THE PORT system

>>> THE FRENCH EXPERTISE <<<

COLLECTION EXPERTISE FRANÇAISE

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE ET SOLIDAIRE

MINISTÈRE CHARGÉ DES TRANSPORTS

CONNECTING land and sea

TABLE OF CONTENTS

FRANCE'S MARITIME ZONES COVER 11 million km², and include 564 ports located across the world's oceans. As gateways in and out of the country, these ports form a crucial link in the logistics chain, whose efficiency and reliability are essential to the development of external trade and territorial wellbeing. Connected by road, river and rail infrastructures, ports also play a role as industrial centres, and contribute to our ability to remain competitive as a nation.

France's current position as one of the major gateways to continental Europe is down to the ambition of the country's port system, which is built around a three-pillar strategy.

- Synergy: Mainland France is home to three port systems – the Seine corridor, the Northern corridor and the Rhone corridor –, which are of both European and international importance. Clear articulation between the ports within these systems is essential.

- Competitiveness: Ports are not simply hubs for infrastructure oversight; they are ecosystems and service centres in their own right, with the power to attract investors. They have the power to innovate from developing solutions using renewable energies to diversifying their range of economic sectors in response to the decline in oil products transportation.

- Improving the fluidity of port shipping via the development of mass transport methods to connect with their hinterland, along with research and innovation to encourage the arrival of "connected ports" – Entities that are responsive and adapted to the needs of their clients and users.

When faced with the challenges of the 21st century, this ambition also forms part of a larger dynamic: the "blue growth" of the European Union, which must be intelligent, sustainable and inclusive. This is also reflected in the pursuit of green growth, and a form of economic development that preserves the natural resources essential to its own perpetuation. Finally, this same ambition is also served by the circular economy, which unites economic growth and the preservation of our natural heritage via new modes of design, production and consumption.

THIS DOCUMENT ILLUSTRATES

The dynamic innovations underway at French ports in terms of infrastructure, management, and interconnections with other ports and interfaces, all of which serves to make these facilities more competitive.

Ministry of Ecological and Inclusive Transition - Ministry of Transport
Ref. DICOM-DAEI/BRO/18073-2 - September 2018 - Editorial project manager: I. Flégeo/MTES-MCT - Editorial committee: Jean-Matthieu Farenc (Cerema), Marina Lagune, Béatrice Danin, Mathilde Gougeon (DGITM), Bruno Rakedjian, Arnaud Gorin (DAEI) - Edited by: Jean-Matthieu Farenc (Cerema) - Editorial secretary: I. Flégeo/MTES-MCT - Graphic design and layout, infographics: F. Chevallier/MTES-MCT
Photo credits: A. Bouissou/Terra (cover) - L. Mignaux/Terra (p. 6) - Willy Berré (p. 7) - Charier (p. 8) - Haropa (p.9, page top photo) - Malandain (p. 9, page bottom photo) - MGI (p. 10) - SOGET (p. 11) - A. Bouissou/Terra (p. 12) - SIT RS (p. 13) - L. Mignaux/Terra (p. 14) - A. Bouissou/Terra (p. 15) - L. Bilot/Terra (p. 16) - Bouygues (p. 17) - L. Mignaux/Terra (p. 18) - L. Mignaux/Terra (p. 19) - Farenc (p. 20) - D. Valente/Terra (p. 22) - A. Bouissou/Terra (p. 23) - Farenc (p. 25)
Printed by: MTES-MCT/SG/SPSSI/ATL - Brochure printed on European ecolabel-certified paper: www.eco-label.com

ECONOMIC IMPORTANCE OF PORTS

FRANCE
5th largest port system in Europe

11 million km²
France's maritime *zones are the 2nd biggest in the world*

33,160 hectares of portzones

More than 300,000 direct jobs *in surrounding areas generated by combined maritime activity (excluding coastal tourism)*

688 M€ *in revenues for the 11 largest ports in 2015*

188 km
The total length of all trading port docks in France

126 M€ in revenues *for the river ports of Paris and Strasbourg in 2015*

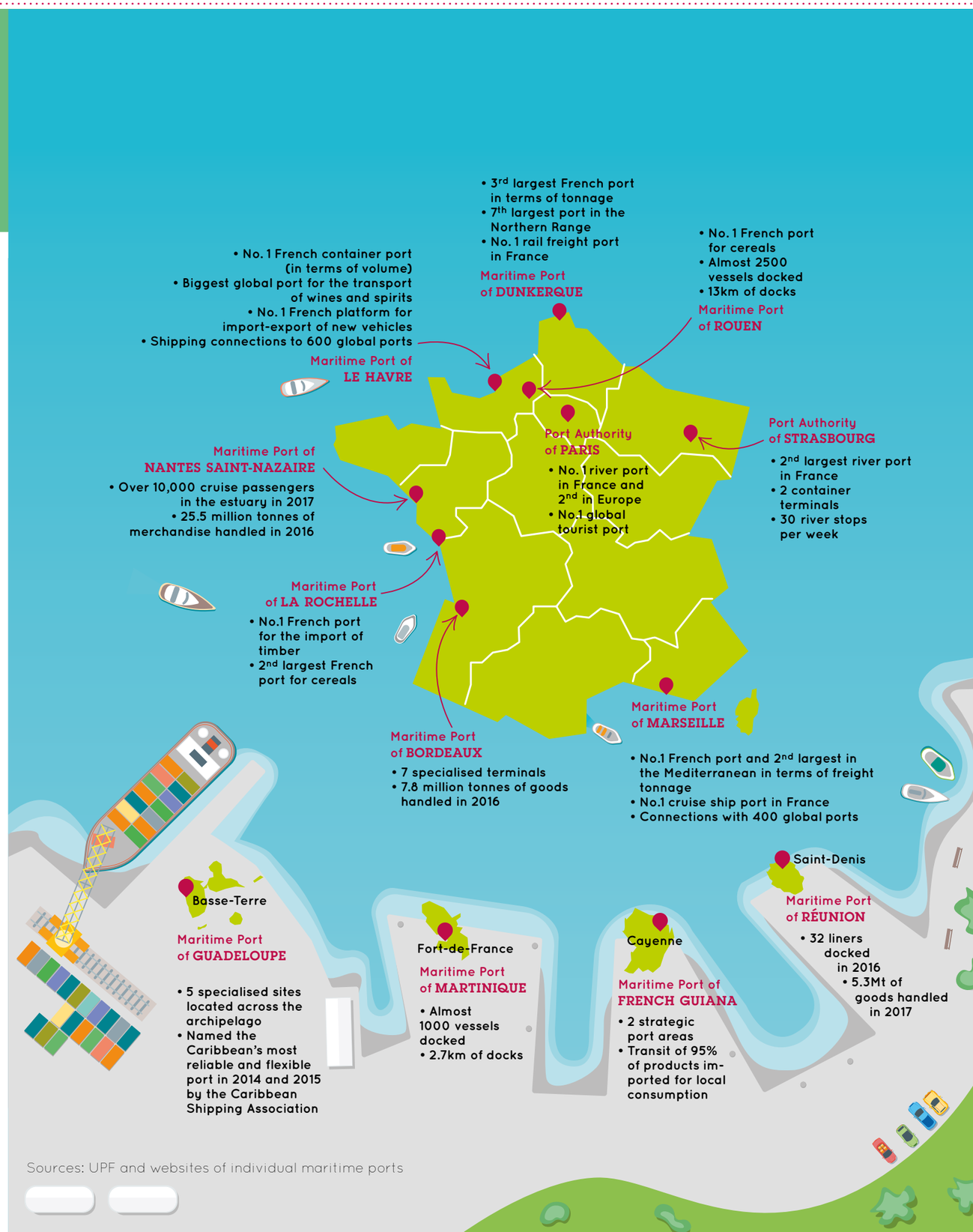
HAROPA, *a group made up of the ports of Le Havre, Rouen and Paris, is the 5th largest port grouping in Europe*

