

Local action plan for the port of Porto Nogaro

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Introduction

This document has been drafted in the framework of the European project CLEAN BERTH, which aims to strengthen the institutional capacity of ports in the cross-border area of the Interreg ItalySlovenia Programme and create the basis for a coordinated and permanent governance in the field of port environmental sustainability and energy efficiency, by jointly developing action plans and a long-term strategy, increasing coordination and cooperation between ports to strengthen their sustainability and competitiveness.

In particular, the objective of this document is to draw up an inventory of Greenhouse Gases (GHG) also known as "Carbon Footprint" and an action plan for their reduction, within the Porto Nogaro port area, in accordance with the contents of the following documents:

- "Document 1 -D.3.1.2.1_STATUS_QUO_ITA.pdf"
- "Document 2 - D.3.1.3.1_metodologia_AP_ITA.pdf"
- "Document 3 - SUSPORT_D.3.2.1_TNA_methodology_FINAL.pdf"
- "Document 4 - SUSPORT_D.3.3.1_AP_model_FINAL.pdf"

The methodology identified to approach the study and production of the analysis refers to the UNI EN ISO 14064 standard, which identifies carbon dioxide equivalent (CO_{2eq}) as the unit of measurement for assessing GHG emissions, as established by the Convention on Climate Change (UNFCCC).

The principles to be followed in drawing up the GHG inventory are defined by the UNI EN ISO 14064 standard and are as follows:

- **Relevance:** the final result of the evaluation must represent an understandable and reliable basis for subsequent decisions
- **Completeness:** the completeness of the Carbon Footprint report must include all sources of port emissions within the pre-established boundaries. All important steps and possible exclusions must be reported and justified
- **Consistency:** consistency in applying the methodology is important to obtain a meaningful comparison of information related to greenhouse gases over the years. Any change (in data, boundaries, factors, etc.) must be documented transparently

- Transparency: all issues relating to the carbon footprint report must be documented effectively and consistently, based on verification. Any assumptions or forecasts must be made public and the sources used for the data and methodologies must be indicated.
- Accuracy: the quantification of greenhouse gas emissions must be as realistic as possible, i.e. the level of uncertainties must be reduced as much as possible.

This methodology makes it possible to develop a current and prospective assessment of energy requirements, providing the tools to guarantee the environmental sustainability of the port area over time, with the same quality of services offered, through the identification of innovative technical and organisational solutions linked to the supply and use of energy, whatever form it takes.

This energy and environmental plan, in addition to limiting the energy needs of the port area, sets as its objectives the reduction of GHG emissions, with particular attention to CO₂.

Reducing GHG emissions from ports is not only a measure to tackle global warming, but also contributes to promoting innovation, implementing energy efficiency and improving the quality of life in the surrounding areas.

Although emissions in port areas represent only a small part of the total emissions that can be associated with the whole maritime transport logistics chain (which includes land transport to ports, port operations and maritime transport), any reduction of emissions in the port area not only improves local air quality and noise reduction, but also helps to reduce the global climate effect in a synergistic way. In this sense, port area management authorities have an important role to play in engaging actors in the port community to be more environmentally friendly and facilitate through initiatives the implementation of best environmental practices and the encouragement of measures aimed at improving energy efficiency and promoting the use of renewable energy in the port area.

Legal framework and context

Maritime transport emits about 940 million tonnes of CO₂ per year and is responsible for about 2.5% of global GHG emissions. According to the 3rd IMO study, it is predicted that emissions from maritime transport could increase by between 50% and 250% by 2050. For this reason, both the

EU and Italy, but more generally the international community, have adopted new strategies to reduce CO₂ emissions in maritime transport and ports.

The following paragraphs are intended to provide an overview of the regulations and policies adopted at international and national level to combat climate change.

Italian and European legislation relating to the reduction of GHG emissions and in particular CO₂ in the maritime and port sector

The reduction of CO₂ emissions is one of the main objectives of the EU, which has issued several directives that have been adopted by the Member States. The main ones are:

- EU Directive Emission Trading (ETS 2018/410) regulates emissions from energy-intensive sectors by setting a reduction target of -43% by 2030, stressing the need to take action on emissions from maritime transport, and periodically reviewing the work of the IMO;
- Decision Effort Sharing allocates the emission reduction target in the sectors not covered by the ETS Directive (transport, buildings, agriculture and waste) in a binding manner between Member States;
- EU Directive Carbon Capture and Storage defines a common regulatory framework for the industrial-scale development of CO₂ capture, transport and storage projects;
- EU Directive 2009/30 CE sets out the characteristics that petrol and diesel must have in order to be commercialised in the EU. It requires fuel suppliers to reduce GHG emissions per unit of energy produced during the life cycle of fuels by up to 10% by 2020;
- Regulation (EU) 2015/757 of the European Parliament and of the Council stipulated that from 2018 shipping companies must monitor and from 2019 report: CO₂ emissions, fuel consumption, distance travelled, time spent at sea and goods transported per voyage. All ships sailing to EU ports must be equipped with a compliance document

In Italy, since law, n. 84 of 28.01.1994 the concept of environmental sustainability of ports has been introduced as part of port system planning, in line with the policies promoted by the relevant EU Directive. Legislative Decree no. 169 of 04.08.2016 promotes the drafting of the Port System Energy and Environmental Planning Document (DEASP) by the Port System Authorities, with the aim of

pursuing CO₂ emission reduction objectives through the implementation of measures to improve energy efficiency and promote the use of renewable energies. The Guidelines adopted by MATTM in 2018, define the methodologies to be followed for the drafting of DEASPs, which in analogy to the requirements of this document, recall some normative references that must be taken into account in the context of the carbon footprint of a port and in the definition of a related action plan aimed at a reduction of GHG emissions. The measures and interventions considered must be subjected to a cost-benefit analysis in accordance with the Guidelines for the evaluation of investments in public works issued by the MIT and the European standard ACB DG REGIO, 2014.

In addition to the standards listed above, other standards that have been taken into account in the drafting of the document are listed below:

- Directive 2007/71/CE, (implemented by Ministerial Decree of the Ministry of the Environment, Food and Rural Development of 01.07.2009) on port reception facilities for ship-generated waste and cargo residues;
- The Communication from the Commission to the EU Parliament and the Council COM 2002/595 of 20.11.2002 An EU strategy to reduce atmospheric emissions from seagoing ships in which it invited Port Authorities to impose, encourage or promote cold ironing;
- Directive 2012/33/UE on the sulphur content of marine fuels;
- Directive 2005/35/CE of 07.09.2005 on ship-source pollution and on the introduction of penalties for violations;
- Green Paper “Towards a future Maritime Policy for the Union : a European vision for the oceans and seas”7.6.2006, COM (2006) 275;
- Commission Recommendation of 08.05 2006 on the promotion of the use of cold ironing for ships at berth in Community ports close to residential areas.
- The Communication from the Commission to the EU Parliament and the Council “An Integrated Maritime Policy for the European Union”, 10.10.2007 COM (2007) 575;
- The Communication from the Commission “Communication on a European Ports Policy”, 18.10.2007 COM (2007) 616;
- Communication from the Commission to the EU Parliament, the Council, the EU Economic and Social Committee and the Committee of the Regions “20 20 by 2020 Europe's climate change opportunity”, 23.1.2008 COM30;

- “Directive 2008/50/CE on ambient air quality and cleaner air for Europe;
- “Marine Strategy Framework Directive”, 17.6.2008, 2008/56/CE;
- “Greening Transport”, 8.7.2008, COM (2008) 433;
- Directive 2014/52/UE on the assessment of the effects of certain public and private projects on the environment;
- New PIANC reference standards;
- ISPRA report "Maritime transport and environmental management in Italian port areas", 17.5.2016;
- Publications and workshops by ESPO (European Sea Ports Organisation)/EcoPorts (the main environmental initiative of the European port sector);
- IMO's MARPOL International Convention for the Prevention of Pollution from Ships (Annex VI), which requires the use of marine fuels with a sulphur content of less than 0.5% m/m from 2020.

