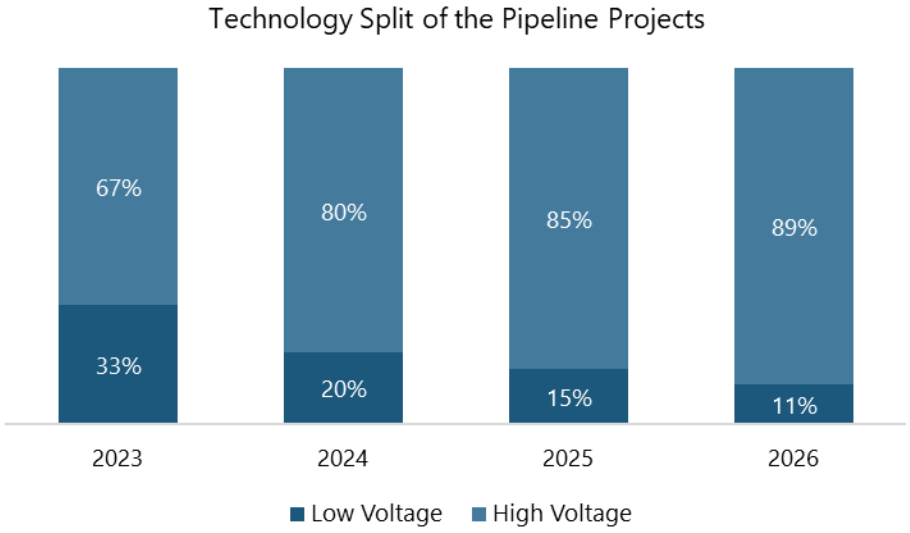
The Ecosystem behind Shore-To-Ship Power in Spain

Introduction

Ports across Europe are aiming to achieve the decarbonization goals set by the EU's "Fit for 55" target which requires ports to reduce their GHG emissions by 55% by 2030 and ultimately make the EU climate neutral by 2050. Globally, Europe is the leading market for shore-to-ship power systems due to several country-level initiatives by European countries. These markets include Norway, Sweden, Netherlands, and Germany. Among these markets, the shore power market in Spain is in a growing phase and many ports are taking initiatives toward the electrification of their terminals. Historically, Spain has installed several Low Voltage (LV) shore-to-ship power systems which indicates that a significant market of High Voltage (HV) systems is addressable which is evident from the chart below:



Stakeholders Overview

- **Country Level Stakeholders**

The ports in Spain are owned by the government without the involvement of any municipality and the port authorities report to the central government. Puertos del Estado, the national agency for state ports coordinates the Onshore Power Supply (OPS) Master Plan for Spanish ports. It has set a budget of €6 million which includes an EU subsidy of €1.5 million. This plan is part of the National Action Framework for the development of infrastructures for the use of alternative fuels in the transport sector, co-financed by the Connecting Europe Facility - CEF program for the construction of the Trans-European Transport Networks (TEN-T).

The shore power connections at the ports require an enormous amount of electricity and utility companies are responsible to handle the excess energy demand. In this regard, they must look for the upgradation of their grids or the installation of new substations. The port authorities themselves also are looking to

meet the excess demand by taking initiatives of installing rooftop solar and wind power-based generation systems.

In the initial phase of the OPS Master Plan, three pilot projects have been installed at the **port of Tenerife, Pasaia port**, and the **maritime connection Palma de Mallorca-Barcelona**

- **Port of Tenerife** has installed OPS at Santa Cruz de Tenerife, Santa Cruz de La Palma, and San Sebastián de La Gomera in Spring 2019.
- **Pasaia Port** has provided a power supply at its Ro-Ro vehicles' specialized berth.
- Balearic Port Authority together with the Port Authority of Barcelona, has offered power supply in two berths in **Palma de Mallorca** in December 2021 and **Barcelona ports** in August 2020 respectively.

In addition to the pilot projects, the OPS Master Plan has been expanded to install more shore-to-ship power systems in Spain till 2025. During the "OPS Meet Algeciras 2022" held on July 7th, 2022, at the port of Algeciras, it announced the installation of the OPS facilities at the passenger terminals of the **ports of Algeciras and Tarifa** before 2025 with an investment of €30 million. In a later phase, the project will be expanded to cater to the container terminals gradually till 2030. In a recent development in December 2022, the port of Algeciras has tendered the first of these projects for the OPS installation at its passenger terminal. The €150,000 for this specific project is being funded by the Next Generation EU Funds. The port's commitment to decarbonization is evident from the fact that it has invested €40 million in the past decade to ensure the uninterrupted supply of electricity with the connection of the Isla Verde substation with that of Cañuelo.

- **Regional Stakeholders**

European Flagship Action for Cold Ironing (EALING) program aims to provide a sustainable TEN-T maritime network. EALING Studies is an EU harmonized framework for the electrification of 16 EU maritime ports including 4 Spanish ports. It will accelerate the effective deployment of 30 OPS facilities at these EU maritime ports.

Opportunity Areas and Case Studies from Recent Projects

One of the key challenges for ports is to overcome the insufficient grid capacity constraint to meet the excess demand in most port facilities. Also, the electrical network does not usually reach the connection point at the docking facilities. Several new opportunities have emerged due to this challenge, and it has brought together companies from various backgrounds to come up with solutions.

- **Role of Utilities:**

EALING Works Valenciaport aims to upgrade the port infrastructure by constructing a new high-to-medium-voltage electrical substation and the underground electrical lines connecting the substation to the grid to cater to the additional energy demand because of shore power connections at the **port of Valencia**. In January 2022, the contract for the construction work for the electrical substation is awarded to the company Cobra Instalaciones y Servicios with a completion period of 24 months and the connection to supply 132 kV voltage to the new substation is given to the company Eiffage Energía, with a completion period of 8 months.