350 *Million of tonnes of merchandise shipped in 2015*

185 terminals

31.8 million *passengers in 2015*

Sources: Union of French Ports and Key Transport Figures, 2017 edition (SDES)



Sources: UPF and websites of individual maritime ports

1. Developing INTERFACES

SCOPE OF APPLICATION: EXAMPLES

Innovative infrastructures

Digital tools to fluidify the flow of goods

PORTS ARE AN ESSENTIAL LINK in the chain of international merchandise flow, both into and out of France. In order to improve competitiveness and ensure the economic development of the regions they serve, French ports are taking innovative steps to develop various port interfaces, and are:

> **Building docks and developing terrestrial port areas,** in order to provide the best possible conditions for the companies they host. In doing so, they are acting to improve the interface between land and sea;

> **Serving the hinterlands** that support them, and participating in the development of a high-performance and essential mass transport network;

> **Essential links in the continental logistics chain,** representing core logistical issues. Ports serve as an interconnection between different modes of transport, and are instrumental in the flow of goods;

> **A driving force in the digitalisation of the maritime transport sector.** Ports are helping to dematerialise the flow of goods, which is essential in terms of fluidity, safety and rapidity of exchange.

NANTES – SAINT-NAZAIRE

Smart docks

The I-Mareco project (which stands for "instrumentation for optimised maintenance, re-engineering and design") was jointly developed by the Port of Nantes Saint-Nazaire, Bouygues Public Works France, the University of Nantes, and Keops Automation.

Its objective is to provide greater control and understanding of the life cycle of structures made from reinforced concrete, via a series of sensors inserted into the structure during its construction. This procedure aims to optimise maintenance costs.

The initiative

A 350m-long stretch of dock has been built in the Port of Saint-Nazaire, and will serve to demonstrate the technology.

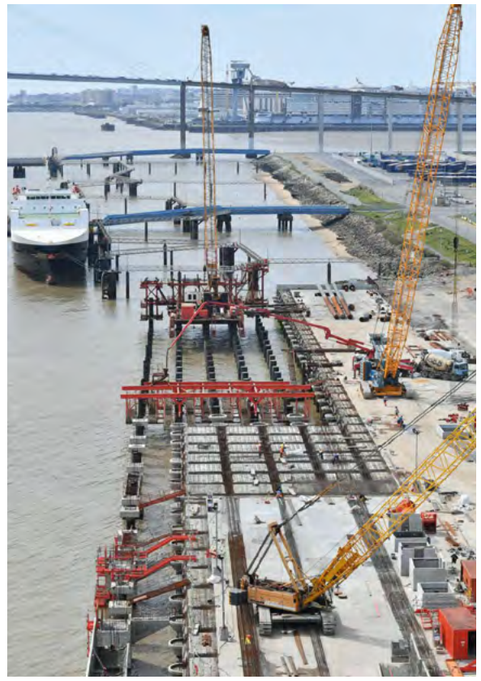
How it works

The sensors implanted by the team from the University of Nantes on the demonstration dock measure the penetration rate of chlorides and provide maps of electrical resistivity, which enable users to determine the level of corrosion present within the concrete. At the same time, fiber optic compression measurements are carried out to measure the "arching" of the concrete. The full data set is then cross-referenced with climate data.

ADDITIONAL BENEFITS +

> **Anticipating and targeting maintenance operations, in order to limit cost overruns and possible periods of non-use.**

> **This instrumentation could be fitted onto floating wind farms, particularly to measure wear and tear on their anchoring.**



Bouygues

Bouygues Public Works carries out large-scale projects in civil engineering and infrastructure, subterranean excavation and construction, transport lines and river/maritime construction.
The company's notable projects include:
- The Monaco maritime expansion; a 6-hectare maritime infrastructure that will be home to a new eco-district;
- The Port of Calais maritime extension via the creation of a new 110-hectare harbour basin;
- Construction of a freight and container terminal at Montoir-de-Bretagne; a 350m dock extension for the Maritime Port of Nantes Saint-Nazaire.
- Construction of a 900 ml enclosing dyke made from gabions and riprap, as part of the development project for the Brest commercial port;
- A 350m extension of the Flanders Dock in the Port of Dunkerque in order to allow docking of the latest generation of container ships.

www.bouygues.com

BREST

The floating dock

The floating dock, built at the request of the Ministry of Armed Forces for the harbour at Brest, led to a full-fledged port innovation.

The initiative

An industrial grouping led by the Charier company (featuring Charier GC Agence, Semen TP, Demathieu & Bard, Ducrocq, Ingérop and Naval Group) designed and built a 160m-long concrete floating dock.

This dock meets a number of objectives at a reduced cost:

- Supply of additional services. The dock is adaptable to heavy tides, and reversible;
- Providing additional functionalities via a double deck that is accessible 24/7. The uncovered upper deck enables the manoeuvering of vehicles, as well as pedestrian access to vessels. The lower deck, which is covered and accessible only to operational personnel, hosts the various service connections required by vessels, which can be quickly connected and disconnected ("plug and play");
- Using less materials: 60 to 70% less than the construction of a traditional dock.

