



HAROPA
PORT Le Havre
Rouen
Paris



Innovating every day



Editorial

03

Port and logistics innovation

07

The digital transition

13

The environmental transition

19

Creating societal value

23

International positioning

27



"Innovating means enabling sustainable progress for our port ecosystem."

"It means continually questioning our practices, tools and models to meet the expectations of a radically changing world. It is a requirement that guides every project undertaken by HAROPA PORT along the entire Seine Axis.

In our areas of operation - whether in port security, seamless goods throughput, port-industrial and logistics research or reliable communications – innovation provides practical solutions to meet the challenges of efficiency, competitiveness and the ecological transition.

You will discover in this brochure some of our projects and achievements, collaborative programmes undertaken alongside our clients and partners and reflection on how the port of tomorrow will be shaped together with us."

Benoît ROCHET,
CEO and Chair of the Management Board, HAROPA PORT

"Innovation, the core of our model for growth"

"Given that the development of R&D is a key focus for national port strategy, HAROPA PORT was not slow to come forward as a driver of innovation.

From the management of risk to the management of skills, and including logistics, energy and the environment, France's leading port has made innovation a core component of its model for growth, notably taking advantage of the potential offered by the new digital technologies. Its role in initiatives varies: direct participant, assembler, facilitator, etc. All approaches are useful in the pursuit of innovation in all its forms as a central focus for all our activities."

Jérôme BESANCENOT,
Head of Digital Transition at HAROPA PORT.

Innovation for...



Seamless, secure goods throughput



Better operational performance



Rethinking the port's place in the city



A role as incubator within a collective dynamic

The 4 pillars of HAROPA PORT's innovation approach

Port and logistics innovation

The digital transition

The environmental transition

Creating value for society

A hand holding a smartphone with various digital icons floating around it, representing logistics and supply chain management. The icons include a truck, a location pin, a ship, a hand holding a key, a globe, a recycling symbol, a bar chart, and a barcode. The background is a blurred industrial setting.

Making navigation easier

The smart navigation channel

The “smart channel” of tomorrow is on the horizon in Rouen: equipped with sensors capable of integrating the latest technologies such as IoT (the Internet of Things), these new tools – among other technical advances – will guarantee the right conditions for navigation and help optimise dredging programmes. **The digital revolution creates new potential for aiming at the highest possible safety and performance.**



Safer port calls



ShoreTension®, a first for Le Havre!

It was in the port of Le Havre that the **ShoreTension®** mooring solution was first validated in France. It is a system that stabilises the ship alongside the dock during its time in port using mooring lines in Dyneema® (an ultra-high tensile strength polyethylene fibre) attached to hydraulic jacks, plus solar-powered remote monitoring of line tension in real time. If an abnormal level of tension is detected, the relevant port personnel will be informed immediately by text message.

Facilitating modal shift

"Optiroute", the solution for heavy goods vehicles

The **Optiroute** project improves **reception and transit conditions for heavy goods vehicles** in Le Havre's port industrial area and the nearby hinterland. The objective is to ensure smooth road traffic flows and guaranteed safety & security for goods and transport equipment.

Specifically, the plan provides:

- An appointment system at terminals for road vehicles.
- Increased capacity at secure truck holding and storage areas.
- Development of applications for the visualisation of traffic in real time (bridge operations, accidents, roadworks, etc.).
- Installation of LNG-CNG service stations.



Guided choice with *Multiland*

The Multiland software program is intended specifically for **multimodal transport planning**. It lets customers compare the financial and environmental gains offered by different solutions, allowing an option to be selected on the basis of full information.

The Seine in real time

Available on the Internet, **SIF Seine (Seine information service)**, a service developed by HAROPA PORT and the VNF (French waterways authority), is **a navigation assistance tool for freight and passenger carriers**.

Its purpose is to optimise river navigation by providing a wide range of information on river water levels, bridge clearances, availability of on-river infrastructure, traffic, and much else.

Rethinking river logistics

Box2Home, a swap body unlike any other

Box2Home specialises in the distribution of heavy packages and is offering a **brand-new solution for the delivery of voluminous items** within the hour or at agreed times, combining river-based platforms, a digital application and in-city distribution. The company has developed an **innovative swap body** in aluminium; it is lightweight, making handling easier on Paris docks. These swap bodies can be assembled in groups of three to form one 40-foot container. Once separated at destination, they clip on to electric vans for last-kilometre delivery.