Italian and European policies related to the reduction of greenhouse gas emissions, in particular in the maritime and port sector

Italy, as a member state of the EU, has been at the forefront of policies to reduce GHG emissions since 1992. At the Rio de Janeiro Conference that year, it joined the United Nations Framework Convention on Climate Change (UNFCCC), and in 1997 it joined the international treaty known as the Kyoto Protocol. Under the Kyoto Protocol, the EU pledged to reduce its greenhouse gas emissions from 1990 levels by 8% and Italy by 6.5%. Subsequently, the EU adopted a series of targets for 2020, set out in the “Climate & Energy Package 2020”: -20% CO₂, +20% RES and +20% EE.

From 1990 to 2018, the EU has reduced its greenhouse gas emissions by 23%, exceeding the 20% target. The Kyoto Protocol has led to other international agreements to which Italy and the EU have always adhered with the aim of further reducing their GHG emissions, including: the financial commitment for climate signed in 2009 at COP15 in Copenhagen and the adoption in 2012 of the Doha Amendment to reduce emissions by at least 18% by 2020 compared to 1990. In 2016, Italy signed, together with the EU and 190 others, the Paris Agreement, the first universal and legally binding agreement on climate change, whose objectives are to keep the average global temperature

increase below 2C° compared to pre-industrial levels, to ensure that global emissions peak as soon as possible and to achieve a balance between emissions and removals in the second half of the century. The EU's contribution under the Paris Agreement is to reduce its GHG emissions by at least 40% by 2030 compared to 1990 levels.

To implement the Paris Agreement, the EU adopted the "Climate & Energy Package 2020", consisting of a set of directives and regulations aimed at achieving the 2030 targets (-40% CO₂ + 32% RES +32.5% EE). In 2019, the EU Commission presented the Green New Deal a "growth strategy aimed at transforming the EU into a fair and prosperous society with a resource-efficient and competitive economy that generates no net GHG emissions in 2050". In the Green Deal, the EU's 2030 target to reduce GHG emissions to at least 50-55 % is increased. Within this overall framework of European and national targets and policies, the contribution that shipping can make to reducing emissions is potentially high. In 2018, the IMO adopted a strategy to reduce annual GHG emissions from shipping by at least 50 % by 2050 compared to 2008 and to continue efforts to phase them out as early as possible in this century. The EU has set out a strategy to reduce GHG emissions from this sector in EU Commission Communication 479.

The strategy is divided into consecutive phases involving the monitoring, reporting and verification of CO₂ emissions from large ships calling at EU ports, GHG reduction targets for the maritime transport sector and further medium and long-term measures. In Italy, at the beginning of 2020, the MISE published the "Piano Nazionale Integrato per l'Energia e il Clima" (PNIEC), through which it sets national targets for the reduction of CO₂ emissions by 2030, foreseeing that the most significant contribution will come from the transport and civil sectors. The PNIEC is part of a favourable national context made up of strategic documents including the National Climate Change Adaptation Strategy (2015) and the National Energy Strategy (2017), and documents that direct national policy towards the decarbonisation of the transport sector as "elements for a sustainable mobility roadmap" (2017), the National Infrastructure Plan for the Recharging of Electricity-powered Vehicles, the National Strategic Framework for the development of the alternative fuels market in the transport sector and the implementation of related infrastructure within which the provision of refuelling points in ports of LNG for shipping and the use of hydrogen in the maritime sector is envisaged.

In the update note to the 2019 Economic and Financial Document (naDEF2019), an increase in investments is also planned to encourage the electrification of ports and strengthen their connection with airports through the railway system. The PNIEC also aims to improve air quality by promoting the electrification of consumption in the transport sector, specifying the interest in

equipping ports with electrified docks (cold ironing). The PNIEC identifies the modal shift as a measure to reduce emissions due to freight transport, promoting the integration between ship transport and local distribution by road with low environmental impact vehicles, confirms the Marebonus mechanism that provides incentives to road haulage companies where they adopt combined road-sea transport modes, and promotes the development of the National Logistics Platform (PLN), with the aim of optimising transport through increased interconnection and facilitating data management. In line with the "DAFI Directive on the establishment of an infrastructure for alternative fuels", the PNIEC identifies the development of LNG as a strategic measure to reduce emissions from maritime transport and port services, providing that by 2025 an adequate number of refuelling points will be built as well as implementing incentive tools for the construction of depots and / or distributors and the use of LNG vehicles.

Description of the port area

The Aussa - Corno industrial area has a port known as 'Porto Nogaro' which is composed of the two public structures of Porto Nogaro 'Vecchio' (located near the town of Porto Nogaro), the Porto Margreth structure and the private quay of the former Industrie Chimiche Caffaro, which is reached by the Banduzzi artificial canal.

The Port Margreth, located at a distance of 10.9 km from the Adriatic Sea and connected to its by the sea channel Corno, has an evolution basin with a useful width of 250 m and a quay length of 860 ml. Following the recent dredging carried out by the FVG Region, the Corno sea channel has a bottom level of -7.50.

The Margreth port area benefits from 25 hectares of port quays and yards behind the quay, which are equipped with railway connections, covered warehouses, covered canopies, uncovered storage areas, areas outside the customs barrier, road-rail weighbridges, fire prevention system, scrap iron treatment plant, video surveillance system, office building and green areas. The ships that gravitate to Porto Nogaro weigh on average 3-4,000 tons, with peaks of up to 7,000. Due to the fluvial nature of the access channel to the Port, flat-keeled ships have an easier access.

