Ten-year development plan 2022

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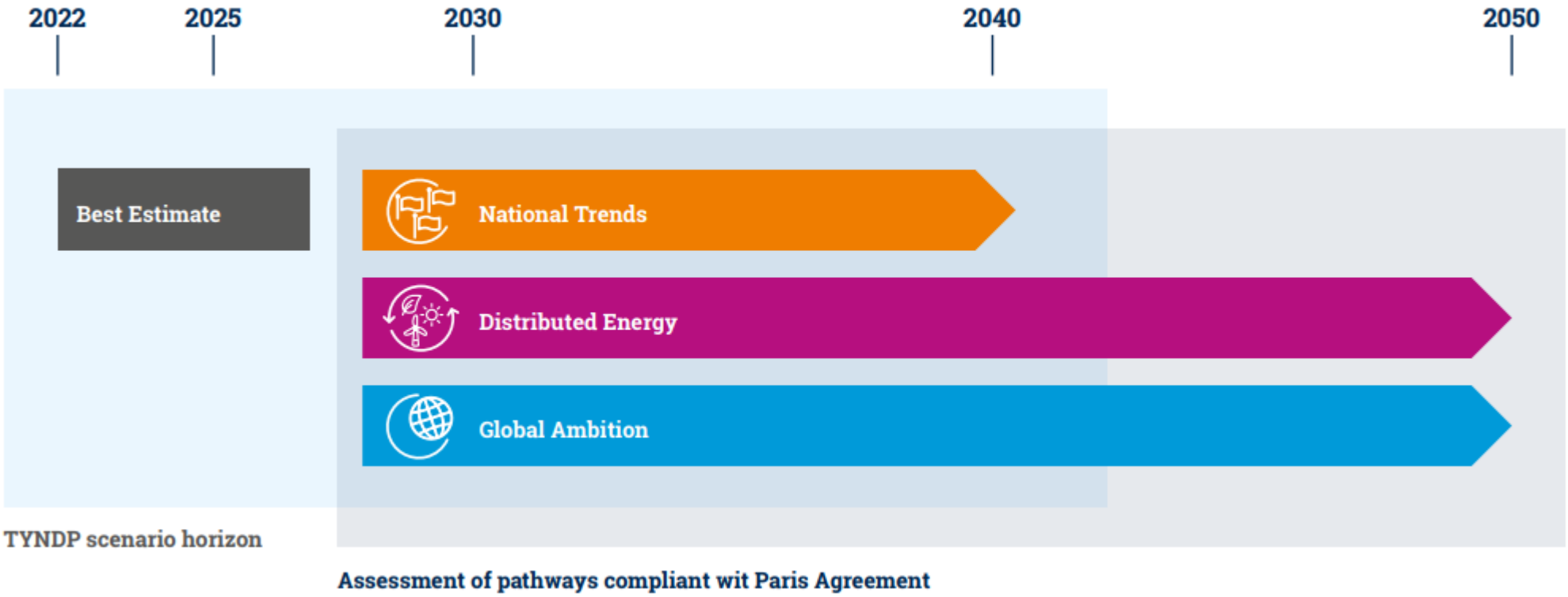
Introduction

- The Ten Year Network Development Plan TYNDP, provides a quantitative basis for infrastructure investment planning and insights into the evolution of integrated energy system perspectives.
- This complex plan, a joint undertaken from the European electricity and gas TSO and is updated every two years.
- The plan contains:
  - Summary of the EU National Energy and Climate Plans (NECP)
  - Distributed Energy Scenario: Higher European autonomy with renewable and decentralised focus
  - Global Ambition Scenario: Global economy with centralised low carbon and RES options
- The TYNDP is reviewed and weighted by ACER (EU Agency for the Cooperation of Energy Regulators). Progress is monitored and reported.

