

Estimating International Supply Curves for Hydrogen and Hydrogen Carriers Delivered to Rotterdam.

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Extended Abstract

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Abstract Summary

Renewable hydrogen is expected to play a key role in achieving climate neutrality by 2050 in Europe, particularly in the Netherlands, given its large energy intensive and hard-to-abate industrial base. Hydrogen can be supplied either in pure form or via carriers such as ammonia, methanol, or liquid hydrogen, each serving different end uses.

This paper addresses the following research question for 2050: how do different hydrogen supply options compare in terms of cost, how robust are these cost differences under uncertainty, and how do policy instruments affect the Netherlands' position as a producer within the international hydrogen supply curve?

To answer this, the paper constructs international supply curves for hydrogen and hydrogen-based carriers delivered to Rotterdam using a Levelized Cost of Supply (LCOS) framework, explicitly modelling the full supply chain from production to end use across four sequential stages: production, conversion, transport, and reconversion.

The contribution is twofold. First, the paper develops a unified multi-carrier supply curve framework enabling direct cost comparisons across supply routes, an approach largely absent from the existing literature. Second, it uses the supply curve as a welfare benchmark for policy analysis, evaluating how instruments such as production subsidies, contracts for difference, and grid tariff policies affect the cost-competitiveness of domestic production relative to imports.

Preliminary results confirm that regions with abundant renewable resources and short transport distances to Rotterdam appear at the lower end of the supply curve. The analysis yields insights into the trade-off between import and domestic production, the robustness of different supply routes under parameter uncertainty, and effect of policy instruments across supply chain stages.

Presenting Author Biography

Nihal Chehber is a PhD candidate in energy economics at the University of Groningen and a researcher at the Netherlands Bureau for Economic Policy Analysis (CPB). Her work focuses on the role of hydrogen in the energy transition, with a focus on energy markets, energy infrastructure, and policy.