How it works

The floating dock is moored to an existing dock on its north end, and connected to an anchoring unit on its south side via a mooring system made up of semi-slack chains combined with shock absorbers. This system was designed to suit the significant tidal range at the site (8.5m).

ADDITIONAL BENEFITS +

- This project's environmental impact has been reduced thanks to the lower use of materials, and by making it possible to redeploy sediment dredged during the installation of the dock in the form of backfill, thereby ensuring the stability of the anchoring unit implanted on the south side of the dock.
- The dock can be adapted to all types of tidal ranges and sea beds.
- Its additional functionalities enable users to achieve higher performance levels.

Naval Group (formerly DCNS)

Naval Group is a French industrial company – A leading European operator in the naval-military sector and a major player in marine infrastructures and renewable marine energies. Offering advanced technologies on an international scale, Naval Group responds to the needs of its clients through its exceptional expertise, unique industrial resources and ability to form innovative strategic partnerships. The group designs, builds and maintains submarines and surface vessels. It also provides services for shipbuilding sites and navy bases. Finally, the group offers a wide range of solutions for renewable marine energy. With a strong sense of corporate and social responsibility, Naval Group is a member of the United Nations Global Pact. As of 2016, the group's revenues were €3.2 billion and it has around 12,800 employees.

www.naval-group.com

LE HAVRE

The S-Wing portal

The initiative

The Maritime Port of Le Havre offers an internet portal, providing port users and the public with useful information. This portal, known as S-Wing, provides information on:

- The movements of vessels arriving, departing or docked at the port;
- Stops on the routes taken by maritime and river crossings, as well as their origin and destination;
- All captains' ratings posted for the Port of Le Havre.

Users can also access operational tools, including geographical visualisations of vessels, interactive tide patterns, and regular data updates on wind and sea swell.

How it works

Interfacing with the PCS S)One Port Community System in use at the Port of Le Havre (which itself interfaces with the IT system of the French customs authority), S-Wing enables users to carry out a number of tasks in a paper-free manner:

- Administrative formalities regarding stopovers;
- Entry and exit declarations;
- Declarations for operational waste and cargo residue;
- Vessel declarations to establish port dues.

ADDITIONAL BENEFITS +

- A virtual interface enables users to view a real-time 3D representation of all boats present in the Maritime Port of Le Havre. This interface opens the port up to the public, making restricted spaces visible.
- In addition to Le Havre, S-Wing is now also used in the ports of Nantes Saint-Nazaire and Abidjan.

ALL OVER FRANCE

The Cargo Community System and the Port Community System

The Cargo Community System and Port Community System (CCS and PCS) are neutral and open electronic platforms enabling intelligent and secure information exchanges between private and public operators, in order to improve the competitive positioning of port and airport communities. These systems optimise, orchestrate and automate port requirements and logistical processes, using a single data entry point to connect the various links in the logistics chain (Source: IPCSA).

The initiative

The French CCS and PCS extend beyond the maritime environment, covering the modes of transport that come before or after the shipping stage, namely maritime, air, river, rail and road. These systems allow merchandise and modes of transport to be monitored throughout the shipping process (from "door to door"), thanks to their ability to communicate with hinterland platforms and their interconnections with the CCS and PCS systems at international ports. The CCS and PCS are the central pillars of port logistics performance and competitiveness.

How it works

Installed in 2005 by the MGI and Soget companies, the AP+ software has become the French standard for freight management for all modes of transport: maritime, air, river, overland and road. It is responsible for 95% of French maritime freight (both container and conventional). It has been installed in the majority of French ports, both on the mainland and in overseas territories. AP+ software has also been sold to international users in Mauritius, Benin, Indonesia and Togo.

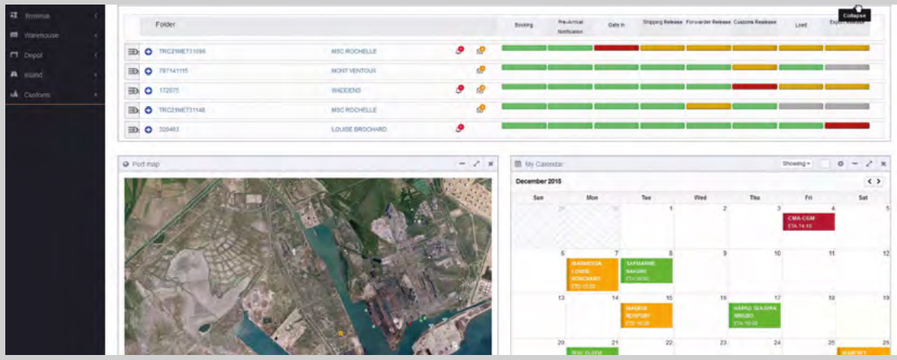
New generations of CCS and PCS have been developed, and include various improvements: Ci5 by MGI, which was first installed at Marseille Fos in early 2018, and S)One by Soget, which currently equips Haropa ports, as well as the national platforms of the Democratic Republic of the Congo and Jamaica. MGI and Soget are working to create a common access portal for CCS and PCS systems.

ADDITIONAL BENEFITS

›The different generations of CCS and PCS systems – AP+, S)One and Ci5 – communicate with the IT systems already being used by French Customs, the port authority, vessel owners, terminal operators, transit companies, logistical operators, and onward transport companies. They are also connected to maritime community systems whose aim is to harmonise and dematerialise nautical procedures for the docking of vessels (directive EU/2010/65).