Scenarios

	Distributed Energy Higher European autonomy with renewable and decentralised focus	**Global Ambition** Global economy with centralised low carbon and RES options
Green Transition	At least a 55 % reduction in 2030, climate neutral in 2050	
Driving force of the energy transition	Transition initiated at a local/national level (prosumers)	Transition initiated at a European/international level
	Aims for EU energy autonomy through maximisation of RES and smart sector integration (P2G/L)	High EU RES development supplemented with low carbon energy and imports
Energy intensity	Reduced energy demand through circularity and better energy consumption behaviour	Energy demand also declines, but priority is given to decarbonisation of energy supply
	Digitalisation driven by prosumer and variable RES management	Digitalisation and automation reinforce competitiveness of EU business
Technologies	Focus of decentralised technologies (PV, batteries, etc.) and smart charging	Focus on large scale technologies (offshore wind, large storage)
	Focus on electric heat pumps and district heating	Focus on hybrid heating technology
	Higher share of EV, with e-liquids and biofuels supplementing for heavy transport	Wide range of technologies across mobility sectors (electricity, hydrogen and biofuels)
	Minimal CCS and nuclear	Integration of nuclear and CCS

Scenarios


2022
2025
2030
2040
2050
Best Estimate
National Trends
Distributed Energy
Global Ambition
TYNDP scenario horizon
Assessment of pathways compliant wit Paris Agreement

Power sector EUROPE: TYNDP2022

Emission of electricity generation

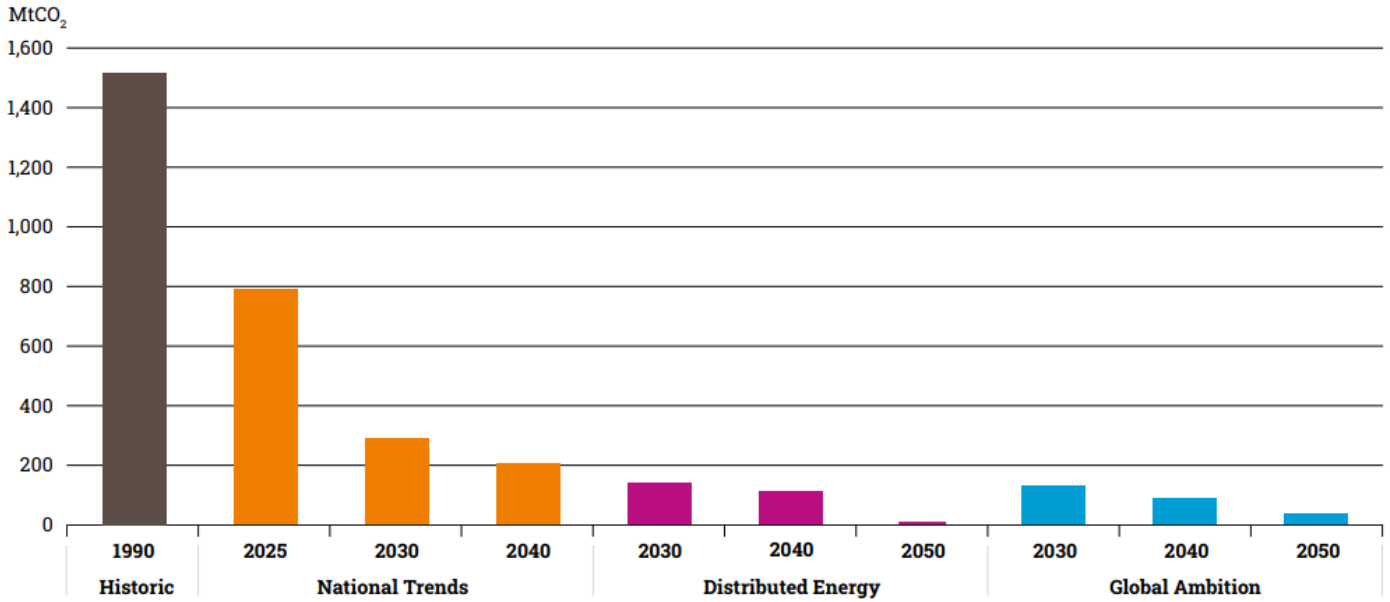


Figure 41: Emission of electricity generation for EU27 (Excluding dedicated RES for Power-to-Methane production (see. Configuration-5 in Scenario Building Guidelines))

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Power sector EUROPE: TYNDP2022

