Navigating the Roadmap for Clean, Secure and Efficient Energy Innovation

Effects of pathways scenarios on the gas infrastructure


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Research Question

- What is the natural gas infrastructure need of the EU28 assuming that decarbonisation happens?
- How does the decarbonisation affect the different stakeholders of the natural gas sector?
METHODOLOGY - MODELLING

GAS PRICES

INVERT/EE-Lab
Building sector

FORECAST
Industry

ASTRA
Transport

POWER DEMAND

ENERTILE/TEPES
Power and heat sector

GAS DEMAND

EGMM
Gas market

Partial gas market equilibrium

PCI project evaluation

Gas demand
### Framing the Decarbonisation for Modelling - Pathways

<table>
<thead>
<tr>
<th>Heading</th>
<th>Reference</th>
<th>Diversification</th>
<th>Localisation</th>
<th>Directed Vision</th>
<th>National Champions</th>
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<tr>
<td>EU28 RES gas</td>
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<td>No</td>
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<td>Pathways</td>
<td>Pathways</td>
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</tbody>
</table>

**BAU**

Pathways

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**Legend**
- **Diversification**: High, No tariffs, Pathways
- **Localisation**: High, Current tariffs, Pathways
- **Directed Vision**: Current, Yes, No tariffs, Pathways
- **National Champions**: Current, Yes, Only spot, Pathways
**Gas Demand Development in the Pathways Scenarios**

- **Transport** – up
- **Industry** – stagnates
- **Building and power&heat** – down

**2500-3500 TWh/year decrease**
Reference: Russian market share is increasing, more LNG to the markets

Diversification and Localisation: Import dependency falls with the appearance of increased RES gas
## PCI Evaluation – EU28 CBA

<table>
<thead>
<tr>
<th>NPV, M€ total</th>
<th>Reference</th>
<th>Diversification</th>
<th>Localization</th>
<th>Directed vision</th>
<th>National champions</th>
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</table>

*Can not be compared with Pathways; Larger project cluster assessed; now part of reference case (e.g. BRUA phase 1, Balticconnector cluster)

PCI identified in the case study with positive NPV have received and FID or have been commissioned (GIPL, Krk LNG, BRUA phase 1, Balticconnector)

No new infrastructure is needed in neither the Referenca case nor the Pathways

HU-SI interconnector competing infrastructure commissioned (Krk LNG)
Drastic decrease in consumer bill for natural gas due to demand drop in Pathways
European consumers are paying 50-70 Bn €/year less in 2050
This decrease in consumer expenditures relates to the gas market – cost increase of new technologies is covered in other sectoral models!
European gas producers and new entrants are selling higher volumes but by 2050 realise the same level of revenues in Diversification and Localisation scenarios.

1.4-1.5 Bn €/year losses in Directed Vision and National Champions.
Operational income drops to $\frac{1}{4}$

Drastic cost-cuts and no CAPEX increase is advised

Pressure on regulators to increase tariffs is a risk, this might further decrease the competitiveness of gas

Decommissioning of pipelines might have distortive effect on SOS, however decrease in share of gas in primary energy mix solves the SOS issue
Without decarbonisation, need for storage is growing (due to increased import needs)

Current (overbuilt) storage infrastructure would be better utilised in the reference scenario. Still, no further storage investment is needed

In all Pathways scenarios need for storage decreases drastically to 200-300 TWh/year (currently 600-700 TWh/year)
**Effects on Main External Suppliers**

Falling demand: smaller size of the pie
Increased competition between Russian and Norwegian gas, falling sales
Lower prices for European consumers
**Effects by Stakeholders**

![Bar Chart]

- Diversification
- Localisation
- Directed Vision
- National Champions

**Change compared to reference, Bn €/year**

- Consumer
- Producer
- TSO
- SSO
- LNG
- LTC (trader)
- Total
**Takeaways**

All decarbonisation scenarios bring drastic gas demand drop

Reduction in gas procurement cost may be allocated to new technologies and support for biomethane production, but not to create stranded infrastructure

Do not encourage any new investment to the gas infrastructure

Do not give wrong signal to infrastructure operators

PCI investment was assessed with three different gas models, which found the same investment development need for Europe (which were included in current reference)
Navigating the Roadmap for Clean, Secure and Efficient Energy Innovation

Thank you!

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Gas market model EGMM

**INPUT**
- Demand by countries (annual quantity, monthly distribution)
- Domestic production (annual quantity, minimum and maximum production)
- LTC contracts (ACQ/DCQ), flexibility
- Infrastructure: Interconnectors, storage, LNG, tariffs
- External price: for LTC, LNG, DZ, NO, TR, RU

**OUTPUT**
- Wholesale gas price by country
- Consumption by countries
- Gas flows on interconnectors
- Storage stock change
- Import through long term contracts and spot trade

**Social welfare:**
- Consumer surplus
- Producer surplus
- Storage operation profit
- Storage arbitrage profit
- Net profit from long-term contracts
- TSO auction revenue
- TSO operation profit
- LNG terminal operator’s profit