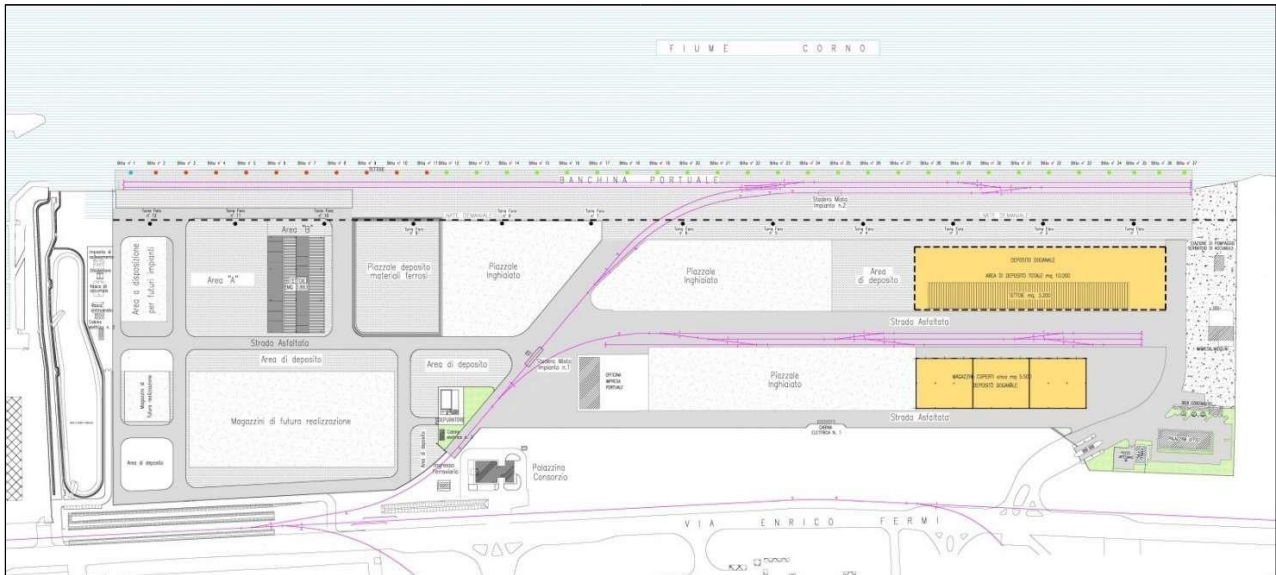


Figure 1 – Area of Port Margreth

The organisation of the multiple port services is assigned to competent and authorised operators. Of considerable importance is the future strengthening of the connection with the nearby Interporto Alpe Adria in Cervignano del Friuli, in order to improve intermodality and logistics at Porto Nogaro.

In the industrial area of Aussa-Corno, which is closely connected to Porto Nogaro, a series of private initiatives for the storage and processing of goods are being implemented. Among these we can mention the creation of Consorzio Portonuovo, a private company for the management of services and the maintenance of Porto Nogaro's facilities.

A number of companies operate within the port area of Porto Margreth, including maritime agencies, port companies and companies related to port services. The following table summarises the operators active in the port area under analysis.

Type	Operator
Port service	Consorzio Portonuovo
	Gruppo Ormeggiatori del Porto di Monfalcone e Porto Nogaro
	Pratici di Mare Porto Nogaro
Port companies	Impresa Portuale Porto Nogaro s.r.l
	Midolini F.Ili S.p.A
Maritime Agencies and Forwarding Agencies	Ciscato & Company
	Ferest Shipping
	Friultrans
	Marlines
	Navimar
	Nogarosped
Other	Tradax
	Ufficio Circondariale Marittimo di Porto Nogaro
	Agenzia delle Dogane di Udine - Sezione operativa di Porto Nogaro - Cervignano
	Guardia di Finanza - Comando Compagnia San Giorgio di Nogaro
	Apostolato del Mare

Table 1 – Port authorities and operators active in the Porto Nogaro

The main function in terms of surface area occupied is the commercial one associated with the goods handling activities carried out by the two port companies operating in the area under concession.

In order to better understand the activities carried out in the port area that is the object of analysis, some information and data explaining the goods handled and the equipment and vehicles present in the port area in 2019 are given below.

Freight traffic data for the Porto Margreth 2019

YEAR	LOADED GOODS [ton] (a)	UNLOADED GOODS [ton] (b)	TOTAL [ton] (a+b)
January	47.160	64.017	111.177
February	49.256	39.494	88.750
March	47.365	45.473	92.838
April	66.330	81.908	148.238
May	48.783	73.340	122.123
June	44.640	66.516	111.156
July	52.621	75.428	128.049
August	36.455	55.201	91.656
September	48.564	82.648	131.212
October	58.014	63.366	121.380
November	49.676	73.916	123.592
December	67.576	47.771	115.347
TOTAL	616.440	769.078	1.385.518

Table 2 - Freight traffic data 2019 Port Margreth

List of vehicles and equipment used for handling goods in the Porto Margreth area

TYPE	QUANTITY	FUEL
Harbour Crane	7	Diesel oil
Forklift truck	11	Diesel oil
Locotractor	1	Diesel oil
Wheel loader	5	Diesel oil
Sweepers	1	Diesel oil
Tractor	2	Diesel oil
Car	4	Diesel oil
Articulated truck	6	Diesel oil
Van	1	Diesel oil

Table 3 - List of equipment and vehicles operating in the Port Margreth 2019

Traffic data in/out for vessels and port operational vehicles

TYPE	NUMBER
Vessel traffic	318
Road traffic	48.000
Rail Traffic	114

Table 4 - Sea and land transport data 2019

Mapping out stakeholders

The drafting of this document was possible thanks to a fruitful collaboration of all the main stakeholders who carry out activities in the area of Porto Margreth.

Stakeholders were involved through initial presentations of the project's aims and methods.

Data on the main GHG sources contributing to direct and indirect emissions from the port area were then collected. This activity was carried out through the administration of a questionnaire to the Managing Authority and to all the Concessionaires considered to be the most energy intensive, which allowed for a rapid and efficient collection of data relative to the energy consumption of the subjects operating within the identified Operational Boundaries, for the reference year 2019. The definition of the interventions, on the other hand, took place through the gathering of useful information during the meetings with the main Concessionaires characterised by the most energyintensive activities, in order to discuss the most effective opportunities for containing energy consumption and reducing GHG emissions, in line with the development plans of their activities and with any actions already planned.

Below is a list of the stakeholders included in the analysis and the type of involvement that concerned them.

NUMBER	STAKEHOLDER	PORT	TYPE	ENERGY DATA COLLECTION	DEFINITION OF INTERVENTIONS
1	COSeF	Porto Nogaro	Managing Authority	✓	✓
2	Consorzio Portonuovo	Porto Nogaro	Port services provider	✓	✓
3	Impresa Portuale Porto Nuovo	Porto Nogaro	Port terminal company	✓	✓

4	Midolini F.Ili S.p.A	Porto Nogaro	Port terminal company	✓	✓
5	TS Traction & Service s.r.l. – CO.RAC.FER. s.r.l.	Porto Nogaro	Port services provider	✓	
6	Regione Autonoma Friuli Venezia Giulia	Porto Nogaro	Managing Authority		✓
7	Gruppo Ormeggiatori di Monfalcone	Porto Nogaro	Port services provider	✓	
8	Ocean s.r.l.	Porto Nogaro	Port services provider	✓	

Table 5 – Mapping out stakeholder

Actions for environmental sustainability and port energy efficiency

This document aims at pursuing adequate objectives, with particular reference to the reduction of CO_{2eq} emissions.

To this end, it defines the strategic guidelines for the implementation of specific measures aimed at improving energy efficiency and promoting the use of renewable energy in the port.

The action plan then identifies a series of technological solutions, rules and incentive tools that can reduce the use of primary energy, giving priority to the most environmentally friendly technologies.

These solutions are divided into two types:

- Actions, involving works, facilities, structures, as a result of investments made with the aim of improving energy efficiency and produce energy from renewable sources;
- Policies, which aim to reduce CO_{2eq} emissions through the introduction of rules, priorities, facilitations, incentive mechanisms etc. (calls for tenders and contracts with Concessionaires etc.).

(calls for tenders and contracts with Concessionaires, etc.).