New-generation containers

Containers are changing to encourage shippers to use the river. Flat-rack containers without fixed side walls or roof can adapt to voluminous cargo since they can be loaded from the top or the sides. For wood, Sogestran has designed FlexiMalle, a 7-tonne capacity curtainsider structure with fold-down, removable walls.



Urban delivery, as seen by Ikea (see following page).

In-city delivery: the green revolution

- From now on, 70% of IKEA's Paris customers will be getting their home deliveries thanks to electric vehicles and barges. This virtuous chain is a response to the company's requirements for **effective urban logistics**, enabling city-centre congestion to be avoided for more reliable delivery times. (see photo on previous page)
- FLUDIS company uses a warehouse boat for on-board preparation of its delivery runs. It is designed for **limited environmental impact**: good hydrodynamics, 100% electric propulsion with batteries and a power generator. And thanks to its two cranes, it needs no dockside handling equipment.

ZULU06: a new kind of self-propelled barge

ZULU06 is the very first self-propelled barge to run on hydrogen for navigation on a French river in 2024:

- 300kg hydrogen storage at 300 bars.
- Aligned with the European Flagships project for the development of self-unloading craft running on fuel cells for in-city distribution.
- A barge for in-city distribution.
- Self-unloading.



Port of Paris, quay of Seine

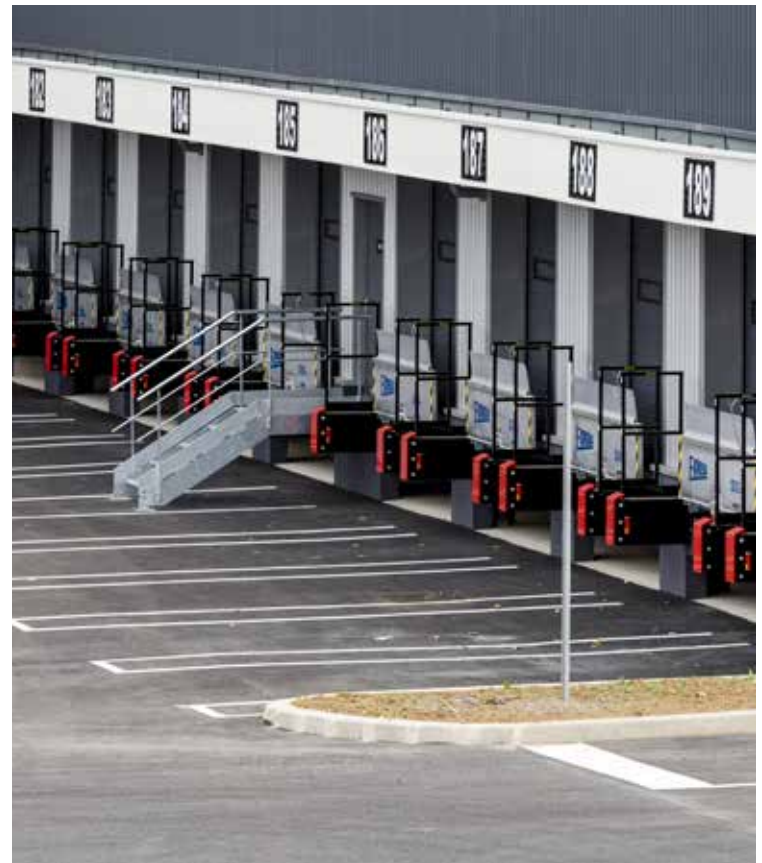
Optimising real estate

The Air² Logistique flagship programme

Constructed by GSE and developed by VALLOG, this **latest-generation facility** covers an area of 63,000 sq. m. It has two levels, both accessible for trucks, 48 travel-through loading docks at ground level and 23 standard docks on the upper level. This new urban distribution hub is located on the port of Gennevilliers, notably giving IKEA France the use of 50,000 sq. m. to supply Paris and the western Paris area.

