Long-term power price outlook

Christian Sjødin

Senior Consultant · Montel Advisory

AUGUST 2026

Tobias Federico

Chief Analyst· Montel

AUGUST 2026

MONTEL

Working with scenarios is a bit like in the movie “Rashomon” by Akira Kurosawa

Source: Wikipedia Rashomon

Our Job

Easy: Just simulate, what could happen in the future 2003 to 2009

Source: Montel Markets

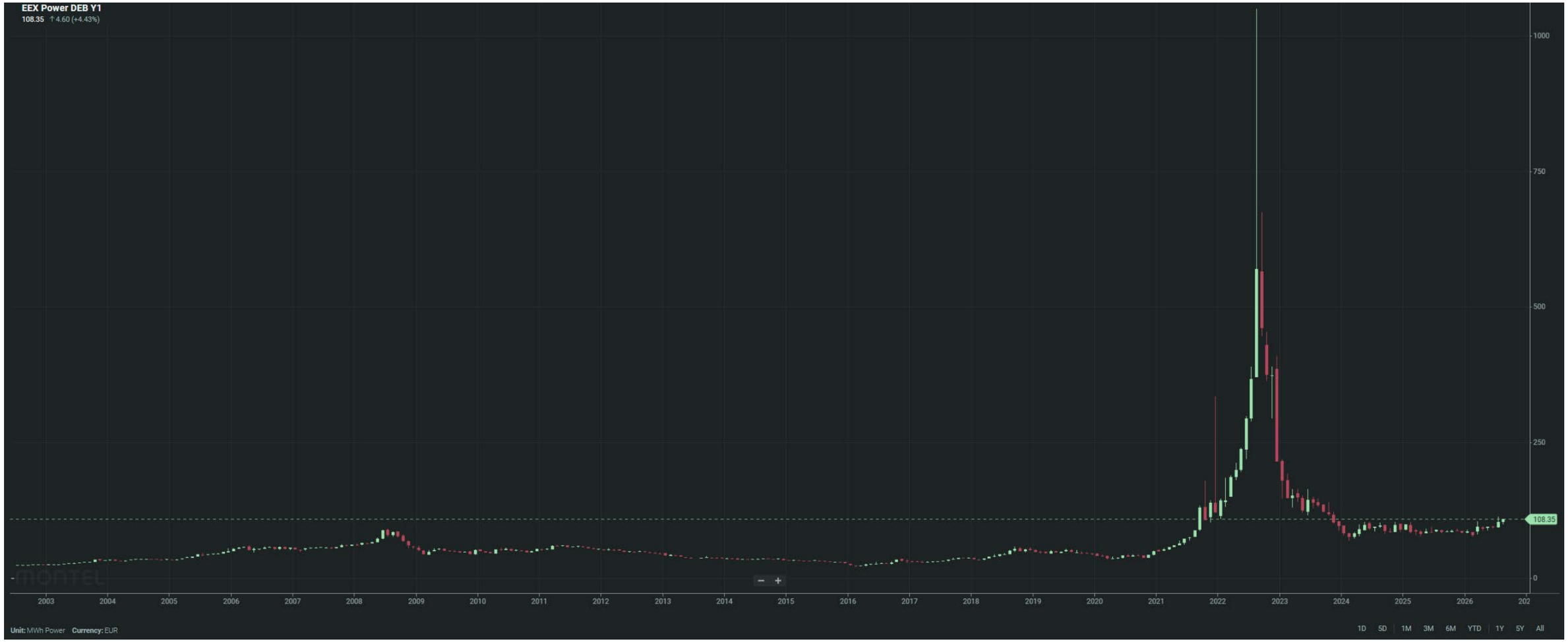
Our Job

Easy: Just simulate, what could happen in the future until 2016

Source: Montel Markets

Our Job

24 years of power prices



Source: Montel Markets

AI Data Center Growth

Always good to know

Spuirce: LinkedIn

Power Demand Driver

Expected increase in power demand by 10 % within the next 5 years

Discussed as new industrial revolution

What is fueling this revolution ?