Capacity and generation

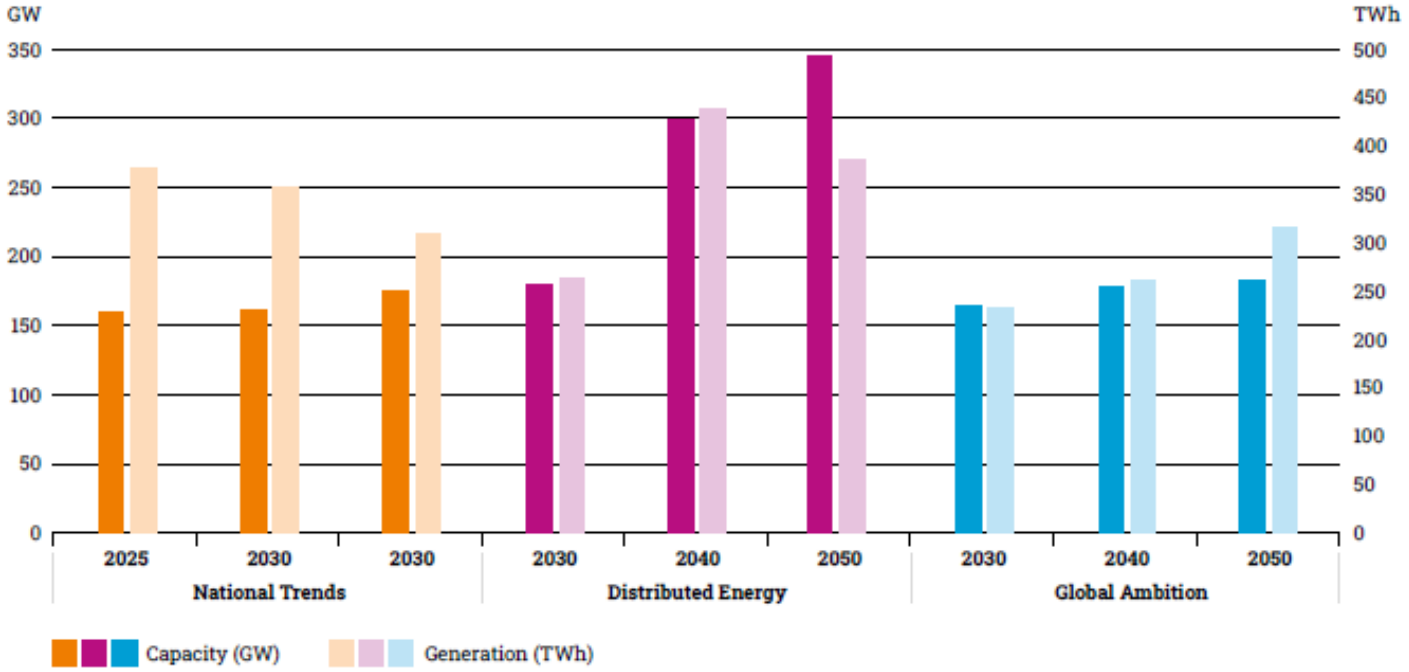

Figure 26: Evolution of the main methane and hydrogen fired power capacity and generation for EU27 (Excluding Small Thermal and CHP which operation can be driven by other factors such as heat production)