MGI

For 30 years, MGI has been designing and installing Cargo Community Systems (CCS) and Port Community Systems (PCS) for port, airport and terrestrial communities. MGI's vision is to *connect supply chains via a smart system that will ensure fluidity and door-to-door visibility of merchandise being shipped*. MGI has formed a technological partnership with Thales Services for the development of Ci5; a new generation of PCS based on innovative open-source technologies. MGI has also joined forces with CEA Tech for the development of the AI engine included in its new Channel 5 service; a decision-making solution for port environments. The company carries ISO 27001 certification, and is supported by the ANSSI (France's National Agency for IT Systems Security) for cybersecurity management methodologies. Recent distinctions: Winner of the Gold IT award from the IAPH in May 2017 for the Smart Port 2.0 project, integrating Ci5 and Neptune Port; winner of the "Port du Futur" trophy, awarded in Paris in September 2017 for the logistics category for Channel 5.
In 2016, MGI's's total revenue stood at over €6 million.
www.mgi-ci5.com



Soget

SOGET is the global leader in Port Community Systems (PCS) with over 70 contracts in four continents.
In 2015, Soget launched S) ONE, its new-generation PCS. S)ONE is a Port Community System that manages, on a national scale, the full range of logistics processes being operated by public and private entities. Soget offers turnkey solutions combining technological excellence with a recognised method of implementation, in order to bring greater fluidity to port and airport communities.
In May 2013, the Port Authority of Cotonou received the Gold IT Award from the IAPH for its implementation and use of the PCS. Based in Le Havre since 1983, Soget is a founding member of the International Port Community System Association (IPCSA), as well as the Sefacil foundation. Soget is also part of a number of global strategic alliances (Bureau Veritas, Microsoft, Thales, etc.) and is a consulting expert for a number of international organisations.
In 2016, Soget posted revenues of €16.8 million (€6.9 million from exports).
www.soget.fr

2. Serving CITIZENS AND COMMUNITIES

MAIN MEASURES

Information serving all users - citizens and operators

Choosing cleaner energy sources

FRANCE'S PORTS must uphold several major responsibilities and commitments. They are:

> Responsible for the safety and security of people and merchandise in all areas of the port. Ports work alongside customs authorities, veterinary and phytosanitary inspection teams, and anti-fraud departments, working to implement all necessary measures while guaranteeing maximum fluidity of goods passing through the port;

> Responsible for the management of natural spaces falling within their boundaries. Ports protect our precious biodiversity, working to find a balance between economic development, industrial security and environmental protection policies;

> Drivers of sustainable development. Ports are the instigators of positive change dynamics (development of renewable marine energy, circular economy, fuelling boats with liquified natural gas, management of the local electricity supply, etc.).

UPPER RHINE

River Information Service

e-RIS (the river information service for the Upper Rhine) is a portal that gathers and combines information required by users of the Rhine between Basel and Lauterbourg, in order to optimise the use of facilities and improve the services provided to vessel operators. It is the result of a partnership between the Navigable Waterways of France Organisation (VNF) and French Electricity (EDF).

The initiative

The e-RIS website enables users to access several types of information:

- **On waterway status:** real-time water levels and 14-day forecasts, floods, events;
- **On waterway navigation:** position of boats, blockages and traffic regulation, waiting time at locks, geolocation of objects in waterways, identification of available services and limitations;
- **Logistics:** calculation of estimated time of arrival (ETA) of boats at destinations, updated in real time.

How it works

The level of access to the information provided by e-RIS is determined based on four profile types:

- **Free access:** neutral information regarding boats;
- **Fleet managers:** ability to view their boats with names displayed;
- **Ports:** ability to view boats due for arrival with names displayed;
- **Lock keepers:** circular view of vessels in proximity to the lock, with names, dimensions and cargo displayed.

ADDITIONAL BENEFITS +

> This tool, which was developed for VNF and EDF, is also accessible to users and ports on the river Rhine.

> e-RIS will interface with a port management tool serving the nine ports on the Rhine – The Barge Traffic System (BTS). The ports can transmit information on journey times and the duration of docking time, and e-RIS will post expected arrival times.

> A smartphone application, e-RIS mobile, is available on Android in both French and German.

> Two SIFs are currently in the study phase; one for the Saône and the Rhône, and the second for the Seine between Le Havre and Paris. The latter will notably include data on tidal behaviour.

Voies navigables de France - VNF

Created in 1991, Navigable Waterways of France (VNF) is a State-sanctioned public administrative body.
It is responsible for overseeing and modernising Europe's largest waterway network, made up of 6700km of canals and navigable rivers, as well as 40,000 hectares of public land along their banks. VNF oversees the operation and maintenance of a number of facilities: 1595 locks, 494 weirs, 65 reservoir dams, 74 canal bridges, 35 canal tunnels and 3756km of dykes.
VNF has created the Batelia centre for innovation ("Bureau of technical and logistical assistance for industrial operators and artisans"), which falls under a European consortium, EIBIP (European Inland Barging Innovation Platform), of which the Netherlands, Germany, Austria and France are all members. Batelia, which unites operators in the waterway transport, research and industrial sectors, coordinates initiatives aiming to modernise the sector and accelerate environmental progress in river transport.

www.vnf.fr

ALL OVER FRANCE

Development of a fleet using liquified natural gas

The International Maritime Organisation (IMO) has decided to limit sulphur emissions from boat engines to 0.5% as of 2020. The European Commission has transposed this legislation to European waters, which now contain several Emissions Control Areas where the maximum engine sulphur level is set at 0.1%.

Liquified Natural Gas (LNG) is one solution capable of achieving these regulatory objectives. Methane, which makes up 95% of LNG, is the least polluting type of fossil fuel. Its combustion does not emit any soot, particles or smoke. It also generates less carbon gas and nitrogen oxide than fuel oil or coal, and very little sulphur dioxide.

The global fleet of boats using LNG fuel includes 85 vessels currently in service, and 87 on back-order.

The initiative

France has published a National Plan for the deployment of LNG as a maritime fuel, and will have the capacity to offer LNG fuelling solutions capable of meeting the future needs of vessel owners, via a comprehensive network installed along its coastline.

The Maritime Port of Le Havre is currently able to authorise LNG fuelling operations using the truck-boat mode of transfer, and will soon be able to authorise barge-boat and boat-boat transfers. LNG fuelling of cruise ships was launched in May 2016. The first four liners equipped with an LNG propulsion system were ordered by AIDA cruises and its parent company, the Italian group Costa.

The Maritime Port of Marseille is studying several fuelling solutions. At least two massive cruise liners running exclusively on LNG will make regular stops in the city's port.

In 2019, the Port of Caen will welcome its first LNG ferry, operated by Brittany Ferries. The fuelling operations will be carried out by tanker trucks equipped with LNG engines from the Dunkerque terminal.

Other developments are currently in progress. The dredging boat *Samuel de Champlain* will be the first service vessel to be converted to run on LNG. This dredger is regularly used in Le Havre, Rouen and Nantes Saint-Nazaire.

In the shipbuilding sites at Saint-Nazaire, four cruise liners under construction will be equipped to run on LNG.

