TECHNICAL DESCRIPTION (PART B)

COVER PAGE

Part B of the Application Form must be downloaded from the Portal Submission System, completed and then assembled and re-uploaded as PDF in the system. Page 1 with the grey IMPORTANT NOTICE box should be deleted before uploading. Note:
Please read carefully the conditions set out in the Call document (for open calls: published on the Portal). Pay particular attention to the award criteria; they explain how the application will be evaluated.

The term 'project' used in this application form and other documents is synonymous to the term 'action' used in the CEF Regulation 2021/1153.

PROJECT	
Project name:	Onshore Power Supply Infrastructure Deployment at the TEN-T Core Bordeaux Port
Project acronym:	**BENAQ**
Coordinator contact:	Mrs. Pauline AUBONNET Grand Port Maritime de Bordeaux (France)
Starting date	12/06/2025
Duration	39 months

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0. IMPACT — COST-BENEFIT ANALYSIS

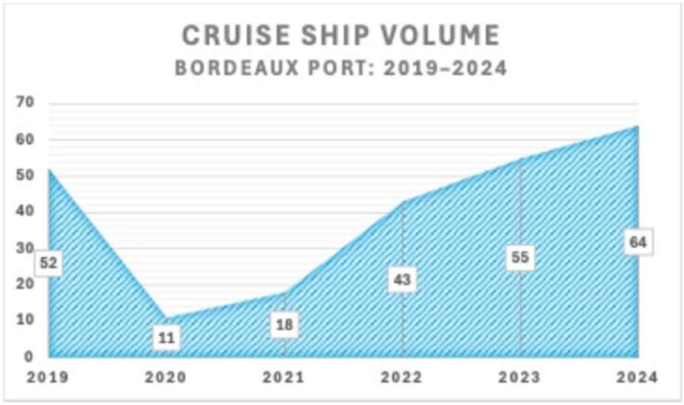
0.1. DEMAND ANALYSIS

Demand/traffic forecast study

Provide the results of the demand/traffic forecast study (if any).
Give an outline of the overall context (including date of completion) and scope of the study, explain the methodology chosen and the assumptions made regarding the demand growth rate and the utilisation rate on completion of the project.
Provide the list of indicators and their sources of verification (e.g. institution or organisation collecting statistical information, website, database, etc.). If the study carried out goes beyond the scope of the project, give an overview of the demand analysis of the global project and explain how it is related to the project.
Clarify if TEN-T/CEF or other EU programmes have provided financial support for the study.

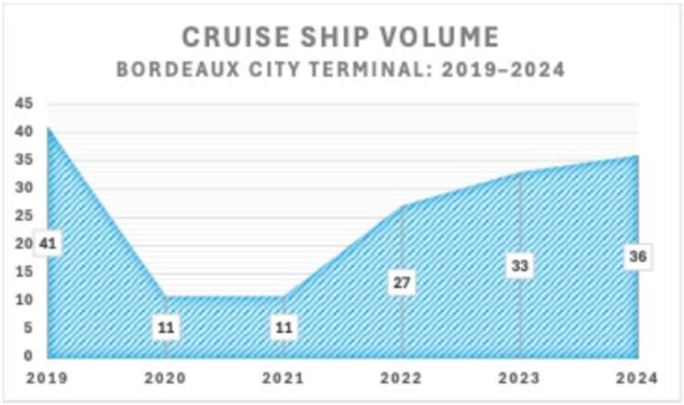
Development of the cruise ship volume at Bordeaux Port: port calls, berthing time, fleet size

Since the COVID-19 pandemic, the cruise industry along the French Atlantic coast has strongly recovered, as Bordeaux Port's figures show: While 52 cruise ships called at Bordeaux Port in 2019 (that is before the pandemic began), only 11 cruise ships called in 2020 and only 18 cruise ships in 2021 (due to travel restrictions during the pandemic years). In contrast, 43 cruise ships called at Bordeaux Port in 2022 (after the pandemic was over), 55 cruise ships called in 2023 and 64 cruise ships called in 2024. This means, the cruise ship volume at Bordeaux Port increased by 23% compared to 2019, the last year before the COVID-19 pandemic began.



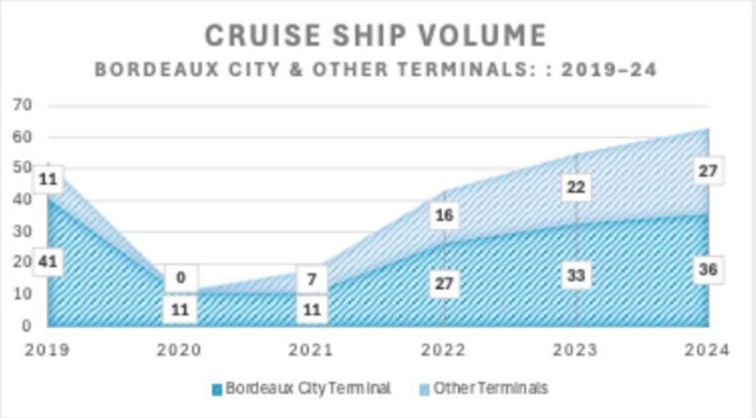
Graphic: Cruise Ship Volume's Development at Bordeaux Port, 2019–2024

Regarding the years 2022–2024, call data analysis shows that most of the cruise ships calling at Bordeaux Port were moored at the Bordeaux City terminal: 27 of 43 cruise ships in 2022; 33 of 55 cruise ships in 2023 and 36 of 64 cruise ships in 2024. So, in all three years (2022, 2023 and 2024) the annual number of cruise ships above 5.000 *gt* moored at the quayside of the Bordeaux City terminal is above 25 – the number above which maritime ports are to be equipped to provide shore-side electricity supply for at least 90% of the total number of port calls of cruise ships above 5.000 *gt* as specified in the AFIR Regulation (EU) 2023/1804, Art. 9.



Graphic: Cruise Ship Volume's Development at Bordeaux City Terminal, 2019–2024

Though the majority of cruise ships was mooring at the Bordeaux City terminal in the years 2022–2024, the volume of cruise ships mooring at Bordeaux Port's other terminals grew enormously over the same time: 16 of 43 cruise ships were mooring at another terminal than Bordeaux City in 2022; 22 of 55 cruise ships in 2023 and 27 of 64 cruise ships in 2024. Most of these port calls by cruise ships were concentrated on the Verdon terminal: 15 out of 16 cruise ships in 2022, 19 out of 22 in 2023 and 24 out of 27 in 2024. This means, the cruise ship volume at Bordeaux Port's other terminals, above all at the Verdon terminal, increased by 145% compared to 2019, the last year before the COVID-19 pandemic began.

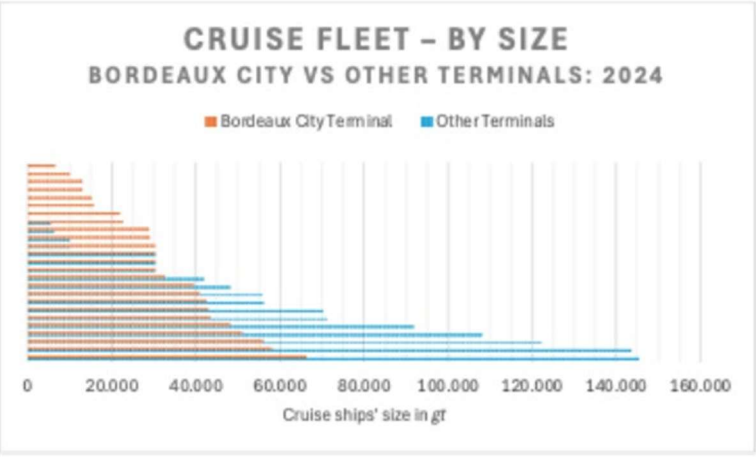


Graphic: Cruise Ship Volume's Development at the Bordeaux City and Other Terminals, 2019–2024

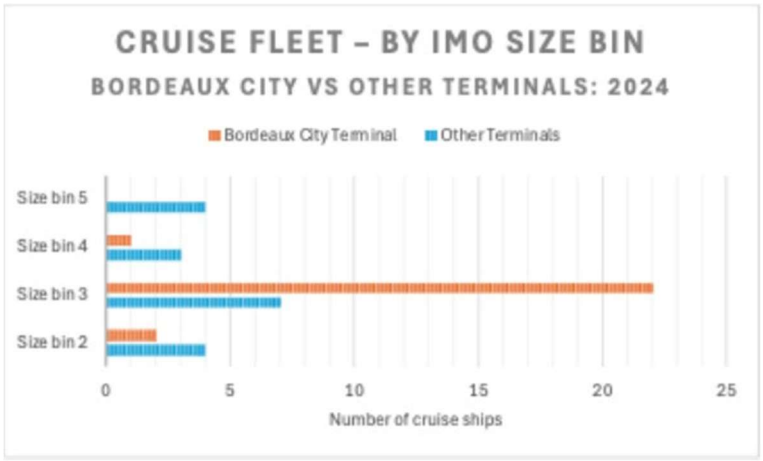
The call data analysis also shows the size of the cruise fleet calling at Bordeaux Port in 2024 and, more importantly, at which terminal which cruise ships of which size were mooring: In 2024, no cruise ship larger than 70.000 gt was mooring at the Bordeaux City terminal; all cruise ships over 70.000 gt up to 145.000 gt were mooring at Bordeaux Port's other terminals – above all at the Verdon terminal.

These figures reflect on the one hand the different terminals' cruise berth characteristics (maximum draft, maximum air draft, maximum length over all [LOA]), which are among other determined by their geographical location in the Gironde estuary, upstream the Garonne River respectively.

Though, on the other hand, these figures reflect the efforts to minimise the impact cruise shipping has on the historic city of Bordeaux – listed as world heritage site by UNESCO – and its inhabitants.

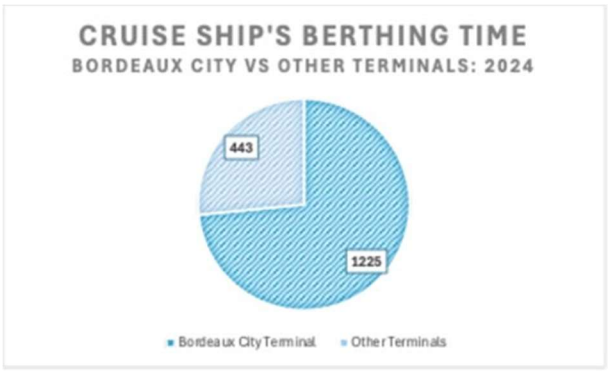


Graphic: Cruise Fleet calling at Bordeaux Port by Size and by Terminal in 2024



Graphic: Cruise Fleet calling at Bordeaux Port by IMO Size Bin and by Terminal in 2024

While the total number of cruise ships mooring at the Bordeaux City terminal represents slightly more than half of Bordeaux Port's total cruise ship volume, this ratio looks very different with regard to berthing hours: of 1.698 total berthing hours in 2024, 1.255 hours were spent at the Bordeaux City terminal (73%) and only 443 hours at the other terminals (27%).



Graphic: Cruise Ship's Total Berthing Time in 2024 – Bordeaux City vs Other Terminals

Similarly informative is a comparison of the cruise ship's average berthing time at Bordeaux Port's different terminals in 2024. While the average berthing time at the Bordeaux City terminal is 34 hours per port call, the average berthing time of cruise ships at Bordeaux Port's other terminals is only 16 hours per port call.



Graphic: Cruise Ships Average Berthing Time per Port Call by Terminal in 2024

Development of container ship volume at Bordeaux Port over the last six years

Unlike cruise shipping, the COVID-19 pandemic has not had a major impact on container shipping at Bordeaux Port. As port of call on CMA CGM's Atlantic Feeder Line, the Bassens terminal has been called at very regularly by container ships – approx. once a week – over the last six years. The figures show a stable container ship volume of 41–50 port calls per year for the years 2019–2024.



Graphic: Container Ship Volume at the Bassens Terminal, 2019–2024

Both the total berthing time as well as the average berthing time per port call increased at the Bassens terminal in the years from 2022–2024. The total berthing time increased from 1.246 hours in 2022 to 1.398 hours in 2024, while the average berthing time per port call increased from 28 hours per port call in 2022 to 34 hours per port call in 2024.



Graphic: Container Ships' Average Berthing Time per Port Call at the Bassens Terminal, 2022–2024

Demand forecast for the cruise and container ship volume at Bordeaux Port

As part of its discussions with the Financial implementing partner of the AFIF BENAQ project, namely the CdC, Bordeaux Port has estimated the expected change in traffic at the terminals that will be equipped with OPS.

These estimates are based on regular discussions with, in particular:

- The industrial port complex and its expressed needs.
- Investors involved in industrialisation projects planned as part of the Low Carbon Industrial Zone (ZIBAC).
- Shipowners, in particular: ○ Feeder operators for European short sea shipping. ○ Cruise operators.
  - Cruise industry professionals.
- The Chamber of Commerce and Industry.

