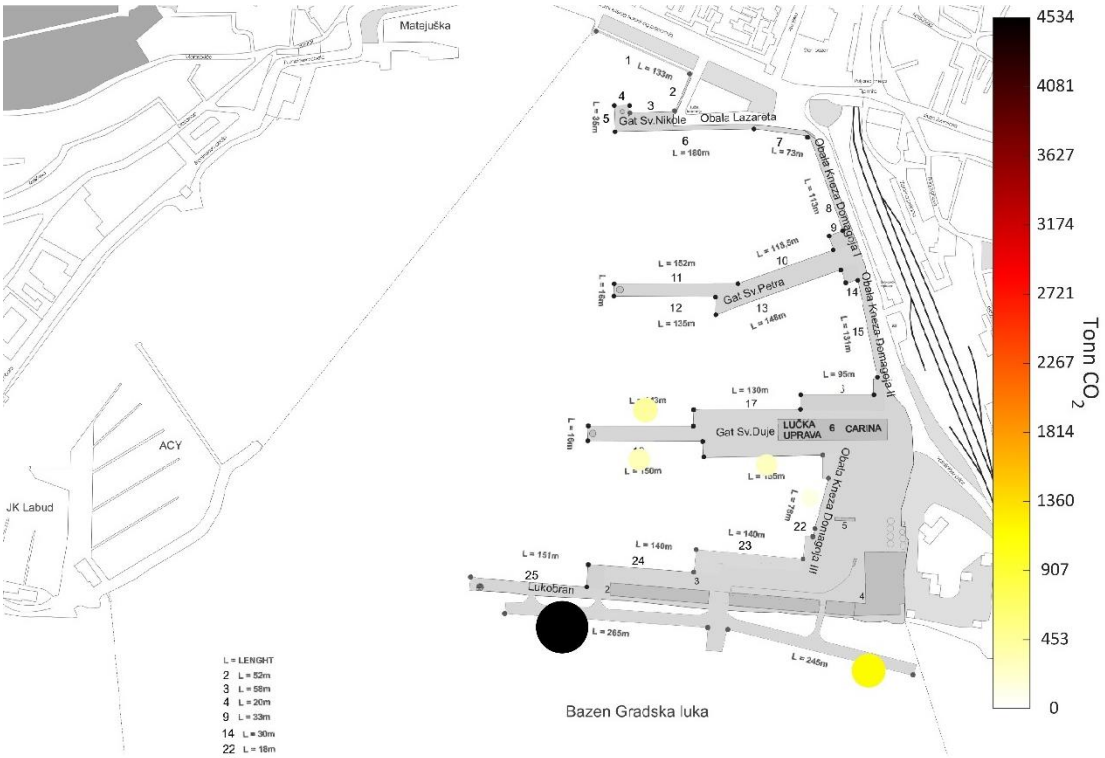


Picture 4: Mapped liner mooring emissions

Cruise ships mooring emissions distribution for each dock are shown in Graph 10 together with liner emissions for a comparison. The emissions map for cruise ships alone is shown in Picture 4. Most of the cruise ship emissions are concentrated on dock 26, with much smaller emissions from dock 27. Other docks for international arrivals have significantly smaller emissions.



Graph 11: Liners and cruise ships emissions in mooring phase for each dock



Picture 5: Mapped cruisers mooring emissions

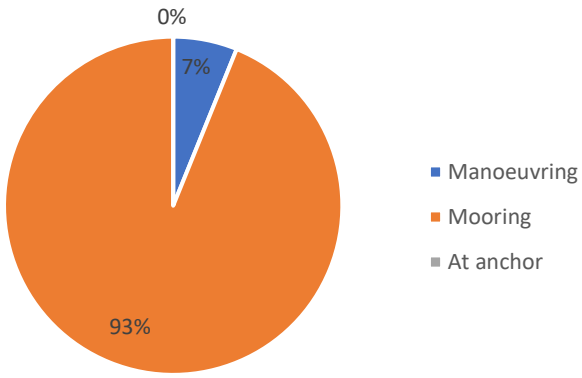
At anchor phase emissions

As a passenger port, the number of ships at anchor in Port of Split is small. During the whole of 2019 there were only 32 ships at anchor, all of these ships were cargo ships considered in the category "other". Overall emissions of ships at anchor were estimated as **6.76 tonne**.

Emissions comparison

Ships at berth represent the largest part of ship emissions in Port of the Split. Visual representation of GHG emissions by operation mode is presented in Graph 11. Detailed emissions breakdown from ship traffic is shown in Table. As expected, emissions from anchored ships are practically negligible. Mooring emissions are 14 times larger than manoeuvring emissions. While this ratio looks extremely skewed toward mooring emissions, similar ratios can be found in other ports. Port of Gothenburg

had 10 times larger emissions from mooring than from manoeuvring in 2010 (Winnes, 2015). Since the city of Split is a popular Cruiser destination this ratio is further inclined toward mooring.