The definition of the "Carbon Footprint" has highlighted the most energy-consuming and impacting activities, which in the case of Port Margreth are closely related to the quayside vehicles used for the handling of goods and the parking and manoeuvring of ships on the quay.

These activities are not directly managed by the Port Management Authority and, therefore, the effectiveness of the strategy and actions included in this document cannot disregard the sharing of energy-environmental improvement objectives with the port community (ship owners, port companies, etc.), on whose activities depend the main sources of emissions in the analyzed port area.

The following paragraphs illustrate both the interventions promoted by private and public subjects operating in the port area and the measures that may be proposed by the Managing Authority (COSeF) to support the emission reduction objectives pursued by this document.

Actions

For each hypothesized intervention, a brief fact sheet was defined in which the following information is provided:

- stakeholders;
- summary description of the project;
- estimated investment cost;
- technical life of the intervention;
- assumed period of realization; ☐ expected results:
 - o consumption decrease
 - o renewable energy production
 - o expected CO_{2eq} emission reduction
- cost-effectiveness indicator;

The cost-effectiveness analysis is a simplified evaluation procedure for calculating one or more indicators that relate the economic costs of an intervention to benefits that are as representative as possible of the main expected results of a project, expressed with a non-monetary unit of measurement.

The simplification of the calculation takes place mainly at two levels:

- the representation of the results with a physical unit of measurement that avoids a much more complex reconstruction of the benefits in economic terms;
- At the cost level, it is possible to refer only to investment costs, avoiding the complexities and uncertainties of prior assessment of operating costs.

The cost-effectiveness indicator was calculated from the ratio between the total CO_{2eq} emissions avoided over the technical life of the project and its investment cost.

It should be noted that the quantification of the reduction in CO_{2eq} emissions resulting from the implementation of the planned interventions was assessed using the standard unit benefit values (gCO_{2eq}/kWh) indicated in Annex 3 of the Ministerial Guidelines for the drafting of "Energy and Environmental Planning Documents for Port Systems DEASP".

Improvement of energy efficiency of the outdoor lighting system and canopies of Port Margreth

ACTORS INVOLVED

COSeF – Consorzio per lo sviluppo economico del Friuli

DESCRIPTION OF INTERVENTION

The project provides for the replacement of the lighting fixtures currently present with others with higher performance and greater efficiency. In particular, it is intended to install 95 LED lighting fixtures with a power of 63W to serve the perimeter lighting and the internal roads of the Port and 52 LED lighting fixtures with a power of 200W to serve the North and South canopies at Port Margreth.

ESTIMATED INVESTMENT COST

96.000 Eur

TECHNICAL LIFE OF INTERVENTION

10 years

ASSUMED PERIOD OF REALIZATION

Start	2021
End	2021

RESULTS	
Saved energy source	Electricity
Decrease of consumption [MWh/year]	82
Renewable energy production [MWh/year]	-
Expected reduction of CO _{2eq} emissions [t/year]	51
COST-EFFECTIVENESS INDICATOR [tCO _{2eq} /€]	
	0,005

Improvement of energy efficiency of the lighting system of the port warehouses of Port Margreth

ACTORS INVOLVED

COSeF – Consorzio per lo sviluppo economico del Friuli

ACTION DESCRIPTION

The project foresees the replacement of the lighting fixtures currently present with others with higher performance and greater efficiency. In particular, it is intended to install n. 108 LED lighting fixtures with a power of 200W to serve the lighting of the port warehouses in Port Margreth.

ESTIMATED INVESTMENT COST

57.000 Eur

TECHNICAL LIFE OF INTERVENTION

10 years

ASSUMED PERIOD OF REALIZATION

Start	2021
End	2022

RESULTS

Saved energy source	Electricity
Decrease of consumption [MWh/year]	95
Renewable energy production [MWh/year]	-
Expected reduction of CO _{2eq} emissions [t/year]	59

COST-EFFECTIVENESS INDICATOR [tCO_{2eq}/€]

0,010

Energy refurbishment project of the thermal envelope of the Port Margreth building

ACTORS INVOLVED

COSeF – Consorzio per lo sviluppo economico del Friuli

ACTION DESCRIPTION

The intervention involves the energy refurbishment of the thermal envelope of the office building owned by COSeF.

In particular, the intervention will affect both the transparent and opaque envelope through the following works:

- Replacement of current windows and doors with new energy efficient windows and doors with solar control;
- Coating perimeter walls and ceilings with cork coat.

ESTIMATED INVESTMENT COST

172.000 Eur

TECHNICAL LIFE OF INTERVENTION

20 years

ASSUMED PERIOD OF REALIZATION

Start	2021
End	2022

RESULTS	
Saved energy source	LPG
Decrease of consumption [MWh/year]	68
Renewable energy production [MWh/year]	-
Expected reduction of CO _{2eq} emissions [t/year]	16
COST-EFFECTIVENESS INDICATOR [tCO _{2eq} /€]	
	0,002

Replacement of boiler and installation of solar thermal panels in the building of Port Margreth

ACTORS INVOLVED

COSeF – Consorzio per lo sviluppo economico del Friuli

DESCRIPTION OF INTERVENTION

The intervention includes the replacement of the current boiler and the installation of a new gas condensing generator. It also provides for the installation of a solar thermal system with a nominal area of 4 m² and storage of 220 liters for the production of hot water.

ESTIMATED INVESTMENT COST

20.500 Eur

TECHNICAL LIFE OF INTERVENTION

15 year

ASSUMED PERIOD OF REALIZATION

Start	2021
End	2022

RESULTS

Saved energy source	LPG
Decrease of consumption [MWh/year]	26
Renewable energy production [MWh/year]	-
Expected reduction of CO _{2eq} emissions [t/year]	6

COST-EFFECTIVENESS INDICATOR [tCO_{2eq}/€]

0,004

Installation of photovoltaic system with a nominal power of 20 kWp on the roof of the building of Port Margreth

ACTORS INVOLVED

COSeF – Consorzio per lo sviluppo economico del Friuli

DESCRIPTION OF INTERVENTION

The project involves the installation of a solar photovoltaic system with peak power equal to 200 kWp on the roof of the building managed by COSeF in the port area of Port Margreth.

The investment provides for the supply and installation of a photovoltaic system consisting of panels using polycrystalline silicon cells with power of the individual panel equal to 250 Wp and the supply and installation of single-phase / three-phase inverters.

installation of single-phase / three-phase inverters for indoor use to switch the voltage from direct to alternating 230 Vac / 400 Vac complete with the protections provided by the CEI 0-21 and equipped with electronics with display for the visualization of the characteristic data of the plant.