This gives rise to the following growth potential:

Number of Calls	2029	2030	2031	2032	2033	2034	2035
Bassens	50	60	70	90	100	100	100
Pauillac	30	32	35	35	35	35	35
Bordeaux Centre	20	22	25	25	25	25	25
Total Calls	**78**	**95**	**120**	**144**	**160**	**160**	**160**

Table: Growth potential of calls that will leverage OPS connections established through the BENAQ project (Source: Bordeaux Port)

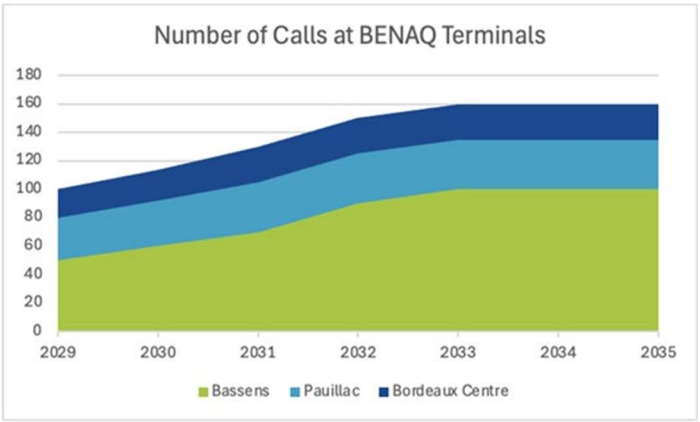


Figure: Growth potential for calls that will leverage OPS connections established through the BENAQ project (Source: Bordeaux Port)

This moderate growth reflects several trends:

- Advanced discussions between the port, current and future industries in Bassens, the Chamber of Commerce and Industry, and shipowners regarding the planned **opening of a second feeder line**. A third line, also under discussion, is not included in the estimate made here due to the less advanced stage of its planning. The real growth potential is therefore higher in Bassens than the figures used during the exchanges with the Implementing Partner and shown here. The **ongoing restructuring of the Bassens terminal** (redevelopment of the terminal and its tools, recommissioning of rail facilities, industrial relocation, etc.), as well as geopolitical crises, have impacted recent traffic in Bassens, but are **expected to result in growth in demand, as confirmed by manufacturers and transport companies using Bassens**.
- The **reorganisation of cruise shipping within the UNESCO site of Bordeaux**, which, after the decline linked to the project works, will gradually return, but **to a more sustainable lower level of port calls than currently**.
- The **gradual ramp-up of the Pauillac terminal**, which **will take over some of the current calls at Bordeaux city centre**, as well as **new calls linked to the continued growth in cruise ship traffic** already observed in Bordeaux over the past decade.

It should be noted that these growth prospects are based on cautious assumptions, designed to secure the loan granted by the Implementing Partner under this AFIF project. Recent developments in the cruise sector have shown that stronger growth is entirely possible. Similarly, the outlook for Bassens is based on a mix of projects announced by operators (2nd feeder line, Ariane Espace, Defence, Bas Carbone industrial zone), which have been weighted to ensure the robustness of the economic model, which could be affected by the failure of one of the planned projects.

On the other hand, if the BENAQ project is not completed, it is almost certain that the loss of acceptability of cruise calls in the centre of Bordeaux will lead to a sharp decline in this activity, or even the closure of the port to cruise operators. The completion of the BENAQ project is therefore critical to ensuring the economic health of the port and the stakeholders benefiting from this activity (see section 4.2.1).

0.2. ECONOMIC AND FINANCIAL ANALYSIS

0.2.1. Socio-economic impact analysis

Socio-economic impact analysis

Describe the general socio-economic impact of the project.
Describe whether the project (or the wider global project) has the potential to generate cash revenues, and what are the limitations (legal, regulatory, or commercial, if any), that constrain the revenues generation to the levels you have estimated.
Provide details on the expected revenues and their timeline (e.g. number and diversity of users).
Describe if the users are sensitive to prices and if they are captive.
Provide indications concerning the degree of certainty of your assumptions and estimations.
Explain whether the project will operate in an autonomous manner or whether the expected level of revenues depends on the completion of additional investments or processes.
For Works proposals required to submit a full CBA, describe the main results of the economic analysis of the cost benefit analysis (Economic Rate of Return (ERR) and Economic Net Present Value (ENPV).
If the scope of the economic analysis addressed by the CBA is wider than the scope of the project, explain the difference in scope between the CBA and the project and to what extent findings of the CBA are relevant to the project.
Please upload the CBA report and the CBA cash flow template filled in.
For Works proposals required to submit a simplified CBA, provide information under this section and submit the simplified CBA calculator filled in. No need for a separate CBA report.
For the CBA report, please use the unitary values referred to in the Handbook on External Costs of Transport.
***Note:** For more guidance on CBA, see CINEA Guide on economic appraisal for CEF Transport Projects, DG REGIO Guide to Cost-Benefit Analysis of Investment Projects and DG REGIO CBA Economic Appraisal Vademecum.*

The BENAQ project contributes to the attractiveness and sustainability of the TEN-T Core port of Bordeaux. It does so in two areas:

- **Through its positive role in container transport in Bassens**, a municipality that is highly dependent on the industrial port complex, which accounts for **8.620 jobs in the area** according to INSEE.
- **Through its positive role in cruise tourism**, which is important for the tourism sectors in Bordeaux, Pauillac and their vineyards, with **an average economic impact per call of €330.000** for the city of Bordeaux, representing an annual turnover of more than €10 million according to the Chamber of Commerce.

The socio-economic impact of Bordeaux Port and its industrial port complex (CIP)

Bordeaux Port impact on its industrial ecosystem

The analysis by the French National Institute for Statistics and Economic Studies (INSEE) published on May 27, 2025 highlights the importance of the Bordeaux industrial port complex (CIP).

"At the end of 2017, **8.900 people were employed in 232 facilities forming the Bordeaux industrial port complex** (CIP), with a fairly even split between maritime and non-maritime activities. The CIP is therefore positioned as a complex for the organisation of freight transport and industrial processing. **Its activity is concentrated in three municipalities: Bassens, Bordeaux** and Bruges, where it makes a significant contribution to the local economy. Compared to the rest of the Gironde region, (...) **wages are significantly higher and jobs are more stable**.

Offering a wide range of port services for the transport and processing of a wide variety of goods and raw materials, Bordeaux Port is a logistics hub and industrial platform serving the economy of the Bordeaux metropolitan area, the Gironde department and, more broadly, the Nouvelle-Aquitaine region. With 7,3 million tonnes of goods imported and exported in 2017, Bordeaux Port is primarily a bulk port where the import of refined petroleum products dominates. It also has a strategic position for imports of containers and raw materials for local industries. In terms of exports, its activity remains highly diversified: while cereals are a flagship product, traffic is supplemented by exports of fertilisers, oilcake and oils, as well as, remarkably, crude oil extracted in Aquitaine. Bordeaux Port is home to a major industrial port complex (CIP) that makes a significant contribution to employment and added value in many of the region's economic sectors. It also hosts a dynamic ecosystem that includes the manufacture of leisure vessels and ship maintenance, repair, conversion and dismantling operations.

The CIP is mainly concentrated near the quayside areas, also known as industrial port areas. These areas are home to nearly 70% of the establishments that make up the CIP of Bordeaux Port." **Implementing the BENAQ project will therefore positively impact the working conditions at large parts of the CIP, by reducing the air and noise pollution most workers are exposed to.** "Beyond these areas, the CIP also extends over 20 municipalities in the Gironde region.

4

Type	Facilities	Jobs
Port management	15	601
• Customs, maritime affairs, port authority	4	68
• Other port-related services	11	533
Organisation of transport	68	2 084
• Chartering and transport organisation	55	1 526
• Courier services, express freight	5	369
• Port handling	8	189
Ship construction and repair	10	812
• Ship construction and repair	10	812
Water transport	16	231
• Water transport	16	231
Total maritime activities	**109**	**3 728**
Industry	36	1 735
• Extractive industries	9	198
• Food industries	4	362
• Chemical and pharmaceutical industries	11	818
• Other manufacturing industries; Fabrication, repair and installation of machinery and equipment	12	357
Wastewater collection and treatment, waste treatment	8	230

• Wastewater collection and treatment, waste treatment	8	230
Business services	91	837
• Trade	32	264
• Logistics	26	246
• Engineering	13	83
• Other business services	20	244
Land transport	30	1 529
• Land transport	30	1 529
Total non-maritime activities	**165**	**4 331**
Total CIP activities	**274**	**8 059**

Table: Distribution of jobs at the CIP, according to facility types and numbers (Source: INSEE)

Maritime and port activities are the core business of a port. They include establishments directly related to port management, transport organisation, shipbuilding and ship repair, as well as water transport. In 2017, maritime activities carried out in 109 establishments and employed 3.700 people, representing 46% of jobs in the CIP. More than half of these are directly related to goods traffic: transport organisation, chartering and transport and logistics activities, ss freight, courier services and port handling.

ʒ advantage of the port infrastructure, non-maritime activities are also established in the CIP. Representing ,400 jobs, they are mainly in industry (40%) and land transport (35%). This balance between maritime and non maritime activities distinguishes the Bordeaux CIP from ports such as Nantes and Rouen, where three-quarters of employees ɲ-maritime jobs.

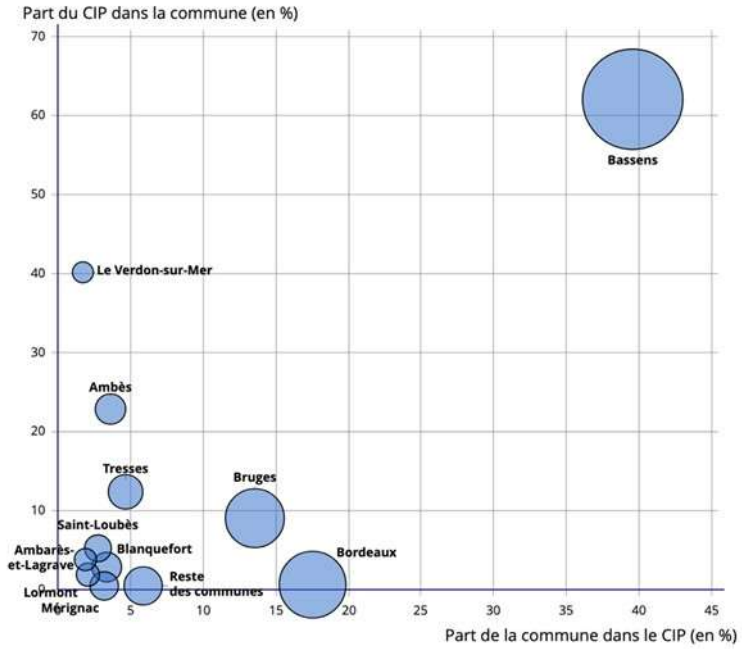
Significant local economic benefits

In Bordeaux, the wealth generated by businesses in 2024, estimated at €890 million, contributes 1,7% of the county's l wealth (Département de la Gironde: County Council).

e other hand, goods traffic through the Bordeaux CIP generates 1,1 jobs per tonne transited, compared wi ge of 0,6. As in other French estuary ports such as Nantes (on the Loire) and Rouen (on the Seine), the t ŋg through the Bordeaux Port is mostly processed by industries located close to the port. It therefore contri to direct local economic benefits, unlike PIPs specialising in logistics serving other French regions, which are generally ɛd in seaports.

Furthermore, in some municipalities in the Gironde region, port activity accounts for a very significant proportion of local employment. **In Bassens, there is a strong interdependence between the municipality and the port: as the main location for port activities, Bassens accounts for nearly 40% of jobs in the complex. These jobs account for 62% of all jobs in the municipality, making it most dependent on port activity.** Similarly, in Le Verdon-sur-Mer and Ambès, local jobs are heavily dependent (40% and 23% of salaried jobs in the municipality, respectively), even though these municipalities have a limited share of port activity. However, three municipalities, Bassens, Bordeaux and Bruges, alone account for two-thirds of these establishments and 71% of salaried employment in the CIP. **With 3.200 jobs, Bassens accounts for one third of the wealth generated by the port.** It is followed by the municipalities of Bordeaux and Bruges, which account for 1.400 and 1.100 CIP jobs respectively.

Figure 3 – Contribution des communes à l'emploi du CIP de Bordeaux et poids du CIP dans l'emploi de la commune



Contribution of municipalities to the use of the CIP in Bordeaux and weight of the CIP in municipal employment (Source: INSEE)

The municipality of Bassens accounts for 40% of jobs in the Bordeaux CIP. These 3.200 port jobs represent 62% of all jobs in the municipality.

More stable jobs and attractive pay

In general, jobs in the CIP benefit from more stable forms of employment and higher pay than in the rest of Gironde. Contracts are more often permanent and full-time, particularly in non-maritime activities. In the maritime sector, "water transport" has the highest rate of fixed-term contracts (26%) due to the seasonal nature of the activity, with passenger ferries operating between Le Verdon-sur-Mer and Royan and between Blaye and Lamarque. With €14,5 net per hour compared to €12,1, a difference of 20%, CIP companies offer better pay than those in the rest of the Gironde region. For equivalent socio-professional categories, the pay gap is still in favour of the CIP, and even more so for managers and higher intellectual professions. In line with many managers in the 'port management' sector, maritime jobs enjoy higher wages than non-maritime jobs (€15,2 net per hour compared to €14)."

In his analysis, "*Les escales de croisière maritime à Bordeaux, entre retombées et nuisances*" (Cruise ship stopovers in Bordeaux: between economic benefits and negative impacts), published on 22 May 2023, Victor Piganiol, professor of history and geography and doctor of tourism geography at Bordeaux Montaigne University, details the socioeconomic effects of cruise shipping in Bordeaux.

According to his analysis, "Bordeaux has several assets that attract luxury cruise ships: a river navigable by the largest ships, world-renowned tourist attractions and access to the Atlantic coast. This has resulted in the creation of a productive sector aimed at a limited but very wealthy customer base. While the benefits are real, albeit diffuse and difficult to assess, the negative impacts are concrete and localised:

- Temporary privatisation of access to the quay

and • Significant air pollution."

The BENAQ project offers a solution to both of these problems by drastically **reducing air pollution** caused by stopovers and **consolidating Pauillac as a credible alternative to the Bordeaux City terminal**, as it will enable large cruise ships and, more generally, a substantial proportion of traffic to be redirected. **This dual effect will relieve pressure on the UNESCO World Heritage site in the city centre, improving the social and environmental acceptability of this significant economic sector.**

"The arrival of cruise ships in Bordeaux city centre has become increasingly important in recent decades, confirming the city's position as a prime port of call on the Atlantic coast. In a regional context where tourism is now central to the metropolitan economy, the growing number of cruise passengers disembarking in Bordeaux city centre has become a source of income for some areas and several local stakeholders, raising questions about the environmental sustainability of the model developed."

1. Creating a tourist destination

In Bordeaux, the new urban project decided upon and implemented in 1995 was the catalyst for major changes. The heritage movement (restoration of old buildings and industrial wasteland, renovation of public and private spaces, "illumination" of the city, pedestrianisation, redevelopment of the banks of the Garonne, etc.) and modernisation (construction of the tramway, renovation of the Saint-Jean railway station for the arrival of the high-speed rail line in 2017, major infrastructure projects including the Jacques Chaban-Delmas lift bridge in 2013 and the Cité du Vin in 2016, transformation of disused sites into cultural spaces such as the former German submarine base redeveloped into the "Bassins des Lumières", renaturation process, etc.) is behind Bordeaux's "tourism revival". **The city's classification as a UNESCO World Heritage Site in 2007 was the crowning achievement of its urban planning and architectural policies.**

1.1. Urban tourism once again focused on the river

The riverfront has been revitalised. The old docks have been replaced by a wide, green promenade, organised into several sections that showcase the waterfront formed by the 18th-century quays (...). Subsequently, the redevelopment of the river has enabled the development of new river-based tourist activities and has been accompanied by the creation of several festive events that can attract up to 400.000 people in a single weekend.