How it works

Several operators in the French sector have rallied around the LNG fuel platform for maritime and waterway transport, with the objective of promoting this fuel on a wider scale.

A supply chain is currently being brought together: this involves the installation of fuelling station in ports and along rivers, as well as organisation of the upstream supply chain. The national government is actively working on regulatory issues pertaining to fuelling, notably in terms of safety.

Bunkering solutions will be built around the three LNG terminals at Marseille-Fos, Nantes Saint-Nazaire and Dunkirk. These ports are preparing to play a role as major refuelling locations.

ADDITIONAL BENEFITS +

- **The use of bunkering vessels is an effective solution in the absence of terrestrial infrastructure. This is the solution being backed at the Port of Marseille.**
- **The EDF group has signed an agreement with the Port of Dunkerque to develop a Liquified Natural Gas fuelling station, due to go online at the end of 2018, as part of a global project to provide LNG refuelling services via terrestrial and maritime pathways within the Port of Dunkerque.**

ALL OVER FRANCE

The Chantiers de l'Atlantique shipyard

The Chantiers de l'Atlantique shipyard in Saint-Nazaire is a maritime construction and fleet services company employing 2500 staff. It is one of the global leaders in the shipbuilding sector due to its expertise and broad network of co-manufacturers, combined with a first-rate industrial outfit for the design, manufacture, assembly and launch of highly complex vessels (including both passenger boats and military vessels). The company is also set apart by its ambitious research and development policy, as well as the quality of its industrial processes. In May 2016, the company delivered *Harmony of the Seas*, which as of 2017 was the biggest liner in the world (362 metres long and 66 metres wide). It also has significant business operations in the offshore markets. It produces and installs substations for wind farms and offshore operations. In 2016, the Chantiers de l'Atlantique posted revenues of €1.3 bn.

www.stxfrance.fr

The Floatgen project

Since 2009, the Maritime Port of Nantes Saint-Nazaire has become a major player in the development of the marine renewable energy sector in France. By 2021, the Saint-Nazaire fleet will number 80 wind turbines, while the islands of Yeu and Noirmoutier will have 62.

The port has invested in order to offer the sector logistical solutions for the reception and processing of particularly large or heavy industrial equipment.

The Nantes Saint-Nazaire port community is home to Floatgen, a pilot project for a floating windfarm. This technology will extend the development potential of offshore windfarms into deep waters, which offer stronger wind currents.

The initiative

Construction began in 2016, and the turbines were installed along the coast of Nantes-Saint-Nazaire in 2017.

This wind farm has a 2MW capacity and rests on a floating foundation built from concrete or steel. This foundation is made up of a surface float in the shape of a rectangular ring, which is relatively compact with a low draught and high-performance hydrodynamic properties. A central well located in the interior of the float helps absorb its movement via the effect of the tossing of the water retained within the structure, and reduces movement incurred upon the turbine.

The foundation is compatible with offshore turbines currently on the market. It is also suitable for low draughts, including with large-dimension turbines.

Once the turbines were connected and a final series of tests carried out, Floatgen was able to go into full production, and has been feeding into the electrical grid since September 2018.

How it works

The project was organised through a European consortium made up of seven partner organisations:

- **Ideol,** the project coordinator, responsible for the design and engineering of the foundation, as well as the construction and installation of the wind turbines along the coast of Croisic;
- **The École Centrale de Nantes** hosted Floatgen's pilot turbines on its marine experimentation site, and provided the SEM-REV anchoring system at a depth of 33 metres;
- **Bouygues Public Works** carried out the construction of the floating foundation;
- **The University of Stuttgart** contributed to the coupled digital simulations and the assessment of the measurement phase;
- **Rsk Group** provided the environmental analysis for the flotation system;
- **Zabala** covered communications for the project;
- **Fraunhofer-Iwes** was in charge of the benchmark analysis between the Floatgen flotation system and other comparable floating solutions.

ADDITIONAL BENEFITS

- The Piriou group has a 21-metre catamaran (the WFSV model) on the market for use as an offshore wind farm service vessel.
- The Ideol company and their floating foundation were chosen by the Japanese government to design and build two floating pilot projects (installation due in 2018).
- A strategic protocol agreement has been signed between Ideol and Atlantis Resources (a developer of renewable marine energy projects) with the aim of developing 1.5GW of floating wind turbine projects in UK waters.
- Ideol has also entered into a partnership with Irish renewable energy developer Gaelectric. The objective is to develop a 30MW project, followed by commercial projects operating at various GW levels, equipped with floating foundations along the Irish coast.

NANTES – SAINT-NAZAIRE

Ideol

The Ideol company was founded in 2010 with the objective of developing a floating wind farm, guaranteeing maximum technical and economic viability. This turbine foundation, trademarked as "Damping Pool", is compatible with turbines currently on the market. Ideol was named among the top 100 innovative companies in Europe (all sectors) in the Red Herring 2017 rankings.
In 2016, the company's total revenue amounted to €3.5 million.

www.ideol-offshore.com

BORDEAUX

The PEEPOS Energy Transition Strategy

Maritime ports are home to a number of logistical and industrial activities, and operate in interaction with local urban areas. They are on the front lines of the energy transition.

Bordeaux Atlantic Port has made a commitment to the energy transition and adapting its industrial port activities to climate change. PEEPOS, which in French stands for "positive energy and economy port", is the cornerstone of this strategic project, and aims to bring about integrated innovations in port activities in order to limit their energy consumption and spur the development of river-based alternative energies.

The initiative

The PEEPOS approach is based around three key pillars:

- **Innovation** via the emergence and sharing of technological innovations for research into new energies, and the implementation of more environmentally-friendly industrial and logistical processes;
- **Green growth** in terms of port activities, but also on a wider scale throughout the surrounding Aquitaine region. Bordeaux Atlantic Port is encouraging environmentally-friendly industrial processes;
- **Energy** savings, striving constantly to achieve energy consumption optimisation in port-industrial zones, and supporting the development of green energy.