Green Dock: unique in Europe

Driven by Goodman on Gennevilliers port, the Green Dock project involves the construction of a 90,000 sq. m. logistics warehouse. Unique in Europe, **this four-level building optimises land use and anticipates zero land artificialisation requirements (ZAN)** while also meeting the logistics needs of the Grand Paris urban district authority as part of the low-emissions zone (ZFE). A floating pontoon will provide a river-based solution for last-kilometre logistics into the central city area.



The digital transition



Ensuring seamless, reliable traffic flows

Now a one-stop port service

The 4th generation collaborative electronic system known as the Port Community System (PCS) offers a one-stop port service, i.e. a single point of interaction for all stakeholders in logistics chains. It is completely automated and available around the clock, **providing instantaneous information transmission and information-sharing during port operations**. It ensures seamless, organised supply chain flow management, helps reduce port congestion and provides customers with faster goods release.

The one-stop port service (Guichet unique portuaire – GUP) comprises the following services:

- The **SJONE** platform developed by SOGET (*) is a **digitalization resource for document, goods and logistics flows related to foreign trade**. It guarantees **improved connectivity between actors**: based on the most advanced digital applications, SJONE enhances goods throughput performance, fluidity and reliability.
- **DrakHAR**, a new information system developed by HAROPA PORT, is used by the Rouen port community to manage waste from ships (ECOPORT), **reception of declarations and the organisation and operational monitoring of maritime and river port calls**. Based on the same technology as S-WiNG, as used by Le Havre, it is now a tool for comprehensive port call management along the Seine Axis. It includes a component specifically intended for the management of hazardous goods, TIMAD, providing a simplified declaration procedure that is 100% dematerialised and optimised, along with real-time (24/7) tracking of the transportation of hazardous materials to and from port.

(*) A publisher of international trade facilitation software since 1983.



Rouen: Quai de la Papeterie

My T&T : tracking containers with a single click

The Easyport economic interest grouping formed by HAROPA PORT and SOGET launched its first two applications in Le Havre in 2023. "My T&T", which is free of charge and open for general access, lets users track the transportation of goods in real time from anywhere in the world based on the container reference. This means that transport and logistics operations can be optimised due to enhanced fluidity, effectively resulting in lower costs and fewer delays. As for "My ETA", this uses artificial intelligence for more reliable estimated ship arrival times: the information gathered makes for a more efficient supply chain.

According to Stéphane Raison, CEO of HAROPA PORT: "These applications make our ports more attractive by offering our customers value-added services for the traceability of their goods."

"PortAll", for safer navigation

This service provides shipping companies **with electronic maps of Rouen and Le Havre navigation channels** and offers them access to useful information for the planning and preparation of their port calls, and thereby safer navigation. The server can be accessed via a web link issued on request by the Rouen harbourmaster.

A digital twin: a port realer than reality!

HAROPA PORT is developing a digital twin for ship port call operations and time spent at berth. Based on data synchronisation (sea and weather conditions, vessel characteristics, cargo type and volume, gantry crane status, availability of port facilities and manpower, and so on), **this tool enhances the safety and efficiency of port operations**, in line with the IMO-recommended JiT (Just in Time) Model.



Digitising mobility

Traveling with the web app...

HAROPA PORT has launched its web app across the Seine Axis ports: this information vehicle issues notifications wherever construction works are likely to impede traffic and allows any incidents to be reported.

Waze: now also on ports

HAROPA PORT wanted Waze to take account of ongoing construction works on the port industrial area in Le Havre, as well as bridge and lock operations, allowing users to plan their trips and adjust their routes.



Preventing cyber risks

Enhanced security with CYMPATI

HAROPA PORT is working on the creation of a **Port Cybersecurity platform** (CYbersécurité Portuaire, MARitime eT Industrielle – CYMPATI) whose purpose is to enhance cybersecurity to benefit the information systems of actors in the logistics chain, thereby guaranteeing data security. The project is part of the “Le Havre, smart port city” programme.

The first edition of the “Cyber Guide”

In September 2023, HAROPA PORT and Seine Port Union launched the first “Cyber Guide for Seine Axis port industrial areas”. This resource was developed with the support of SOGET and GIE Easyport with the aim of supporting **an effort to raise collective awareness** of cybersecurity among port operators.

Digital security – a national issue

HAROPA PORT is a member of Campus Cyber, a national cybersecurity flagship comprising actors in this field (companies, government departments, training organisations, researchers and non-profit bodies).