Tourism in Bordeaux is based on three pillars: wine, heritage and the river. These elements are often linked, as evidenced by the development of wine tourism, which showcases the "red gold" to tourists immersed in the Bordeaux vineyards, sometimes through the use of river transport. **Tourism has gradually established itself in the local and regional economy**, alongside traditional industries such as wine-growing and wine-making, civil and military aeronautics, aerospace and services, contributing to the economic prosperity of the area. Bordeaux has become one of France's leading tourist cities in terms of commercial tourist overnight stays. In 2022, 6,4 million overnight stays were recorded in commercial accommodation (compared with 2 million in 2000 and 5 million in 2015). Before Covid, in 2019, 17,6 million passengers were welcomed at Bordeaux Saint-Jean station, and 7.7 million passengers (57% of whom were on international flights) passed through Bordeaux-Mérignac airport (...).

Cruise ship moored in the centre of Bordeaux (Source: Google Maps screenshot taken on 23 June 2022, CNES data 2022)



2. The specificity of Bordeaux Port Calls

Bordeaux is a stopover suited to small cruise ships and marked by strong seasonality, with cruise ships avoiding the low season and taking advantage of the complementary climate. Tourism stakeholders are banking on the destination's assets (...).

2.1. High-end tourism

The relatively small size of ships docking in Bordeaux, due to technical constraints linked in particular to the Gironde estuary, effectively limits the number of places on board to between several hundred and a thousand cruise passengers. This restricted offer, combined with growing demand, explains the very high prices (up to €6.000 or even €10.000 per person for a cruise, although prices vary greatly depending on the offer). The high-end services provided by international cruise companies are therefore reserved for a wealthy clientele: luxury ships are no longer just another means of transport, but a tourist product. The destination is the vessel, which becomes a tourist attraction in its own right. (...).

2.2. The system of stakeholders linked to maritime transit in Bordeaux

The actors or groups of stakeholders gravitating around maritime ports of call in Bordeaux can be divided into three heterogeneous groups. Those who are responsible for establishing the ports of call and enabling them to operate, those who benefit from them, and those who denounce their effects. (...).

The objective of the "external" stakeholders is to make the Gironde estuary a mandatory passageway, a systematic port of call along the Atlantic coast. In Pauillac, the transformation of former logistics activities dedicated to the transport of spare parts essential for the construction of the Airbus A380 into berthing posts for cruise ships is one example (Lestage, 2022). For multinationals specialising in the marketing of sea cruises, the main aim is to open up a new growth market, but also to create, develop and promote Bordeaux as an additional product in their portfolio, enabling them to diversify their offering and provide their customers with a wider choice. (...).

Categories of Stakeholders	Stakeholders
Stakeholders enabling calls in Bordeaux and benefiting from them	• Shipbuilders and subcontractors. • Cruise companies (Hapag-Lloyd, Oceania Cruises, Seabourn Cruise Line, Norwegian Cruise Line Holding...). • Cruise promotion organisations (CLIA, Cruise Europe). • Travel agents, tour operators, booking platforms. • Airlines. • Ship owners, charterers, crew members. • Cruise line insurers. • Port authorities (Bordeaux Port), Gironde pilots. • French government (prefectural and port personnel). • Shipping agencies. • Elected officials (municipal, regional, etc.). • EPCI (CdC de la Pointe du Médoc). • Political and administrative staff. • Tourism professionals (OTCBM). • Port cities (Cruise Bordeaux). • Business community (Chamber of Commerce, companies, etc.). • Private security companies (*Lynx Sécurité*).

Stakeholders benefiting from calls in Bordeaux	• Cruise operators. • Local shopkeepers and artisans. • Gastronomy and entertainment professionals. • Accommodation providers (for crew and passenger overnight stays). • Wine industry (winegrowers, etc.). • Transport providers (bus drivers, taxis, etc., such as Les Transports Girondins). • Tourism professionals (guides, incoming agencies such as Bordeaux Excellence).

Stakeholders denouncing calls in Bordeaux	• Some permanent residents (joggers, cyclists, walkers, etc.). • Some non-cruise tourists. • Environmental movements (XR Bordeaux). • Political opponents. • Some metropolitan elected officials. • Media, bloggers and internet users (social media).

3

Table of stakeholders involved in Bordeaux stopovers, grouped according to their role and perception (Source: Pr. Dr. V. Piganiol, - Bordeaux Montaigne University)

. The importance of port calls in the local economy

is very difficult to measure where the economic benefits of cruise passengers begin and end when they call at a po
ıere is considerable disparity between the data and analyses found in the various documents published by ports ar
tourism organisations. In any case, ports of call such as Bordeaux remain the poor relation of the cruise industry, as the
ırrent logic of the cruise industry places the ship at the heart of the project, allowing it to maximise its profits at th
:pense of land-based destinations, however prestigious they may be. It should also be added that Bordeaux can be
›th a departure and arrival point for cruises."

2024, the Bordeaux Chamber of Commerce calculated that each cruise ship docking in Bordeaux generates a average of €330.000 in economic benefits for the city, representing an annual turnover of more than €10 million.

"3.1. Harvesting the benefits

The Bordeaux regions benefiting from summer stopovers, whose number and importance vary depending on the scale
ınsidered and their ability to capitalise on cruise-related sources of income, enjoy **economic benefits ranging fro**
veral thousand to several million euros. These are places and itineraries where tourism already played a significant
role in the productive system and which did not have to adapt specifically to welcome cruise passengers: Bordeaux,
ıint-Émilion, Blaye, Cadillac, Libourne, the prestigious wine châteaux of the Médoc, for example. Only restaurant
vners have had to adapt their offering by taking English lessons and changing their menus to meet the requiremen
of international customers (...). Ultimately, cruise passengers do not contribute to spreading tourist flows across th
areas concerned or to diversifying the tourist sites visited. They deploy the same strategies as noncruise tourists, acting
day trippers who make a few "shore excursions" but return to sleep "at sea" in the evening.

That said, the tourist structure has been somewhat reorganised, in particular to enable cruise passengers to visit the Bordeaux vineyards by chartering buses to take them there, parking in car parks adjacent to the disembarkation
ıngways. There has also been an adaptation of the tourist routes initially planned for non-cruise passengers and/
the creation of specific itineraries that are shorter and more focused on Bordeaux's iconic sites and activities, such as
e Miroir d'eau, the Cité du Vin and the Grand Théâtre. (...)

3.2

uise stops enable these regions to further diversify their sources of tourists and foreign currency: mooring fees, pr
ıd post-cruise accommodation, souvenir purchases, food and drink expenditure, bookings for activities or tourist
rvices, etc. **In Bordeaux, cruise passengers stay longer than elsewhere**, so their expenditure is higher. It is estimated
at **a cruise passenger disembarking in Bordeaux spends an average of €150 per day and up to €200 during**
30 **›pover,** compared with an average of €89 in Le Havre, €80 in La Rochelle and €44 in Marseille. (...)

. The controversy around port calls

ıe temporary and ultra-localised privatisation of public space (the space confiscated includes the size of a ship, plus
m upstream and downstream) leads to competition between uses, between those necessary for the disembarkation
ıd re-embarkation of cruise passengers and other functions present throughout the year: sports activities (skateboarding, rollerblading, cycling, running, walking, etc.) or recreational activities (walking, strolling, aperitifs, relaxation, etc.). This competition can take the form of conflicts of use between, on the one hand, the permane
population (residents) and temporary non-cruise passengers (tourists) and, on the other hand, cruise passengers ar
pervisory staff (security guards, cabin crew, public officials from the city or the Bordeaux Port). (...) During the summ
period, the repetition and accumulation of stopovers (two stopovers may currently take place simultaneously) create
prolonged and significant disruption for permanent residents and non-cruise tourists."

Without the BENAQ project, "this inconvenience could, in the not-too-distant future, generate negative feelings or even total rejection of cruise ship stopovers. While the number of cruise passengers (40.000 disembarked in Bordeaux in 2019) remains relatively insignificant when compared to the total population of the city centre (260.000 inhabitants in 2019) or that of the metropolitan area (810.000 inhabitants in 2019), this is not the case at the microlocal level, where the nuisances are developing.

The passage of cruise ships entering or leaving the Port de la Lune (Bordeaux Port) results in the closure of the Jacques-Chaban-Delmas bridge to motor traffic for several hours. However, this is one of the main crossings of the Garonne

within the city walls and, moreover, one of the busiest since the permanent closure of the stone bridge to road traffic in July 2018. The closure of the bridge systematically leads to traffic congestion. The blockage of this road link in the middle of the day exasperates some users and municipal and metropolitan councillors (...)".

The BENAQ project's contribution to **redirecting a significant portion** of the Bordeaux City terminal's calls to the Pauillac terminal **will substantially reduce the number of lift-bridge closures** required. It will **also limit the number of simultaneous calls by smaller vessels to one**, thereby reducing disruption on the city centre quays.

0.2.2. Financial analysis

Financial analysis

Describe the financial viability/sustainability of the project over its lifecycle (budget in balance; use of funds vs sources of funds).
For works proposals submitting a CBA, mention the value of the financial indicators after CEF funding (i.e. assuming that CEF support is granted for the amount requested (Financial Rate of Return FRR (C after CEF) and Financial Net Present Value FNPV(C after CEF)). Compare the profitability achieved after CEF funding with national and international benchmarks for the sector.
For projects with negative FNPV and with FRR smaller than the discount rate, explain why or under which conditions (e.g. other grants, reduction of costs) you would still proceed with the project despite its insufficient financial viability and illustrate how the project would be at least financially sustainable (i.e. not likely to default and therefore not putting at risk the commitment from the EU budget) by showing that the cumulated cash flows are always positive. Unprofitable/non-viable projects need to demonstrate their sustainability, for example by benefitting from other sources of support (such as national/local grants or operational subsidies) or revenues that can compensate negative cash flows or by the applicant's commitment and financial capacity to cover the remaining gap or absorb potential losses or accept deferral of profits.
Describe any financial risks associated with the implementation of the project.

As with other OPS projects, achieving financial balance for the BENAQ project is complex and requires external financial support, such as the AFIF grant and the loan provided by the Implementing Partner.
Indeed, a project of this type generates significant costs:

- Project studies, planning and management costs (not eligible for AFIF funding).
- Investments in OPS infrastructure such as:
  - Connection costs to the national distribution grid (ENEDIS).
  - Port network costs.
  - Associated civil engineering works.
  - Equipment costs (sheltered electrical architecture and CMS).
- Operating costs such as: Handling costs; Maintenance costs; Electricity purchase costs.

Year	1	2	3	4	5	6	7	8	9	10
in K€	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
OPERATING FLOW										
Products	**0**	**0**	**0**	**2.214.711**	**2.748.205**	**3.424.361**	**4.165.136**	**4.653.890**	**4.700.429**	**4.747.433**
Turnover				2.214.711	2.748.205	3.424.361	4.165.136	4.653.890	4.700.429	4.747.433
Operating Costs	**0**	**140.000**	**136.058**	**2.875.486**	**3.247.429**	**3.635.151**	**4.247.536**	**4.592.192**	**4.633.017**	**4.674.354**
Net depreciation				521.569	521.569	521.569	521.569	521.569	521.569	521.569
Financial costs		140.000	136.058	132.006	127.840	123.558	119.156	114.631	109.978	105.196
Property costs										
Maintenance & Repair				160.000	161.600	163.216	164.848	166.497	168.162	169.843
Energy supply				1.529.911	1.876.070	2.229.824	2.809.054	3.128.365	3.159.648	3.191.245
Electricity transmission TURPE				454.000	465.350	476.984	488.908	501.131	513.659	526.501
Salary cost				78.000	95.000	120.000	144.000	160.000	160.000	160.000
Operating profit	**0**	**-140.000**	**-136.058**	**-660.775**	**-499.225**	**-210.790**	**-82.399**	**61.698**	**67.412**	**73.079**
Corporate income tax (IS) 25%	0	-35.000	-34.015	-165.194	-124.806	-52.697	-20.600	15.425	16.853	18.270
Result after income tax	**0**	**-140.000**	**-136.058**	**-660.775**	**-499.225**	**-210.790**	**-82.399**	**61.698**	**67.412**	**73.079**
Cumulative result after income tax	0	-140.000	-276.058	-936.833	-1.436.058	-1.646.848	-1.729.247	-1.667.549	-1.600.137	-1.527.058

Table: Extract of the operating Flow of the BENAQ projet - first 10 years (Source: Bordeaux Port)

In view of these costs, the potential revenue is limited. Indeed, in order to ensure that the obligation to connect to shore power is acceptable to operators (rather than using their diesel auxiliaries), without significantly undermining the port's competitiveness vis-à-vis ports without OPS, the price that can be passed on to shipowners for their electricity consumption can only include limited additional cost of the investment and its operation.

CASH FLOWS										
JOBS	350.000	11.215.778	11.219.720	148.772	152.938	157.220	161.622	166.148	170.800	175.582
Investments	350.000	11.075.000	11.075.000							
Repayment of loan		140.778	144.720	148.772	152.938	157.220	161.622	166.148	170.800	175.582
RESOURCES	206.889	11.406.556	6.410.497	-139.206	22.345	310.779	439.170	583.267	588.981	594.648
Self-financing capacity	0	-140.000	-136.058	-139.206	22.345	310.779	439.170	583.267	588.981	594.648
Investment Grant	206.889	6.546.556	6.546.556	0	0	0	0	0	0	0
Loan		5.000.000								

Table: Extract of the Cash Flows of the BENAQ project - first 10 years (Source: Bordeaux Port)

Without external funding from the AFIF programme and from the Implementing Partner, the project cannot be balanced and is not feasible.

