

1 General information

Seaport: Port of Antwerp-Bruges

Country: Belgium

Project title: Hydrotug 1

WPSP theme: Climate and Energy



2 Introduction

The Port of Antwerp-Bruges is steadfast in its commitment to achieving climate neutrality by 2050. As part of this ambitious goal, a comprehensive climate plan was developed aimed at significantly reducing CO₂ equivalent emissions by 2030, in accordance with the European Climate Law and the Paris Climate Agreement. This plan encompasses a detailed inventory of emissions across all scopes — internal (scope 1), indirect from purchased energy (scope 2), and indirect in the value chain (scope 3) — to accurately assess and mitigate the environmental impact. Among the flagship projects driving this vision forward is the Hydrotug 1, the world's first hydrogen-powered tugboat. This groundbreaking vessel dramatically cuts carbon emissions in maritime operations.

3 Description of the project

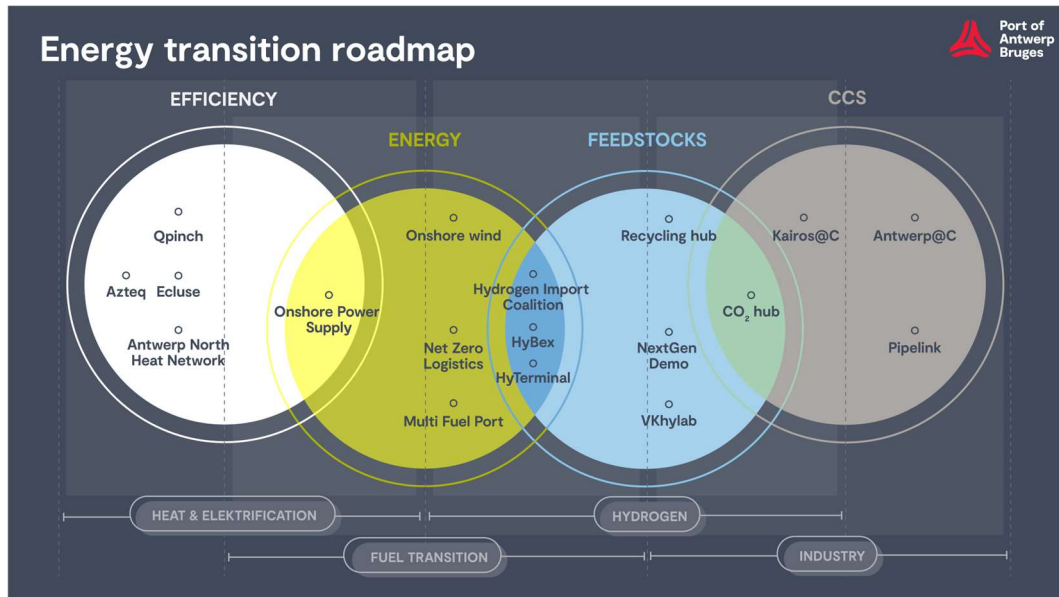
The Hydrotug 1 project, a collaboration between the Port of Antwerp-Bruges and CMB.TECH, marks a significant milestone in the port's sustainability journey. As the world's pioneering hydrogen-powered tugboat, this innovative vessel epitomizes the port's commitment to green maritime operations.

Equipped with dual-fuel technology, the Hydrotug 1 represents a strategic investment in clean energy solutions for tugboat propulsion. By incorporating hydrogen combustion engines, the port is not only reducing its carbon footprint but also setting new standards for environmental stewardship in the maritime industry.



4 Vision and leadership deployed by the port's management

The Hydrotug 1 initiative is a crucial component of the Port of Antwerp-Bruges' Energy Transition Roadmap, under the pillar of energy, highlighting a strategic focus on circular economy principles.



By investing in pioneering technologies such as hydrogen-powered tugs, the Port is not only reducing its carbon footprint but also setting a global benchmark for green maritime operations. The Hydrotug 1, equipped with dual-fuel engines capable of running on hydrogen and traditional fuels, epitomizes this forward-thinking approach.

This project underscores the Port's leadership in integrating environmental considerations into its operational and strategic planning, demonstrating a clear pathway towards achieving climate neutrality by 2050. As part of its vision to become a multi-fuel port, the Port of Antwerp-Bruges is leveraging innovative solutions like the Hydrotug 1 to transition towards sustainable energy sources. This approach fosters innovation and promotes collaboration across the maritime industry to achieve a more sustainable future. Additionally, it aligns with the Port's strategy of greening the fleet, contributing to the overall goal of reducing emissions and promoting environmental sustainability in maritime operations.