ESTIMATED INVESTMENT COST

72.000 Eur

TECHNICAL LIFE OF INTERVENTION

20 years

ASSUMED PERIOD OF REALIZATION

Start	2021
End	2022

RESULTS	
Saved energy source	Electricity
Decrease of consumption [MWh/year]	21
Renewable energy production [MWh/year]	-
Expected reduction of CO _{2eq} emissions [t/year]	12
COST-EFFECTIVENESS INDICATOR [tCO _{2eq} /€]	
	0,003

Installation of photovoltaic systems on available roofs in Port Margreth

ACTORS INVOLVED

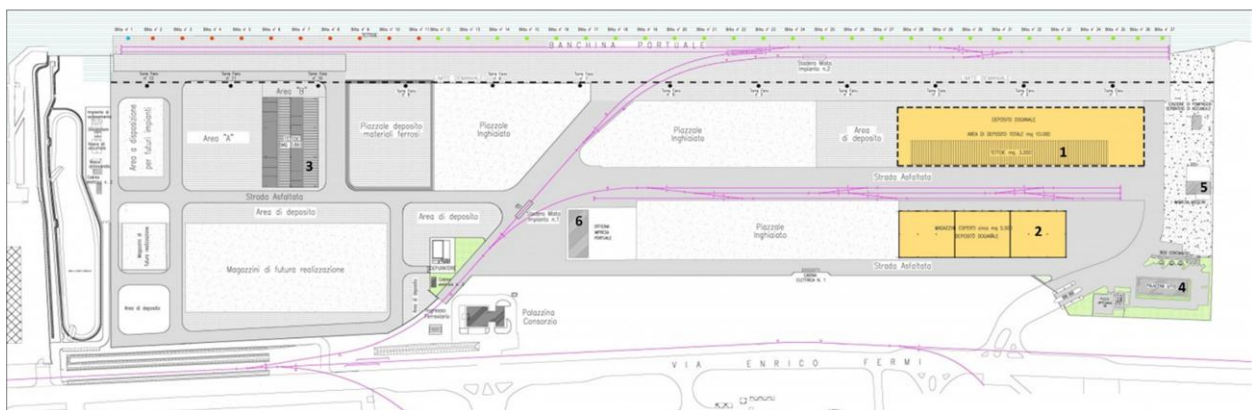
COSeF – Consorzio per lo sviluppo economico del Friuli

DESCRIPTION OF INTERVENTION

The intervention assumes the installation of solar photovoltaic systems on all free and available roofs currently present in the port area and net of those occupied by the photovoltaic system provided in the previous intervention. The intervention therefore identifies the peak power that can be potentially installed in the port area and the maximum producibility of photovoltaic electricity associated with it.

Below is a summary table with the subdivision of the systems assumed on individual buildings and a map of the areas affected by the intervention.

Building	Gross surface [m ²]	Net surface [m ²]	Peak power [kW _p]
1) Customs warehouse - South canopies	3.200	2.560	233
2) Customs warehouse - Covered warehouses	5.500	4.400	400
3) Area "B" - North roofs	3.800	3.040	276
4) South building and technical building building	600	480	24
5) Midolini Enterprise building - South	370	296	27
6) North Port Enterprise Building	570	456	41
Total	13.470	10.776	1.001



The intervention involves the installation of 6 photovoltaic systems with different power and extension in relation to the available surface of the individual covers for a total peak power (potential) of about 1.000 kW.

ESTIMATED INVESTMENT COST

3.300.000 Eur (considering a price of about 3.300 €/kWp)

TECHNICAL LIFE INTERVENTION

10 years

ASSUMED PERIOD OF REALIZATION

Start	2022
End	-

RESULTS

Saved energy source	Electricity
Decrease of consumption [MWh/year]	-
Renewable energy production [MWh/year]	1.069
Expected reduction of CO _{2eq} emissions [t/year]	576

COST-EFFECTIVENESS INDICATOR [tCO_{2eq}/€]
0,003

Revamping and electrification of dockside equipment at Port Margreth

ACTORS INVOLVED

Impresa Portuale Port Nogaro

F.Ili Midolini S.p.A

DESCRIPTION OF INTERVENTION

The intervention foresees the revamping of 4 port cranes currently used by the two port companies operating in the port area of Port Margreth for the handling of goods from ships. These cranes are designed to be powered by electricity instead of the current diesel power supply.

The table below shows the vehicles involved.

Type	Model	Quantity	Property	Registration year	Fuel
Harbour Crane	FANTUZZI REGGIANE MHC 65	1	F.Ili Midolini S.p.A	2005	Gasolio
Truck Crane	Italgru GS1800T	1	Impresa Portuale Port Nogaro	1988	Gasolio
Truck Crane	Italgru GS650P	1	Impresa Portuale Port Nogaro	2008	Gasolio
Truck Crane	Gottwlad	1	Impresa Portuale Port Nogaro	1998	Gasolio

Therefore, it is hypothesized to make it advantageous to convert the current fossil fuel supply to electric power.

ESTIMATED INVESTMENT COST

n/d

TECHNICAL LIFE INTERVENTION

10 years

ASSUMED PERIOD OF REALIZATION

Start 2022

End -

RESULTS

Saved energy source	Diesel
Decrease of consumption [MWh/year]	- (Energy carrier replacement)
Renewable energy production [MWh/year]	-
Expected reduction of CO _{2eq} emissions [t/year]	188 (with 100% renewable electricity supply)

COST-EFFECTIVENESS INDICATOR [tCO_{2eq}/€]

Replacement and electrification of dockside equipments at Port Margreth

ACTORS INVOLVED

Impresa Portuale Port Nogaro

F.Ili Midolini S.p.A

DESCRIPTION OF INTERVENTION

The intervention foresees the replacement of 3 harbour cranes currently used by the two port companies operating in the port area of Port Margreth for the handling of goods from ships.

These cranes will be replaced with high efficiency electrically powered harbour cranes.

The table below shows the vehicles involved.

Type	Model	Quantity	Property	Registration year	Fuel
Harbour Crane	LORAIN MC 8150	1	F.Ili Midolini S.p.A	1975	Gasolio
Harbour Crane	LINK BELT HC 218	1	F.Ili Midolini S.p.A	1971	Gasolio
Crane truck	Italgru GS820P	1	Impresa Portuale Port Nogaro	1984	Gasolio

Therefore, it is hypothesized to make it advantageous to convert the current fossil fuel supply to electric power.

ESTIMATED INVESTMENT COST

n/d

TECHNICAL LIFE OF INTERVENTION

20 years

ASSUMED PERIOD OF REALIZATION

Start	2022
End	-

RESULTS

Saved energy source	Diesel
Decrease of consumption [MWh/year]	- (Energy carrier replacement)
Renewable energy production [MWh/year]	-
Expected reduction of CO _{2eq} emissions [t/year]	53 (with 100% renewable electricity supply)

COST-EFFECTIVENESS INDICATOR [tCO_{2eq}/€]

-

Electrification system of the quay (cold ironing) of Port Margreth

ACTORS INVOLVED

Autorità di Gestione (COSeF – Regione Friuli Venezia Giulia)

DESCRIPTION OF INTERVENTION

The intervention involves the construction of conduits and manholes and the implementation of the cold ironing network (delivery switchboards, transformers, cabins and Alternative Maritime Power or similar) that will allow the supply of electricity from the dock to the ships.

In particular, this intervention will be carried out on two berths and involves the installation of two outlets of 1 MW each that will supply two General Cargo ships at the same time.

ESTIMATED INVESTMENT COST

3.600.000 Eur

TECHNICAL LIFE INTERVENTION

15 years

ASSUMED PERIOD OF REALIZATION

Start	2022
End	-

RESULTS	
Saved energy source	Low sulfur fuel oil
Decrease of consumption [MWh/year]	- (Energy carrier replacement)
Renewable energy production [MWh/year]	-
Expected reduction of CO _{2eq} emissions [t/year]	3.218 (with supply of electricity from 100% renewable sources compared to use of low sulfur fuel oil 0.1%)
COST-EFFECTIVENESS INDICATOR [tCO _{2eq} /€]	
	0,013

Policies

In this Section are described some possible initiatives that, even if they don't foresee the direct realization of works of efficiency, could activate considerable energy savings favoring both the implementation of interventions of installation of plants for the production of renewable energies, and the energy efficiency of buildings and processes and the mooring of boats whose CO_{2eq} emissions are as contained as possible.