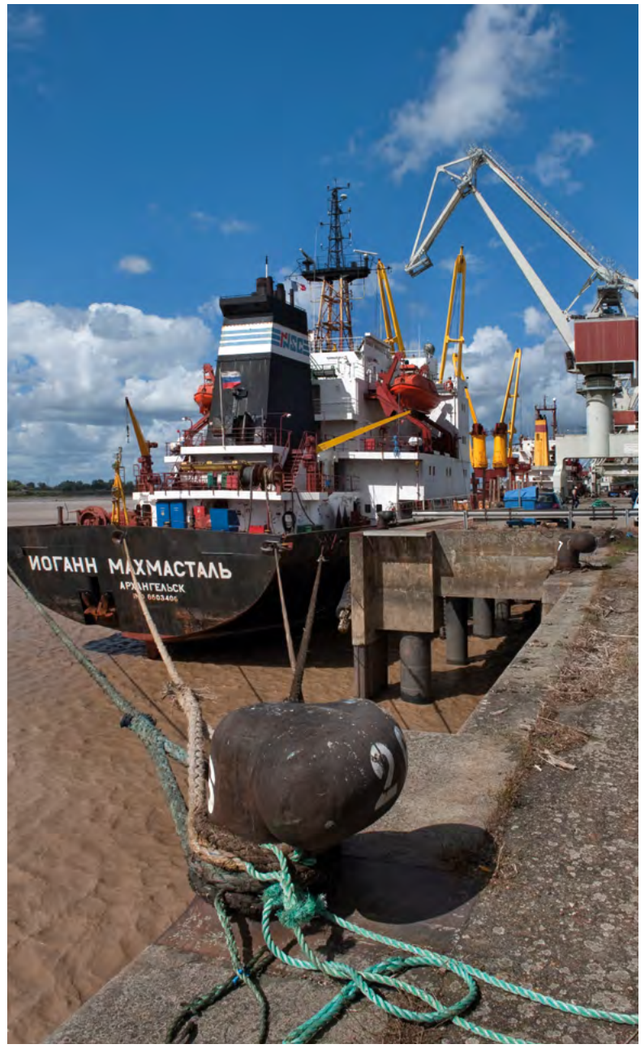
How it works

In practical terms, PEEPOS is being delivered via several structural projects.

- **PEEPOS Startup** oversaw the launch phase. The Maritime Port of Bordeaux has supported port companies through their energy audit processes, and has studied the development of river-based alternative energies. This project received the backing of the European Commission in 2014, demonstrating its coherence with the EU's broader energy strategy.
www.peeopo.eu/
- **PEEPOS Smart Green:** A strategic plan entitled *Working Towards a Low-Carbon Port by 2020* was submitted to the European Union in early 2017. This plan notably involved improving the availability of wood-energy storage (wood pellets, waste timber, etc.) by providing renovated facilities capable of producing solar power. The electricity produced will be consumed on-site via the development of an intelligent distribution network (a so-called "smart grid"), which means that consumption levels can be anticipated and priority given to locally-produced electricity.
- **The PEEPOS Ambès** platform is helping to pave the way for the factories of the future in the field of innovative eco-business (green chemicals, renewable energy, waste processing, energy efficiency, etc.) using an approach that combines the needs of ports and cities.

ADDITIONAL BENEFITS ⊕

- **Seeneoh, the trial testing area for river-current turbines, has been operational since December 2016. Seeneoh has just landed a contract with its first client, HydroQuest, the leading global name in river current turbines.**
http://www.seeneoh.com
- **The Port of Bordeaux is working to replace the Maqueline dredging boat with an LNG-powered water injection dredger.**
- **The traditional projectors at one of the docking terminals have been replaced by high-power LED projectors, which are more efficient and consume less energy.**
- **A synergy between two companies has been identified and put to use; the SIAP processes dangerous industrial waste, which generates significant quantities of heat and steam – these energy-carrying outputs are used by the Michelin site for the manufacture of synthetic rubber.**
- **Gironde XL 3D: digital mapping and mathematical modelling of the estuary will lead to greater efficiency in the docking of large vessels, and contribute to improving the environmental footprint of transport methods.**



BORDEAUX

3. Generating UNIFYING DYNAMICS

SCOPE OF APPLICATION: EXAMPLES

Regional development strategies

A global vision of environmental issues

FRENCH PORTS:

> Cooperate and collaborate, in particular via inter-port alliances, shared port strategies and approaches uniting a given coastline or coast-inland corridor. Multi-lateral approaches with an open-source basis, such as the recent parliamentary projects based around coastal or coast-inland corridors, encourage coherence in public policies affecting ports and enhance regional economic development;

> Help build relationships between cities and ports (events, collaborative charters, communal projects). Cities and their surrounding areas provide ports with the human and economic resources they need, along with a dedicated hinterland. Ports bring tourists, while also providing cities with the goods that supply the local area, create jobs, foster a certain image and generate investments. These relationships can lead to conflicts (involving the use of real estate by one activity over another, pollution, air quality, etc). Ports and cities must work together to resolve these issues intelligently, in a way that maintains their win-win relationship.

ALL OVER FRANCE

Structuring an integrated port system

With its three maritime coasts, mainland France enjoys a privileged position as one of the main points of entry to Europe for goods in transit. In order to strengthen this position, a system structured around the links between maritime and inland ports has been implemented.

The initiative

This approach has led to the structuring of three major corridors to provide access to mainland France, but also to the north and east of Europe (southern Germany, Switzerland, etc.):

- **The Seine corridor with Haropa:** this alliance of the Maritime Ports of Le Havre and Rouen and the Port Authority of Paris was created in 2012;
- **The Rhône-Saône corridor with MedLink Ports:** this association, founded in 2015, unites nine trimodal platforms from the Rhône-Saône corridor (Pagny, Chalon-sur-Saône, Mâcon, Villefranche, Lyon, Vienne-Sud, Valence, Avignon and Arles), the Maritime Port of Marseille-Fos and the Port of Sète, Navigable Waterways of France (VNF), and the National Rhône River Commission;
- **The Northern corridor with NorLink Ports:** this association notably unites the regional ICC (Port of Lille), Port of Dunkerque, the Strait Ports Company (Ports of Boulogne-sur-Mer and Calais), and the joint syndicate of Docks Seine Nord Europe-Escaut (Port of Valenciennes).

How it works

Haropa is a one-stop-shop commercial platform that identifies, research and offers clients the best possible solutions for multi-modal transport. Its major strength lies in its ability to drive forward the competitiveness and visibility of the Seine valley port system. At the international level, Haropa is equipped with a network of representatives active in China, South Korea, India, Japan, Brazil and the USA.

The MedLink Ports partnership aims to reinforce the position of the Port of Marseille-Fos within its hinterland, via the construction of a comprehensive, mass-scale and trimodal service offering that combines actions from various adherents.