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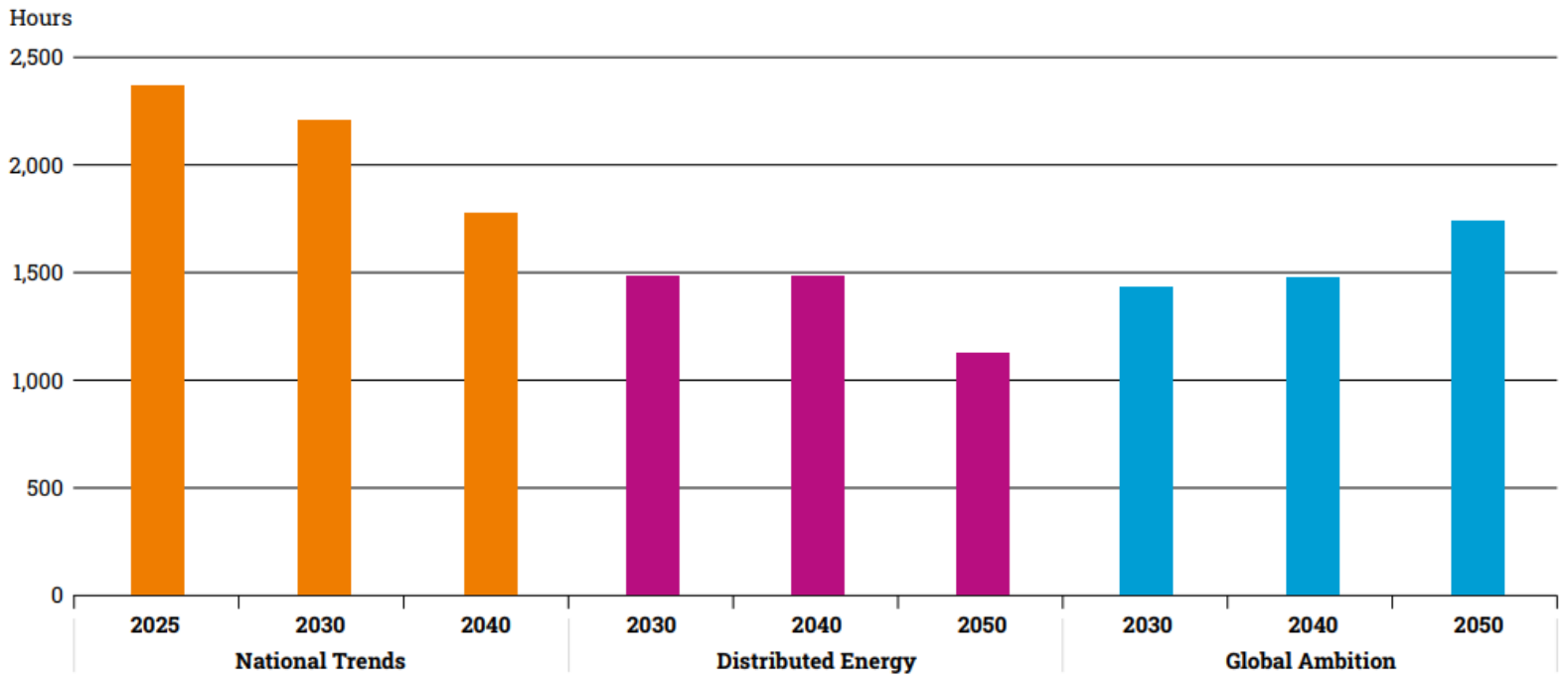
No reduction in power capacity is foreseen for all three scenarios. Generated electricity ranges from 250 -450 TWh.

Power sector EUROPE: TYNDP2022

Utilisation gas fired assets



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The average full load hours of gas fired power generation units for EU27. Hours range from 1000 to 2300 hours per year.

