Technische Universität Berlin

ENSYS Digital Transformation in Energy Systems

Supported by:
Federal Ministry for Economic Affairs and Climate Action
on the basis of a decision by the German Bundestag

The Role of PCI-PMI Infrastructure in Reaching Europe's Energy Policy Targets

resilient-project.github.io · pypsa.org · github.com/PyPSA/pypsa-eur · github.com/bobbyxng

PCI-PMI projects

CO_2 and H_2 infrastructure

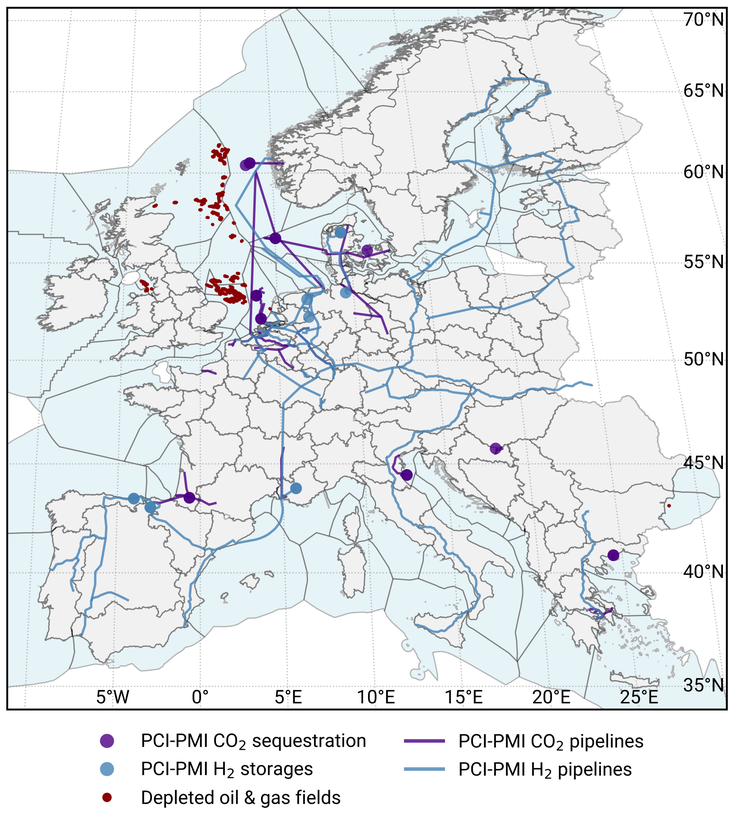

Figure 1: Map of the regional scope including clustered onshore (grey) and offshore regions (blue), as well as PCI-PMI CO_2 and H_2 pipelines, storage and sequestration sites. Depleted offshore oil and gas fields (red) provide additional CO_2 sequestration potential [1].

Table 1: Regret matrix setup: Long-term and short-term scenarios.

Short-term	Reduced targets	Delayed pipelines	No pipelines
Long-term scenarios			
Decentral Islands (**DI**)	■	–	–
PCI-PMI (**PCI**)	■	■	■
PCI-PMI nat. (**PCI-n**)	■	■	■
PCI-PMI internat. (**PCI-in**)	■	■	■
Central Planning (**CP**)	■	■	■
Targets			
GHG emission reduction	■	■	■
CO_2 sequestration	–	■	■
Electrolytic H_2 production	–	■	■
H_2 electrolysers	–	■	■
CO_2 + H_2 infrastructure			
CO_2 sequestration sites	■	■	■
CO_2 pipelines to seq. site	■	■	■
CO_2 pipelines	■	□	–
H_2 pipelines	■	□	–