Each revolution has its own fuel

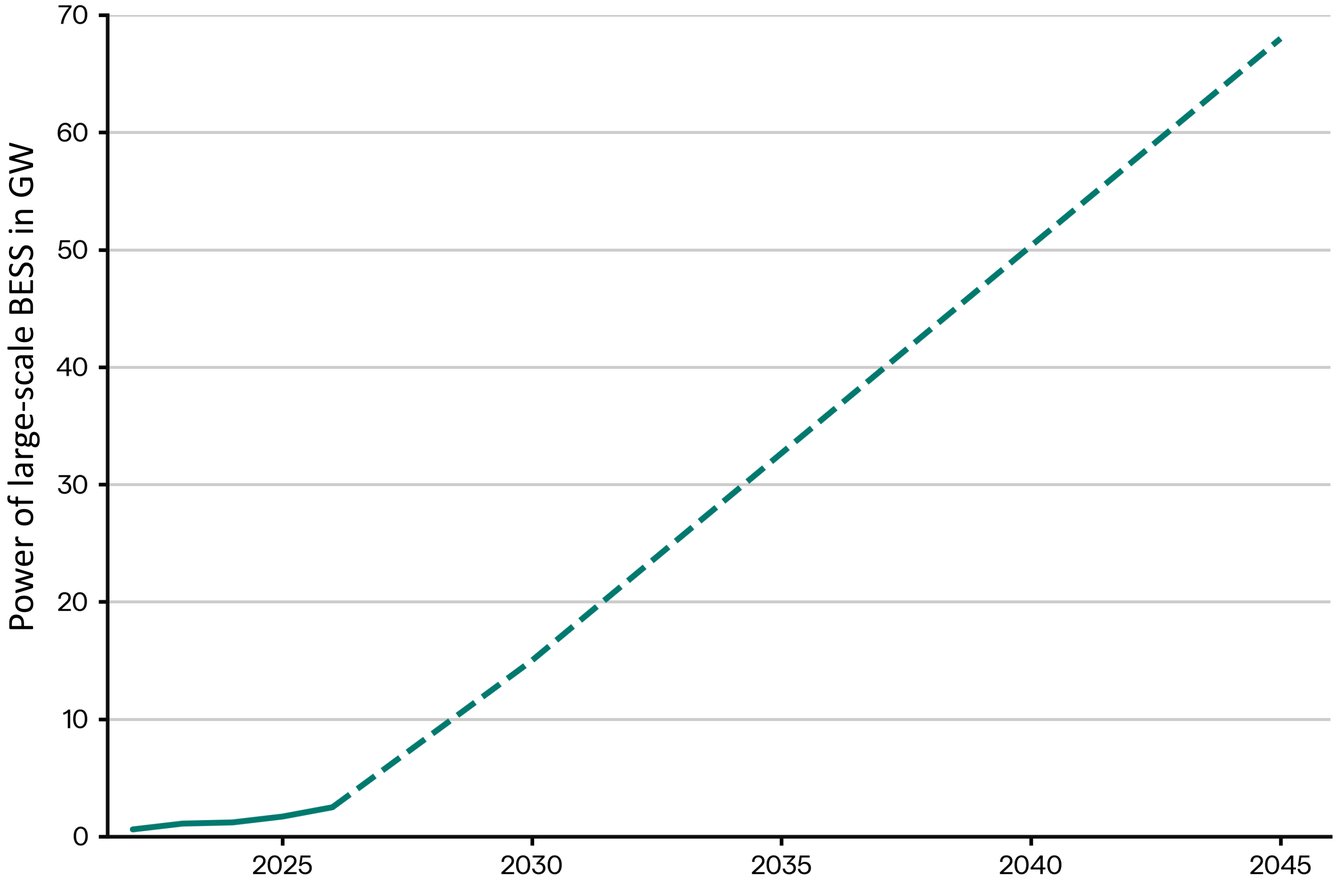
Stockton and Darlington Railway

- 1825 – the first commercial railroad
- First use of steam locomotives
- Rail transport of passengers and goods
- Originally intended primarily for coal transport
- Triggered the railway construction boom.

Source: John Dobbin – 1. Painting held by the National Railway Museum, York 2. heritage.stockton.gov.uk, public domain, https://commons.wikimedia.org/w/index.php?curid=2306190

BESS Development

The BESS Development in the Scenario „Central“ in Germany



2030:

- **Assume that 60% of the grid connection commitments from the ’Bundesnetzagentur’ will be build**
- **Leads to: ~ 15 GW of large-scale battery power on the Day-Ahead market**

2045:

- **Assume numbers from the grid development plan of the “scenario B”**
- **Leads to: ~ 68 GW of large-scale battery power**