TOTAL NET CASH FLOW	-143.111	190.777	-4.809.223	-287.978	-130.593	153.559	277.547	417.120	418.182	419.066
Working Capital Start of Period		-143.111	47.666	-4.761.557	-5.049.535	-5.180.128	-5.026.569	-4.749.022	-4.331.902	-3.913.721
Working Capital End of Period	-143.111	47.666	-4.761.557	-5.049.535	-5.180.128	-5.026.569	-4.749.022	-4.331.902	-3.913.721	-3.494.654
TOTAL DISCOUNTED CASH FLOW	-138.943	179.826	-4.401.120	-255.865	-112.651	128.603	225.671	329.278	320.501	311.825
NET CASH FLOW CUMULATIVE DISTRIBUTIONS	-138.943	40.883	-4.360.237	-4.616.102	-4.728.753	-4.600.150	-4.374.478	-4.045.200	-3.724.699	-3.412.874
Year	1	2	3	4	5	6	7	8	9	10
Years of operation				1	2	3	4	5	6	7

Table: Extract of the Cash Flows of the BENAQ project - first 10 years (Source: Bordeaux Port)

With external funding from the AFIF programme and from the Implementing Partner, the project can break even after 24 years of operation.

Table: Financial Balance of the BENAQ project (Source: Bordeaux Port)

Financial Balancing of the BENAQ Project	
FNPV end of 5th year	-4.728.753 €
FNPV end of 10th year	-3.412.874 €
FNPV end of 15th year	-1.980.352 €
FNPV end of 20th year	-749.402 €
FNPV end of 24th year	98.935 €
FNPV end of 30th year	1.643.536 €
ROI end of 10th year	-20,99%
ROI end of 15th year	-6,64%
ROI end of 20th year	-5,27%
ROI end of 24th year	0,18%
ROI end of 30th year	2,13%
Project profitability year	2049

In view of the Bordeaux Port's environmental commitments and its desire to contribute as a public institution to the decarbonisation policies of the European Union, the French government and local authorities, the project can be carried out if it obtains funding to cover its funding gap.
The following sections show that it will actively contribute to the fight against climate change and improve the health of port users and residents, particularly in the heart of the Bordeaux metropolitan area, which is listed as a UNESCO World Heritage Site.
This investment should also contribute to the attractiveness of the port for transport companies, manufacturers in the area, particularly in Bassens, and the cruise and tourism industry in the region. The indirect economic and financial benefits of the project should therefore help to consolidate the relevance of this investment, for which the implementing partner has approved the principle of a loan.

The AFIF Implementing Partner CDC conducted a counterpart analysis of Bordeaux Port with favourable results

The Banque de France rating is D1+, indicating a very good financial situation, very strong financial health and an exceptional ability to meet financial commitments.
GPMB shows a satisfactory financial situation over the period 2022-2024. The financial structure is solid, characterized by an increase in equity in 2024 and controlled indebtedness. Operations demonstrate a good level of self-financing capacity (CAF) despite a profitability deficit observed over the last two years.
Revenue is consistently increasing (+5.4% on annual average over the period 2022-2024). The level of self-financing capacity is up by +5.3 million euros compared to 2023, reaching 7.1 million euros, thereby bringing the debt repayment capacity to 2 years. This strong growth is attributed to both an increase in collected revenues (+3.4 million euros) and a decrease in operating expenses (-1.8 million euros), along with low indebtedness. The net self-financing

capacity, which was slightly negative in 2023 (-245K€), stands at 5.6 million euros at the end of 2024, resulting in an overall margin (net SF capacity / revenue) of 12.4%.

As a public industrial and commercial establishment (EPIC), the port does not have share capital in the legal sense. An initial endowment was established at its creation, supplemented by specific contributions from the French State, which amount to 142 million euros by the end of 2024.
With stable resources increasing by 7.2% against a stable fixed asset base between 2022 and 2023 (new investments being neutralized by the depreciation of assets), working capital (WCR) increases by 17.7 million euros, rising from 11.9 million euros in 2022 to 29.6 million euros, equivalent to 236 days of revenue, which is a comfortable level. The working capital requirement (WCR) tightens to reach 2.6 million euros compared to 0.6 million euros in 2023.

0.3. SOCIAL, ENVIRONMENTAL AND OTHER IMPACTS

0.3.1. Impact on congestion, modal split, safety and security, service quality, noise, air pollutants

Impact on congestion, modal split, safety and security, service quality, noise, air pollutants

Describe the expected positive and/or negative impacts of the project on time savings, optimisation of existing capacity and service quality. If quantified in the CBA, mention the total monetary value of such impacts (€ Net Present Value (NPV)) and the main assumptions in terms of quantities (e.g. change in number of hours or vehicles) and unit values (e.g. €/hour or €/vehicle/km).
Describe the expected positive and/or negative impacts on modal split.
Describe the expected positive and/or negative impacts on safety and security. If quantified in the CBA, mention the monetary value of such impacts (€ NPV) and the main assumptions in terms of quantities (e.g. change in number of accidents, injuries and fatalities) and unit values (€/accident).
Describe the expected positive and/or negative impacts of the project on noise emissions. If quantified in the CBA, mention the total monetary value of such impacts (€ NPV) and the main assumptions in terms of quantities (e.g. change in number of trains) and unit values (e.g. €/train).

Impact on congestion

The logistics tool of feeders, whose port calls will be electrified in Bassens (WP2), provides answers to several issues faced by companies: the safety and smooth flow of goods transport, their environmental responsibility and urban congestion caused in part by heavy goods vehicles.

The development of sea transport is reducing the number of trucks on the road, even though road transport remains the dominant mode of transport. A weekly container line represents the equivalent of almost 600 km of parked trucks. For example, the container ship that operating on the Atlantic feeder line, the ‘Hanna’, has a capacity of 600 containers, or 600 trucks that would otherwise have to pass through one of France's major cities, while its fuel consumption is equivalent to only that of around 11 trucks.

In addition, WP1 and WP3, by redirecting a substantial part of the maritime cruise traffic from Bordeaux Centre to Pauillac, will significantly reduce the number of openings of the Chaban Delmas bridge over the Garonne, which has a major impact on traffic in the Bordeaux city centre for several hours each time a cruise ship passes.

Finally, coaches currently transporting passengers over a distance of 100 km between the Verdon terminal and Bordeaux city centre will see their journey halved from Pauillac.

Impact on service quality

Bordeaux Port has worked for many years with the local Chamber of Commerce and Industry (CCI) and the Maritime and Port Union to convince regional companies to opt for maritime transport. These companies now see maritime transport as a way of reducing their carbon footprint. Above all, Bordeaux Port has invested €11 million to completely restructure the Bassens container terminal. Bordeaux Port's cargo handling companies are seeing their business grow as a result of this development. The companies using these shipping lines are mainly SMEs and mid-cap companies but also include the medical NGO “Médecins sans frontières”, for example.

Impact on Noise emissions

For Bordeaux Port, the reduction of noise emissions by cruise ships is an important concern.

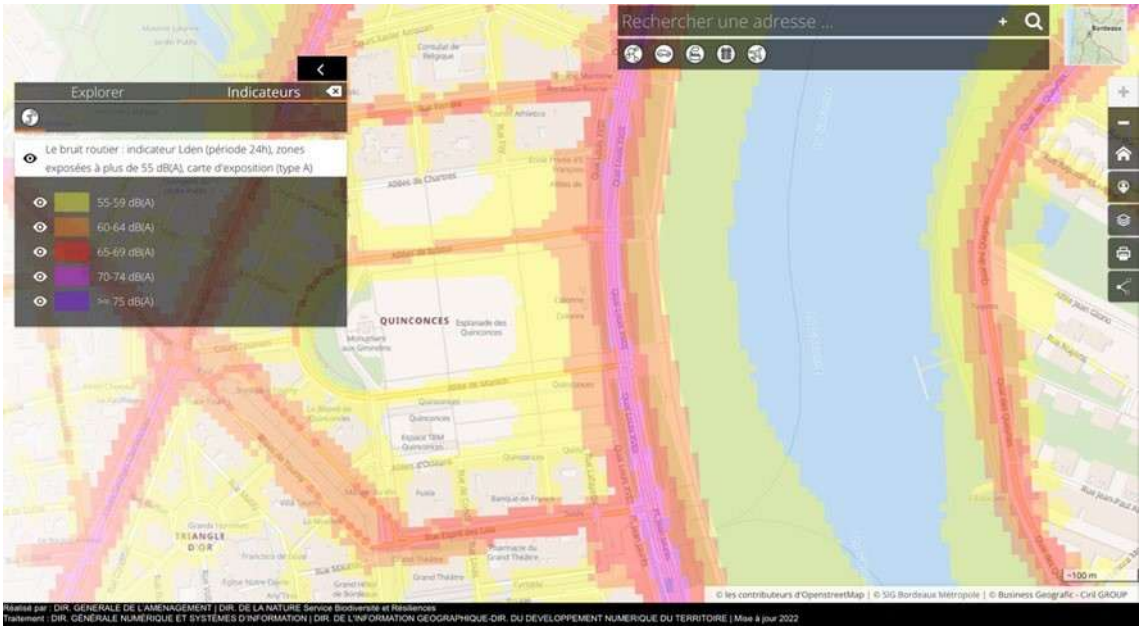
As call data show, the volume of cruise ships heavily depends on the season. The cruise season at the Atlantic coast lasts from April to October with three peak months in May, June and September with 11,12 and 16 port calls at

Bordeaux Port in 2024. This means, that for local residents noise emissions by cruise ships are either non-existent to very low (November–March), medium in low season (April, July, August, October) or rather high in peak season (May, June, September) – depending on the season.



Graphic: Cruise Ship Volume at Bordeaux Port per Month, 2022–2024

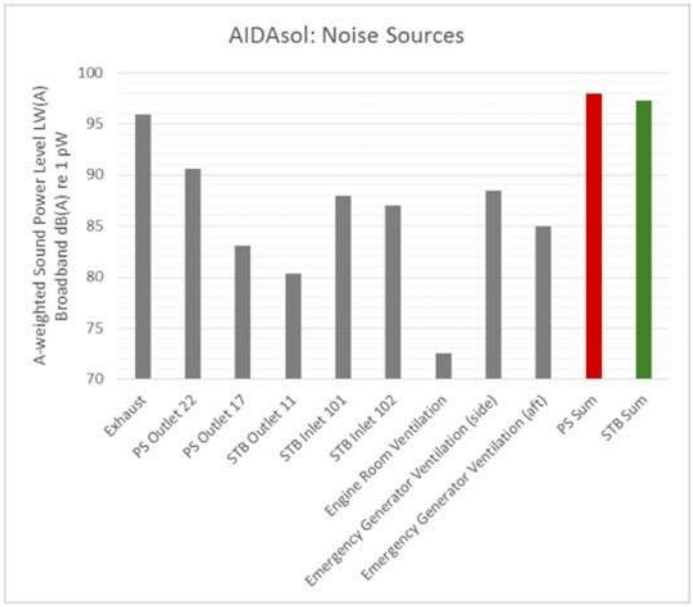
In addition, noise emissions are due to road traffic very high along the Garonne River in Bordeaux City. Along *Quai Louis XVIII*, where the City cruise terminal is located, the average noise level by road traffic over 24 hours (weighted for evening hours (6 p.m. to 10 p.m. = +5 dB(A)) and night-time hours (10 p.m. to 6 a.m. = +10 dB(A)) is between 70 and 74 dB(A). (See picture below).



Picture: Average noise level by road traffic over 24 hours along Quai Louis XVIII

To determine the noise emissions caused by cruise ships at berth, it is referred to the INTERREG Baltic Sea Region project “Green Cruise Port” in the context of which technical noise investigations were conducted at the Port of Hamburg’s City cruise terminal. One of the three cruise ships investigated in frame of noise investigations is the AIDAsol, which has been calling very regularly at Bordeaux Port in the last few years (4 times in 2024, 2 times in 2023 and 3 times in 2022) and which is thus of particular interest.

The noise investigations of the AIDAsol showed that overall sound power levels of noise sources on board, that is exhaust gas outlets and ventilation openings, summed up to 102 dB(A) – the highest contribution to sound power coming from the diesel generator exhaust (96db(A)). (Cf. graphic below).