The objectives:

- To bring the cybersecurity community together for greater control of digital risks;
- To develop synergies between actors for focused technological innovation;
- To assist training to ramp up skill levels across the entire ecosystem.



Working together

Making use of drones

HAROPA PORT is a member of CIDN Drones (Normandy drone innovation centre), which develops drone solutions for use in the maritime and port environment. **Based on the pooling of equipment and resources** among partner members, the CIDN conducts field trials of anti-drone measures, air quality surveillance, 5G, and more.

Learning coding at École 42

HAROPA PORT has partnered with *École 42* in Le Havre, where participatory computer technology training is helping to add professional skills to the Seine Axis, the aim being to develop digital innovations. This partnership provides training for the entrepreneurs who will be supporting HAROPA PORT in future port digital transition projects.

The “5G Lab” collective

This collective was formed by the port and the Le Havre Seine Métropole urban district authority in 2020 as part of the “Le Havre Smart Port City” programme, and includes three industrial firms: Nokia, Siemens and EDF, who have now been joined by Hub One, a digital subsidiary of the Paris Airports Authority (ADP). The objective: to test **use cases for private-sector industrial 5G** with a view to potential development along the Seine Axis.

Identified practical use cases include:

- **On-water connectivity:** improving land-sea communications to allow commercial vessels to exchange information as early as possible on their approach to port, plus coverage for the development of new services, notably based on the following applications:
 - o Real-time high data-rate transmissions: video, tug assistance, bathymetrics, dredging, risk management.
 - o Connected items: buoys, sensors for advance notification of navigation conditions.
- **Logistics and multimodality:** coverage of industrial parks and improved connectivity for mobile equipment, an anticollision system, predictive maintenance, traceability.
- **Industry 4.0:** digitisation of procedures, improved connectivity for operators, simplification of telecoms, predictive maintenance, geolocation of property and individuals.

Private-sector 5G coverage is generally intended for use only by port and industrial firms. It constitutes key infrastructure whose purpose is to **enable the digital transition and enhance the attractiveness of the Seine Axis**.

The environmental transition



A new form of bunkering

Deployment of multi-energy service stations at Greater Paris ports

Following a call for project proposals issued by HAROPA PORT for the provision of real estate at a number of ports in the Greater Paris region, Distry, a company, will be installing multi-energy service stations at Bonneuil-sur-Marne, Bruyères-sur-Oise and Montereau-Fault-Yonne. **They are additional to those already in place along the Seine Axis**, notably including the NGV refuelling facility based in Le Havre's port-industrial area near its logistics parks.



Le Havre: Port 2000



Quayside electricity

Work is ongoing on quayside electrification for the cruise terminals in Le Havre and Rouen. This programme is part of a broader approach to include quayside electrification along the Seine Axis and the roll-out of supply points for water and electricity at terminals of strategic importance for river transport (especially for river barges and river cruise ships in Paris). These ambitious goals will make HAROPA PORT Northern Europe's first port to be able to provide 40MW to cruise ships, starting in 2025.

The ITOCHU study focuses on ammonia

HAROPA PORT intends to offer a mix of various green fuels for bunkering and to that end is contributing to a study into **the safe utilisation of liquid ammonia** now being conducted by ITOCHU, a Japanese company, alongside seven private firms and global organisations (including CMA-CGM and the port of Rotterdam). One of the main topics relates to simultaneous use on container terminals of two types of operations: containerised freight and ammonia bunkering, the aim being to help container transport firms achieve greater efficiency.

Protecting nature

Ecological innovation on the Seine Axis also involves...

- **Connection of houseboats to the Paris sewer network** to “regain high water quality”. To date, 43 ports out of 45 have been connected. The challenge now is to carry out this programme before the 2024 Olympics on the 17 kilometres of quayside under HAROPA PORT management.
- **Collaboration in Rouen with Néo-Eco**, a company, on research into the recycling of dredged sediment: it could be used to produce concrete and as gravel in roadbuilding, leading to the emergence of local circular economy sectors across all France’s ports.

Bacteria for cleaner sediment

The port of Rouen is making use of “bioremediation” to put dredged sediment to good use. The idea is to utilise bacteria, fungus and various plants capable of removing or neutralising water pollutants. Applied initially in February 2022 in the Charles-Babin dock (Saint-Gervais basin), this biological process has proven its worth: dredged sediment can now be used to fill in gravel pits.



