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MAY 2021

SMART PORTS IN FRANCE

STUDY CONDUCTED IN COLLABORATION BETWEEN THE FRENCH-NORWEGIAN CHAMBER OF COMMERCE (CCFN) AND INNOVATION NORWAY OFFICE IN PARIS.

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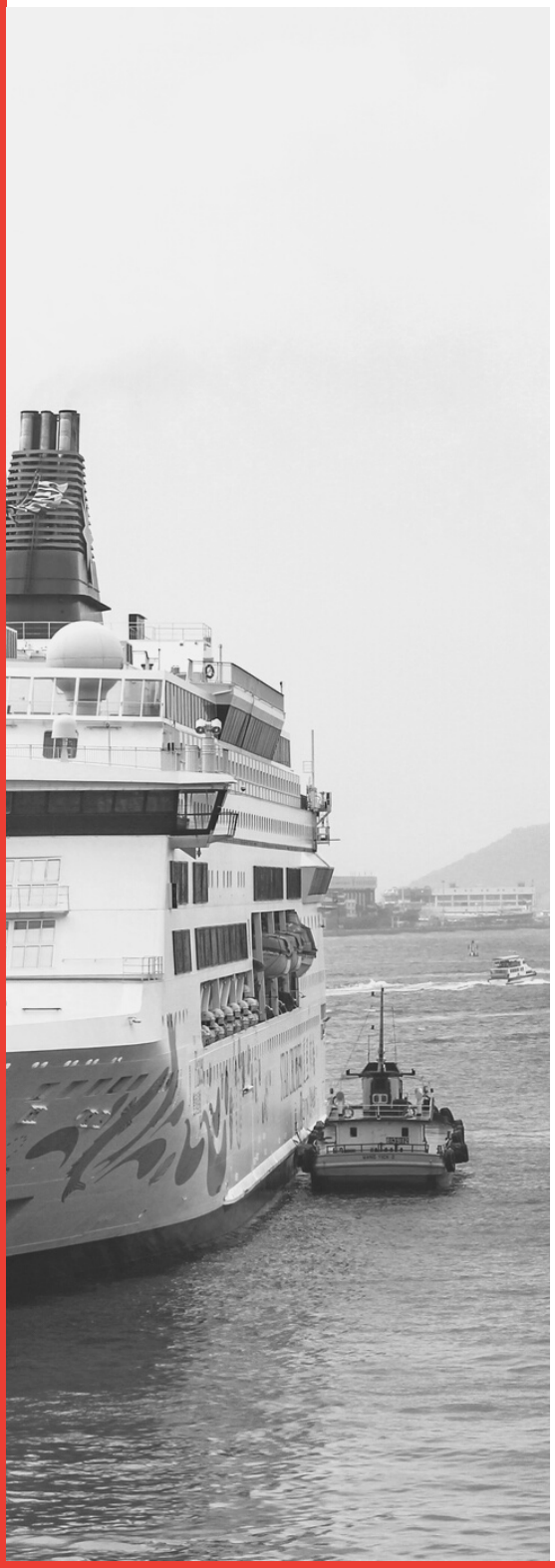

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EXECUTIVE SUMMARY

France is a leading maritime and port nation with access to almost all the oceans and the second largest exclusive economic zone in the world. It stands at the crossroads of the world's busiest shipping routes and enjoys a strategic position thanks to its overseas territories. Despite its strategic geographical position and large maritime industry, France has lagged behind other European countries in the modernisation of its ports. To address this challenge, major efforts are now undertaken to assert France's status as a globally competitive maritime destination.

Major public investments are currently being made in the modernisation of ports and green port infrastructure. The French government's €100 billion economic recovery plan France Relance, presented in September 2020, will devote €200 million to the modernisation and upgrading of the country's seaport infrastructure. An updated national port strategy was also presented at the beginning of 2021, outlining the ambition to regain market share for its ports, focusing on inter-port collaboration, more sustainable solutions and autonomous solutions. Simultaneously, France is moving from a national source model to a stronger focus on international cooperation.

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This report gives an overview of general market trends in French smart port development, in addition to details on projects in five selected ports. Opportunities most notably lie within renewable energy and green technologies, especially hydrogen and technologies for 'territorial integration' of different transport modes.

Digitalisation and optimisation of logistics and unit flows is also interesting; and technologies for data collection and analysis. Note also that opportunities exist in the development of use cases and tests of specific technologies as well as Horizon Europe calls and consortia.