Graphic: Sound power levels of measured noise sources onboard AIDAsol
(Source: Technical noise investigations at Hamburg City cruise terminals, figure 37)

The noise sources onboard the AIDAsol, that is exhaust gas outlets and ventilation openings, modelled for portside and for starboardside are given in the figure below:

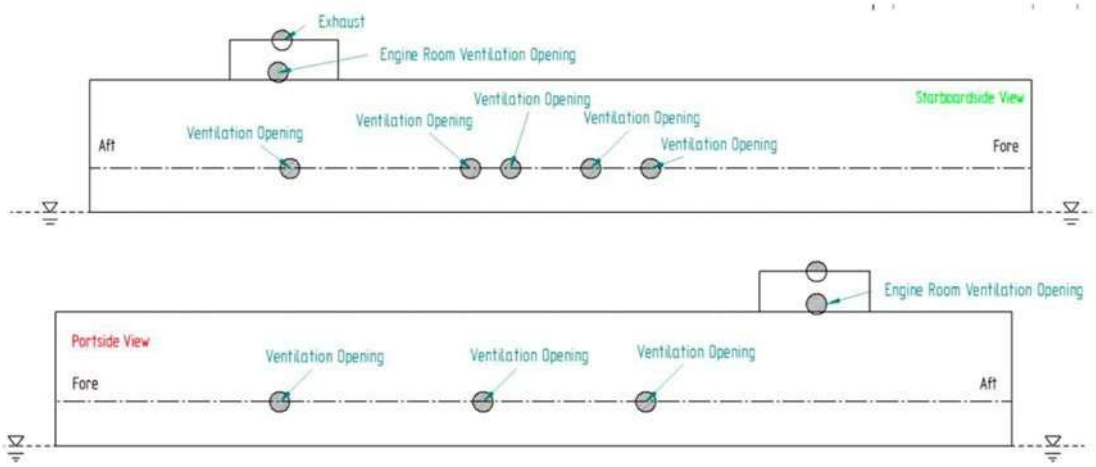


Figure: Modelled noise sources on AIDAsol
(Source: Technical noise investigations at Hamburg City cruise terminals, figure 17)

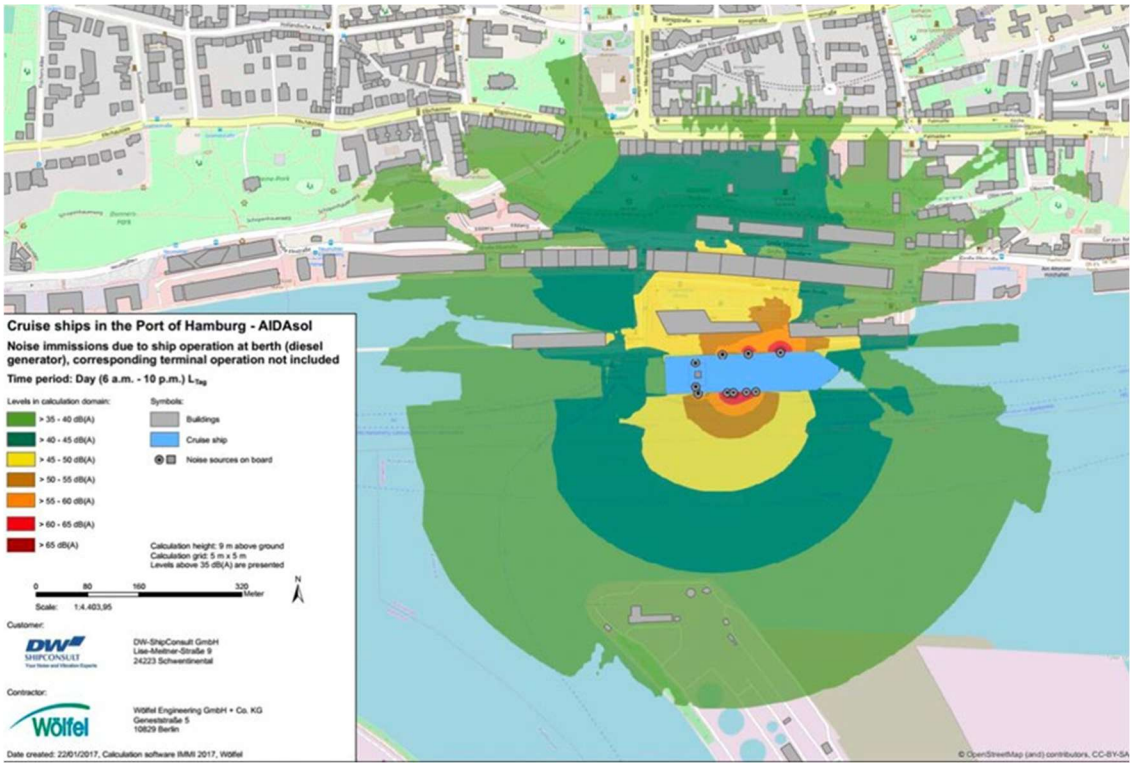
The technical noise investigations at Port of Hamburg also revealed that the AIDAsol contributed significantly to noise emissions in the low frequency regime (by about 12dB). Though the investigations also showed that shore-side power supply is an effective countermeasure against low frequency noise from cruise ships.



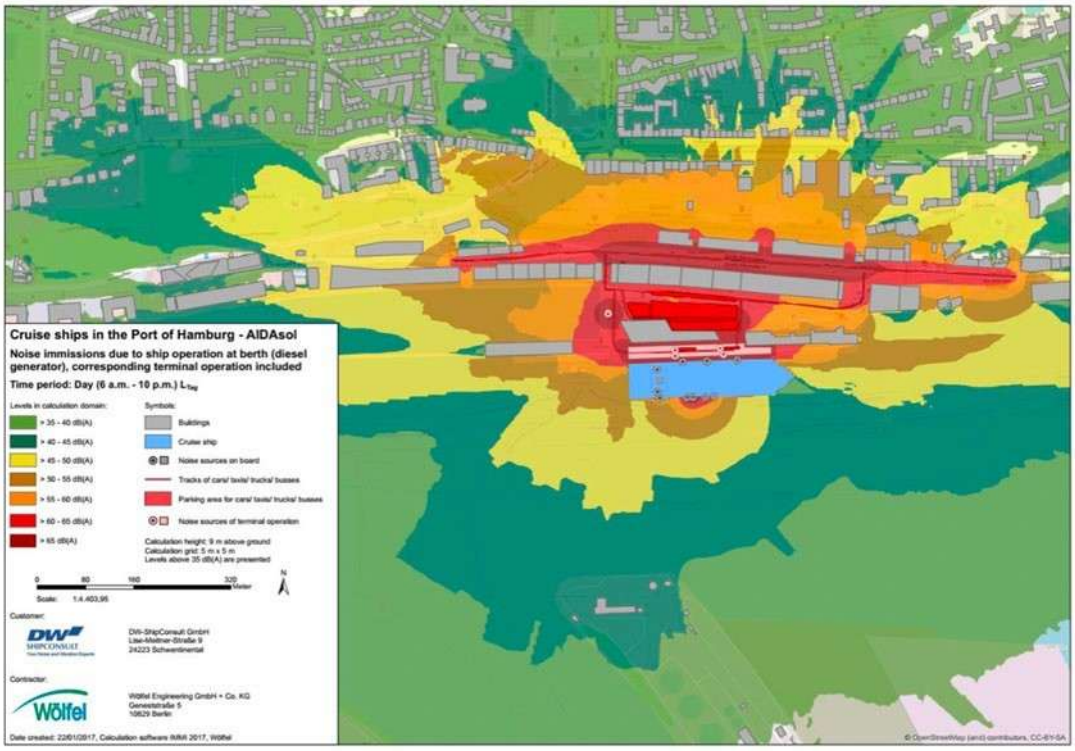
Graphic: Modelled low frequency noise level LCeq – Laeq inside buildings with two types of facades compared (Source: Technical noise investigations at Hamburg City cruise terminals, figure 40)

The following sound maps of the AIDAsol at berth, all taken from "Technical noise investigations at Hamburg City cruise terminals" show:

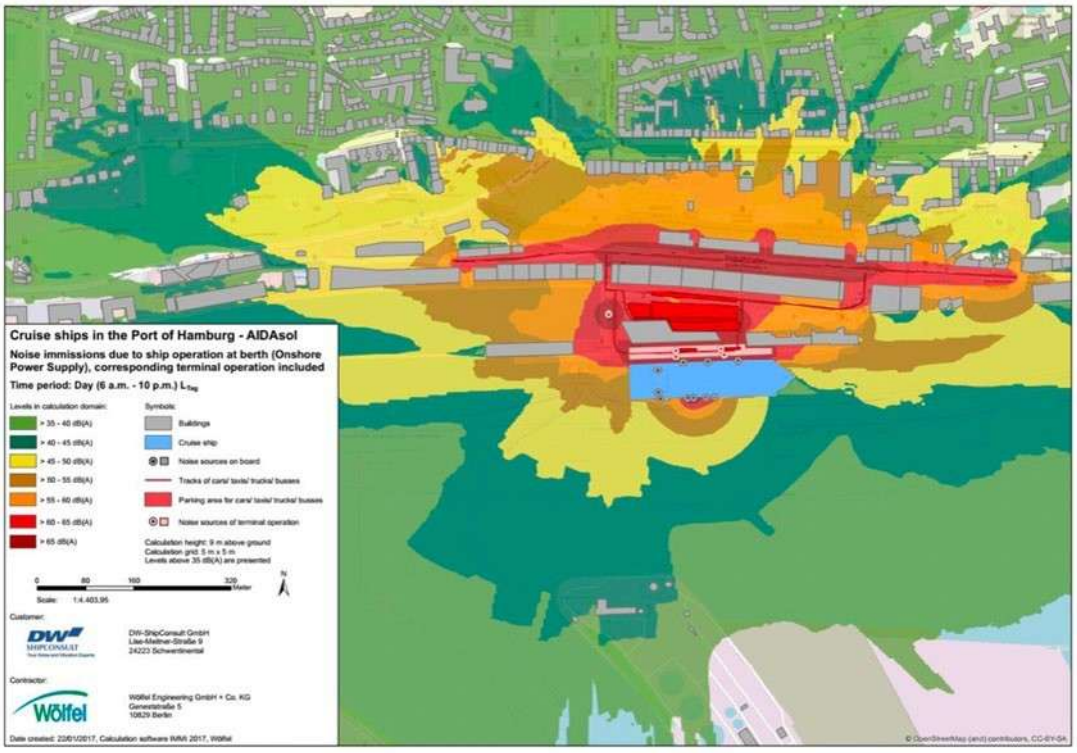
1. Noise emissions due to ship operation at berth (diesel generator), corresponding terminal operation not included, daytime.
2. Noise emissions due to ship operation at berth (diesel generator), corresponding terminal operation included, daytime.
3. Noise emissions due to ship operation at berth (Onshore Power Supply), corresponding terminal operation included, daytime.



Sound Map 1: AIDAsol in Altona, only ship, from measurements on 20.08.2017



Sound Map 2: AIDAsol in Altona (Diesel), all sources, from measurements on 20.08.2017



Sound Map 3: AIDAsol in Altona (OPS), all sources, from measurements on 23.04.2018

A comparison of Sound Map 2 and Sound Map 3, the AIDAsol at berth with and without OPS, shows that cruise ships at berth are not the dominant noise source of a cruise terminal and that therefore, the supply of shore-side electricity does reduce noise emission by cruise ships at berth but only marginally in comparison with noise emission by terminal operation.

However, as described above, the investigated cruise ships at berth were the most significant low frequency noise emitters at the terminal (which is not evident from the sound maps as they do not display noise emissions in the low frequency regime).

The study on technical noise investigations at Hamburg City cruise terminals concludes that the installation of shoreside electricity supply is “a very promising noise mitigation measure” for exhaust gas noise, as the generator engines can be completely turned off: “By avoiding the need to run the onboard generator engines due to OPS operation, the noise in the low frequency range would be significantly reduced. It is there recommended to use OPS for noise reduction purposes”.

The BENAQ project proposed by Bordeaux Port will thus reduce noise emissions from noise sources onboard cruise ships at berth with a significant impact in the low frequency range by supplying shore-side electricity at the Bordeaux City terminal.

Impact on air pollutants

Furthermore, for several years, air quality near port areas has been a major concern. Polluting emissions from maritime transport have a significant environmental impact. Indeed, cruise ship calls in Bordeaux Port have been raising new questions from local residents, managers, and political authorities.

Thus, a specific study on this activity was conducted in collaboration with Bordeaux Metropolis and the city of Bordeaux. It was undertaken in April and May 2018 and had the objective to evaluate the impact of maritime and river ships on air quality during periods of high passenger traffic.

These two months of measurements around the terminal in the centre of Bordeaux have shown that cruise ships are not the major source of air pollution in the neighbourhoods surrounding the port and the measured concentrations are lower than those observed in other French ports.

However, the effects on air quality of introducing OPS in Bordeaux with the BENAQ project have been quantified in the following section (see section 4.3.2 hereafter).

0.3.2. Environmental and climate impact

Environmental and climate impact

Describe the expected positive and/or negative impacts of the project on the climate change targets (such as the Paris Agreement and the 2030 Climate and energy framework).
*Describe the expected positive and/or negative impacts of the project on the emission of air pollutants such as Particulate Matter - PM2.5, Nitrogen oxides - NOX, Sulphur Dioxides – SO2, etc. If quantified in the CBA, mention the total monetary value of such impacts (€ NPV) and the main assumptions in terms of quantities (change in tonnes or vehicle*km) and unit values (e.g. €/tonnes or €/vkm).*
Specify if the project helps to reduce greenhouse gas emissions (GHG) and limit global warming. Explain how it impacts upstream and downstream emissions (e.g. emissions from purchased electricity as well as full life cycle). For works proposals submitting a CBA, also include the total monetary value of such impacts (€ NPV) and the main assumptions in terms of quantities (avoided tonnes of GHG) and unit values (e.g. €/tCO2equivalent).
Describe how climate change has been taken or will be taken into consideration when designing the project and its components.
Describe how the project is consistent with the climate proofing of infrastructure mitigation pillar (including how the cost of greenhouse gas emissions have been integrated in the economic evaluation, how it is consistent with the energy efficiency first principle and how it is consistent with the emission targets for 2050; for details, see Commission Technical guidance on the climate proofing of infrastructure).
Describe in detail the measures that are foreseen to monitor, prevent and mitigate a negative impact on the environment, and provide an estimation of the associated costs.

The BENAQ project proposed by Bordeaux Port will have a positive impact on environment and climate, as it will significantly reduce the emission of GHG as well as air pollution caused by cruise ships and container ships at berth by supplying shore-side electricity at the Bordeaux City terminal, the Pauillac terminal and the Bassens terminal. As it is planned for the future to redirect cruise ships from the Verdon terminal to the Pauillac terminal which is to be equipped with OPS and where no significant numbers of cruise ships have been mooring to date, for the estimation of the GHG and air pollution reduction potential figures for the Verdon terminal were used. The estimations based on these figures are easily transferable to the Pauillac terminal.

Estimation of greenhouse gas emissions and air pollution caused by cruise ships and container ships during berthing time at Bordeaux Port

To assess the impact the proposed BENAQ project will have on the environment and the climate, estimations of GHG emissions and air pollution have been performed based on the methodology established in the “Fourth IMO Greenhouse Gas Study” by the International Maritime Organization (IMO). First, however, a thorough call and fleet

analysis was carried out based on data from VIGIEsip, Bordeaux Port's port call management software, covering the years 2022, 2023 and 2024.

The following assumptions were made in order to estimate emissions and air pollution:

- As none of the cruise or container ships calling at Bordeaux Port between 2022–2024 were powered by LNG, it was assumed the auxiliary engines of all cruise and container ships calling in this period were running on Marine Diesel Oil (MDO) – following the IMO definition of MDO as "distillate marine fuels in general" including marine gas oil.
- The auxiliary engine power output was determined by ship type (cruise, container), by ship size (in gt for cruise ships, in TEU for container ships) and by operational mode (at berth) – always assuming that the main engine power is larger than 500 kW. (Cf. Fourth IMO GHG Study, table 17).
- The baseline specific fuel consumption was determined by engine type (auxiliary engine), by fuel type (MDO) and by year of built (before 1983, 1984–2000, 2001+). (Cf. Fourth IMO GHG Study, table 19).
- To determine the auxiliary engines' specific fuel consumption, it was assumed that auxiliary engines do not depend on their load and that their fuel consumption therefore is solely governed on the power demand and their baseline specific fuel consumption:

$$FC_{AE,i} = SFC_{base} \times W_{AE,i}$$

Where $FC_{AE,i}$ is the hourly fuel consumption for the auxiliary engines, SFC_{base} designates the baseline specific fuel consumption and $W_{AE,i}$ the power output for the auxiliary engines (Cf. Fourth IMO GHG Study, equation 11).