The policies can be grouped into two different types:

1. Incentive schemes to support port operators investing in less energy intensive facilities/equipment and/or renewable energy sources.
2. New rules or discounts on berth fees for efficient, low CO_{2eq} vessels.

It should be noted that the quantification of the reduction in CO_{2eq} emissions resulting from the implementation of the planned measures was assessed using the standard unit benefit values (gCO_{2eq}/kWh) indicated in Annex 3 of the Ministerial Guidelines for the drafting of "Energy and Environmental Planning Documents for Port Systems DEASP".

Incentive mechanisms for Concessionaries

Incentives for the implementation of RES plants

PROPOSER

Management Authority (COSeF – Regione Friuli Venezia Giulia)

INCENTIVE MECHANISM

Reduction of concessionary fees or introduction of a bonus at the time of assigning the concession within the limits and according to the methods allowed by the regulations in force concerning the taxation of activities linked to the movement of goods and/or passengers, or concerning the determination of concessionary fees in the maritime domain.

OBJECTIVE OF THE MEASURE

Incentivize the realization by the Concessionaires of RES plants.

MEASURE DESCRIPTION

The instrument could envisage a reduction in concessionary charges or the introduction of a bonus at the time of assigning the concession commensurate with the quantity of CO_{2eq} emissions avoided thanks to the energy produced by new RES plants and self-consumed. The costs for the construction of the RES plants remain the responsibility of the concessionaires. This reduction will be defined within the limits and according to the methods allowed by the regulations in force concerning the taxation of activities related to the movement of goods and/or passengers, or concerning the determination of concession fees in the maritime domain.

INCENTIVE VALUE

Incentives may be determined based on the actual amount of CO_{2eq} emissions avoided.

In order to define the mechanism necessary for the economic valorisation of avoided CO_{2eq} emissions, reference can be made to the principles contained in the Ministerial Guidelines for the drafting of "Energy and Environmental Planning Documents for Port Systems DEASP", at the basis of Cost Benefit Analyses. These principles lead to measure not only the direct economic costs and benefits of a given intervention at the expense or in favor of the proponent, but also the social costs and benefits at the expense or in favor of the community. It is proposed to use Table A in Annex 3 of the DEASP Guidelines to quantify the environmental benefits of electricity production from RES and self-consumption within the port area. These values expressed in €/MWh produced and self-consumed will form the basis of the incentive that the Management Authority may recognize as a discount on concession charges.

VERIFICATION AND MEASUREMENT

In order to verify and measure the amount of energy produced and self-consumed, it is proposed to ask the Concessionaire to access the national incentive mechanism provided for by the RES 1 decree. “Ministerial Decree of July 4, 2019 - incentives for electricity produced by in-shore wind, solar photovoltaic, hydroelectric and residual gas plants from purification processes” and the consequent registration at the registers or auctions as provided for by the same Ministerial Decree.

EXPECTED REDUCTION IN CO_{2eq} EMISSIONS

Taking into account the potential energy produced by photovoltaic systems installable on the roofs available in the port area of Port Margreth, it is estimated that the implementation of this measure could avoid the annual emission of about 560 tons of CO₂ equivalent.

Incentives for the implementation of energy efficiency measures in buildings and processes (operational equipment)

PROPOSER

Management Authority (COSeF – Regione Friuli Venezia Giulia)

INCENTIVE MECHANISM

Reduction of concessionary fees or introduction of a bonus at the time of assigning the concession within the limits and according to the methods allowed by the regulations in force concerning the taxation of activities linked to the movement of goods and/or passengers, or concerning the determination of concessionary fees in the maritime domain.

OBJECTIVE OF THE MEASURE

Incentivize the realization by the Licensees of interventions aimed at the energy requalification of buildings and plants.

MEASURE DESCRIPTION

The tool could envisage a reduction in concessionary charges or the introduction of a bonus when assigning the concession commensurate with the quantity of CO_{2eq} emissions avoided thanks to the implementation of energy efficiency measures in buildings or processes (operating equipment). The costs for carrying out energy efficiency measures must be borne by the Licensees. This reduction will be defined within the limits and according to the methods allowed by the regulations in force concerning the taxation of activities linked to the handling of goods, or concerning the determination of concession fees in the maritime domain.

INCENTIVE VALUE

Incentives may be determined based on the actual amount of CO_{2eq} emissions avoided.

In order to define the mechanism necessary for the economic valorisation of avoided CO_{2eq} emissions, reference can be made to the principles contained in the Ministerial Guidelines for the drafting of "Energy and Environmental Planning Documents for Port Systems DEASP", at the basis of Cost Benefit Analyses. These principles lead to measure not only the direct economic costs and benefits of a given intervention at the expense or in favor of the proponent, but also the social costs and benefits at the expense or in favor of the community. It is proposed to use Table A in Annex 3 of the DEASP L.G. to quantify the environmental benefits of energy efficiency projects in

the case where the intervention produces a reduction in the end use of electricity and Tables B and C in Annex 3 of the DEASP L.G. in the case where the intervention produces a reduction in fossil fuel consumption.

These values expressed in €/MWh will form the basis of the incentive that the Management Authority may recognize as a discount on concession charges.

VERIFICATION AND MEASUREMENT

It is proposed to pay the Concessionaire an incentive based on the consumption of energy actually avoided annually for a number of years to be determined. In order to verify and measure this amount of avoided consumption, it is proposed to apply Performance Verification and Measurement Plans proposed by the Concessionaire and approved by the Managing Authority.

Questi valori espressi in €/MWh formeranno la base dell'incentivo che l'Autorità di Gestione potrà riconoscere come sconto sugli oneri di concessione.

EXPECTED REDUCTION IN CO_{2eq} EMISSIONS

Taking into consideration the operational means currently used by port companies in the Port Margreth area and the related efficiency opportunities, it is estimated that the implementation of this measure could avoid the annual emission of approximately 250 tons of CO₂ equivalent.

Electricity supply with Guarantee of Origin

PROPOSER

Management Authority (COSeF – Regione Friuli Venezia Giulia)

INCENTIVE MECHANISM

No incentives are envisaged but the introduction of new rules governing the granting of concessions.

OBJECTIVE OF THE MEASURE

Bind the Concessionaire to the use of guaranteed-of-origin electricity by changing the rules for issuing concessions.

MEASURE DESCRIPTION

The Guarantee of Origin (GO) is an electronic certification that attests to the renewable origin of the sources used by IGO-qualified plants. For each MWh of renewable electricity fed into the grid by IGO-qualified plants, the GSE (Gestore dei Servizi Energetici) issues a GO certificate, in accordance with Directive 2009/28/EC. The Guarantees of Origin correspond to a supply of energy from sustainable sources. In order to ensure that consumption corresponds to the amount of sustainable energy purchased, a procedure called Act of Cancellation is carried out at the GSE. Each act of cancellation corresponds to a Certificate of Cancellation, which contains a code that identifies the plant from which the renewable energy was purchased and from which the corresponding Guarantees of Origin derive.