5 Engagement of societal and commercial stakeholders

The launch of the Hydrotug 1 by the Port of Antwerp-Bruges and CMB.TECH in december 2023, marks a significant milestone in sustainable maritime operations. This project highlights the region's dedication to environmental stewardship and innovation in the shipping industry. The Hydrotug project leverages the combined strengths of the Port of Antwerp-Bruges and CMB.TECH to develop advanced solutions for industries such as shipping, railways, and power generation. It is the first vessel that uses the BeHydro V12 dual fuel medium speed engines – each providing 2 megawatts – with the latest IMO Tier III & EU Stage V emissions

aftertreatment. BeHydro, a joint venture between Agoria member Anglo Belgian Corporation (ABC) and CMB.TECH, combines the skills of a premium engine manufacturer with the views of a leading ship owner, reinforcing CMB.TECH's leadership in sustainable marine and industrial technologies.

The Hydrotug 1 project also exemplifies European collaboration, integrating components sourced from across the continent. Built in Spain and prepared for operation at IDP Shipyard in Ostend, Belgium, the Hydrotug 1 showcases European shipbuilding expertise. Its propulsion system features BeHydro engines from Belgium, Swedish generators, and a Swiss-designed exhaust system for optimal environmental performance. The vessel's Dutch-crafted wheelhouse ensures efficient navigation and control. Central to the Hydrotug 1's innovation is the hydrogen technology developed by Antwerp-based CMB.TECH, marking a significant advancement in clean maritime energy solutions. The project's emphasis on local employment, with the entire crew hailing from the port, underscores the Port of Antwerp-Bruges' leadership in promoting sustainable maritime practices and regional collaboration.



6 Contribution to sustainability and the UN SDG's

The Hydrotug 1 project exemplifies a significant contribution to sustainability and the United Nations Sustainable Development Goals (SDGs). By embracing hydrogen-powered technology, the project directly addresses **SDG 7: Affordable and Clean Energy** by promoting the use of renewable and clean energy sources in maritime operations. Furthermore, the project aligns with **SDG 8: Decent Work and Economic Growth** by employing the entire crew from the local port, fostering economic growth and promoting decent work opportunities within the community. Through its emphasis on circular economy principles and the utilization of innovative technologies, such as hydrogen combustion engines, the Hydrotug 1 project supports **SDG 9: Industry, Innovation, and Infrastructure** by fostering innovation and sustainable infrastructure development in the maritime sector. Additionally, it contributes to **SDG 13: Climate Action** by reducing carbon emissions and mitigating the environmental impact of maritime transportation. Furthermore, the Hydrotug 1 project demonstrates a strong commitment to **SDG 17: Partnerships for the Goals** by fostering collaboration between public and private stakeholders. The partnership between the Port of Antwerp-Bruges and CMB.TECH, alongside other stakeholders, underscores the importance of multi-sectoral partnerships in driving sustainable development initiatives and achieving global sustainability goals.



7 Results

The introduction of the Hydrotug 1 marks a significant milestone in advancing sustainable maritime operations. With its dual-fuel engines capable of running on hydrogen and traditional fuel, the Hydrotug 1 has showcased impressive reductions in emissions and a commitment to eco-friendly practices within the shipping industry.

Notably, the Hydrotug 1 features 54 Type III hydrogen storage cylinders, with a total capacity of 415kg of hydrogen. It employs two 2MW V12 dual-fuel BeHydro engines, equipped with IMO Tier III & Stage V SCR and particulate filters, achieving a remarkable shift of 65% of traditional fuel consumption to hydrogen, reducing the associated emissions during its operational cycle. With a 65-ton bollard pull, this tractor tug is classified alongside Lloyd's Register and includes a Belgian branded Brusselle hydraulic- electric winch, and Volvo Penta IMO tier 3 & Stage V auxiliaries. The tug is manned by a crew of three and has a maximum gross tonnage of 499 GT.

By harnessing hydrogen as a clean fuel source, the Hydrotug 1 eliminates emissions yearly equivalent to those of 350 cars, making a substantial impact on reducing carbon footprint in maritime transportation. Its classification by Lloyd's Register and adherence to stringent environmental standards further validate its credibility and effectiveness as a green maritime solution. The successful deployment and operation of the Hydrotug 1 serve as a testament to the tangible benefits of embracing alternative fuels and cutting-edge technologies in maritime transportation.



8 Relevant information

[Hydrotug 1: the very first hydrogen-powered tug | Port of Antwerp-Bruges \(portofantwerpbruges.com\)](https://portofantwerpbruges.com)

[Port of Antwerp-Bruges & CMB.TECH launch the Hydrotug 1, world's first hydrogen-powered tugboat \(portofantwerpbruges.com\)](https://portofantwerpbruges.com)

[Hydrotug dual-fuel tugboat | CMB.TECH](https://cmb.tech)

9 Contact information



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