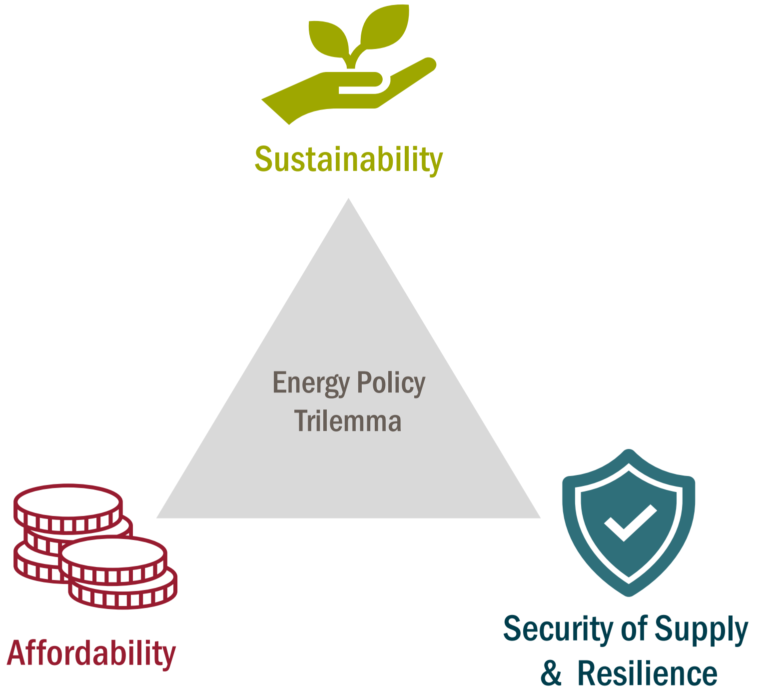
Ensuring Resilience in the European Energy Transition