Source graph: Josephine Steppart, Montel Energy Brainpool

Agenda Nordic Power Outlook

01 **Forecasting challenges**

02 **Consumption**

03 **Nordic power balance**

04 **Price forecasts**

Forecasting challenges

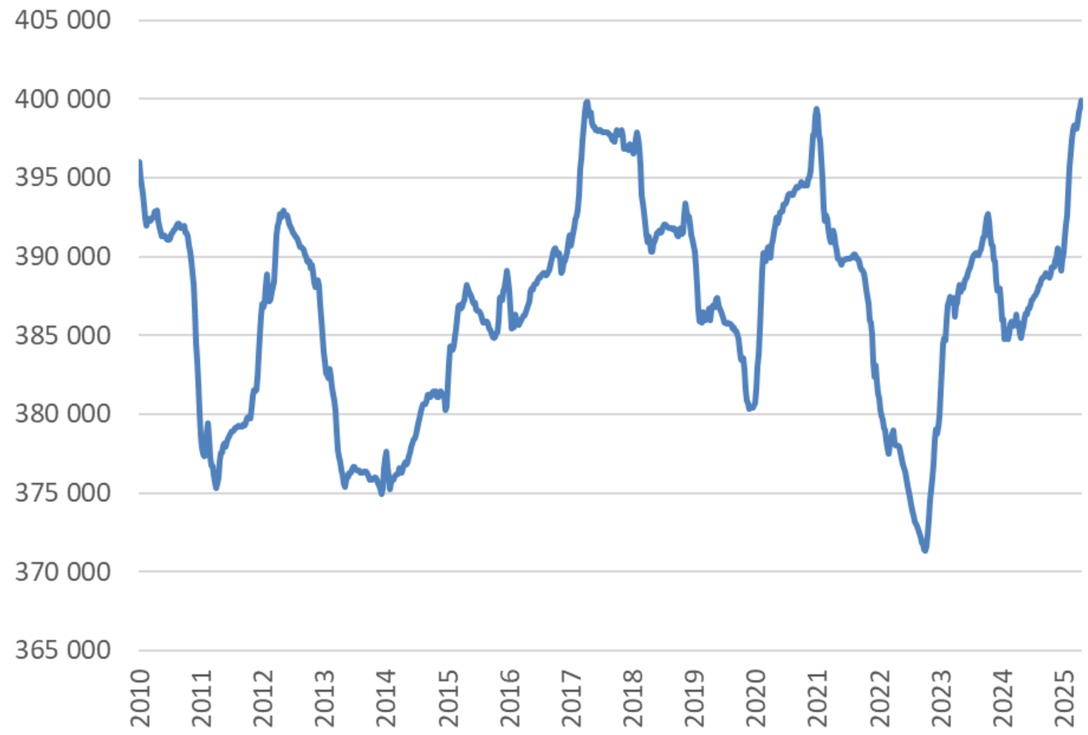
Key uncertainties shaping the Nordic outlook.

- Policy ambition vs. market frameworks
- Grid capacity & queue management
- Technology cost curves
- Permitting
- Power price feedback
- Public opposition
- Project maturity
- Macro, geopolitics & financing

Demand growth — a myth?

Nordic load has barely moved in 16 years.

Historical 52-week rolling consumption, Nordic ex. Baltics - 2010 to 2025



Source: Montel Syspower / ENTSO-E

Energy efficiency improvements

Better building codes and smart energy systems reduce electricity use per capita. Population growth!

Changing urban economic structure

Urban growth and changes linked to the service sector reduces energy intensity, flattening load profiles.

Industry consumption

Highly cyclical, driven by demand and power prices. Fairly flat base level despite major structural changes; efficiencies and structural decline offset by electrification. Production output has increased.

