PORT OF CARTAGENA HACKATHON – 6 February 2025

Advances in energy innovation: four key projects for decarbonisation and sustainability

The Port Authority of Cartagena organised a Hackathon on 6 February within the framework of the energy transition and decarbonisation, with the support of the consulting firm Crowe for deployment activities and the H2Nostrum Association for innovation related to topics of strategic interest. This initiative was carried out in the context of consolidating potential proposals under the Port of Cartagena Authority's Portlab initiative and was motivated by the 2025 Innovation Fund call.

The Innovation Fund has a budget of EUR 2.4 billion allocated to renewable energy projects, decarbonisation, carbon capture, utilisation and storage, and energy storage. This fund is mainly financed through the EU Emissions Trading System (EU ETS), from which more than half of the EUR 40 billion total may still be available to support technological projects and new processes at small, medium and large scale, provided they meet the criteria of viability, maturity, decarbonisation potential, replicability and efficiency established by the call.

During the event, concepts related to four innovative projects of strategic relevance for the future were defined, ranging from carbon capture and storage (CO_2) to port electrification through the development of new energy systems. These initiatives aim to reduce external energy dependency, CO_2 emissions and other atmospheric pollutants, increase energy efficiency, and promote the circular economy for various industries and port-related activities.

The project concepts are outlined below:

1. **Hydrogen production and industrial and regional feedstocks**
   The project considers the production of hydrogen from renewable energy sources, as well as the generation of heat and cooling through new technologies (solar thermal and photovoltaic energy, electrolysis, heat pumps, etc.), in order to meet part of the energy demand of a highly innovative industrial company operating within the port.

In particular, the use of industrial-scale thermochemical processes is envisaged for the processing of biomass obtained from forest cleaning activities, as well as the production of biogas of agricultural origin, with the aim of obtaining feedstocks of interest for the regional petrochemical and agricultural sectors. The main barrier to implementation may be the administrative timelines required.

2. Carbon capture, transport and storage (CO_2)

This project considers the capture, transport and storage of CO_2 emitted by fuel-intensive industries located within the port area (cement production, fuel manufacturing, etc.). These companies have identified the need to efficiently manage the CO_2 released into the atmosphere during their production processes. The project is structured around three innovative technological pillars, each focused on a specific stage of the CO_2 value chain, and will make use of available renewable and residual energy sources. The main barrier may be the high investment required and the need for an integrated approach to maximise impact, although the involved stakeholders have already advanced their feasibility studies.

3. Electrification of port operations at the Port of Cartagena

This initiative aims to reduce pollution generated by port operations within the Port of Cartagena through the deployment of a highly innovative renewable energy generation and storage system. The project includes the use of photovoltaic panels on conventional and floating structures, as well as electrical storage systems, to supply clean energy to cruise ships docked at the port and to support other local activities. This model would significantly reduce the use of fossil fuels by vessels during their stay in port, contributing to lower pollutant emissions and compliance with new regulatory requirements.

4. Integration of renewable energy and carbon capture solutions (CO_2)

The fourth project explores the integration of different carbon capture, utilisation and storage technologies combined with renewable energy generation and innovative processes. The objective is to develop a demonstrator enabling a circular economy by transforming CO_2 into products of industrial interest. In this context, collaboration between technology companies and research centres will be essential to validate the technologies involved.

Challenges and opportunities

These projects face significant technological and regulatory challenges. Key issues include ensuring economic viability and profitability through well-defined business models, as well as obtaining permits, particularly environmental ones. In addition, scalability and replicability may depend on space availability, the evolution of energy storage costs and efficiency, and the development of shared infrastructure.

Despite these challenges, the four projects represent a major opportunity to position Cartagena and its port as benchmarks in clean energy and sustainability. Cooperation between companies, public authorities and research centres will be essential to turn these initiatives into reality in the coming years, contributing to climate change mitigation and the development of a more circular, green and resilient economy.