This procedure would allow concessionaires to purchase electricity on the market with a Guarantee of Origin certificate. The certified origin of this energy would allow for more accurate quantification of CO_{2eq} emissions without having to use the national conversion factors specified by the “National Inventory Report 2019” by ISPRA, guaranteeing an overall reduction in the carbon footprint of the port area.

INCENTIVE VALUE

None

VERIFICATION AND MEASUREMENT

Verification of CO_{2eq} emission reduction performance is not required.

EXPECTED REDUCTION IN CO_{2eq} EMISSIONS

The implementation of this measure, extended to all private and public entities operating in the Port Margreth area that do not currently procure electricity from GO suppliers, could avoid the annual emission of approximately 90 tons of CO₂ equivalent.

Incentive measures and rules for shipping companies

Incentives to support shipowners and operators using ships with reduced environmental impact

PROPOSER

Management Authority (COSeF – Regione Friuli Venezia Giulia)

INCENTIVE MECHANISM

Reduction of the mooring fee, within the limits and according to the methods allowed by the regulations in force concerning the taxation of activities linked to the movement of goods and/or passengers, or concerning the determination of concession fees in the maritime domain.

OBJECTIVE OF THE MEASURE

Encourage mooring of low environmental impact ships (high ESI – Environmental Ship Index)

MEASURE DESCRIPTION

Within the framework of the agreement signed by the main ports worldwide, called World Ports Sustainability Program (WPSP), in order to limit polluting gas emissions into the atmosphere, the Environmental Ship Index (ESI) has been defined. This indicator identifies ships that achieve better results in reducing air emissions than those required by the current emission standards defined by the International Maritime Organization.

The ESI assesses the amount of nitrogen oxide (NO_x) and sulfur oxide (SO_x) that is emitted by a ship and includes a reporting system on the ship's GHG emissions.

The ESI formula consists of different parts for NO_x, SO_x, and CO₂; a bonus is also awarded for the presence of an onshore power plant (OPS). The ESI score ranges from 0 for a ship that meets current environmental performance regulations to 100 for a ship that does not emit SO_x and NO_x and reports or monitors data to establish its energy efficiency.

Thus, ESI is an indicator of ship environmental performance, the definition of which is currently voluntary on the part of Shipowners.

The Management Authority, in consultation with the collecting agent, could incentivize the mooring of ships characterized by a good ESI score through a reduction in the value of mooring fees. This reduction will be defined within the limits and according to the modalities allowed by the regulations in force concerning the taxation of activities linked to the movement of goods and/or passengers, or concerning the determination of concession fees in the maritime domain.

INCENTIVE VALUE

The value of the discount to be applied to mooring fees could be determined through the economic valuation of the environmental and social benefits due to the reduction of CO₂, SO_x and NO_x emissions.

In particular, the amount of the reduction on the mooring fee could be proportional to the ESI score achieved by the ship during the mooring phase. This reduction will be defined within the limits and according to the methods allowed by the regulations in force concerning the taxation of activities linked to the movement of goods and/or passengers, or concerning the determination of concession fees in the maritime domain.

VERIFICATION AND MEASUREMENT

There is no measure but a calculation of avoided emissions based on what is reported on the ESI certification.

EXPECTED REDUCTION IN CO_{2eq} EMISSIONS

The implementation of this measure will make it possible to drastically reduce the environmental impact associated with the emission of polluting gases such as SO_x, NO_x and greenhouse gases during the mooring phase in the port area.

The reduction in CO_{2eq} emissions is linked to the availability of the EEDI certificate and depends on the amount of fuel used. Compliance with the EEDI standards is expected to result in a reduction in fuel consumption and GHG emissions associated with individual vessels of between 10% and 50% compared to the benchmark.

Summary of actions: time frame and possible funding sources

Overall, the energy-environmental interventions listed in SECTION 5.1, the implementation of which began in 2021, will generate both economic benefits to the implementers as a result of energy savings and environmental benefits due to the reduction of CO_{2eq} emissions.

A scenario of reduction of CO_{2eq} emissions to 2030 has been developed, the year in which it was assumed the implementation of the last of the interventions reported in this document.

This scenario is represented in the histogram below, which shows the annual reduction in emissions following the implementation of the planned interventions.

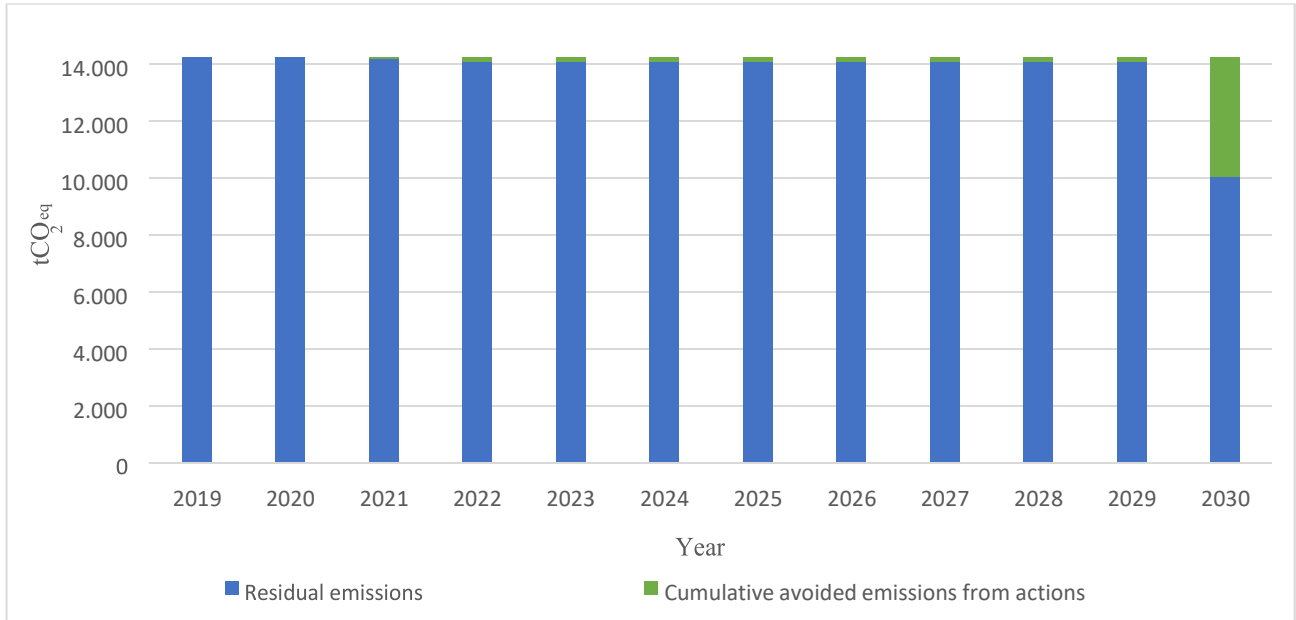


Figure 2 - Annual reduction in emissions following implementation of the proposed and/or hypothesized interventions

Implementation of the planned interventions will reduce Port Nogaro's CO_{2eq} emissions by approximately 29% compared to base year 2019 emissions.

The following is a chronoprogram of the interventions foreseen/hypothesized over a 10-year period, specifying that for the interventions whose realization is uncertain, implementation has been distributed over the period between 2022 and 2030.

