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PROSPECTIVE, ECONOMIC AND LEGAL STUDY ON THE USE OF NON-CONVENTIONAL WATER AND THE DEVELOPMENT OF AN INCENTIVE-BASED PRICING SYSTEM

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FRANCE 2030

CFP ZIBAC – Securing industrial water resources and developing incentive-based pricing to support territorial resilience

The Dunkirk area is characterized by a high industrial density and significant water consumption within the processes of major companies located in the industrial and port zone. In 2024, fifteen companies connected to the industrial water network consumed more than twenty-two million cubic meters, drawn mainly from the Bourbourg Canal. This resource is currently under considerable pressure due to climate change, increasing scarcity, and the arrival of new companies expected in the coming years as part of the area's ongoing industrial development.

It is within this context that ÉcosystèmeD commissioned a study divided into two complementary phases, aiming both to identify new technical solutions for water supply and to rethink industrial water pricing in order to strengthen the collective resilience of the local ecosystem.

The first phase of the study aimed to assess the feasibility of a large-scale storage solution capable of capturing *Wateringues* water during winter, when several hundred million cubic meters are discharged into the sea. The working hypothesis was to store approximately 500,000 cubic meters of raw water during the winter months and release it during low-flow periods. This volume represents barely 1% of the water volumes evacuated each year by gravity, making the project hydrologically feasible. The main challenges associated with this solution are therefore land, technical, and financial.

Three potential sites were analyzed within the Dunkirk Grand Port Maritime area, with the intention of prioritizing locations already designated for development to avoid any new land artificialization. The site located near the Bourbourg Canal and the industrial water network was identified as the most suitable. Three types of infrastructure were then compared:

- An underground reinforced concrete storage facility beneath urbanized areas,
- An above-ground storage solution,
- An extension of the Puythouck Lake in Grande-Synthe.

While the underground option ensures optimal integration, it proves costly and technically complex to implement. The above-ground basin, though more visible, appears to be the most realistic option, offering a good balance between technical feasibility, cost control, and environmental impact. The extension of the Puythouck Lake, on the other hand, faces significant environmental and regulatory constraints due to the site's classification as a nature reserve.

The study concludes that the water resource is available, but the project's success will depend on careful coordination between land constraints, local acceptability, and financing capacity. In the long term, such storage facilities could become a key tool for securing the industrial water network during drought episodes.

The second phase focused on the pricing structure of industrial water access in the area. Currently, the tariff system combines a fixed and a variable component, resulting in heterogeneous access costs among companies. The four main consumers—representing 94% of total consumption in 2024—benefit from lower tariffs than smaller users. The purpose of this preliminary study on tariff restructuring was therefore to reduce these disparities and to create an economic incentive for water efficiency and the use of non-conventional water sources.

Four scenarios were modeled to test different approaches to tariff evolution:

- Scenario A, which does not include new investments, adjusts the number of pricing tiers and the variable rates associated with each tier to achieve more homogeneous prices per cubic meter among industrial users.
- Scenario B integrates the cost of the *Wateringues* storage solution, redistributing it through a dedicated tariff, shared among industries based on their consumption during low-flow periods.
- Scenario C evenly distributes investment costs related to all alternative non-conventional water solutions among all industrial users.
- Scenario D applies differentiated pricing according to the type of solution and its beneficiaries, so that only the direct users of new alternative water sources bear their final cost.

These scenarios resulted in a reduction in price disparities between industrial users while maintaining the financial sustainability of the industrial water service across the territory. The introduction of seasonal differentiation during low-flow periods, combined with the distinction between conventional and non-conventional water, opens the way to an incentive-based pricing system aligned with both the economic and environmental priorities of the region.

This study demonstrates the complementarity between technical and economic levers. The development of storage solutions based on *Wateringues* water provides an operational tool for diversifying supply sources, while tariff restructuring serves as a key governance mechanism for encouraging industries to adopt more sustainable water management practices. Together, these initiatives lay the foundations for a new territorial model of industrial water management — one based on better-shared resources, fairer pricing, and renewed collective governance.

RÉSUMÉ

The Dunkirk area is a highly industrialized territory, with industrial water consumption exceeding 22 million cubic meters in 2024. In a context marked by climate change and industrial expansion, securing and optimizing water resources have become top priorities. To this end, ÉcosystèmeD has conducted two complementary studies: a technical study exploring a raw water storage solution to ensure supply during summer periods, and a tariff study focusing on the future restructuring of industrial water pricing.

The technical study assesses the feasibility of winter storage of 500,000 m³ of Wateringues water to be used during low-flow periods. Three potential sites within the port area were analyzed, and three storage configurations were compared: underground, above-ground, and an alternative option based on the extension of the Puythouck Lake.

The tariff study highlights significant disparities in industrial water access costs, with major consumers currently benefiting from a lower price per cubic meter than smaller users. The proposed reform aims to reduce these gaps, encourage water efficiency and the use of non-conventional water sources, while anticipating future local water governance. Four cumulative scenarios were tested, progressively integrating storage solutions and the necessary investments to secure access to non-conventional water through targeted, incentive-based pricing.

Together, these studies demonstrate the complementarity between technical and economic levers. Looking ahead to 2030, they lay the foundations for an integrated territorial model that combines secured resources, incentive-based pricing, and renewed governance among local stakeholders, supporting the ecological and industrial transition of the Dunkirk industrial-port zone (ZIP).

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