- The auxiliary engines' hourly emissions were estimated either fuel-based or energy-based: fuel-based for carbon dioxide (CO_2) and energy-based for methane (CH_4), carbon monoxide (CO), nitrous oxide (N_2O) and particular matter (PM_{10} and $PM_{2.5}$).
- An estimation of sulphur oxides (SO_x) emissions and nitrogen oxides (NO_x) emissions, however, was not performed as an air quality monitoring study from 2018 showed that both SO_2 and NO_x emissions at Bordeaux City's cruise terminal were very low, that the highest measured values were far from the regulatory limit value and that road traffic and urban background are the main causes of NO_x emissions in Bordeaux.

(Cf. « Étude de l'impact du port de Bordeaux sur les concentrations en polluants atmosphériques », 2018, Atmo Nouvelle-Aquitaine).

- The fuel-based estimation for CO_2 calculates the pollutants depending on the amount of pollutant found in the fuel and engine type. The hourly emissions (EM_i) are obtained by multiplying the hourly fuel consumption (FC_i) by the fuel-based emission factor (EF_f) in g pollutant/g fuel:

$$EM_i = FC_i \times EF_f$$ The

assumed EF_f of CO_2 for MDO is 3,206 g CO_2/g fuel.

(Cf. Fourth IMO GHG Study, equation 12; Annex M, table 45)

- The energy-based estimation for CH_4, CO, N_2O, PM_{10} and $PM_{2.5}$ emissions calculates the pollutants depending on the engine's power output (W) using an energy-based emission factor (EF_e) in g pollutant/kWh. The hourly emissions (EM_i) are calculated as follows:

$$EM_i = EF_e \times W_i$$

While the estimation of CH_4, CO and N_2O does not distinguish between different engine generations – the same values are used for all engine generations and tiers – the estimation of PM_{10} and $PM_{2.5}$ is dependent on the specific fuel consumption and on the fuel's sulphur content. Due to lack of information on MDO's sulphur content in recent fuel years, the latest available data on fuel's sulphur content is used, that is from 2018, assuming the fuel's sulphur content has not increased since.

- The assumed emission factor of CH_4 for auxiliary engines burning MDO is 0,01 g/kWh.
- The assumed emission factor of CO for auxiliary engines burning MDO is 0,54 g/kWh.
- The assumed emission factor of N_2O for auxiliary engines burning MDO is 0,036 g/kWh.
- The assumed emission factor of PM_{10} for auxiliary engines, second and third generation, burning MDO is 0,18 g/kWh, for first generation engines 0,17g/kWh.
- The assumed emission factor of $PM_{2.5}$ for auxiliary engines, second and third generation, burning MDO is accordingly 0,1656 g/kWh, and for first generation engines 0,1564 g/kWh.

(For all emission factors cf. Fourth IMO GHG Study, Annex M).

The number of port calls and the time spent at berth was calculated based on data from VIGIEsip, Bordeaux Port's port call management software. In the case that a ship calling at Bordeaux Port, was mooring on more than one terminal, the berthing time per terminal was analysed and the port call was allocated to that terminal with the longest berthing time (usually to the Bordeaux City terminal). All information on ship type, ship size, year of built was taken either from the port call management software or from publicly available sources.

In 2024, there were 41 port calls by container ships at the Bassens terminal and 64 port calls by cruise ships at Bordeaux Port's different cruise terminals: Container ships spent in total 1.398 hours berthing at the Bassens terminal, with an average berthing time of 34 hours per port call; cruise ships spent in total 1.698 hours berthing time at the cruise terminals, with an average berthing time of 26,5 hours per port call – 1.255 hours of which they spent at the Bordeaux City terminal, where approximately 67% of the emissions caused by cruise ships occurred.

Thus, the calculations performed to estimate the GHG emissions and air pollution from cruise ships and container ships during berthing time at Bordeaux Port in the reference year 2024 result in:

Cruise ships, all terminals, total berthing time		
Pollutant	**Quantity**	**Unit**
Carbon dioxide:	4.619.671,27	kg CO_2
Methane:	77,14	kg CH_4
Nitrous oxide:	277,69	kg N_2O
Carbon Monoxide:	4.165,34	kg CO
Particular matter:	1.388,39	kg PM_{10}
	1.277,32	kg $PM_{2.5}$
Cruise ships, Bordeaux City terminal, total berthing time		
Pollutant	**Quantity**	**Unit**
Carbon dioxide:	2.963.396,37	kg CO_2
Methane:	49,36	kg CH_4
Nitrous oxide:	177,69	kg N_2O
Carbon Monoxide:	2.665,41	kg CO
Particular matter:	888,42	kg PM_{10}
	817,34	kg $PM_{2.5}$
Cruise ships, Verdon terminal, total berthing time		
Pollutant	**Quantity**	**Unit**
Carbon dioxide:	1.547.514,56	kg CO_2
Methane:	25,98	kg CH_4
Nitrous oxide:	93,54	kg N_2O
Carbon Monoxide:	1.403,06	kg CO
Particular matter:	467,69	kg PM_{10}
	430,27	kg $PM_{2.5}$
Container ships, Bassens terminal, total berthing time		
Pollutant	**Quantity**	**Unit**
Carbon dioxide:	306.792	kg CO_2

Methane:	5,17	kg CH_4
Nitrous oxide:	18,62	kg N_2O
Carbon Monoxide:	279,32	kg CO
Particular matter:	93,11	kg PM_{10}
	85,66	kg $PM_{2.5}$

Estimated GHG Emissions and Air Pollution from Cruise Ships and Container Ships during Berthing Time at Bordeaux Port in 2024

Estimation of GHG emissions and air pollution reduction potential through shore-side electricity at Bordeaux Port

To determine the reduction potential and by this the BENAQ project's impact on climate, the emissions from the different greenhouse gases estimated in the methodology described above, are converted on the basis of their global-warming potential (GWP) into carbon dioxide equivalents. Following the recommendations in the IPCC's Sixth Assessment Report (AR6), the GWP-100 assumed for non-fossil methane, including combustion from fossil fuels, is 27, and the GWP-100 assumed for nitrous oxide is 273.

Species	Lifetime (Years)	Radiative Efficiency ($W\,m^{-2}\,ppb^{-1}$)	GWP-20	GWP-100	GWP-500	GTP-50	GTP-100	CGTP-50 (years)	CGTP-100 (years)
CO_2	Multiple	$1.33 \pm 0.16 \times 10^{-5}$	1.	1.000	1.000	1.000	1.000		
CH_4-fossil	11.8 ± 1.8	$5.7 \pm 1.4 \times 10^{-4}$	82.5 ± 25.8	29.8 ± 11	10.0 ± 3.8	13.2 ± 6.1	7.5 ± 2.9	2823 ± 1060	3531 ± 1385
CH_4-non fossil	11.8 ± 1.8	$5.7 \pm 1.4 \times 10^{-4}$	79.7 ± 25.8	27.0 ± 11	7.2 ± 3.8	10.4 ± 6.1	4.7 ± 2.9	2675 ± 1057	3228 ± 1364
N_2O	109 ± 10	$2.8 \pm 1.1 \times 10^{-3}$	273 ± 118	273 ± 130	130 ± 64	290 ± 140	233 ± 110		
HFC-32	5.4 ± 1.1	$1.1 \pm 0.2 \times 10^{-1}$	2693 ± 842	771 ± 292	220 ± 87	181 ± 83	142 ± 51	78,175 ± 29,402	92,888 ± 36,534
HFC-134a	14.0 ± 2.8	$1.67 \pm 0.32 \times 10^{-1}$	4144 ± 1160	1526 ± 577	436 ± 173	733 ± 410	306 ± 119	146,670 ± 53,318	181,408 ± 71,365
CFC-11	52.0 ± 10.4	$2.91 \pm 0.65 \times 10^{-1}$	8321 ± 2419	6226 ± 2297	2093 ± 865	6351 ± 2342	3536 ± 1511		
PFC-14	50,000	$9.89 \pm 0.19 \times 10^{-2}$	5301 ± 1395	7380 ± 2430	10,587 ± 3692	7660 ± 2464	9055 ± 3128		

Global Warming Potential for Greenhouse Gases (Source: IPCC, AR6, Table 7.15)

Once converted into carbon dioxide equivalents, the total amount of estimated emissions from the different greenhouse gases for the reference year 2024 is: from cruise ships during berthing time 4.697,56 t CO_2-eq (of which 3.013,24 t CO_2-eq occurred at the Bordeaux City terminal and 1.573,75 t CO_2-eq at the Verdon terminal); and from container ships 312,01 t CO_2-eq.

However, as the total berthing time given above does not yet take into account the time to connect and disconnect the ships to shore-side electricity (approx. 2 hours per port call) during which the auxiliary engines are still running and still producing emissions, the berthing time has to be adjusted by 2 hours per port. Once adjusted, the emission reduction potential for the reference year 2024 is thus, 293,71 t CO_2-eq for container ships at the Bassens terminal, 2.841,34 t CO_2-eq for cruise ships at the Bordeaux City terminal and 1.339,26 t CO_2-eq for cruise ships at the Verdon terminal – resulting in **a total emission reduction potential of 4.474,31 t CO_2-eq/year for cruise and container ships at berth.** This includes the traffic that will be diverted to Pauillac in the future. Considering the estimated growth of traffic the total climate savings could reach 6270 t CO_2-eq/year in ten years.

Emission reduction potential for cruise ships at the Bordeaux City terminal (berthing time without c/d time)				
Pollutant	**Quantity**	**Unit**	**Converted into CO_2 equivalents**	**Unit**
Carbon dioxide	2.794.337,58	kg CO_2	2.794.337,58	kg CO_2-eq
Methane	46,54	kg CH_4	1.256,58	kg CO_2-eq
Nitrous oxide	167,55	kg N_2O	45.741,15	kg CO_2-eq
		Total in CO_2 equivalents	**2.841,34**	**t CO_2-eq**

Emission reduction potential for cruise ships at the Verdon terminal (berthing time without c/d time)				
Pollutant	**Quantity**	**Unit**	**Converted into CO_2 equivalents**	**Unit**
Carbon dioxide	1.316.931,02	kg CO_2	1.316.931,02	kg CO_2-eq
Methane	22,11	kg CH_4	596,97	kg CO_2-eq
Nitrous oxide	79,61	kg N_2O	21.733,53	kg CO_2-eq
		Total in CO_2 equivalents	**1.339,26**	**t CO_2-eq**

Emission reduction potential for container ships at the Bassens terminal (berthing time without c/d time)				
Pollutant	**Quantity**	**Unit**	**Converted into CO_2 equivalents**	**Unit**
Carbon dioxide	288.797,12	kg CO_2	288.797,12	kg CO_2-eq
Methane	4,87	kg CH_4	131,49	kg CO_2-eq
Nitrous oxide	17,53	kg N_2O	4.785,69	kg CO_2-eq
		Total in CO_2 equivalents	**293,71**	**t CO_2-eq**
			Total emission reduction potential at the three terminals: 4.474,31 t CO_2-eq	

Estimated Emission Reduction Potential for Cruise Ships and Container Ships at Berth at Bordeaux Port in 2024, Converted into Carbon Dioxide Equivalents

Estimation of average power demand of cruise ships and container ships during berthing time at Bordeaux Port

The assumed average power demand of container ships less than 10.000 gt is 1,5 MW, resulting in an estimated total power demand of 2,1 GWh for 41 port calls (with a total berthing time of 1.398 hours) at the Bassens terminal in the reference year 2024.

The assumed average power demand of cruise ships less than 50.000 gt is 4 MW and of cruise ships between 50.000–100.000 gt 9 MW, resulting in an estimated total power demand of 5,89 GWh for 36 port calls (with a total berthing time of 1.255 hours) at the Bordeaux City terminal in the reference year 2024.

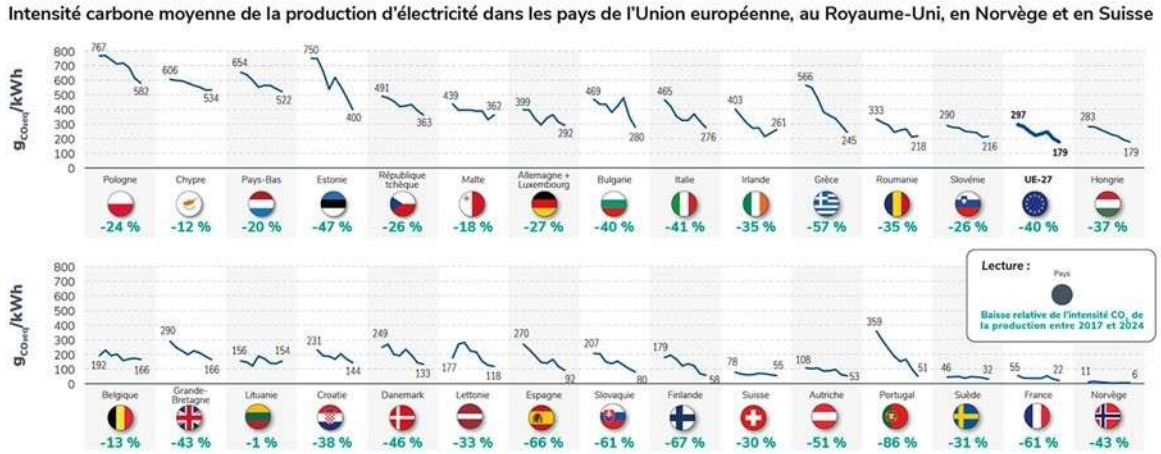
In addition, the assumed average power demand of cruise ships more than 100.000 gt is 18 MW, resulting in an estimated total power demand of 3,38 GWh for 25 port calls (with a total berthing time of 329 hours) at the Verdon terminal in the reference year 2024.