The collaboration between the port authorities and utilities is very crucial for the installation of OPS facilities at the ports. Such a collective effort is observed in the Nexigen project of the **port of Barcelona**, also called "The Wharf Electrification Plan". It is an initiative to reduce carbon emissions to half by 2030 and become a carbon-neutral port by 2050. The port is also promising to provide self-generated renewable energy to these OPS connections. The project has an estimated cost of €110 million and it is co-financed by CEF. A major portion of these funds, €90 million would be used to establish OPS systems. To implement the pilot project, the **Port of Barcelona** has chosen PowerCon to install OPS at the BEST terminal. The remaining amount of €20 million, is dedicated to enhancing the electrical network including two 30 MVA transformers. As a result of the collaboration of the port with the utility Red Eléctrica, the construction of the new 220 kV Ronda Litoral substation has started, which is one of the keys to the success of the Wharf Electrification Plan that will connect the port directly to the high-capacity electricity grid to safeguard the energy supply in the future as well. The first cruise ship will be connected to the port power grid in 2026. The **Port of Barcelona** Dock Electrification Plan is fully aligned with the United Nations Sustainable Development Goals (SDGs).

- **Fostering Collaborations:**
  - **Collaboration with the Private Entities:** Collaboration of the ports with private companies working in the domain of new energy such as hydrogen and energy storage systems can enable ports in realizing a green future. In 2022, the **Port of Bilbao** kickstarted the BilbOPS project which is divided into multiple phases with the first phase of having shore power systems deployed at seven docks. The second phase of the project entails the development of a mobile platform that will generate electricity from hydrogen. This is being done in collaboration with maritime industry players i.e., Petronor, Ferrovial, and research partners like Tecnalia.
  - **Collaboration with Energy Companies:** In November 2022, EndesaX, a subsidiary of a private utility company Endesa, is developing OPS infrastructure to make the **Port of Cadiz** the first port in Spain to offer electricity to cruise ships at the Alfonso quay XIII. The project is expected to be completed by the end of 2023. This will allow EndesaX to build and operate the shore-to-ship power system at the **port of Cadiz** allowing the port authority to achieve its GHG goals by getting involved in the details of project deployment and operation.
  - **Working Groups of Ports and Vessel Operators:** The OPS Master Plan of Puertos del Estado is providing a platform for the various stakeholders to come and work together for the installation of shore power systems. In September 2022, an initiative was taken by the **port of Barcelona** through the creation of a working group of the port, cruise companies, and terminals to accelerate the plans of electrification and reduce vessel emissions.

Funding Schemes

The two major funding schemes to provide grants for shore power connections are the Recovery Plan, Transformation and Resilience funds, and CEF Transport Alternative Fuels Infrastructure Facility.

- **Recovery Plan, Transformation, and Resilience**

The Recovery Plan, Transformation, and Resilience funding for shore power is €60 million which is equally distributed in three annual installments from 2022 to 2024. The deadline to apply for the next call of aid will be from April 1 to June 30, 2023, at noon. To apply for this grant, the documentation is to be submitted through the electronic headquarters of the Ministry of Transport, Mobility and Urban Agenda (MITMA).

- **CEF Transport Alternative Fuels Infrastructure Facility (AFIF)**

The total budget for this scheme is €1.5 billion. It was launched in September 2021 and will be implemented through a rolling call with five cut-off dates for the submission of proposals until the end of 2023.

- 19 January 2022, 17:00 (CET)
- 07 June 2022, 17:00 (CEST)
- 10 November 2022, 17:00 (CET)
- 13 April 2023, 17:00 (CEST)
- 19 September 2023, 17:00 (CEST)

This funding is coming through two channels. One is the implanting partners funded by the European Investment Bank or other European central entities. And the other is from the non-implementing partners provided by other public or private financial institutions.

AFIF Budget (2021-2023)	European Region Funding	Other Funding
AFIF Cut-off 1	€4,500,000	€81,998,692
AFIF Cut-off 2	€116,591,270	€175,940,907
AFIF Cut-off 3,4,5	€928,908,730	€267,060,401
€1,575,000,000	**€1,050,000,000**	**€525,000,000**

Way Forward

To achieve the collective decarbonization goal, Non-governmental Organizations (NGOs) and port associations are also taking initiatives to increase the collaboration between urban authorities, port stakeholders, and their partners worldwide. We are seeing such efforts being done in Spain as well. At the ESPO conference in Valencia (Spain) held in June 2022, the significance of public engagement in the ports' ecological transition was emphasized by the Association Internationale Villes et Ports (AIVP). Puertos del Estado is also taking several initiatives to reinforce connectivity and innovation in its activity such as facilitating exemption from electricity tax called 'quasi-elimination' of the electricity tax for connected vessels.

The decarbonization initiatives would flourish successfully by having strong cooperation between an energy producer and an energy user. As far as the public authorities are concerned, they do play a key endorsing role, ensuring, with available legislative and funding tools, that the business case is rendered positive. Faster implementation, cooperation among various entities, reciprocity, funding & clarity of funding sources combined with standardization & innovation are the key to the successful implementation of a project.

Introducing stringent policies, rolling out incentives for the ports and vessel owners to adopt those policies, and competition between various stakeholders is the best mechanism to create sustainable prosperity, jobs,

and innovation, but primarily and importantly, it substantially improves environmental quality for port-city citizens.