While Norway is perceived as a country with great expertise in the maritime industry and renewable energy, there is a general need to make Norwegian smart port solutions and actors more well-known in France. With increased visibility, the growing need for digital and sustainable infrastructure in the French market represents significant business opportunities for Norwegian stakeholders.

FRANCE – A MARITIME NATION

With an access to almost all the oceans and the second largest exclusive economic zone in the world, France is a global maritime player. It stands at the crossroads of the busiest shipping routes in the world and enjoys a strategic position thanks to its overseas territories.

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France is the 5th biggest port nation in Europe, with approximately 360 million tonnes of goods processed and 30 million passengers per year. The French maritime economy accounts for €75 billion worth of production each year and 300 000 jobs.

Among the 66 French commercial seaports, seven ports in mainland France have been given the status of “major seaport”. The two biggest ones, Marseille and Le Havre, are ranked among Europe’s top ten busiest ports and are the country’s most active and advanced ports in terms of smart technology.

Despite its strategic geographic location and major maritime industry, France has lagged behind other European countries in the modernisation of its ports. The lack of a long-term national strategy and insufficient investment in port infrastructure have long been a handicap for French ports that are faced with growing global competition. To address this challenge, major efforts are now undertaken to assert France’s status as a globally competitive maritime destination.

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OVERVIEW OF FRANCE'S SMART PORT AMBITIONS

POLITICAL AMBITIONS

On the national level, defining a clear seaport strategy has been on the agenda for several years. Although the Covid-19 crisis has further delayed political plans, it has also given rise to new opportunities with major public investments to come.

The French government's €100 billion economic recovery plan France Relance, presented in September 2020, will devote €200 Million to the modernisation and upgrading of the country's seaport infrastructure. Specifically, France will invest in green infrastructures, dock electrification, high environmental quality storage warehouses, river or rail infrastructure to facilitate the modal shift, liquefied natural gas (LNG) and hydrogen refuelling points.

An updated national port strategy was presented at the beginning of 2021. The government's main ambition will be to regain market share, aiming to limit the effects of competition between French ports and to create a common sustainable and digital dynamic.

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THE NEW NATIONAL PORT STRATEGY CENTRES ON FOUR AMBITION

1.Making ports essential links in the performance of supply chains

2.Making ports essential tools for the economic development of the entire country

3.Making ports accelerators of the ecological transition

4.Making ports motors of innovation and the digital transition

These ambitions are operationalised as follows:

·Accelerating the ecological transition of ports by optimising the integration of innovative economic activities

·Accelerating the digital transition of ports by digitalizing information flows, procedures, and the flow of goods

·Developing the zone of influence and attractiveness of the French ports by developing means of mass transportation – rail and river – to streamline the flow of goods

·Strengthening the competitiveness of the French metropolitan and overseas port system on the international arena

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OVERVIEW OF FRENCH SMART PORT AMBITIONS

KEY STAKEHOLDERS

Actors of the French port community working on smart technologies, digitalisation and sustainability include:

Clusters: The French Maritime Cluster (Cluster Maritime Français) is a key player with a global vision. At the regional level, the Pôle Mer Bretagne Atlantique and Pôle Mer Méditerranée are marine science and technology clusters located in Brittany and Provence.

Associations: The Ports of France Union (Union des Ports de France, UPF) is the professional association representing French port operators. It brings together major seaports, chambers of commerce and industry, semi-public companies and port operating companies.

Innovative companies that are leaders on the French market: Soget, MGI, Traxens, Sinay, BuyCo, BlueCargo, MGH, Wakeo, NGE CONNECT.

Large industry groups: CMA CGM, EDF, Naval Group, Engie, Air Liquide, Artelia.

Funding Institutions

ADEME (the French Environment and Energy Management Agency) helps finance projects in the fields of energy and sustainable growth, from research to implementation: full subsidies to non-profit organisations (mainly research institutes), a combination of subsidies and refundable grants to companies, and direct capital investment. Three calls for proposals are open until January 2021 in the fields of sustainable cities and circular economy. Another call in the field of sustainable mobility and transport is open until June 2021.

BPI France, the public investment company, supports SMEs and innovative companies in accordance with national and regional public policies.

ANR (the National Agency for Research) funds scientific teams, both public and private, through short-term research contracts. In the field of smart ports, they have a specific focus on security as well as improving the links between citizens and ports.

