

## ZIBAC - Decarbonization of ZIP activities other than industrial ones

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AAP ZIBAC - 431A – Public summary -  
Decarbonization of port services - GPMD

### 1. Context and objectives:

Studies on Freight Massification and Decarbonization

The Grand Port Maritime de Dunkerque (GPMD) aligns with the national industrial decarbonization strategy, in line with France's targets: a 30% reduction in CO<sub>2</sub> emissions by 2030 (compared to 2020) and contributing to carbon neutrality by 2050. The Dunkerque Industrial and Port Zone (ZIP) is the first awardee of the ZiBaC call for projects through its "DKarbonation" initiative led by the public interest group EcosystèmeD, created at the initiative of the Dunkerque Urban Community (CUD). This group mobilizes private and public stakeholders in the territory, including the GPMD, around promoting sustainable transformation of the area. A lever on which the GPMD can act directly in connection with industrial actors concerns the decarbonization of goods flows, both within and outside the port area.

#### Study objectives

The various studies aim to decarbonize freight transport based on:

- Modal shift solutions, massification, flexibility and speed, and the development of decarbonized transport;
- Modernization of the port rail network.

To achieve these objectives, the work axes have focused on:

- The need to structure the approach by creating a community of interest bringing together public services, companies, transport operators, handlers, and network managers;
- Feasibility study for a rolling highway (ferroustage) terminal;
- Study on modernization of port rail infrastructure;
- Creation of a modeling tool for flows and scenarios in the form of a "digital twin" (Phase 1).

Freight mobility is a key axis in the decarbonization of the ZIP. This goal requires coordinated action from all stakeholders and is strongly linked to passenger mobility and the development of transport infrastructure.

This action allows the GPMD to structure a master plan for the development and decarbonization of freight transport within the Industrial and Port Zone, shared by all stakeholders.

### 2. Main results

#### MovinOn Community of Interest:

The objective was to establish a collective approach to identify levers for massification and modal shift and to bring forward innovative and adapted solutions. Discussions highlighted the need to better understand current and future internal goods flows in the ZIP and to have a planning and transport modeling tool: the Digital Twin. Further studies on dedicated rail lines were also raised.

### Feasibility of a Rolling Highway Terminal

In October 2020, the GPMD launched a Multi-Criteria Analysis study of rolling highway platforms (SYSTRA Study) to support its decision to issue a Market Consultation (AMI) for the creation of a rolling highway terminal. Following the MCA study, it emerged that the technology proposed by LHOR was best suited to GPMD's needs. It was decided to engage DNA Consult, the sole expert in this field, to carry out a feasibility study.

Following the study, it became necessary to launch an AMI to identify an operator capable of implementing the project. This AMI was launched at the beginning of 2025 and awarded to MODALIS. The laying of the first stone in November 2025 illustrates the realization of a project initiated by the feasibility study. This strategic low-carbon logistics infrastructure will be operational in 2026. The terminal will accommodate four 750-meter trains, transfer up to 50,000 TEU/year from road to rail, and connect Dunkerque to major European industrial hubs, reaching Piacenza via Lyon. Emission reductions are estimated at nearly 70,000 tonnes of CO<sub>2</sub> per year.

### Railway Development Plan for 2030

This mission, carried out by SYSTRA, aimed to conduct an in-depth diagnosis of the existing network, integrating technical, functional, and performance dimensions to provide a clear and shared understanding of the current situation. It also aimed to define projected and targeted traffic levels qualitatively and quantitatively and identify short-, medium-, and long-term needs. These needs were then translated into coherent infrastructure development scenarios covering all components. This study is the first diagnostic step, currently being shared with local stakeholders, particularly SNCF Réseau, to support national objectives for the development of rail freight.

### Digital Twin

CEA Tech is developing, as part of ZIBAC, the first phase of a digital twin of port terminals based on the GPMD. The digital tool, developed by CEA and named **EFFICIENCE Digital Twin**, can:

- Explore use cases and assess performance linked to digital twin technology;
- Implement tool prototypes in a representative environment;
- Develop support tools for sizing modal shift platforms, including:
  - A data generator enabling users to easily create scenarios for testing in the Digital Twin;
  - A generic simulation modeling framework allowing multiple digital twins to be instantiated;
- Develop decision-support tools for goods flow processes.

It produces productivity, energy consumption, and carbon emission indicators to identify the most impactful operations at each stage of ship unloading.

### 3. Conclusion

The various sub-studies provided clear insights into the state of GPMD's infrastructure and future needs to meet national and local modal shift objectives. Engaging stakeholders in the industrial and port zone allowed prioritization of the most relevant projects. The initiation of a digital twin (R&D) has emerged as a promising avenue for exploration.

## RÉSUMÉ

As the first awardee of the ZiBaC call for projects through its “DKarbonation” initiative, the Dunkerque Industrial and Port Zone (ZIP) concentrates a significant portion of the territory’s energy-intensive industrial activities.

The GPMD initially initiated the creation of a community of interest with freight transport stakeholders. This community highlighted the need for dedicated rail lines and the development of a digital twin of the port. Regarding rail freight development and thus modal shift, two sub-studies respectively present the feasibility of an LHOR technology rolling highway terminal and scenarios for the development of the rail network in alignment with the placement of flow generators within the port area.

This document describes the work carried out by CEA within the framework of the Zibac project on behalf of the Grand Port Maritime de Dunkerque. This work focuses on the implementation of digital twins and the specific parameterization developed to model container terminals, rolling highway terminals, RoRo terminals, and ferry terminals. Ultimately, the digital twin will allow the calculation and, in fine, the reduction of energy consumption and the carbon impact of freight transport at the scale of an industrial and port zone.

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