Power sector EUROPE: TYNDP2022

EU27 gas production

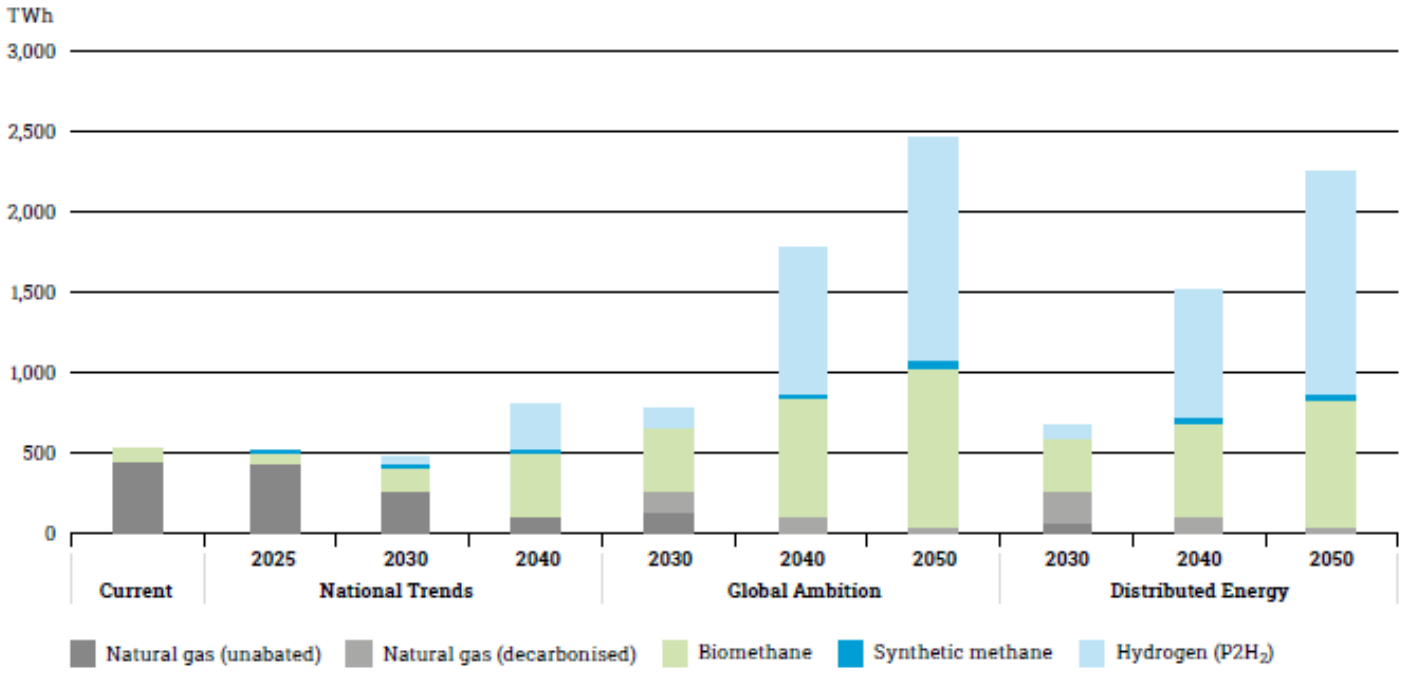

Figure 30: EU27 annual gas production per scenario

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Approximately 600 TWh of low carbon fuels is required for the gas fired assets.

