RÉPUBLIQUE FRANÇAISE
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DKarbonation

ADEME AGENCE DE LA TRANSITION ÉCOLOGIQUE

EXPERTISES

Creation of a seawater loop for the establishment of a hydrogen hub

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AAP ZIBAC – Projet DKarbonation

Objectives

Hydrogen production can require significant amounts of water to cool the electrolysers. The first hydrogen producer to set up operations in the ZIP conducted a feasibility study on a seawater loop for its cooling needs. The study highlights the challenges associated with this technology:

• The cost of supplying water via an open intake at sea appears to be financially and technically unfeasible.

• The coastal well solution involves lower network costs and water that is easier to treat, but operating costs are three times higher than those for industrial water: complex and costly water treatment, and energy-intensive pumping and well operation.

Developing this solution requires in-depth technical studies (geotechnical, hydrogeological, test pumping, simulations), an environmental impact assessment, and additional permits. It therefore became necessary, from a technical and economic standpoint, to pool infrastructure and procedures to enable economies of scale, conduct technical and environmental studies in advance, plan the investment over several years, and establish governance and a corresponding water sales policy. This study aims to analyze the feasibility of creating, on the West Port Industrial Platform, a network for supplying industrial water derived from seawater intake and treatment to meet the needs of industrial processes.

Results

The proposed solution includes a supply and discharge pipeline, a seawater intake, and a discharge outlet. The concept involves designing a pressurized network powered by a pumping station to supply water to the heat exchangers in the primary circuits of industrial facilities and to discharge the water from each heat exchanger into the Dunes Canal. The seawater loop first includes a water intake with a pumping capacity of 30,000 m^3/h. The pumping station has a dual function: to supply seawater to industrial facilities in the summer and to serve as a flood control station for the Bourbourg Canal in the winter.

The extracted water is then pumped via a DN1900 pipeline toward the future hydrogen hub over a distance of approximately 4.2 km. The water is then distributed to the various industrial facilities. The wastewater discharged by each industrial facility is then conveyed and discharged into the Canal des Dunes via a DN1900 pressure pipeline over a distance of approximately 1.3 km. Four industrial facilities were included in the project.

The investment is estimated at approximately €50 million (excluding tax), and the energy balance yields a result of 0.15 kWh/m^3 distributed.

Conclusion

The study demonstrated the technical feasibility of such a solution. The investment is contingent upon there being a sufficient number of large water consumers in the area. It should be noted that hydrogen producers have been able to reduce their projected water consumption by implementing the best available techniques.

RÉSUMÉ

The GPMD has studied the technical feasibility of a shared seawater pumping facility for several industrial companies, particularly hydrogen producers, whose seawater could be used to cool electrolysers and thus conserve the area's industrial water supply.

The study demonstrates the technical feasibility of such a facility, which would provide flood protection in winter and maintain effuent temperature even during the summer.

The pumping capacity is sufficient to supply four industrial sites with a flow rate of 30,000 m³/h. The economic benefit lies in the shared use of such infrastructure, hence the importance for the GPMD to proactively study this feasibility.

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