Strategic Use of Gases to Meet EU Climate Ambitions

Study on behalf of Eurogas

14 November 2024



We inform the discussion for a successful energy transition

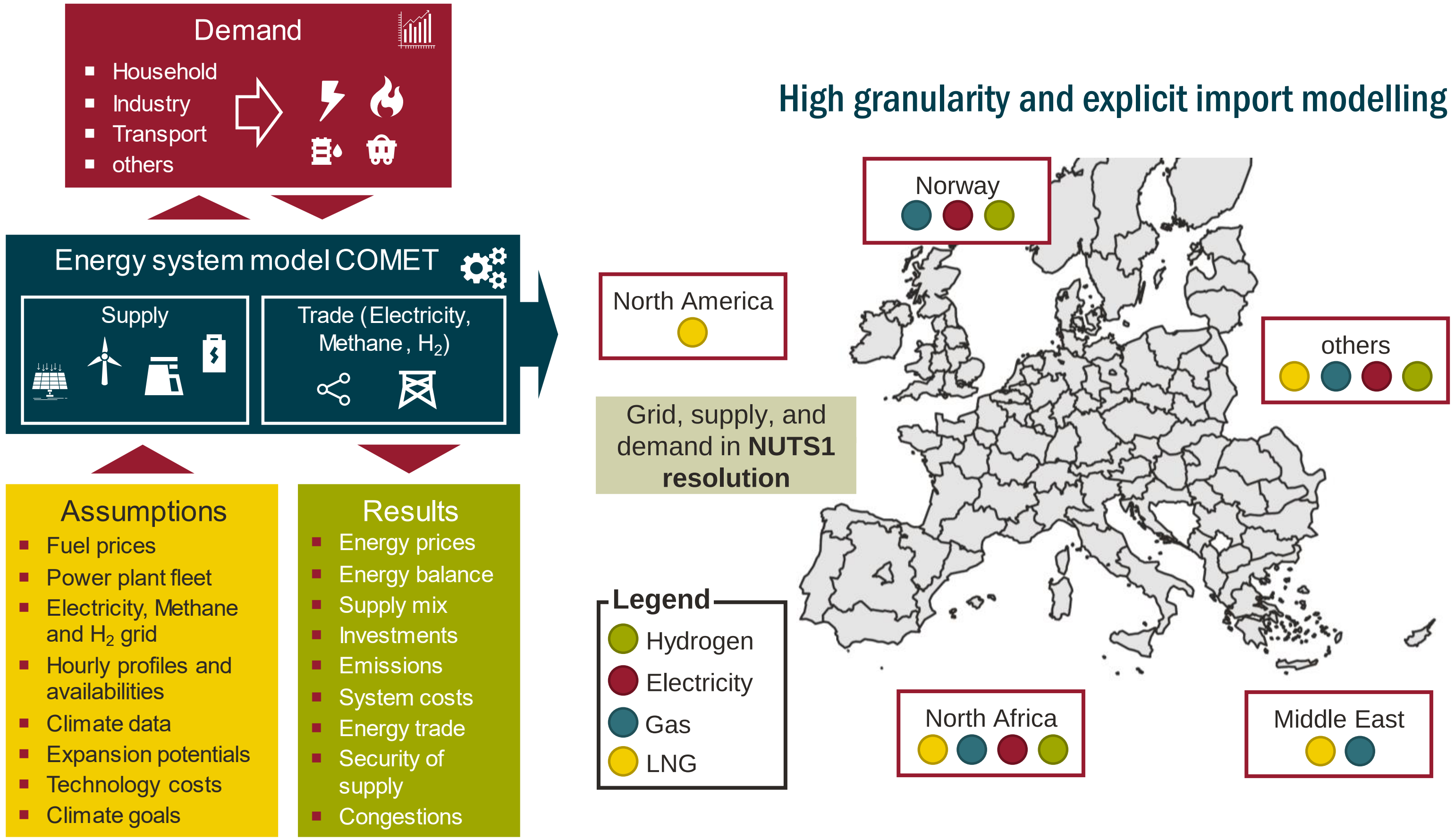
Objectives

- Demonstrate how decarbonisation targets can be reached...
- ...in a cost-efficient and resilient way

Approach

- Unbiased, using external, publicly consulted and approved scenarios
- Technology neutral, allowing all options
- Considering that expectations might be wrong, and secondary targets might be missed

COMET – Cross-sector Optimisation Model for the Energy Transition



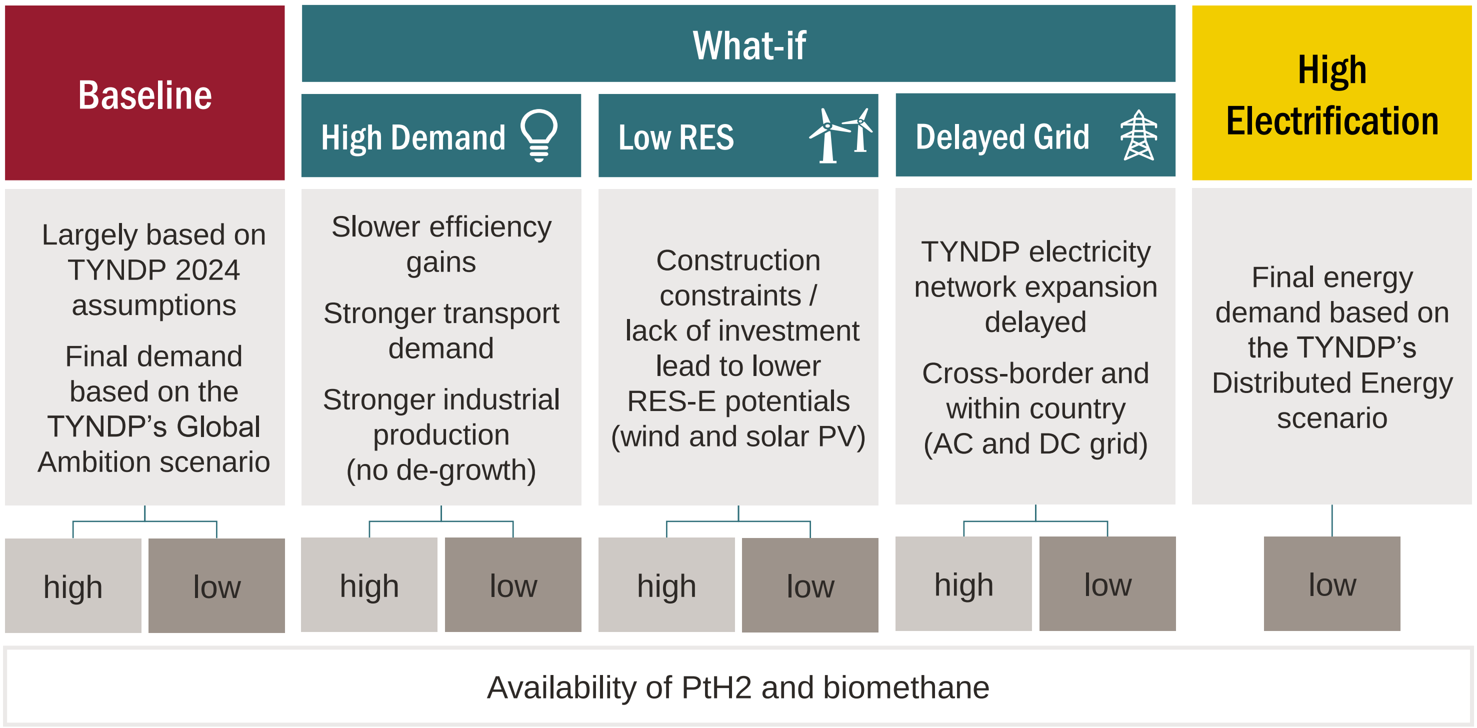
Our scenario framework allows us to isolate the contribution of gases

- We use the ENTSOs' TYNDP 2024 Global Ambition scenario as a basis and expand the analysis using our model COMET
- As the TYNDP features some rather optimistic assumptions, we also look at three deviation scenarios