GANTT DIAGRAM		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Actions	Improvement of energy efficiency of the external lighting system and canopies of Port Margreth												
	Improvement of energy efficiency energy efficiency of the lighting system of the port warehouses of Port Margreth												
	Energy refurbishment project of the thermal envelope of the building of Port Margreth												
	Replacement of boiler and installation of solar thermal panels in the building of Port Margreth												
	Installation of a photovoltaic system with a nominal power of 20 kWp on the roof of the building of Port Margreth												
	Installation of photovoltaic system on available roofing in Port Margreth												
	Revamping and electrification of the quay equipment of Port Margreth												
	Replacement and electrification of the quay equipment of Port Margreth												
	Electrification system of quay (cold ironing) of Port Margreth												

Table 6 - GANTT diagram of the planned/hypothetical interventions

An additional percentage reduction could be achieved by implementing the measures in this document. This reduction could reach a value equal to 9% of total emissions. The suggested measures can be implemented by the Management Authority following further analysis. It is not possible at the moment to estimate exactly the year of these implementations so its evaluation has been considered as the sum of all the effects of a single year.

The graph below compares only the base year (2019 – 14.240 tCO_{2eq}) with 2030, assumed to be the year of implementation of all works.

It shows an estimated overall reduction (actions + policies) of 32% (4.519 tCO_{2eq}) in emissions by 2019.

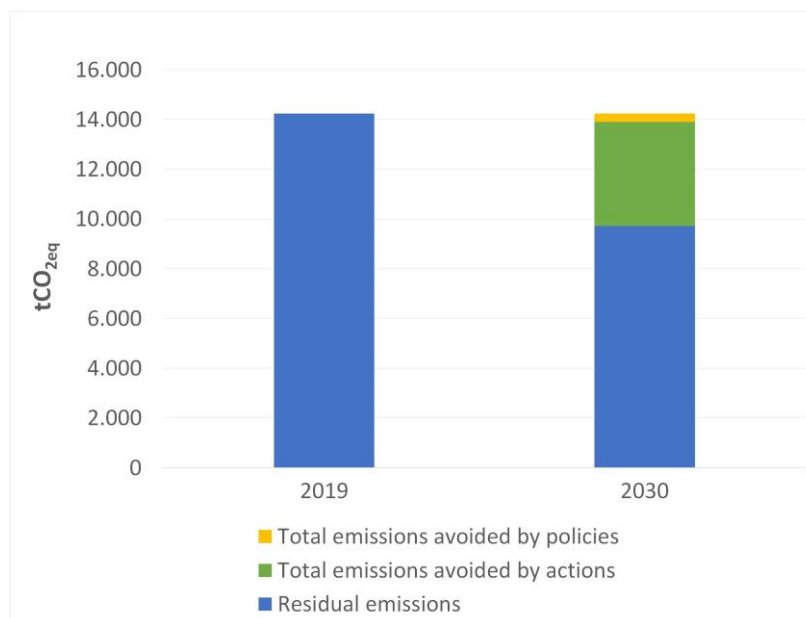


Figure 3 - Summary chart of emissions before and after implementation of interventions and measures

Listed below are the interventions based on an order of priority defined by the result of costeffectiveness analyses.

INTERVENTIONS WITH COST-EFFECTIVENESS ANALYSIS		
PRIORITY	ACTION	INDICATOR [tCO _{2eq} /€]
1	Improvement of energy efficiency of the external lighting system and canopies of Port Margreth	0,013
2	Improvement of energy efficiency energy efficiency of the lighting system of the port warehouses of Port Margreth	0,010
3	Energy refurbishment project of the thermal envelope of the building of Port Margreth	0,005
4	Replacement of boiler and installation of solar thermal panels in the building of Port Margreth	0,004
5	Installation of a photovoltaic system with a nominal power of 20 kWp on the roof of the building of Port Margreth	0,003
6	Installation of photovoltaic system on available roofing in Port Margreth	0,003
7	Revamping and electrification of the quay equipment of Port Margreth	0,002
8	Replacement and electrification of the quay equipment of Port Margreth	-
9	Electrification system of quay (cold ironing) of Port Margreth	-

Table 7 - Interventions with cost-effectiveness analysis

Finally, the possible sources of funding that could finance the identified interventions are reported.

ACTION	SOURCES OF FUNDING
Improvement of energy efficiency of the external lighting system and canopies of Port Margreth	☒ European Community Funds
Improvement of energy efficiency energy efficiency of the lighting system of the port warehouses of Port Margreth	☒ European Community Funds
Energy refurbishment project of the thermal envelope of the building of Port Margreth	☒ European Community Funds
Replacement of boiler and installation of solar thermal panels in the building of Port Margreth	☒ European Community Funds

Installation of a photovoltaic system with a nominal power of 20 kWp on the roof of the building of Port Margreth	☒ European Community Funds
Installation of photovoltaic system on available roofing in Port Margreth	☒ Decreto FER1

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ACTION	SOURCES OF FUNDING
Revamping and electrification of the quay equipment of Port Margreth	<ul style="list-style-type: none"> • White certificates mechanism • National Energy Efficiency Fund
Replacement and electrification of the quay equipment of Port Margreth	<ul style="list-style-type: none"> • White certificates mechanism • National Energy Efficiency Fund
Electrification system of quay (cold ironing) of Port Margreth	☒ Check availability of ministerial funds (MiSE, MIT and MATTM)

Table 8 – Funding opportunities for identified interventions

Consistency with environmental sustainability and energy efficiency policies

The proposed interventions and measures are consistent with the strategies and objectives defined by the energy and environmental planning documents drawn up at regional, national and community level.

In particular, at the regional level, the consumption reduction and emission containment objectives of this document are shared with the Regional Energy Plan (2015), while at the national level they are consistent with Legislative Decree no. 93 of June 1, 2011, Legislative Decree no. 28 of March 3, 2011, Ministerial Decree of March 15, 2012, Law no. 96 of August 6, 2013, Legislative Decree no. 102 of July 4, 2014, SEN (National Energy Strategy), SNACC (National Strategy for Climate Change Adaptation) and the National Integrated Energy and Climate Plan (PNIEC), through which the objectives of the present document are established. the national targets for the reduction of CO₂ emissions to 2030, providing that the most significant contribution will be represented by the transport and civil sectors.

At the national level, the goals identified in this document are consistent with those defined in the "Guidelines for Environmental Energy Documents for Port Systems", issued by the MATTM in agreement with the MIT, which aim to promote energy-environmental sustainability in a strategic area of the country in order to minimize its impacts.

At EU level, finally, it is clear that the objectives of this document are consistent with the implementation of the Paris Agreement and the adoption of the "Climate-Energy Package 2030", consisting of a set of directives and regulations aimed at achieving the objectives to 2030 (-40% CO₂ + 32% RES +32.5% EE).

In addition, in 2019 the EU Commission presented the Green New Deal, planning to increase the EU's 2030 target to reduce GHG emissions to at least 50-55 %. Within this overall framework of European and national targets and policies, the contribution that maritime transport can make to reducing emissions is potentially high. The interventions and measures reported in this document are aimed at reducing the environmental impact associated with maritime traffic and port activities and are consistent with the strategies and objectives identified by EU policies.

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