However, the calculation of total berthing hours given above does not yet take into account the time to connect and disconnect the ships to shore-side electricity (approx. 2 hours per port call) during which the auxiliary engines are still running and still producing emissions. If the estimations are adjusted for the berthing time minus 2 hours/port call for connecting and disconnecting, the total average power demand for container ships at the Bassens terminal is estimated to be 1,97 GWh in 2024, while the total average power demand for cruise ships at the Bordeaux City terminal is estimated to be 5,54 GWh and at the Verdon terminal to be 2,89 GWh in 2024.

The estimated power demand of both container and cruise ships during their berthing time at the Bassens, the Bordeaux City and the Verdon terminal, adjusted for connecting/disconnecting time, is thus 10,4 GWh.

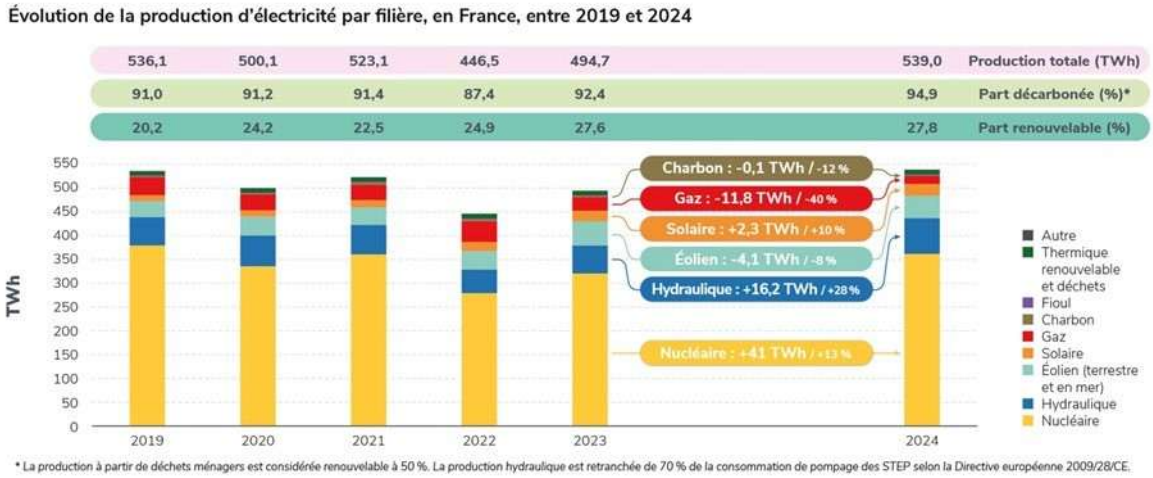
Estimation of greenhouse gas emissions from electricity production through grid connection

When supplying cruise and container ships during berthing time with shore-side electricity from the power grid, the question arises, which energy mixture is supplied via the national power grid. The French electricity mix has become the cleanest electricity mix in the European Union in terms of carbon intensity: in 2024, the generation of electricity caused 21,7 CO_2-eq/kWh, only in Norway less carbon-intense electricity was produced.



Graphic: Carbon Intensity of Electricity Generation in EU Member States, UK, Norway and Switzerland (Source: RTE, https://analysesetdonnees.rte-france.com/bilan-electrique-2024/synthese)

The share of renewable energies in the French electricity mix was 27,8% in 2024, the share of decarbonised energies (including renewables) was even 94,9% in 2024.



Graphic: Development of the French electricity mix by sector, 2019–2024 (Source: RTE, https://analysesetdonnees.rte-france.com/bilan-electrique-2024/synthese)

With regard to the estimated average power demand of 1,97 GWh for container ships at berth the Bassens terminal, the supply of shore-side electricity through grid connection would thus cause 42,84 t CO ,-eq – compared to 293,71 t CO_2-eq without shore-side electricity.

With regard to the estimated average power demand of 5,54 GWh for cruise ships at berth at the Bordeaux City terminal, the supply of shore-side electricity through grid connection would thus cause 120,26 t CO ,-eq – compared to 2.841,34 t CO_2-eq without shore-side electricity.

With regard to the estimated average power demand of 2,89 GWh for cruise ships at berth at the Verdon terminal, the supply of shore-side electricity through grid connection would thus cause 62,65 t CO_2-eq – compared to 1.339,26 t CO_2-eq without shore-side electricity.

Final estimation of GHG emissions and air pollution reduction through shore-side electricity at Bordeaux Port

Therefore, the supply of shore-side electricity for cruise ships avoids 2.721,08 t CO_2-eq at the Bordeaux City terminal and 1.276,61 t CO_2-eq at the Verdon terminal – that is 96% of greenhouse gas emissions compared to without shoreside electricity – and for container ships at the Bassens terminal 250,87 t CO_2-eq – that is 85 % of greenhouse gas emissions compared to without shore-side electricity. With growing demand at the Bassens terminal, the emission reduction potential for container ships could be two or three times as high.

Furthermore, the supply of shore-side electricity for cruise ships at the Bordeaux City terminal will avoid 834 kg PM_{10} respectively 770 kg of $PM_{2.5}$, for cruise ships at the Verdon terminal 398 kg of PM_{10} respectively 366 kg of $PM_{2.5}$, and for container ships at the Bassens terminal 88 kg PM_{10}, respectively 80 kg $PM_{2.5}$ – that is 94% of particulate matters emission compared to without shore-side electricity.

The final total estimation of the BENAQ project's GHG emissions and air pollution reduction through shore-side electricity is thus 4.248,56 t CO_2-eq per year and 1.300 kg PM_{10}, 1.216 kg $PM_{2.5}$ respectively per year.

0.3.3. Climate resilience

Climate resilience ***(for Works topics)***

Describe the climate proofing exercise and how it was taken into consideration when designing the project and its components (see Technical guidance on the climate proofing of infrastructure). Summarise the findings of the vulnerability assessment to identify the climate hazards to which the project is more sensitive (because of its type or location).
If significant risks are identified, explain how the vulnerabilities were embedded in the decision-making process so that they can be addressed and mitigated and what relevant measures were taken to ensure the resilience of the project to climate change.

The BENAQ project is not concerned by the requirement to provide information on climate proofing, as it is not subject to an EIA, as stated on the Funding & Tenders Portal in the FAQ section (see FAQ 30160).

However, the works carried out by Bordeaux Port do, of course, take into account the environmental and climate challenges, which include resilient infrastructure design that considers the forecasts provided by local and national climate and environment agencies.

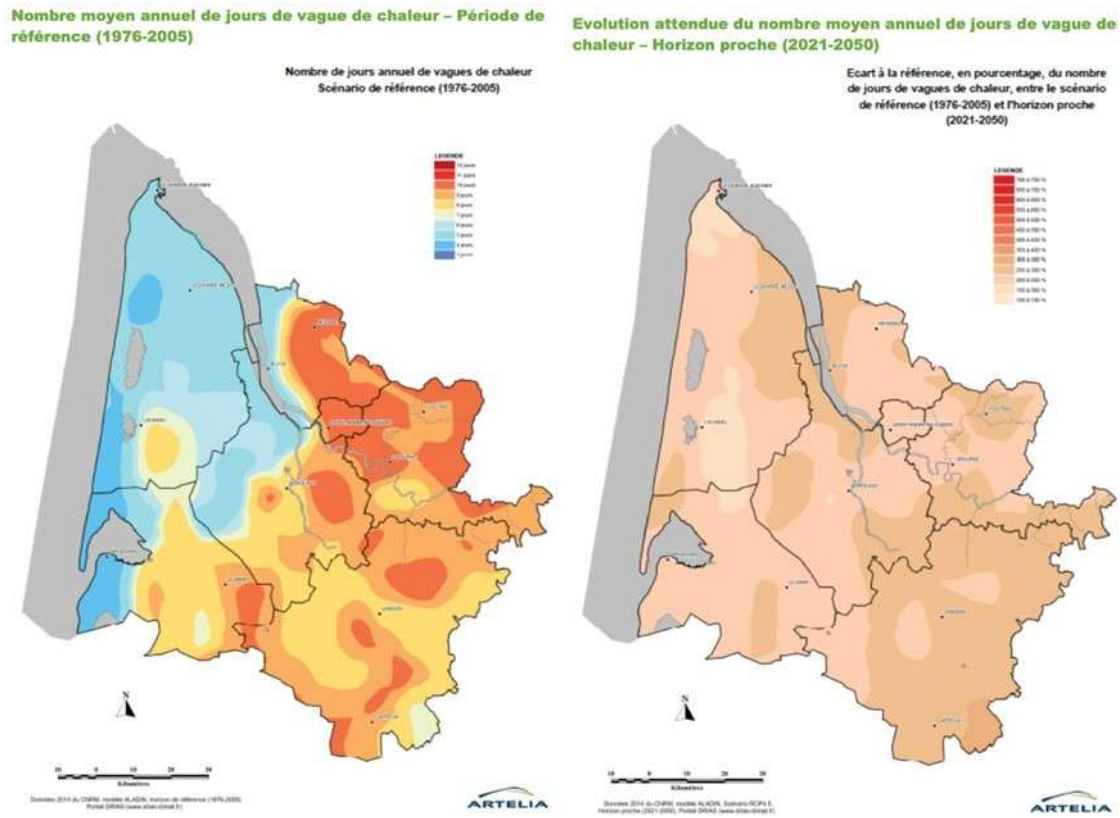
As the largest region in France, Nouvelle-Aquitaine is made up of very diverse territories, including one of the longest coastlines and the largest forest area in the country, as well as vast rural areas, the mountainous regions of the Pyrenees and the Massif Central, and urban areas. It is therefore exposed to a wide range of climate hazards.

The Local Energy and Climate Agency for Bordeaux and Gironde (Alec) draws on national and regional scientific literature to estimate the current dynamics of climate change, differentiating between global average temperature changes (+1,1°C compared to the period 1850-1900) and those recorded in France (+2,3°C compared to the period 1961-2020).

The main vulnerabilities of the region to climate change are:

- An increase in temperatures in Gironde of between +2°C and +6°C according to IPCC scenarios;
- An increase in the Forest Weather Index of +30 by 2040 and +75% by 2060;
- Longer summer droughts of between +5 and +15 consecutive days with less than 1 mm of rainfall compared to the period 1976-2005;
- An increase in the frequency of natural disaster declarations in Gironde linked to differential ground movements following drought (shrinkage and swelling of clay).

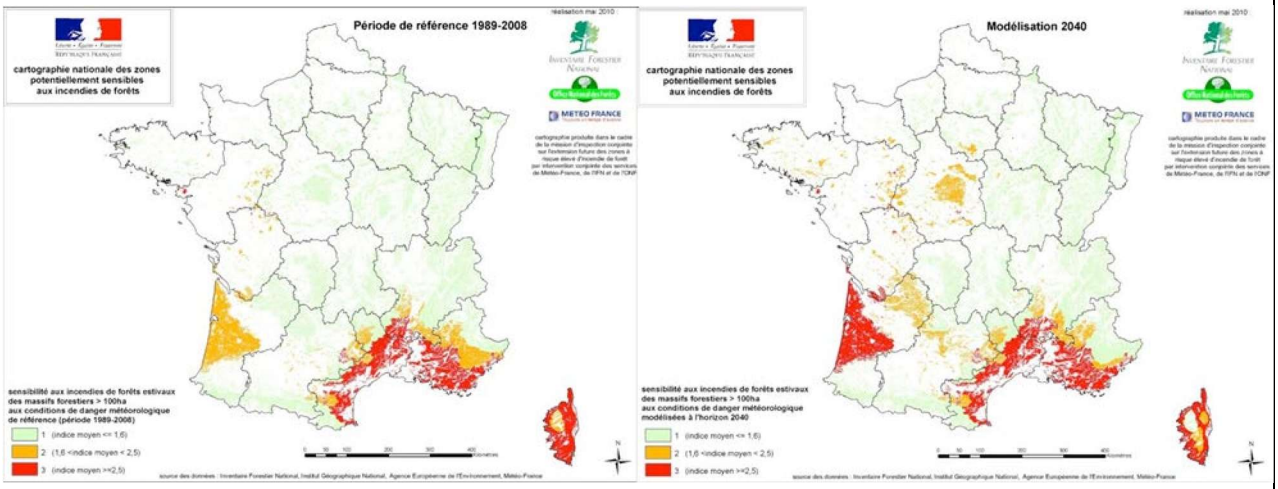
Among these threats, drought is the one that affects the largest number of people in New Aquitaine. While annual precipitation shows significant spatial variability and no real overall trend, there is a fairly clear change in seasonal averages. Since 1950, there has been a decrease in precipitation of 6,5 mm per decade in summer, but also from January to March. At the same time, temperatures have risen by 1,4°C since 1950, with a more marked increase during the summer months. Summers are therefore hotter and less rainy, leading to more frequent droughts. This is evidenced by recent episodes in the region: in 2018, 2019 and 2021, drought led to water shortages in most of the region, but 2022 broke all records: the hottest year ever recorded in the region saw more than 70 days above 30°C and a drought that began in spring and lasted several months.



Maps: Expected evolution of the number of heat waves in New Aquitaine (Source: Overview of the effects of climate change and their consequences in Gironde, Artelia)

The Gironde estuary, which is more temperate, is less affected by heat waves than the rest of the region. Nevertheless, it remains an issue that must be taken into account for port infrastructure.

As a result of these heat waves, the region has already been affected by large-scale fires: of the 72.000 hectares of forest burned in France during the 2022 fires, 45.000 are located in Nouvelle-Aquitaine. Nationwide, the risk of forest fires increased by 18% between 1961-1980 and 1989-2008, according to Météo France.



Map: progression of forest fire risk in the Nouvelle Aquitaine region under the effect of climate change (Source: French government, Meteo France, IFN)

As shown in the maps above, the forest areas prone to increased fire risk in the region are located further south of the Gironde and do not directly affect the terminals of Bordeaux Port.

Caused by melting glaciers and rising sea temperatures (through thermal expansion), sea level rise is one of the irreversible long-term consequences of human-induced climate change. In Nouvelle-Aquitaine, this consequence is reflected in coastal erosion and retreat, exacerbated by extreme weather events (storms, heavy rainfall, etc.). According to the National Observatory on the Effects of Global Warming (ONERC), the sandy coastline is losing an average of 1 to 3 metres per year, with retreats of up to 30 metres during severe storms.