→ All scenarios are analysed assuming high and low availability of renewable gases (biomethane and PtX) to isolate their role under different assumptions

→ We complement the analysis by a High Electrification scenario, based on the TYNDP's Distributed Energy scenario

Scenario framework



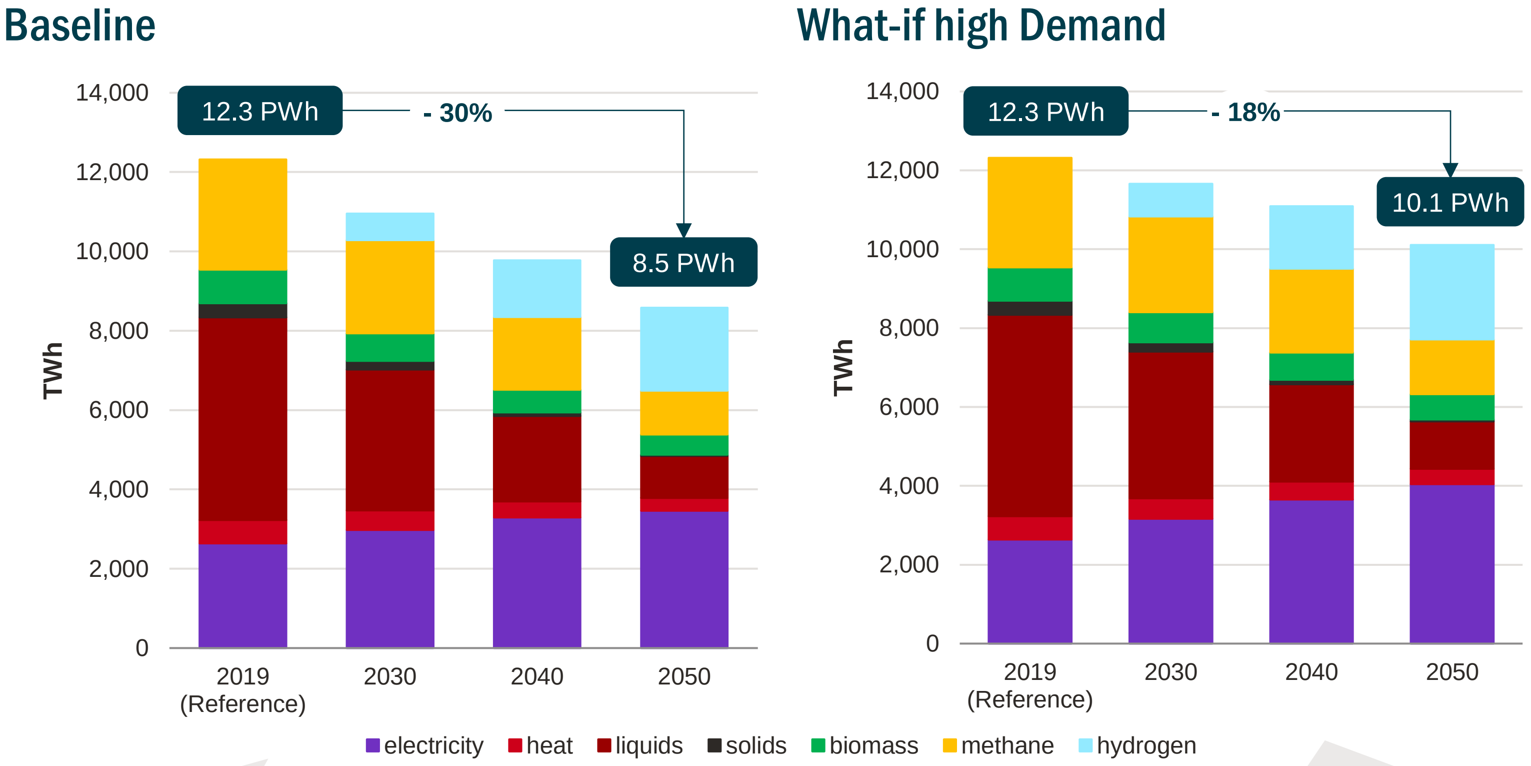
Final demand for gaseous fuels could increase significantly until 2050

+15% (to 3,200 TWh in 2050) using TYNDP Global Ambition assumptions

+36% (to 3,800 TWh) using less optimistic assumptions for energy efficiency

Hydrogen to become the second largest energy carrier with > 2 PWh of final demand

Final energy demand* (EU27)



Baseline scenario derived with the Energy Transition Model using the TYNDP Global Ambition parameters

Alternative scenario with less optimistic assumptions on renovation rates, heat-pump roll-out, transport demand and industrial output

* for energetic and non-energetic use. Slight deviation of Baseline demand from Global Ambition demand due to updated ETM version.