Governments supporting GT based dispatchable energy

Department for Business, Energy & Industrial Strategy

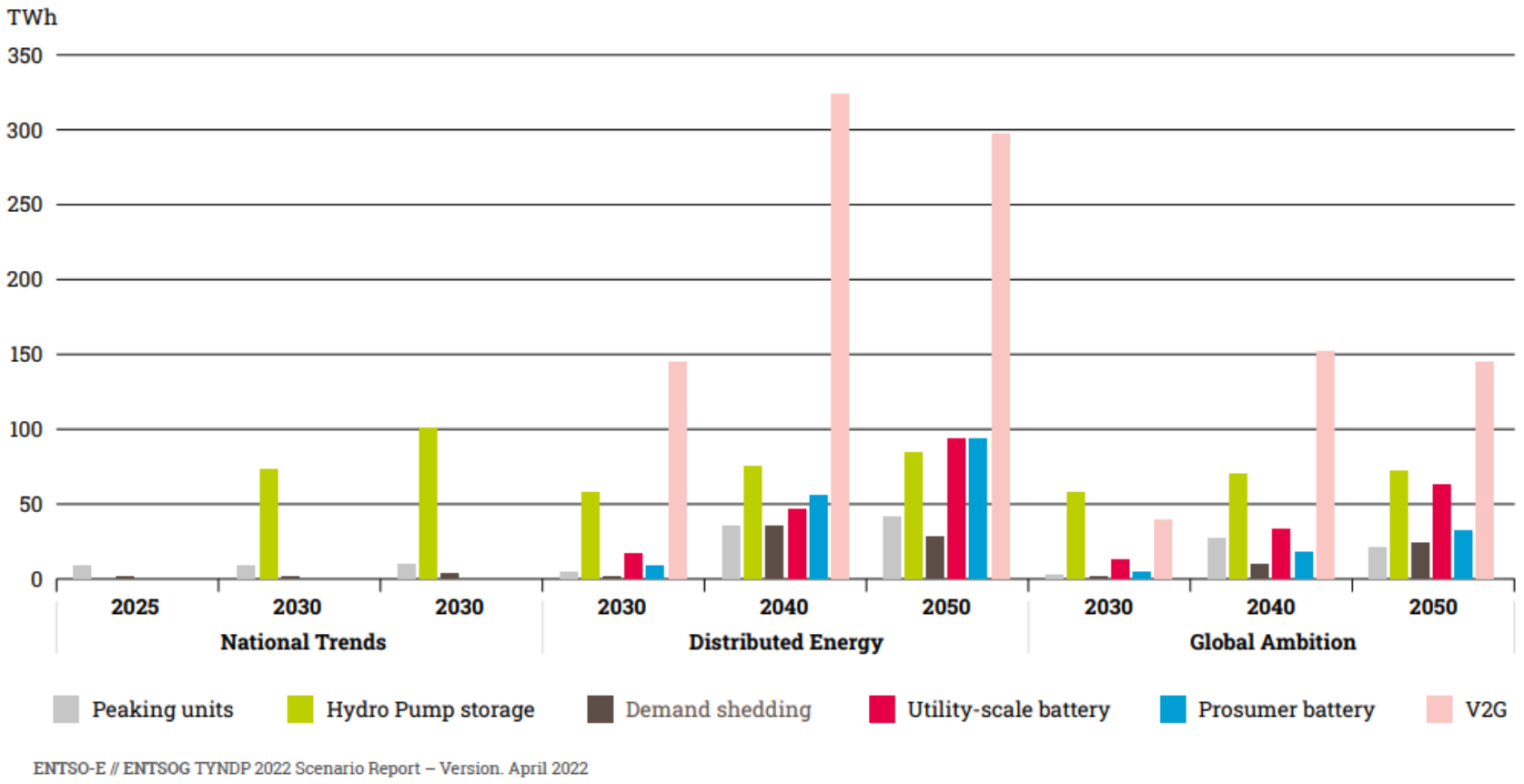
Unabated Natural Gas generation falls throughout the modelled period. Natural Gas generates less than 1% of total generation by 2050 with fleet average unabated Gas load factors below 1% in all scenarios from 2035. Gas capacity increases from 35 GW in 2020 to 70-100 GW in 2050 in the Net Zero Scenarios without Hydrogen. Unabated Gas capacity is lower in the Hydrogen Net Zero Scenarios at 50-90 GW in 2050 as there is 20-25 GW of Hydrogen on the system. Increases in Gas capacity ensure that the system can still meet security of supply constraints. This suggests that 'peaking capacity' in some form (whether gas or hydrogen fuelled) will likely be needed to provide infrequent short-term dispatchable generation to ensure reliable supply in peak demand periods.

Federal Ministry for Economic Affairs and Climate Action

- 4GW of capacity to be tendered between 2024 and 2028 for power plants which generate electricity from renewable hydrogen and where connection to large-scale hydrogen infrastructure, such as a regional grid or large storage facility, is available "comparatively early"
- 4GW of capacity to be tendered for projects which combine wind and PV systems with a form of hydrogen-based electricity storage, such as an electrolyser or local hydrogen storage. This type of project is suitable for locations where larger-scale hydrogen infrastructure is "only available relatively late"
- Up to 15GW of capacity to be tendered for power plants which can initially be operated with natural gas for a limited time period before converting to hydrogen operation by 2035 at the latest. 10GW of this is planned to be tendered between 2024 and 2026, after which the remaining 5GW can be put out for tender.

Power sector EUROPE: TYNDP2022

Dispatchable energy



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Main flexibility sources for adequacy for EU27.

Summary

- No reduction in gas fired capacity is foreseen. Depending on the scenario, the generated electricity is ranging from 250-450 TWh.
- The average full load hours of gas fired power generation range from 1000 to 2300 hours per year.
- Designation of low carbon fuels for the power sectors needs to be assessed and clarified.
- NECPs need to recognize the flexibility of gas fired assets.
- Involvement of ETN in the TYNDP public consultation is advisable.