The French regions are actively contributing to funding innovative projects, such as the Seine-Maritime Region and its support to “Le Havre Smart Port City”.

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OVERVIEW OF FRANCE'S SMART PORT AMBITIONS

MAIN TECHNOLOGIES

Following the global movement toward smarter seaports, all French ports are actively testing new technologies and developing use cases, particularly in the fields of mobility, security, energy and green technologies. French ports' development strategies focus on four main areas:

Mobility of goods and citizens. Soget and MGI are French leaders in port community systems to manage the flow of goods, people and customs procedures.

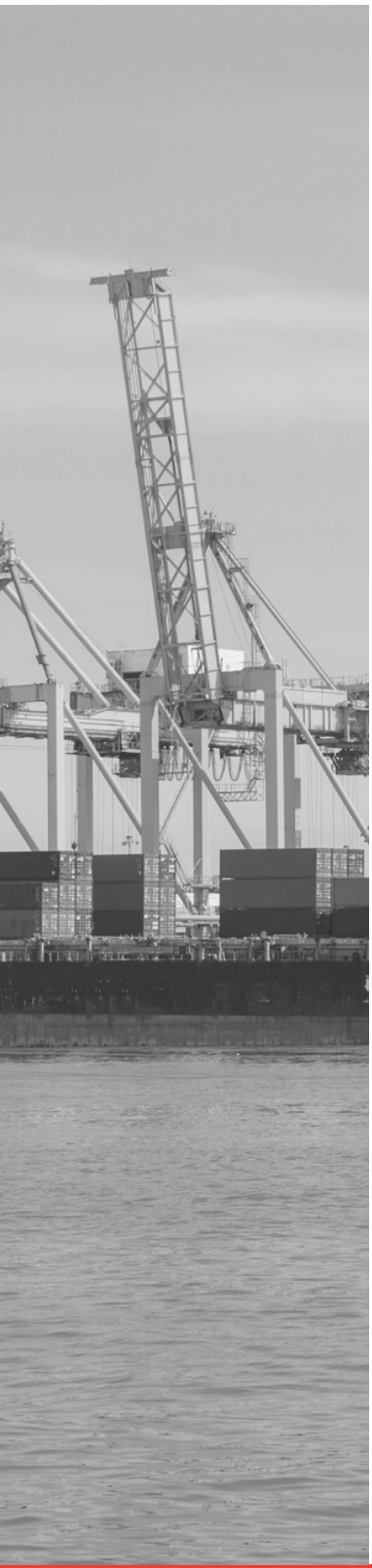
Security of workers and citizens. For instance, in Le Havre, the Computerized Processing of Hazardous Materials (CPHM) tool improves port security for industrial and logistical actors, using a simplified, dematerialized, optimized declaration process and real-time pre/post-dispatch monitoring of hazardous goods. Cybersecurity is also a key topic, with major French actors involved such as Naval Group.

Energy. Floating offshore wind, hydrogen and LNG are at the core of the biggest French ports' efforts to reduce their carbon footprint. The port of Marseille Fos is also investing in geothermal energy and is currently working to connect the shopping centre "Les Terrasses du Port" to a power station that heats and cools using seawater.

The environment. For instance, the port of Marseille-Fos has created an Environmental Performance Index, a platform to discuss and initiate environmental actions, in cooperation with Air PACA and A Lab in the Air.

Digitalisation is also a major priority. Artificial intelligence, big data and IoT are viewed as crucial tools to optimise logistics and to analyse wind speed, wave height, tides, etc. Predictive maintenance is high on the French ports' agenda, with a strong focus on digital twins, blockchain, virtual reality and autonomous systems (such as submarine drones). Similarly, 5G is a rising topic along with cybersecurity issues.

Marseille and Le Havre have come furthest in terms of testing and implementing **smart technologies.** The former has an especially dynamic ecosystem which benefits from the presence of leading worldwide shipping group CMA CGM and its own start-up incubator called Ze Box. On a smaller and more local scale, the ports of Dunkerque, Nantes Saint-Nazaire and Bordeaux are also developing their smart ecosystems and are experiencing a growing need for cooperation.



MARSEILLE FOS

OVERVIEW AND INITIATIVES

- Largest French port, 6th busiest European port
- 80 million tonnes of goods processed each year
- High presence of liquid and refined bulk (oil and gas); solid bulk (coal, bauxite); major passenger port
- Marseille enjoys a strategic location at the junction of intercontinental fibre optic submarine cables, making it one of the most connected places in the world. 3 data centres are located in the port and a fourth one is to be operational by 2022.