Weather, COVID, geopolitics, economy

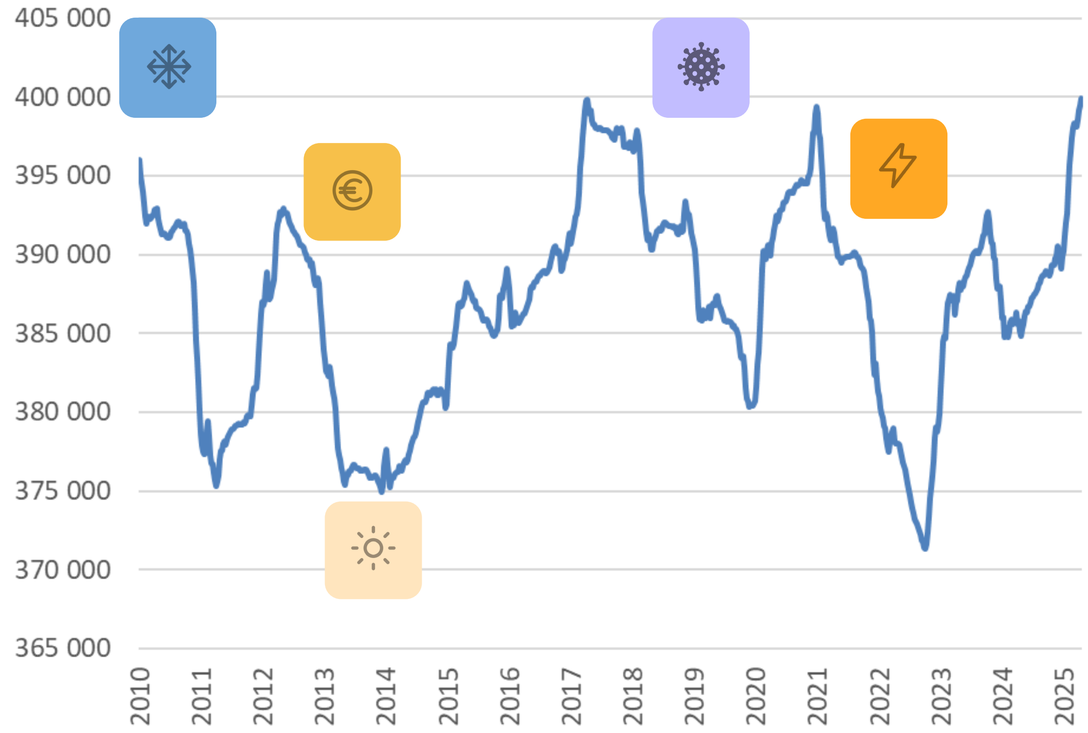
Weather-driven variations and supply/demand shocks strongly impact price and consumption levels.

Prosumer impact

Not a significant factor in the Nordic region in this period.

Demand growth — a myth?

Five events impacting consumption fluctuations.



Source: Montel Syspower / ENTSO-E

2010-11
Cold winter
Severe heating demand

2012–13
Eurozone crisis
European industrial slowdown

2014–15
Mild winters
Heating demand dipped

2020
COVID-19
Industrial pause

2022
Energy crisis
Record prices, demand destruction

Main drivers to the Nordic consumption growth.

1

Hydrogen & new electrolysers

The single largest wedge; anchored by green-steel in Sweden, Finnish electrolyser build-out, Danish PtX and Norwegian e-fuels.

Considerably slower and lower than assumed a couple of years ago.

2

Electrification of transport

EVs, electrified ferries and heavy road freight add a steady, growing baseload across all four countries.

3

New data centres

Nordic data-centre load roughly triples by 2050, with further upside from AI capacity queues.

4

Industry electrification

Process-heat electrification, petroleum electrification and CCS keep the industry band growing.