A mix of renewables, green hydrogen and methane-based gases with CCS is optimal

Hydrogen

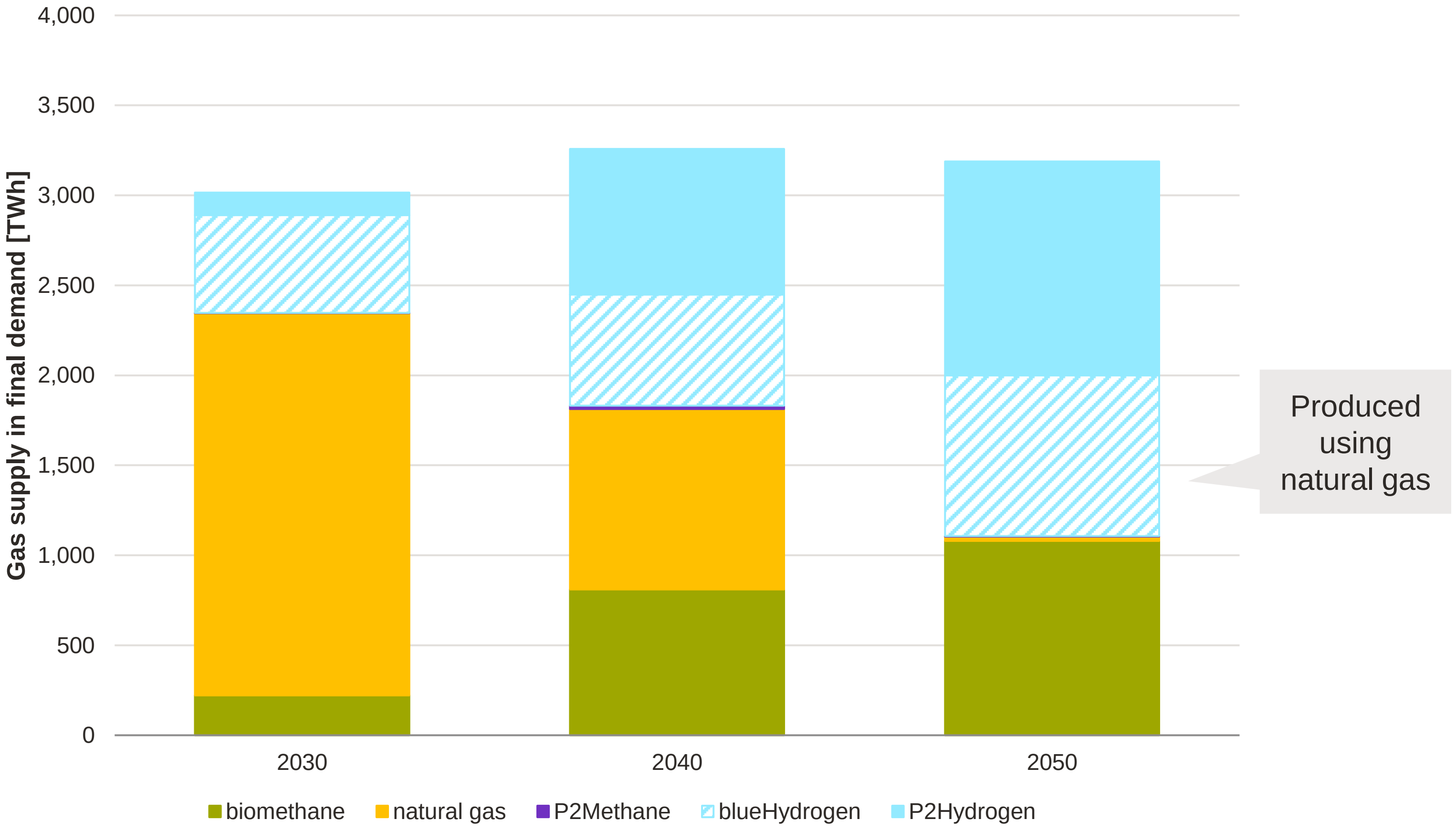
- Blue hydrogen (with CCS) dominant in the short-term
- Power-to-hydrogen increasingly competitive and valuable for the integration of renewables

Methane

- Biomethane with CCS is cost-efficient and generates negative emissions
- Natural gas in final demand declines – but needed for energy conversion

Cost-optimal gas supply mix in final demand (EU27)

Baseline demand assumptions with high gas availability



An energy transition that uses the full potential of renewable and low-carbon gases is more cost efficient