NorLink Ports works to develop mass freight transport between the maritime coast and inland ports, as well as the development of logistics business operations in the north of France. Its ambition is to unite clients, logistics professionals and multi-modal platforms, as well as trade unions and professional representatives.

ADDITIONAL BENEFITS +

Structuring the sector around French port corridors enables:

- **Integrated services, thanks to a comprehensive organisational structure for each link in the logistics chain;**
- **Maintaining a communal vision for all operators in the sector, and coordinated action in terms of port sector investments;**
- **Increasing visibility and encouraging the promotion of the French port system on an international scale;**
- **Achieving economies of scale via the communal sharing of commercial, marketing and communications management systems;**
- **Improving regional coherence by optimising investments in terms of inland access pathways, ensuring the availability of real estate necessary for logistics activities, and promoting a broad-spectrum vision for development.**

ALL OVER FRANCE

Dockside electricity supply

Atmospheric pollution emitted by vessels (ultrafine particles: PM_{10} and $PM_{2.5}$, nitrogen dioxide: NO_2, carbon dioxide: CO_2 and sulphur dioxide: SO_2) can have harmful effects for coastal populations and port cities (respiratory illnesses, etc.). As such, during stopovers, the development of dockside electrical supply systems allows docked vessels to shut off their auxiliary engines and use the port's electrical network. This technique helps to significantly reduce the atmospheric pollution generated by boats and liners to power their on-board equipment.

The initiative

The Maritime Port of Marseille is the first French port to have equipped itself with three dockside electrical supply outlets. The terrestrial electrical supply system has been online since 9 January 2017, and was installed by Schneider Electric and Eiffage Énergie, both of which are world-renowned companies in the electrical equipment sector. The docks currently host vessels owned by Compagnie méridionale de navigation.
In order to connect to the port's electrical network, Méridionale has installed various equipment aboard its boats (transformers, dockside outlet connection panels, etc.), all adhering to global IEC/ISO/IEE standards for dockside electrical supply. Méridionale can now connect to this kind of dockside electrical outlet at any port in the world.

For inland waterways, Haropa and VNF have launched the installation of nine electrical and potable water connections along the Seine river, at four different sites. These charging stations will replace the use of cable-connected portable generators, and will be operational from early 2018.

How it works

In Marseille, every Méridionale boat purchases the electricity it needs directly from the port. The port provides an electrical supply service as part of an adjustment to its port fees.

Emissions avoided annually via the shutting off of engines:
- 7.7 tonnes of fine particles and over 6800 tonnes of carbon dioxide, or the equivalent of 3000 cars per day;
- 49 tonnes of nitrogen oxide, or the equivalent of over 65,000 vehicles per day;
- 4 tonnes of sulphur dioxide.

On the Seine, the Haropa and VNF charging stations will enable 50 tonnes of CO_2 emissions to be avoided (per station, per year).

ADDITIONAL BENEFITS +

ECONOMIC GAINS:
- The price of electricity remains relatively stable.
- The scheme has helped lower Méridionale's operating costs, due to two principal factors:
  - Electricity prices remaining lower than fuel prices;
  - Reduced vessel maintenance costs, as engines are no longer in use during stopovers. Costly engine maintenance operations are therefore required less frequently.

AN OVERALL IMPROVEMENT IN QUALITY OF LIFE AND WORKING CONDITIONS:
- Shutting off engines when docked reduces noise pollution.
- Thanks to engines being shut off, mechanics can work on the boats in optimum conditions. This is also a boost for passengers:
- The scheme brings about significant improvements in terms of air quality and reduced GHG emissions.

Schneider Electric

Schneider Electric is a company specialising in energy management and automation. The company employs 144,000 people around the world. Schneider Electric is not an electricity producer, but uses its expertise to facilitate electricity transfer, transformation and security. In the ports sector, Schneider Electric contributes to the continuous improvement of global standards for dockside electrical supply equipment, working alongside marine certification organisations.

www.schneider-electric.fr/

OVERSEAS

Hosting cruise passengers

The cruise ship sector is an indispensable driver for local tourist economy. As the world's no. 1 tourist destination and 2nd largest maritime area, France possesses undeniable potential for growth in the Mediterranean and the Caribbean (via the ports of Martinique and Guadeloupe). France also has attractive cruise destinations in the Pacific, with Polynesia and New Caledonia home to a number of ports: Nouméa, Lifou, Maré and îles des Pins.

The initiative

Number of passengers arrivals (stopovers and initial boarding) in French destinations in 2015, by cruise basin

*Of which pax IB = number of passengers making initial boarding
** Excl. data for Mayotte and TAAF
Source: Atout France - Data collected from cruise companies and port management bodies

How it works

Overseas ports are developing cooperative strategies and improving the amenities and services provided for cruise ship passengers:

- **Infrastructure improvements:** Guadeloupe port Caraïbes has operated a second terminal at the Pointe-à-Pitre site since 2013. At the Port of Papeete (French Polynesia), a new cruise passenger terminal will be completed in 2020. In Nouméa (New Caledonia), studies are underway for the construction of a new cruise ship terminal;
- **Partnerships with airports:** in Papeete (French Polynesia), airport redevelopment work will be completed in 2020;
- **Cooperation agreements between ports and cities:** Guadeloupe oversees interface projects in Pointe-à-Pitre and Basse-Terre. The city of Papeete is moving forward with an urban renovation of its sea front and tourist areas;
- **Inter-port cooperation:** in the Indian Ocean, the APIOI (Association of Indian Ocean island ports) is banking on the shared assets of its ports to increase visibility. The Port of Nouméa is working in partnership with Carnival Australia and the Australian government;
- **Mobilisation of the tourism sector:** the Tahiti Cruise Club unites operators from the sector and works to promote the island to international ship owners;
- **Hosting cruise passengers:** in Nouméa, a tourist information desk and team are on hand to welcome and inform cruise passengers; in addition, a free Wi-Fi network has been set up and a revision of the port signage is underway.

ADDITIONAL BENEFITS +

- The islands of Guadeloupe won 2nd place in the Seatrade Cruise Awards in the Destination of the Year category for 2015.
- In 2016, Martinique won three prizes awarded by Travel Alliance Media, a professional media outlet and leading figure in the USA travel market. The awards were best cruise destination in the Caribbean, best Caribbean food destination, and best Tourism Office for the Americas.

MARSEILLE

The Euroméditerranée Project

In order to respond to the many challenges being faced in the 21st century, particularly in economic and environmental terms, a partnership was founded between port and city in order to reduce greenhouse gas emissions, lower the use of fuel, rationalise the flow of goods and open up access to previously restricted spaces.