Marseilles smart port vision: a *port that is more digital, sustainable, better connected to its logistics and industrial environment and to the citizens*

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CURRENT PROJECTS

AN ACTIVE ECOSYSTEM

In cooperation with the Aix-Marseille University and International Chamber of Commerce, the port of Marseille launched the structure “Smart Port in Med” to federate actors of the ecosystem. The Brain Port community, a collective intelligence hub, has also been created to develop research and innovation projects involving researchers and companies.

LOGISTICS

Ci5, a new intelligent cargo system to track and manage cargo and support supply chain efficiency, was developed by MGI. It is based on open source technology which lets it communicate with any IT system or use any new technology (AI, big data, IoT and blockchain)

Blockchain experimentation.

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SMART AND GREEN ENERGY SOLUTIONS

Shore to ship power supply.

The Jupiter 1000 project: Building an entire ecosystem around hydrogen. This project is the first industrial demonstrator of Power to Gas with a power rating of 1 MWe for electrolysis. An innovation zone called “Innovex” has been created to produce green hydrogen by electrolysis using wind power. In parallel, the hydrogen will react with CO2 captured from nearby industrial sites to produce methane. A hydrogen refuelling station is to be built in the port in cooperation with Air Liquide.

TERRITORIAL INTEGRATION

A focus area for the port in 2021 is the development of digital tools for a greater connection with the citizens of Marseille, such as a digital demonstrator

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OPPORTUNITIES

Marseille Fos has until recently worked mostly to structure its smart port initiative and ecosystem, working mainly with local actors. However, from 2021 onwards, the port will more actively search for new international partnerships. The following fields present renewed opportunities:

- The fluidity and continuous optimization of flows, be it vehicles, energy or data, is one of the areas where the port has most needs. The 900 cameras on the two harbours of the port represent a source of data that has not yet been fully exploited for the purposes of optimizing road and rail flows.
- Applications using IOT and blockchain to manage flows
- Hydrogen is one of the main priorities and the port's needs in terms of technology and innovation will increase
- The port's CO2 capture activities would benefit from the Norwegian expertise
- Territorial integration is a new focus area
- Marseille port authorities are open to cooperation on R&D, finding new fields of experimentation, and hosting more mature projects
- Since 2019, the port has been organising a yearly open innovation programme, the Smart Port Challenge, in cooperation with eight major international groups. It aims at providing innovative companies with experimentation sites, data, teams and means of communication. Both national and international companies with innovative solutions are welcome to apply to each proposed challenge.

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HAROPA

OVERVIEW AND INITIATIVES

- Leading port complex in France uniting the ports of Le Havre, Rouen and Paris into a single complex along the Seine axis
- 5th largest port complex in Northern Europe
- More than 120 million tonnes of maritime and river traffic

HAROPA's Smart Port vision: *becoming the first smart corridor, along the Seine, with no equivalent in Europe*

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CURRENT PROJECTS

SYSTEM TRACKING

Le Havre is working on setting up an intelligent information system to track the movement of dangerous goods; optimising traffic flow when locks or bridges are closed; using big data to monitor air quality, water quality and acoustic underwater pollution; and working in

LOGISTICS

Rouen is developing a satellite navigation technology on the Seine

RIS

Paris is developing a River Information System (RIS) to give information about available spots

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ELECTRIC TERMINALS

HAROPA recently secured funding from the Connecting Europe Facility (CEF) for its project aiming at installing 78 electric terminals along the Seine, to be completed in 2023.

SMART PORT CITY

Le Havre won the National Future Investment Programme with its Smart Port City project, a € 241 million plan aiming at improving the connection between the port and the city. In cooperation with corporate groups such as Thales, CISCO and EDF, 21 equipment and demonstrator projects will be set up by 2030 in the following fields: innovative data platforms that optimise the flow of goods and people; circular economy in the industrial zone; decarbonization and environmental quality; new job creation; the creation of places and services that attract students, talents, residents and visitors. A drone platform, services for cruise ship passengers and actions to improve air quality are among the projects on the agenda.

OPPORTUNITIES

HAROPA is currently investing in and focusing on:

- Smart containers which can be tracked thanks to sensors
- Siemens Gamesa's new wind turbine factory in Le Havre
- Dockside connection for cruise ships and container ship

- 5G is high on the port's agenda, with a focus on big data and secure data sharing. They are cooperating with numerous start-ups on these topics.