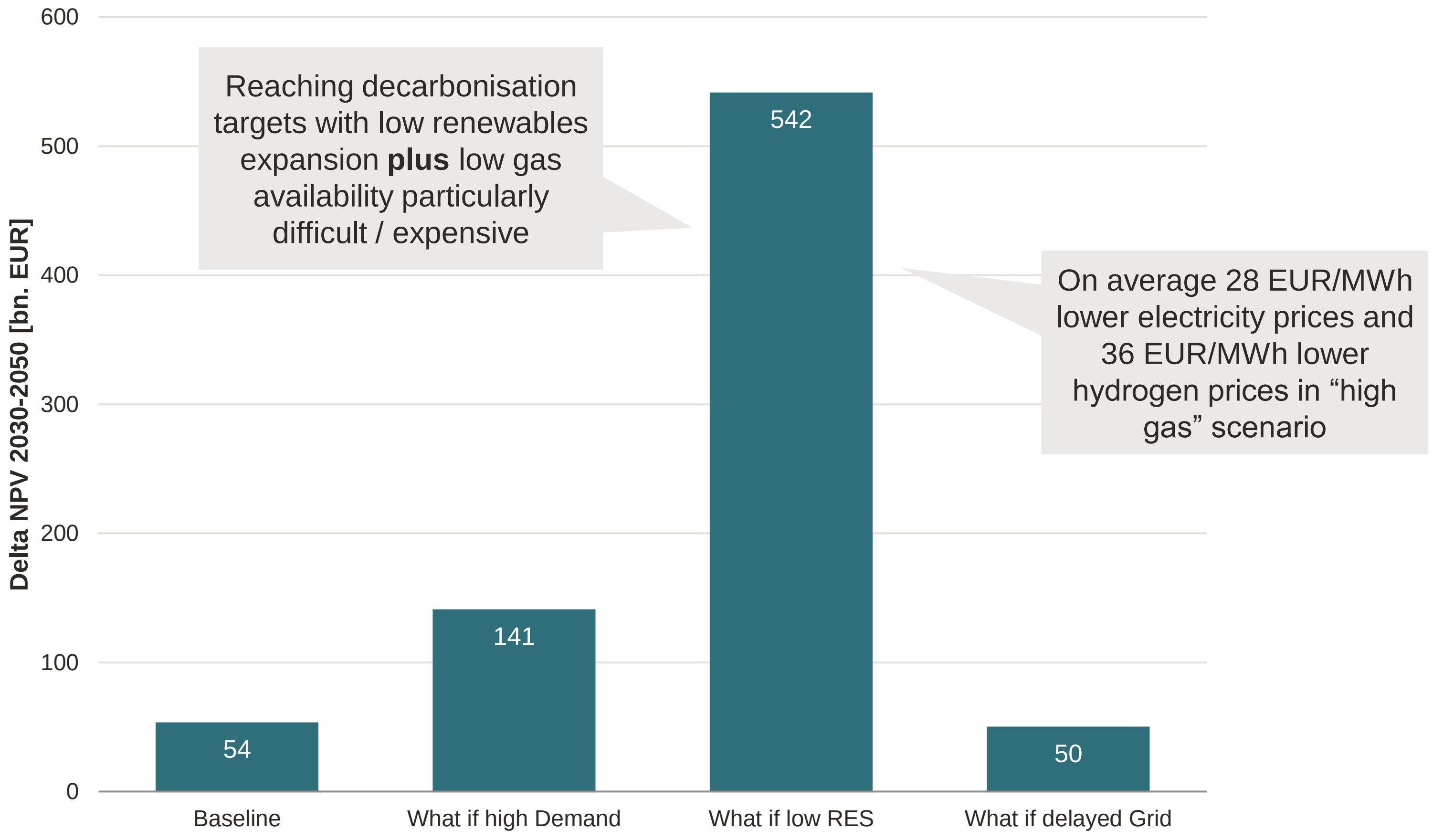
- Effective ramp-up and integration of renewable gases can save up to 540 bn. EUR in system costs*
- Lower system costs translate into
  - lower electricity prices: 4-28 EUR/MWh

    → up to 21% reduction
  - lower hydrogen prices: 8-36 EUR/MWh

    → up to 30% reduction

Impact on system costs* (EU+EFTA+UK, 2030-2050)