Graph 12: Share of GHG emissions by operational mode

Summary of contributions to the production of greenhouse gases in the maritime sector, in the port of Split, in 2019		
Category	**t CO2eq**	**%**
Anchored ships	6.76	0.04
Ships manoeuvring	982.80	6.5
Moored ships	14052.5	93.4
TOTAL	**15042.0**	**100.00**

Table 8: Overall of GHG emissions in maritime sector

Summary of contributions to the production of greenhouse gases in the maritime sector, in the port of Split, in 2019		
Category	**t CO2eq**	**%**
Electric energy	46.5	0.3
Heating	0.0	0.0
Service vehicles	0.0	0.0
Operational port vehicles	0.0	0.0
Heavy vehicles + Road vehicles	164.4	1.1
Naval port service (e.g. pilot/tug)	0.0	0.0
Railway tractors	0.0	0.0
Anchored ships	6.8	0.0
Ships manoeuvring	982.8	6.4
Moored ships	14052.5	92.1
TOTAL	**15252.9**	**100.0**

Table 9: Overall of total GHG emissions

4. SWOT Analysis

2. External factors —*Opportunities and Threats*

Internal factors deal with aspects related to the organization carrying out the SWOT analysis, in the present case, it is port of Split. The analysis may view internal factors as strengths or as weaknesses depending upon their effect on the project objectives. Factors are derived from the previous steps of territorial need assessments, such as the examination of the programme area, the greenhouse gas inventory, stakeholder involvement and their feedback.

The external factors may include stakeholders, technology, regulations and policies, cultural aspects, infrastructure, market demands. The results are presented in the form of a matrix (Table 7). The matrix is not merely a list to be compiled: important factors should be examined in detail reporting how they can foster or hinder the project objective implementation.

	STRENGHTS	WAKNESSES
Internal Factors	STRENGHTS - Location in the city centre - Rail and bus terminals are situated in the port area - Implementation of PERS - Existing waste management plan - Implementation of pilot actions within the SUSPORT project for improving energy efficiency (outdoor LED lights, monitoring stations) - Implementation of the new terminal building is an ongoing project - Reconstruction and extension of the Coast of Kneza Domagoj I and II in the City Port of Split - Location in the city center which threatens local residents and tourists	- Non-existing energy efficient solutions in the port area - Non-existing alternative fuel solutions - Congestion caused by road traffic in the city and on the access roads to the port - Poor railway infrastructure which results in insufficent modal share of railway transport - No direct access to the highway
	OPPORTUNITIES	THREATS

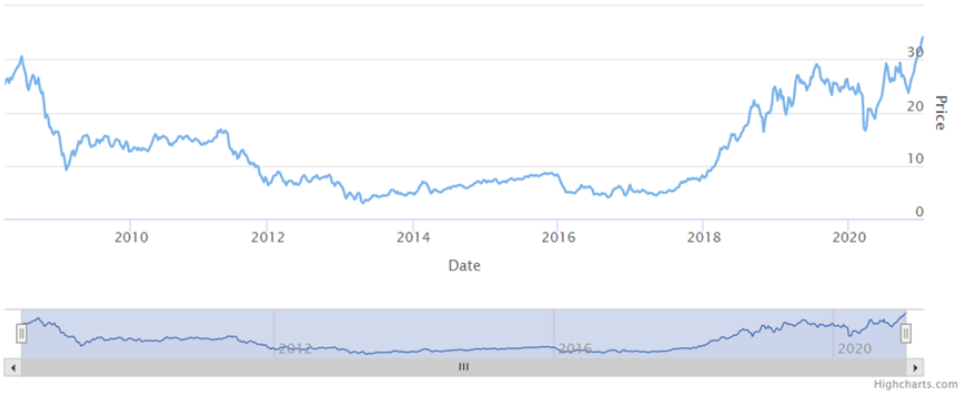
theExternal factors	- Implementation of new technological advances in the port area - Usage of EU funds for the purpose of implementing new technologies - Implementation of modern technologies and energy efficiency is one of the key goals for the port of Split - Implementation of the project for connecting port with airport	- Increase in cruise traffic may cause an increase in the carbon footprint - Constant increase in car traffic will require different organization and entrance to ships/ferries - Lacking connections between railway and road infrastructure

Table 9: SWOT Analysis – Potrebno usuglasiti s Lučkom upravom

5. Conclusion

Being a passenger port, most of the GHG emissions in the port of Split are directly related to ship traffic, specifically manoeuvring and mooring. Other sources of GHG emissions are negligible with only significant amounts produced indirectly by electrical energy consumption or directly from road vehicles traffic inside the port area. Taking into consideration statistics which indicates that an EU citizen on average produces around 7t of CO2 per year (source: EUROSTAT, 2018) we may calculate that specific emission per passenger and hour represents only 0,00427 tCO2/passenger. This is a very good result because with assumption that an average stay of each of 5 607 789 passengers (total number of passengers in the port of Split for 2019) is approximately 3 hours, the result indicates 7,61 tCO2 per passenger on yearly level. In comparison to an average 7t per EU citizen it is a very good result especially when taking into account that ports are very intensive areas related to emissions.

Different activities can be taken to decrease these emissions, among which shore-to-ship power supply (cold ironing) could provide the most benefit but considering its technological requirements and financial range these projects are unlikely to be implemented without the support of governments and EU funds. Considering expected raise in ETS pricing towards 65 €/t towards 2030, ship operators could find further incentives for the application of such systems.



Graph 13: Trend of EU ETS carbon market price

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