Results & Discussion

CO_2 and H_2 infrastructure

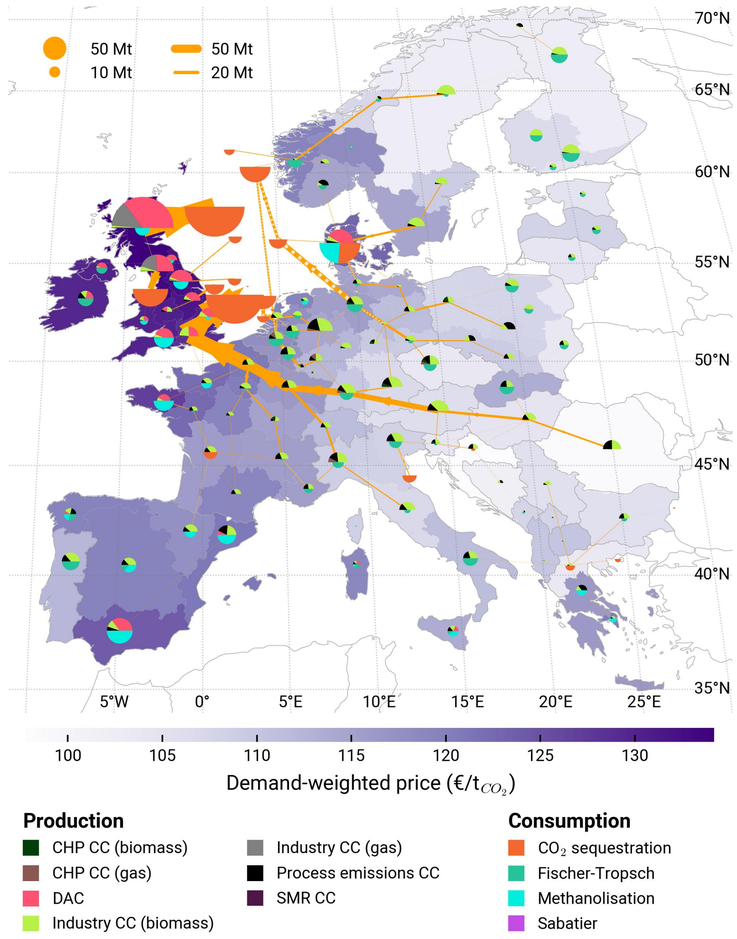

Figure 2: *PCI-in long-term* scenario (2050) — CO_2 balances and distribution

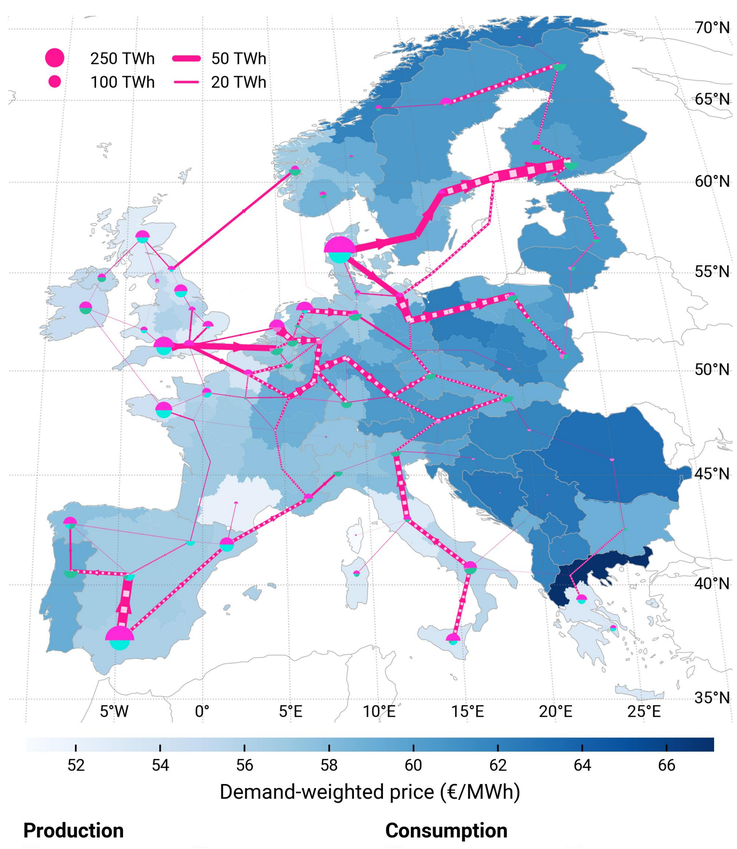

Figure 3: *PCI-in long-term* scenario (2050) — H_2 balances and distribution

Conclusion & Key Findings

TODO FIII

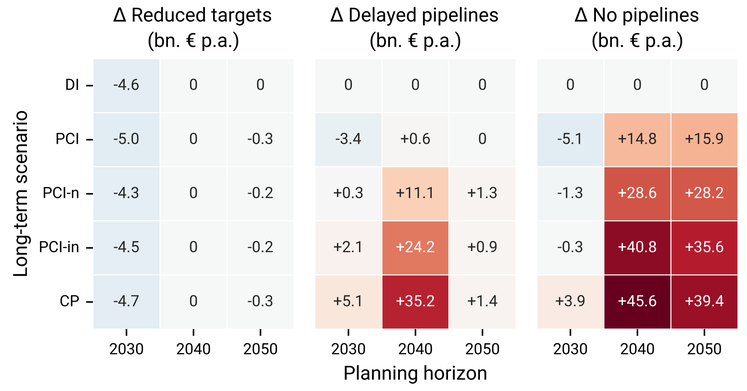

Figure 4: Regret matrix. Calculating regret terms by subtracting system costs of long-term scenarios (columns) from short-term scenarios (rows). Positive values reflect higher costs in the short-term scenarios compared to the long-term ones.

PyPSA-Eur is a spatially and temporally highly resolved **linear optimisation model that covers the European continent**. The model is suitable both for operational studies and generation and transmission expansion planning studies. The continental scope and highly resolved spatial scale enables a proper description of the long-range smoothing effects for renewable power generation and their varying resource availability.

RESILIENT Project

Resilient Energy System Infrastructure Layouts for Industry, E-Fuels and Network Transitions

Open Source

All tools are open-source and available on GitHub. The code is licensed under the MIT license, which allows for free use and modification of the code. PyPSA and PyPSA-Eur are actively developed and maintained by the Department of Digital Transformation in Energy Systems at the TU Berlin and the global **PyPSA community**.

References

[1] Fabian Hofmann, Christoph Tries, Fabian Neumann, Elisabeth Zeyen, and Tom Brown. H2 and CO2 network strategies for the European energy system. *Nature Energy*, pages 1–10, April 2025.

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