System cost savings from high renewable gas availability



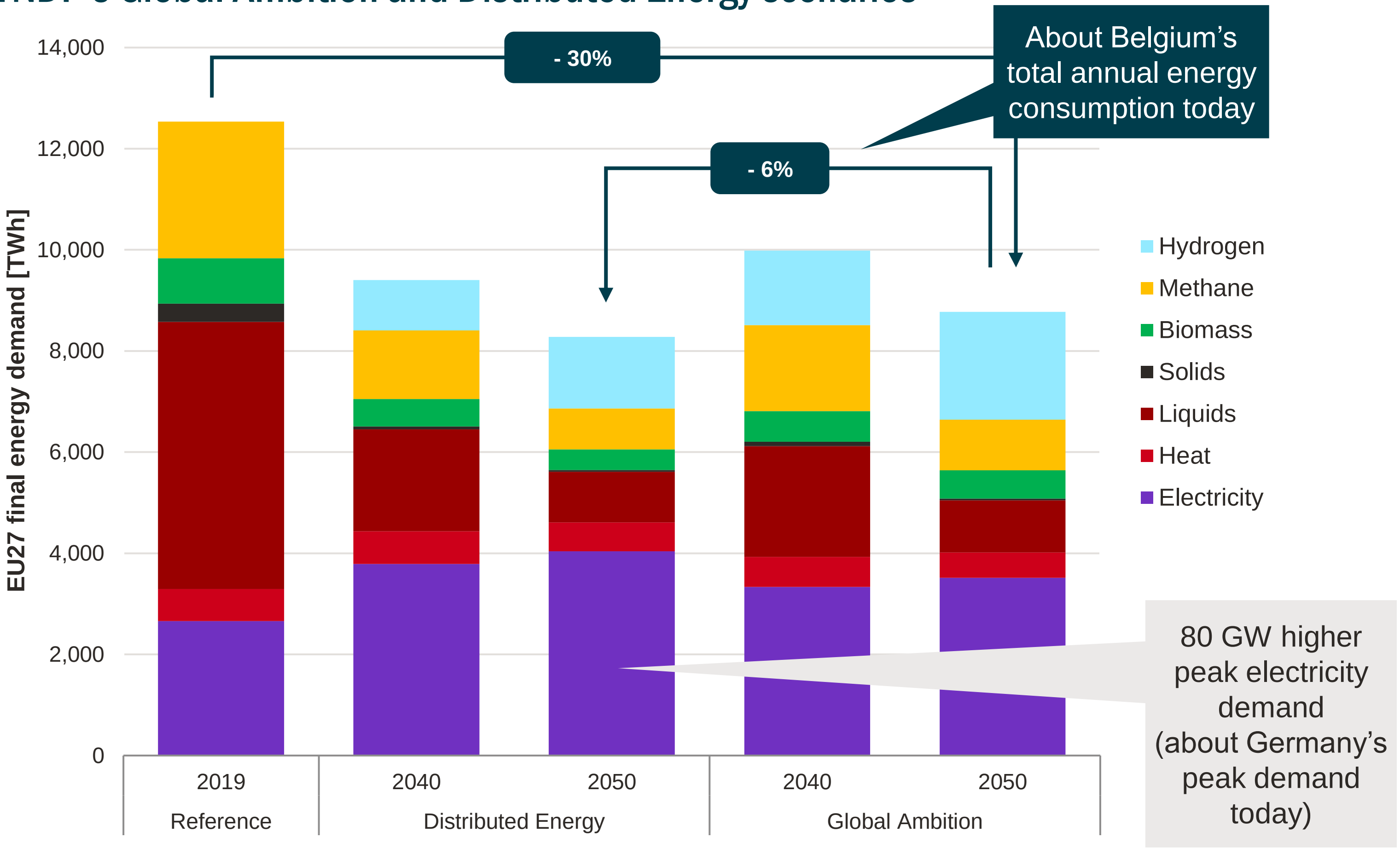
* All costs associated with the supply, storage and conversion of energy in EU+EFTA+UK. Costs of final demand sectors not included, NPV (5% discount rate).

Gases play a major role in final energy demand even in high electrification scenarios

- Final demand is 6% (500 TWh) lower in the TYNDP Distributed Energy scenario compared to the Global Ambition scenario
- The share of gases (methane and hydrogen) still increases from 22% in 2019 to 27% in 2050
- Hydrogen becomes second largest energy carrier in final demand (17%) after electricity (49%)
- Total absolute gas (methane and hydrogen) demand in 2050 still at 82% of the reference value in 2019