- Hydrogen is also a priority, starting with river transport. Refuelling and connecting infrastructure are some of the main challenges that the port wishes to solve.

- Building and improving carbon capture infrastructures

- HAROPA is focusing on international and European cooperation. They are part of a European consortium that participated in the EU Horizon 2020 Green Deal call for green ports and were awarded nearly €25m in funding to promote smarter, zero-emission transport in ports. HAROPA wishes to participate in more such consortia at the European level.

- They are part of a European consortium that will participate in the Green Port call for projects and wish to encourage similar calls on the European level.

- The port complex is active in most European networks (ESPO, EFIP) as well as in informal networks such as the Northern Range.

- In 2021, they are planning to apply to the EU Innovation Fund and calls at the national level from ADEME and ANR (particularly on how to associate citizens and ports).

- HAROPA is open to all kinds of cooperation, from signing new partnership agreements, cooperating on Horizon Europe projects or welcoming delegations.

DUNKIRK

OVERVIEW AND INITIATIVES

- France's third-ranking port, 7th port of the North Europe Range
- Major industrial centre and heavy bulk cargo handling port
- France's leading port for containerised fruit and copper imports and second-ranking port for trade with Great Britain
- Landing base for Franpipe, the pipeline transporting natural gas from the Norwegian Continental Shelf, operated by Norwegian state company Gassco

A list of current projects will be shown on the next page.

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ELECTRIC SUPPLY

CMA CGM and Dunkirk port have recently inaugurated a cold ironing system. By plugging into an onshore electricity supply, container ships calling at port can shut down their auxiliary engines while still getting the power they need.

STORAGE

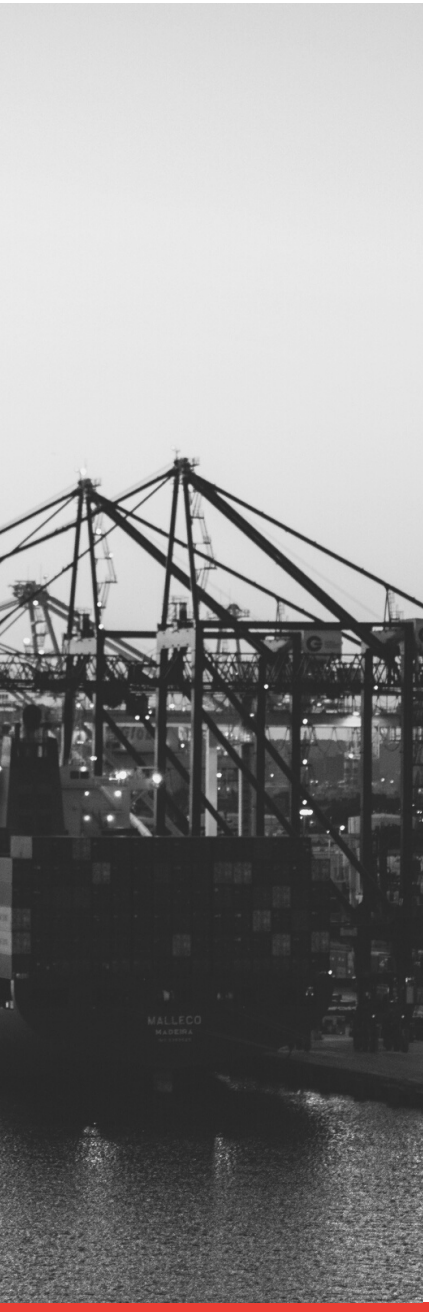
oTotal is to build a 25 MW energy storage facility at Dunkirk port, France's largest battery storage project along the nation's northern coast.

APP DEVELOPMENT

Work has started to increase the port's capacity for LNG refuelling following CMA CGM's announcement that it is building LNG-fuelled ships.

FUNDING

Investments in capturing polluting emissions and processing recovered dust.



NANTES SAINT-NAZAIRE

OVERVIEW AND INITIATIVES

- Leading port on France's Atlantic Seaboard and the fourth biggest national port authority
- A port area extending over a 65-kilometre stretch along the Loire Estuary
- Energy accounts for the largest share of the total traffic volume (70 %)

A list of current projects will be shown on the next page.

