

PROJECT PARTNERS



FACTS AND FIGURES

Carbon-Neutral Production and
Direct Fuel -Cell Deployment of
IsoPROPANOL as Energy Carrier

Acronym: IsoPROPEL

Duration: 42 months

Start date: 1 November 2025

EU Funding: €3,995,636.25



Visit our website!
<https://isopropel.eu>



<https://www.linkedin.com/company/isopropel/>



Funded by
the European Union



Circular Liquid Fuel
for Clean Waterborne
Transport

IsoPROPEL Project

IsoPROPEL enables zero-emission waterborne transport through a waste-free energy cycle using renewable isopropanol to power fuel cells.

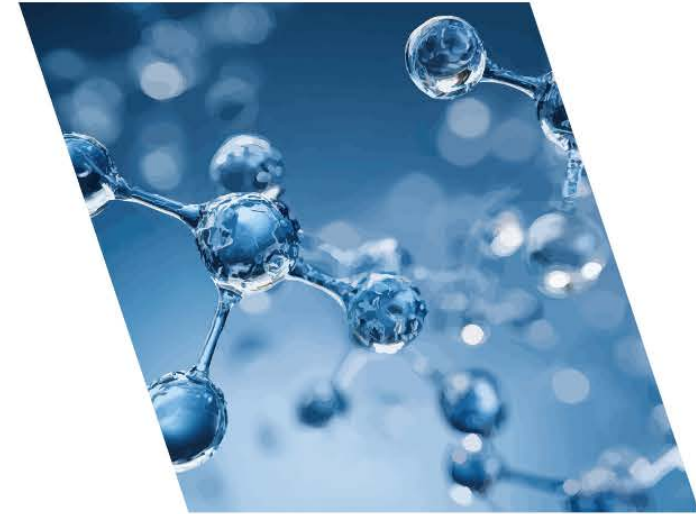
IsoPROPEL is a 3,5-year project developing renewable isopropanol as a high-density and recyclable energy carrier to power zero-emission waterborne transport. Paired with direct liquid-fed isopropanol fuel cells, isopropanol enables a zero-emission, circular energy cycle, avoiding the storage safety, and emissions challenges of conventional fuels. Inland waterways provide the test case for this innovative solution, with both fuel production and fuel cell technology validated at TRL4.

Approach

IsoPROPEL combines electrified chemical conversion, advanced catalysis, computational materials design, and fuel cell engineering to establish isopropanol as a rechargeable, zero-emission energy carrier for waterborne transport.

The project approach includes:

- Electrified CO₂ conversion to C₁ intermediates: A fast temperature-swing chemical-looping process, driven by radiofrequency induction heating of solid oxygen carrier materials, enables efficient carbon dioxide reduction to syngas.
- Selective tandem catalysis to isopropanol: Renewable C₁ intermediates are converted through a single-pass tandem catalysis process to acetone and subsequently to isopropanol achieving high selectivity.
- Computationally guided materials design: First-principles simulations and machine learning are used to design platinum-group-metal-free electrocatalysts and fluorine-free proton-exchange membranes with high performance.
- Direct isopropanol fuel cell operation: Energy is recovered on board using a direct isopropanol fuel cell, which converts liquid isopropanol to electricity via selective electro-dehydrogenation, producing acetone as the only byproduct and eliminating carbon dioxide emissions.
- System integration and sustainability assessment: Advanced simulations support integration into inland waterway powertrains, including double-liquid fuel logistics, thermal management, and operational strategies.



"IsoPROPEL enables zero-emission waterborne transport through a waste-free energy cycle using renewable isopropanol to power fuel cells"