Final energy demand* – EU27

TYNDP's Global Ambition and Distributed Energy scenarios



* for energetic and non-energetic use

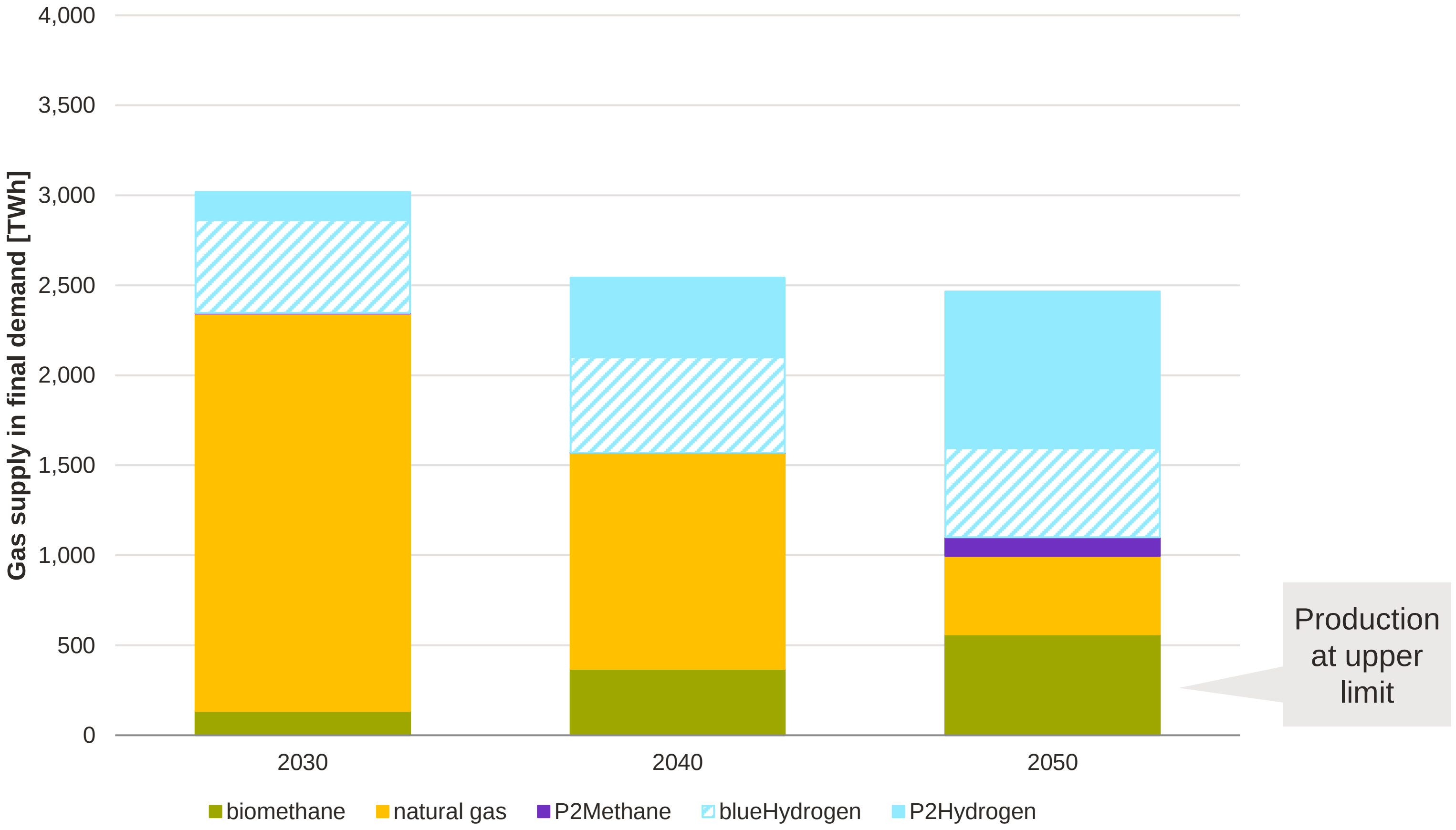
Ramping up low-carbon and renewable gases: A no-regret choice

Despite lower final demand for gases in the High Electrification scenario…

- Power-to-Hydrogen production still needs to increase significantly to facilitate wind and PV integration
- Increasing blue Hydrogen production is still essential for a cost-optimal supply mix
- Biomethane (with CCS) is fully utilised
- Natural gas is still needed for blue hydrogen production – and even final demand if full biomethane potential is not developed

Cost-optimal gas supply mix in final demand (EU27)

High Electrification scenario with low gas availability



A strong focus on electrification results in higher costs than a balanced energy transition

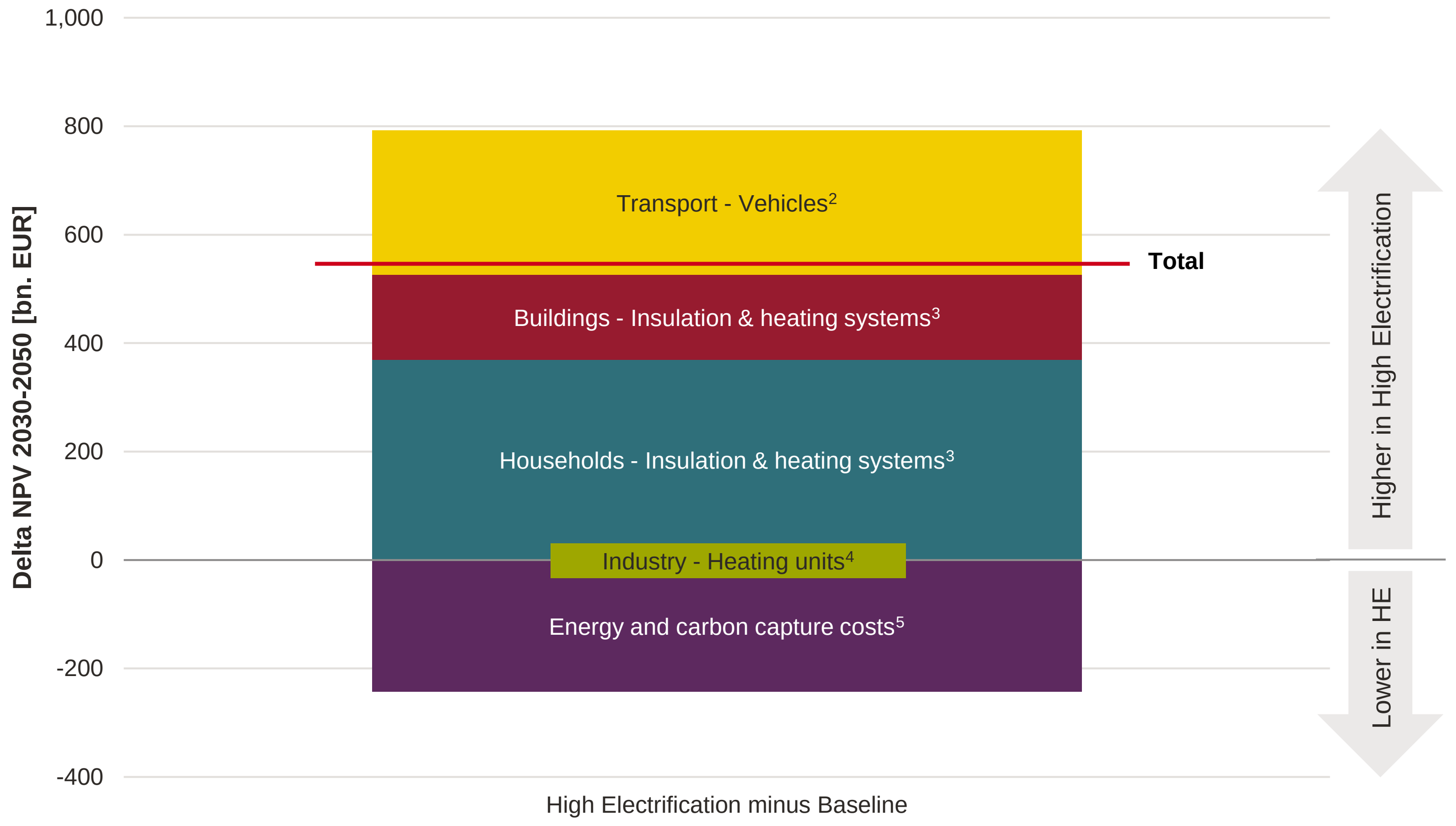
Our analysis of the most relevant sectors (indication) shows