Aside from the current projects on the next page, the port is also looking for solutions to optimise flows and goods traceability on its ro-ro terminal. The port authorities are interested in developing use cases and sharing experience with other actors working on similar issues.

CONNECTION

A ship information panel (dates of arrival, departure, type of ship, etc.) is being studied, as well as a connected discovery walk in the port along the estuary.

WAITING TIME

A dynamic calculation method for ETA ("estimated time of arrival") is being tested and aims to better predict the arrival of ships.

APP DEVELOPMENT

Development of the smartphone app "A bon port".

FUNDING

Nantes Saint-Nazaire Port is planning to invest € 200,000 in the development of the three targeted solutions mentioned above.

OPPORTUNITIES AND RECOMMENDATIONS

While French ports have traditionally been working locally and regionally, there is a renewed need for international cooperation and partnerships

France is a global maritime player with a longstanding maritime expertise. Faced with fierce competition, French ports are now shifting their focus from a local and national perspective towards a European vision, laying the ground for numerous opportunities.

The major French seaports have defined their own smart port strategies and are currently in the testing phase of various projects. There will be an increasing need for new partnerships and innovation in the sectors on the following page.

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OPPORTUNITIES

- Digitalisation to optimise logistics and the flows of goods, people, vehicles, data and energy.
- Technologies using AI, big data, IoT or blockchain to improve data collection and analysis will be crucial. For this purpose, 5G and cybersecurity have been defined as tomorrow's main topics by French port authorities.
- Energy and green technologies are viewed as an integral part of the ports' smart strategies, contributing to an optimal functioning. Developing a hydrogen value chain is a major priority, particularly in Marseille and Le Havre. Both ports have ongoing projects to produce green hydrogen through electrolysis as well as capturing industrial CO2, areas in which Norwegian expertise would be particularly welcome.
- Territorial integration will be a focus area in 2021, with an increasing need for technologies and solutions to build bridges between the port and the city, and the citizens and the rail and river networks.
- While French ports have traditionally been working locally and regionally, there is a renewed need for international cooperation and partnerships. At the local level, the ports have initiated several programmes to foster co-innovation and to bring together research, start-ups and large corporations (such as Marseille's open innovation programme). At the European level, the largest ports are actively taking part in calls in the Horizon Europe program (such as the port of Bordeaux) and the Green Ports scheme.
- There is growing interest in developing use cases, testing specific technologies, sharing experiences and building partnerships. Clusters such as the French Maritime Cluster or the Pôle Mer are relevant entry points on the French market.
- While Norway is perceived as a country with a major savoir-faire in ocean industries and renewable energy, its expertise in terms of smart technologies is not well-known to French port authorities. In spite of this lack of visibility, the growing need for digital and sustainable infrastructures offers an engaging perspective for Norwegian stakeholders.

INTERVIEWS CONDUCTED

FOR THE PURPOSE OF THIS STUDY, WE HAVE INTERVIEWED KEY ACTORS OF THE FRENCH SMART PORT ECOSYSTEM.

Frédéric Dagnet, Director of Evaluation and Foresight Studies for the Marseille-Fos Port Authority

Nicolas Frachon, Head of the Metropolitan Major Projects, Aix-Marseille Chamber of Commerce and Industry

Frédéric Rychen, Professor - Aix-Marseille University

Cédric Virciglio, European and international affairs manager – HAROPA

Lucie Trulla, Manager of the energy transition service – Nantes-Saint-Nazaire Port Authority

Emilie Neveu Lemaire, Information Systems manager – Nantes-Saint-Nazaire Port Authority

Pascal Ollivier, Chairman of the European Port Community System Association and President of Maritime Street

SOURCES

FOR THE PURPOSE OF THIS STUDY, WE HAVE GATHERED INFORMATION FROM A VARIETY OF SOURCED THAT ARE LISTED ACCORDINGLY BELOW

HAL | Stratégie portuaire et défis logistiques : Quels leviers pour des dynamiques de long terme ?

Le Gouvernment Francaise | France Relance

Marseille Fos Le French Smart Port in med | Home

HAROPA Ports | Smart Corridor

CCI Métropolitaine Aix-Marseille-Provence | Marseille enclenche sa transformation en «port intelligent»

Ministère de la Transition écologique et solidaire - Ministère chargé des Transports | Le système PORTUAIRE

Directorate for Maritime Affairs | France, a maritime player in the 21st century

Ministre de la Transition Ecologique | Acteurs, réseau, et activités portuaires en France