The Seine Estuary

Creating societal value



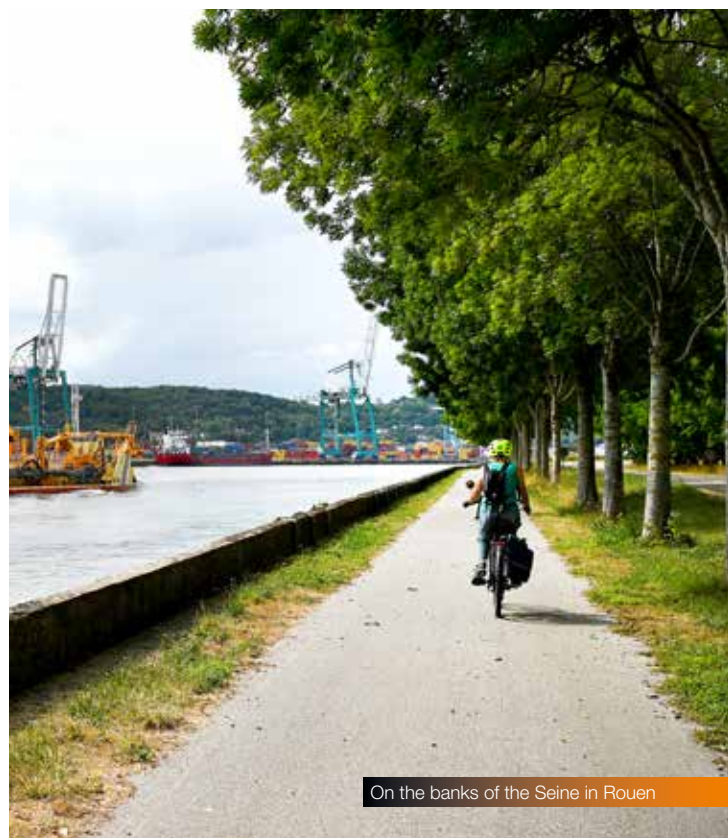
On the banks of the Seine in Paris port

Favoriser l'acceptabilité des ports

Ports are often seen as closed off spaces isolated from the city and recreational and residential areas. Today, HAROPA PORT is adapting to a growing demand from wider society for **mixed site uses** and to allow local residents **to reoccupy certain sites by associating them with local development projects**.

Rethinking the port's place in the city

- **In Paris**, in a local context of strong societal demand and the reopening of the river, HAROPA PORT is creating mixed-use spaces compatible with local activities at Paris area ports. One example is Boulogne–Legrand port, which has been entirely redeveloped: opened in 2023, it now addresses the strategic issues around modal shift, development of urban river logistics and the desire to return to the river and make it a place for walking and recreation. This means coexistence between passenger stop-off points, transshipment docks, promenade areas and spaces for leisure and shops.
- **In Rouen**, the port is continuing to transform its port and industrial sites. The Flaubert eco-district (90 hectares on the left bank) is under redevelopment as a park running alongside the river and associated with an almost 3km-long promenade area. This programme won the national grand prize for landscaping (2018). Along the quaysides, within the city itself, hangars (104, 105, 105b) have become centres for tourist, cultural, business and leisure activities.
- **In Le Havre, Southampton dock** (winner of the 2020 Le Moniteur Équerre d'argent prize for architecture) is now a recreational space for local residents and tourists. In the same spirit, the port and Le Havre Seine Métropole urban and district authority have created a greenway for cyclists and pedestrians that crosses more than 7km of port industrial area, linking Le Havre to the Normandy Bridge, following the route of the celebrated 4,000km Vélomaritime – EuroVélo 4 from Kiev to Roscoff.
- Founded (*) in 2015, the purpose of **Le Havre Port Centre** is to bring people together in **a collective effort to explain the port!** Fostering discovery and discussion with the local population, schools, students, professionals and tourists, it is the first facility of its kind in France.



On the banks of the Seine in Rouen

(*) by Le Havre city authority, Le Havre Seine Métropole urban district authority, HAROPA PORT, the Seine Estuary Chamber of Commerce and Industry and the Union Maritime et Portuaire.