- almost 800 billion EUR higher costs in the final demand sector
- additional net system costs of 550 billion EUR in the Electrification scenario between 2030 and 2050.

Further system components like distribution grids are likely to increase the additional costs.

Impact on system costs[1] (EU+EFTA+UK, 2030-2050)

High Electrification (HE) minus Baseline scenario, low renewable gases



[1] NPV (5% discount rate)
[2] Final demand investment costs: Passenger cars and freight transport (trucks, vans)
[3] Final demand investment costs: Heating appliances, insulation
[4] Final demand investment costs: Heat supply in the chemical and other industry sectors – *minor delta*
[5] All costs associated with the supply, storage and conversion of energy

Renewable and low-carbon gases are crucial for a successful energy transition...

... as essential parts of a successful transition alongside electrification

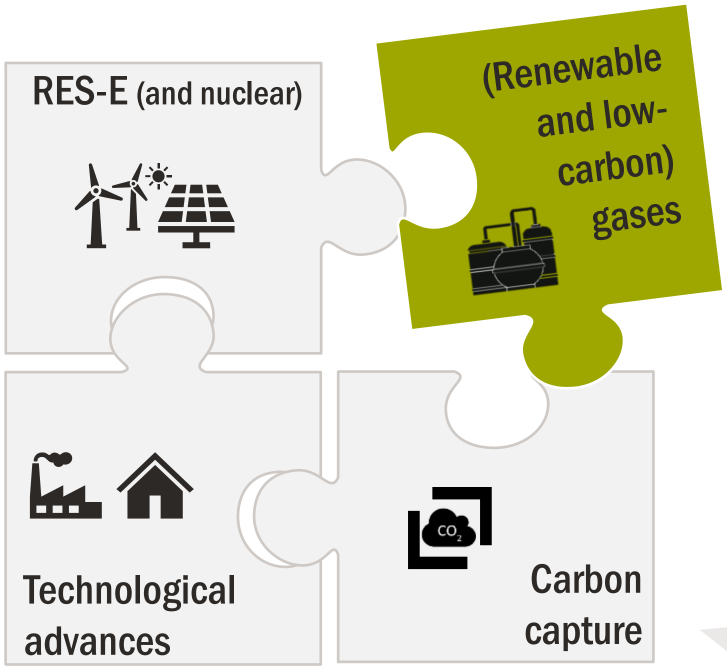
... to be cost-efficient and resilient

... even in high electrification scenarios.

Take aways

Need Power-to-Hydrogen for flexibility

Ensure a resilient, affordable and successful energy transition



Growing role of gaseous fuels, particularly hydrogen, making methane and hydrogen infrastructure essential

Essential for negative emissions and decarbonising remaining fossil fuel consumption

Dr. Christoph Gatzen

Director

+49 221 337 13 110

Christoph.Gatzen@frontier-economics.com

https://www.linkedin.com/in/christoph-gatzen-30177a25/

Dr. Stefan Lorenczik

Manager

+33 660 76 93 51

Stefan.Lorenczik@frontier-economics.com

www.linkedin.com/in/stefan-lorenczik/