The Bassens, Bordeaux City and Pauillac terminals are located within the Gironde estuary and Garonne River, well upstream of the river, and are therefore protected from this maritime phenomenon. Situated on high banks, their risk of marine submersion is also limited.

The main risks identified for the BENAQ project in relation to climate change are therefore mainly the risk of flooding linked to storms and extreme rainfall, as well as high temperatures. Consequently, fixed equipment (distribution stations, transformers, frequency converters, etc.) **will be installed in sheltered and elevated locations in order to minimise their exposure to these potential risks.**

Interoperability and accessibility

Describe if and how the project contributes to increased interoperability of transport systems and/or modes in the TEN-T network.
Describe if and how the proposal enhances the accessibility for passengers and/or goods to the TEN-T network (e.g. cross-border dimension, effect/contribution to territorial accessibility, including for outermost regions and islands).

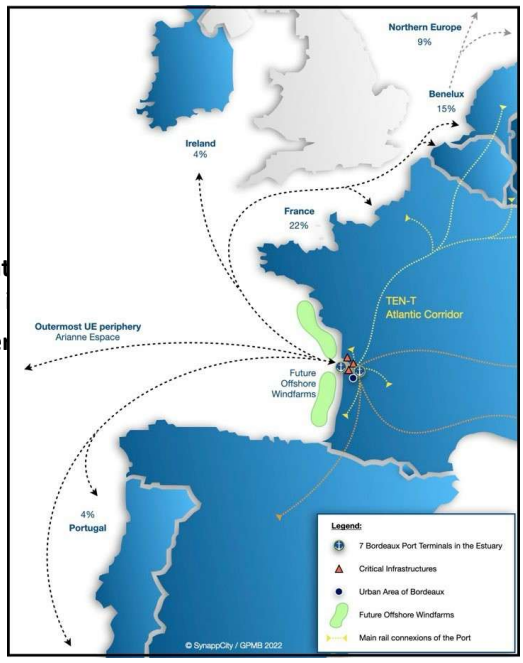
Cruise ships

Along the Atlantic coastline (1000 km of coastline for the French section), calls are differentiated and do not compete with each other. This allows an exchange between ports for the choice of selected OPS technologies, thereby ensuring enhanced interoperability between calls.

For example, the equipment deployed as part of BENAQ will be compatible with those already installed in Le Havre at Pointe de Floride by HAROPA PORT.

Bassens container ships contribute to European short sea shipping

The container ship line calling regularly once a week at the Bassens terminal is CMA CGM's Atlantic feeder line serving Nantes (Montoir de Bretagne) and Le Havre, and every other week Brest. The feeder line contributes to European short sea shipping and connects Bordeaux Port via Nantes and Le Havre with the rest of the world.



In addition, **Bordeaux Port is currently upgrading the rail facilities at** of the TEN-T Atlantic Corridor, which has the lowest modal shift rate

With the completion of the BENAQ project, Bordeaux Port will offer

with a view to enhancing

0.3.4. Decision-making tool, input for policy making or development of best practices

Decision-making tool, input for policy making or development of best practices ***(for Studies topics)***
Show how the project will have an impact as decision-making tool or input for policy making or development of best practices. *Who will use the output of the project and for how long? Describe the extent to which the output will be relied on for decision-making, possibly in relation to other studies and future projects, and at what level, (e.g. a future CEF Transport action, national project, global project, etc.). Describe the relevance and economic value of those future projects in terms of costs and benefits. Explain the degree to which elements of the project could be used to develop best practices.*
Not applicable: Work project.

0.3.5. Interoperability and accessibility

Compliance with ISO standards

For all sites, the equipment is to be compliant with “IEC/ISO/IEEE 80005” standard: “ISO International Standard for Ship Shore Power Supply”:

- “IEC/IEEE 80005-1”: high voltage connection (HVSC) systems, for ships requiring 1 MVA or more, or ships with HV main supply.
- “IEC/ISO/IEEE 80005-3”: low voltage connection (LVSC) systems, for ships requiring up to 1 MVA.

0.3.6. Innovation and digitalisation

Innovation and digitalisation

Describe if and how innovative technologies are being used to reach the project’s objectives.
Describe if and how the digitalisation forms part of the project (or its use).
In case the project is making use of results from EU-supported research projects, please give the reference of the EU research project.

Fully committed to sustainability in the region, Bordeaux Port is preparing the "port of the future" and working with partners to develop innovative solutions.

Bordeaux Port: a key actor of the energy transition

As a public institution committed to sustainability in the region, Bordeaux Port is a key actor in the energy transition. It has initiated the POSitive Energy and Economy Port (PÉÉPOS, Port à Énergie et à Économie Positives), supported by the European Union. PÉÉPOS aims to bring together various industrial actors and communities to create forwardlooking clusters and together develop the "port of the future".

PÉÉPOS is the "energy pillar" of the Strategic Project of Bordeaux Port for the next 5 years, with a view to:

- Reducing energy expenditure,
- Optimising production processes, • Promoting new sources of energy.



New avenues for an exemplary port

Initiated in 2013, PÉÉPOS Startup has helped to initiate a continuous improvement process, by providing detailed knowledge of the industrial activities of the port and its partners. After several energy audits, a partnership with

ENGIE and EDF was signed at a conference focusing on the port of the future, hosted by Bordeaux Port and attended by nearly a hundred people.



In 2017, PÉÉPOS Smart Green marks the second phase of the project for a “Low Carbon” port based on:

- Promoting alternative fuels such as LNG (Bordeaux Port has invested in a new dredger powered by a dual fuel LNG/diesel engine).
- Developing renewable energies (wood energy, photovoltaics, etc.).
- Energy recovery and green energies (biogas - Project Cape Verde Energy for the development of a biogas plant on the edge of the port).
- Support for the river tidal energy sector. More information on the website seeneoh.com.

Embracing the industries of the future, Bordeaux Port also develops the CleanTech economic platform with the Bordeaux metropolitan area to support industrial port activities focusing on Green Chemistry and renewable energy in Ambès (under the call for projects “Territoires d'innovation de grande ambition”).

With PÉÉPOS, the Bordeaux Port contributes to the sustainable, economic and human development of the region.

Digital port

DIGITAL TWINS OF THE RIVER

Bordeaux Port has initiated, with the help of territorial water actors and France Relance, the design of digital twins of the river to accelerate regional resilience against the impacts of climate change.

It meets the needs of many users, such as decision-makers, companies, research departments and scientists, not forgetting the general public.



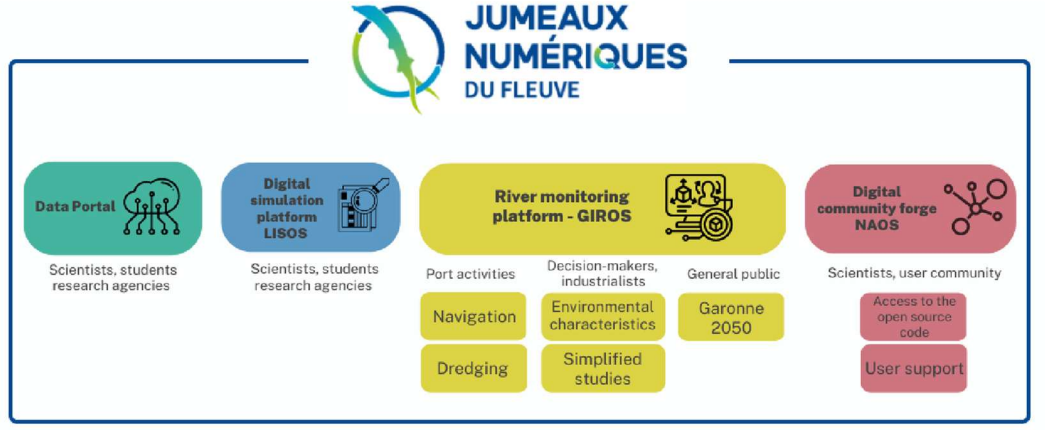
The acceleration of territorial resilience against climate change (source: Bordeaux Port)

Backed by high-powered computing resources that can be used on demand, this innovative operational service will make it possible to monitor the Gironde estuary and, in particular, to carry out digital simulations in order to answer numerous questions related to the impacts of climate change or possible river development operations.

The environment has also been designed to build a community of users and contributors:

- Access to Open-Source files hosted on the regional digital forge to improve digital models or develop new ones.
- Shared workspaces and simulations to encourage community work.

The digital twins of the river also make it possible to easily integrate models of other rivers, or scientific applications.



Innovation catalyst

As a driver of economic development and the digital economy, Bordeaux Port is recognised as a catalyst of innovation. The port is a platform for experimentation and makes its spaces, infrastructure and resources available to its partners. Advanced technology systems such as satellites, sensors, radar and information systems are already widely in use at the port.

Innovation and knowledge sharing

Gironde XL

Bordeaux Port leads the Gironde XL program, co-financed by the European Union, which aims to accommodate large capacity vessels by deepening the navigation channel, and a major digital component: the GIRONDE XL 3D project. This is a free, open-source project replicable at other ports. It involves 3D digital modelling of the Gironde estuary in order to:

- Improve access for large vessels by making better use of the tidal flow.
- Plan more accurately for dredging costs.
- Understand the environmental impacts more clearly.
- Share knowledge.

PIXEL project

Bordeaux Port has positioned itself to respond to the EU Framework Program for Research and Innovation "HORIZON 2020" on the "ports of the future". The port is involved in the PIXEL project focused on the use of the Internet of Things (IoT) and "Big Data", to develop the digital port services that will be found in future versions of VIGIEsip.

VIGIEsip

All port activity is monitored digitally with VIGIEsip

As part of its citizen information sharing efforts, Bordeaux Port has chosen to share data on daily operations. In the Real Time section of the Bordeaux Port website, the general public can see what ships are docked or expected at the 7 terminals. There is also a link to a real-time view of the estuary and the position of the ships.

VIGIE ports

Bordeaux Port is also innovative when it comes to sharing digital expertise with other ports, as the driving force behind the creation of the VIGIE Ports Economic Interest Grouping in 2017. It is currently made up of 20 ports and others wish to join this group in order to benefit from this platform (for example the Hauts de Seine region).

Participation to Events & Conferences

The port participates through its innovation centre in numerous conferences and meetings dedicated to port and logistics synergies, including:

- The World Congress on Intelligent Transport Systems (ITS).
- The TEN-T Days organised by the European Union.
- The AIVP Days (Worldwide Network of Port Cities).
- The European Energy Transition Conference.
- The Shortsea and Intermodality Night.

These examples illustrate the ambition of Bordeaux Port to fully involve the general public and the region in its operations, activities and development through digital solutions. This process is enhanced by numerous partnerships between the port and the scientific community, universities, start-ups, large tech companies and more.

Identified as a "catalyst of innovation" in the framework of a national experiment and the CPER (State Region Plan Contract), the Bordeaux Port continues its work to support the energy transition and develop new sectors, in connection with the public partners already associated with the project and the companies in the port area.

0.3.7. Competition

Competition

Describe the expected positive and/or negative impacts of the project on regional and national competition.

The attractivity of Bordeaux Port will be enhanced by the BENAQ project and OPS services to be offered. This will reinforce Bordeaux Port's image as an innovative port that is strongly committed to energy transition.

The increased attractiveness of the Bassens terminal, whose OPS equipment will be installed at the same time as the terminal is reorganised and terminal equipment renewed, as well as the relaunch of the rail modal shift offer on the TEN-T Atlantic corridor, will have a catalytic effect on the development of the low-carbon industrial zone (ZIBAC). It will reinforce the credibility of alternative means of transport to road transport by offering carbon-free solutions for maritime stopovers and rail transfer.

This high level of connection to the European TEN-T network, via short sea shipping and rail, will strengthen the competitiveness of local and regional businesses, while contributing to the decarbonisation of the Atlantic corridor. It will also consolidate the competitiveness of port calls at Bordeaux Port, which will be better promoted.

The effects should also be felt in the tourism sector, with a more diversified offering for cruise ships, while significantly reducing the nuisance associated with stopovers. This should contribute to the appeal of the UNESCO site in the city centre, as well as the vineyards in the Pauillac area.

0.3.8. Regional and local development and land use

Regional and local development and land use

Describe the expected positive and/or negative impacts of the project on regional and/or local development, and land use.
Assess the impacts on the neighbouring regions.
Indicate if the project is linked to urban development plans, or if it will contribute to increasing the land value.

The BENAQ project will not require the use of new land, as it will be entirely deployed on port terminals, which will be re-equipped. On the contrary, it will enhance the attractiveness and relevance of existing infrastructure:

- The Pauillac terminal has not been used by Airbus since the A380 was taken out of production, and its reuse for carbon-neutral cruise stopovers is a virtuous conversion of infrastructure that has lost its original function.
- The development of Pauillac will streamline cruise shipping in the centre of Bordeaux, reducing its size and presence to one ship at a time, as well as the disruption caused by the occupation of quays and the closure of the lift bridge over the Garonne.
- The UNESCO World Heritage site in Bordeaux city centre will no longer suffer the negative externalities of air and noise pollution caused by cruise ship stopovers.

The Bassens terminal has been undergoing change for several years and offers an attractive range of services for businesses in the industrial port complex, including carbon-neutral stopovers and access to the rail network.

Overall, the BENAQ project will contribute to regional development in the areas of tourism and carbon- neutral transport.



Picture: Two cruise ships calling simultaneously at Bordeaux Centre instead of only one when Pauillac will be fully operational (Credit: F. Cottereau, Sud Ouest)

0.3.9. Outermost regions

Outermost regions (if applicable)
Describe which outermost regions are impacted by the project. *Indicate how the regions and project promoters cooperate. If relevant, specify which countries are impacted and explain how the cooperation with them is ensured.*
Not applicable: the project is located on the French metropolitan territory. However, the feeder line calling at Bassens contributes to the connection between European mainland and the French outermost regions, like the islands of Guadeloupe and Martinique in the Caribbean.

0.3.10. Other considerations

Other considerations
Please describe any other relevant considerations.
No other consideration.

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