Forming ties with the local region

- **Dialogue, the keystone of every project**

HAROPA PORT is in constant dialogue with its local populations. Over and above the public consultations required by regulations and governed by law, exchanges of views are increasing on all Seine Axis projects, ranging from the PSMO (Port Seine Métropole Ouest – a Paris area port to serve the region) to the projected river access channel to Port 2000, and including the development of the riverbanks and industrial programmes in Rouen: dialogue is now a permanent fact. It takes the form of numerous workshops, newsletters and site visits, as well

as schemes for continuous contact such as the port improvement charters (see sidebar) and the standing consultation bodies already in place at ports of Bonneuil-sur-Marne and Gennevilliers.

- **A wide variety of partnerships, including:**

- Le Havre Seine Développement,
- Rouen Normandy Invest (RNI),
- Choose Paris Region,

on topics connected with the attractiveness of the local region, innovation and economic development.



Le Havre, Southampton dock

A Port Improvement Charter

HAROPA PORT, the City of Paris and construction and recycling sectors companies have signed a Port Improvement Charter whose purpose is to set out a commitment to making the riverbanks beneficial for all and to reconcile apparently incompatible site uses. The objective is to help improve the integration of ports and their installations into their urban, architectural and landscape surroundings, to control their societal and environmental impacts and to foster dialogue between all stakeholders. It was in this context that the signatories (firms in the construction and recycling industries) agreed to submit to annual audits of their facilities, to be carried out by ECOCERT, an independent body. With a view to transparency, the results are to be made public. The banks of the Seine and the Paris canals now have their own star rating system, like hotels and restaurants.

The ports also support social inclusion

In addition to the many partnerships that open ports and quaysides up to initiatives of all kinds, HAROPA PORT grants preferential tariffs to a range of establishments pursuing cultural or social inclusion goals and located on port territory, among which are a number of organisations in Paris:

- “Péniche du Cœur”, a houseboat for the emergency housing of homeless people;
- “Fleurion Saint Michel”, a houseboat run by the Order of Malta for the benefit of particularly vulnerable individuals;
- “Thalassa”, a former motor launch, now a halfway house for former prisoners;
- “Les Amarres”, a quayside inclusive, festive safe space at Austerlitz port;
- and the Adamant, a unique psychiatric institution.



International positioning

The background of the slide is a deep teal color. On the right side, there is a stylized representation of a globe. The globe's surface is covered with a complex network of thin, light-blue lines that connect numerous small, glowing white dots. These dots are distributed across the globe, with a higher concentration in the upper left quadrant. The overall effect is one of global connectivity and digital infrastructure.

Innovating together

MAGPIE's European pilot projects

HAROPA PORT is taking part, alongside 44 European partners, in a programme for excellence driven by the port of Rotterdam: MAGPIE (sMArt Green Ports as Integrated Efficient multimodal hubs). The objective: **to develop new technologies for greener maritime transport** by launching pilot projects in areas related to energy and the digital transition, as well as connections to port hinterlands. Magpie trials include: designing electrical charging buoys for power supply to ships moored at sea, and a CO₂ emissions tracking methodology based on digital twinning (i.e. a virtual model of the port).

PASSport for drones

As a member of IAPH (International Association of Ports & Harbors), HAROPA PORT is active in the PASSport programme: this platform operates a fleet of semi-autonomous drones using satellite geolocation. It supplements existing surveillance systems in order to provide **a high level of security across European ports** (cf. EU directive 2005/65/EC).

WPCAP, for fast, collective action

HAROPA PORT is part of the World Ports Climate Actions Program – WPCAP, **a voluntary undertaking by 13 international ports** that, working together, wish to open the way and contribute to the building of future standards. This collective effort is an essential condition for fast, effective action. Among the priorities: quayside electrical power connections for ships at berth to improve air quality and reduce port CO₂ emissions.



Protected area in the port zone.

ABOUT HAROPA PORT

HAROPA PORT, France's leading port, is connected to every continent thanks to its top-rank international maritime service offering. It stretches along the Seine Axis from le Havre up to Paris, including Rouen. This port complex forms a transportation and logistics system capable of providing end-to-end holistic, decarbonised services. HAROPA PORT generates annual maritime and river activity amounting to over 100 Mt and representing some 160,000 jobs.



www.haropaport.com