The initiative

Created in 1995 via an initiative between the national and local governments, Euroméditerranée is an operation in the national interest, whose ambition is to elevate Marseille to the position of a major European metropolis. The Urban Development Agency initiated a deep-rooted transformation of the city centre, which notably involved the development of the city's sea front. This urban renewal operation pursued the goal of transforming under-used industrial land adjacent to the city centre, using this space to develop new commercial, business and residential districts.

The Agency has been entrusted by Public Authorities to carry out development studies, acquire the land (480 hectares), before beginning the renovation work and launching promotional/communications campaigns for the project. Euroméditerranée also benefitted from EU financial aid (ERDF - European Regional Development Fund).

How it works

A charter was signed between the city and port in 2012, defining shared objectives and a vision for the future. A planned reorganisation of port activities led to new facilities being positioned around the port: to the south, an urban cultural centre linked to Euroméditerranée, to the north, a centre dedicated to tourism and in the middle, a business hub focusing on the city (in particular with regard to urban infrastructure logistics).

ADDITIONAL BENEFITS +

- Interfaces between the city and the port were created, with port spaces given over to public use. A number of visual pathways were also created, with a number of physical barriers such as raised motorways being removed.
- New structures: Architects such as Zaha Hadid, Jean Nouvel, Massimiliano Fuksas and Rudy Ricciotti have contributed to the transformation of the city's sea front (via buildings such as the Mucem, Cathédrale de la Major and renovated docks, the CMA-CGM tower, and the Les Terrasses du Port shopping centre).
- Reconnecting the city with the port has had a major impact on cruise passenger traffic, which has increased almost a hundredfold in two decades – rising from 18,500 passengers in 1995 to 160,000 in 2000 and 1.6 million in 2016, meaning that Marseille now ranks among the top 15 ports in the world for cruise passenger visits.

For more information

PORTS AND OPERATORS

Working alongside the major multinationals active in the sector, a number of small and medium-sized enterprises are also important stakeholders in the French port system. These operators make a decisive contribution to innovation.
The following list is not exhaustive, but indicates some of the private operators involved in the sector based on their area of activity.

Maritime Ports in mainland France

Maritime Port of Bordeaux
www.bordeaux-port.fr

Maritime Port of Dunkerque
www.dunkerque-port.fr

Maritime Port of Le Havre
www.haropaports.com/fr/le-havre

Maritime Port of Marseille
www.marseille-port.fr

Maritime Port of Nantes Saint-Nazaire
www.nantes.port.fr

Maritime Port of La Rochelle
www.larochelle.port.fr

Maritime Port of Rouen
www.haropaports.com/fr/rouen

Overseas Maritime Ports

Maritime Port of Guadeloupe
guadeloupe-portcaraibes.com

Maritime Port of Guiana
www.portdeguyane.fr

Maritime Port of Martinique
www.martinique.port.fr

Maritime Port of Réunion
www.reunion.port.fr

River Port Authorities

Port autonome de Paris
www.haropaports.com/fr/paris

Port autonome de Strasbourg
www.strasbourg.port.fr

Associations

Armateurs de France
www.armateursdefrance.org

Cluster maritime français
www.cluster-maritime.fr

Pôle mer Méditerranée
www.polemermediterranee.com

Pôle EMC2
www.pole-emc2.fr

Pôle Novalog
www.novalog.eu

Aquimer
www.poleaquimer.com/fr/index.html

Gican
http://gican.asso.fr/

Corican
www.corican.fr

Isemar
www.isemar.fr

Union des ports de France
www.port.fr

Shipbuilding and repairs

Bretagne pôle naval
www.bretagnepolenaval.org

CMN
www.cmn-group.com

Naval Group (formerly DCNS)
https://www.naval-group.com/fr/

STX France (Fincantieri/ Chantiers de l'Atlantique)
http://chantiers-atlantique.com/fr/

Chantier naval de Marseille
www.cndm.eu

ECA Group
www.ecagroup.com

OCEA
www.ocea-yacht.fr et www.ocea.fr

Piriou
www.piriou.com

Touax
www.touax.com

Renewable Marine Energy

General Electric Renewable Energy
www.gerenewableenergy.com

IDEOL
www.ideol-offshore.com

EOLFI
https://www.eolfi.com/fr

ENGIE
www.engie.com

Guinard Energies
www.guinard-energies.bzh/fr/

EDF Énergies nouvelles
www.edf-energies-nouvelles.com

Kraken
www.krakensubsea.com

Schneider Electric
www.schneider-electric.com/ww/en

VINCI Energies
www.vinci-energies.com/

Ship Owners

CMA-CGM
www.cma-cgm.fr

Louis Dreyfus Armateur
www.lda.fr

Brittany Ferries
www.brittany-ferries.fr

Maritime Industry - Marine depollution

Balineau
www.egis.fr

Bouygues Travaux Publics
www.bouygues-tp.com

CAN
www.can.fr/en

CDES
www.cdes.pro

Eiffage travaux maritimes et fluviaux
https://www.eiffageinfrastructures.com/travaux-maritimes-fluviaux

EMCC
www.emcc-construction.com

ENJ Negri
www.negri-france.com/

Entrepose-Geocean
www.entrepose.com/geocean/

Envisan
www.envisan.com

Extract Ecoterres
www.extract-ecoterres.fr/

Ginger Burgeap
www.burgeap.fr

Maïa fondations
maia-sonnier.fr/fr/maia-fondations.html

Razel bec
www.razel-bec.com/

Valgo
www.valgo.com

Maritime Satellite Surveillance - Seismic data capturing

CLS
www.cls.fr

CGG
www.cgg.com/fr/Home

Port IT Systems

Bureau Veritas
www.bureauveritas.fr

MGI
www.gyptis.fr

SOGET
www.soget.fr/fr

Institutions

Ministry for an Ecological and Solidary Transition
www.ecologique-solidaire.gouv.fr

Cerema
www.cerema.fr

SHOM
www.shom.fr

Ifremer
www.ifremer.fr

VNF
www.vnf.fr

Euroméditerranée
www.euromediterranee.fr

COLLECTION
EXPERTISE
FRANÇAISE

France has valuable expertise in numerous fields.
With this collection, discover the wealth of French expertise through concrete examples throughout the country.

www.ecologique-solidaire.gouv.fr