5

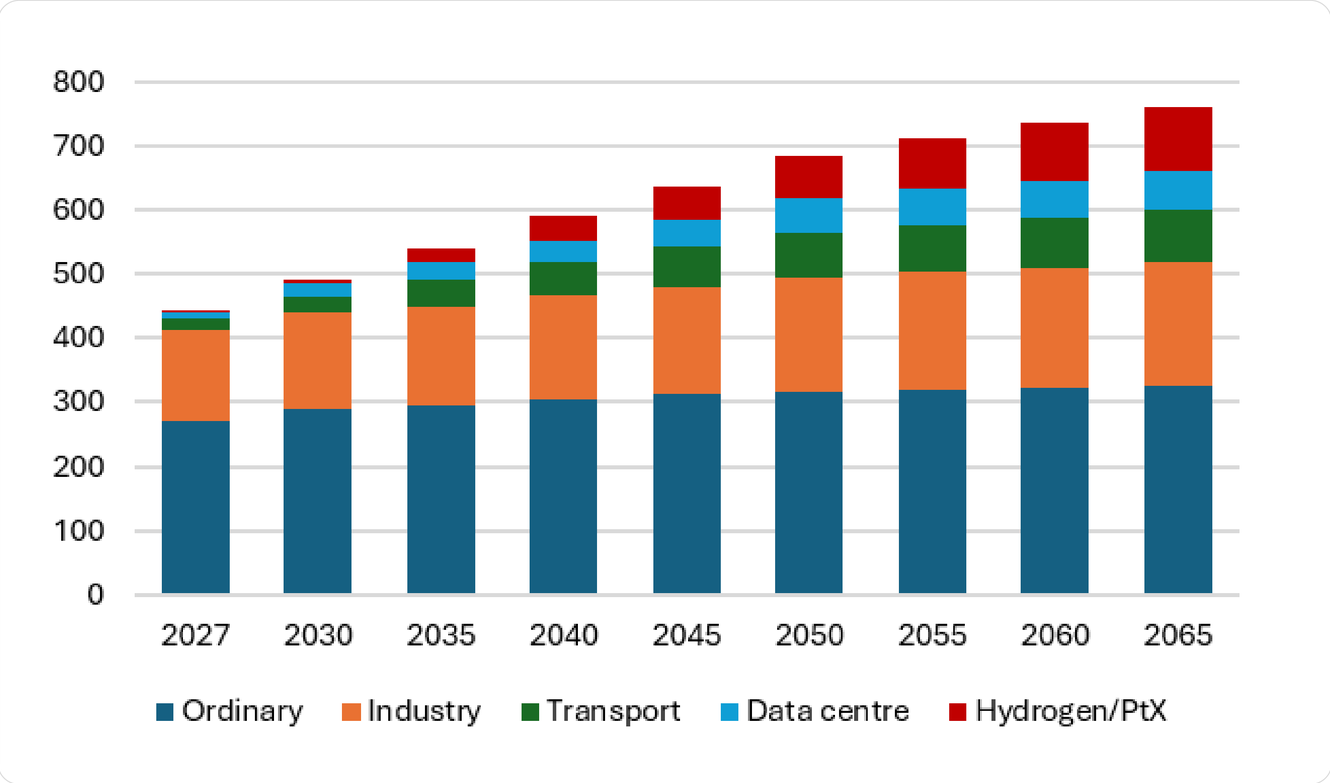
Heat pumps & electric boilers

Continued conversion from fossil and district-heating boilers lifts ordinary load, largely offset by building-efficiency gains.

Nordic Consumption Outlook

From 400 TWh to +710 TWh by 2066.

+80% growth across the Nordics, phased across three distinct horizons



Near-term · +60 TWh by 2030

Step-up driven by transport electrification, data-centre build-out and first part of green-steel / hydrogen projects.

Long-term · +180 TWh from 2030 to 2050

Dominated by hydrogen, transport and data centres; industry continues to grow despite efficiency gains.

Far-end · +75 TWh 2050 to 2066

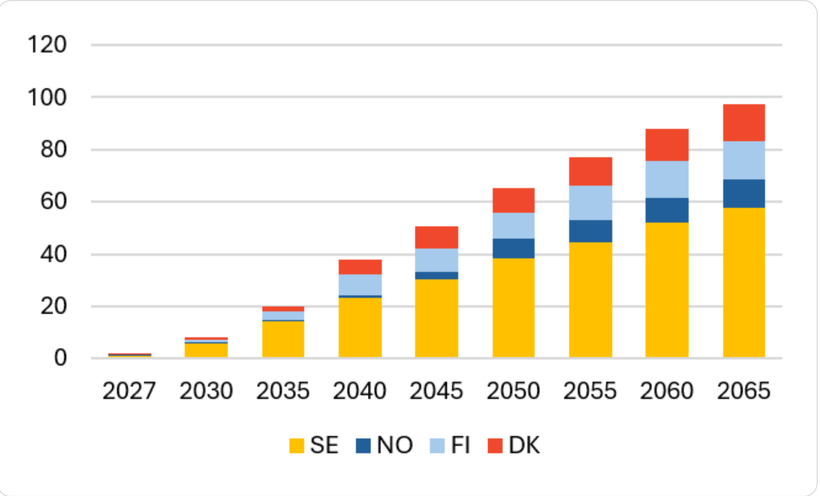
Lion's share hydrogen, as electrification of many sectors is mostly done.

Hydrogen electrolysis demand

Hydrogen grow close to 100 TWh by 2066.

Sweden leads on green steel, highly uncertain on speed and volumes.

The biggest contributor to consumption growth but can easily disappoint.



SE

Sweden

+57 TWh

Green-steel electrolysers

Green steel projects drive a step-change to >50 TWh.

NO

Norway

+11 TWh

Slower ramp, export-targeted

Exports targeted via blue then green H_2 from late 2030s.

FI

Finland

+15 TWh

e-fuels & industrial H_2

Steel and chemicals; strong project pipeline.

DK

Denmark

+14 TWh

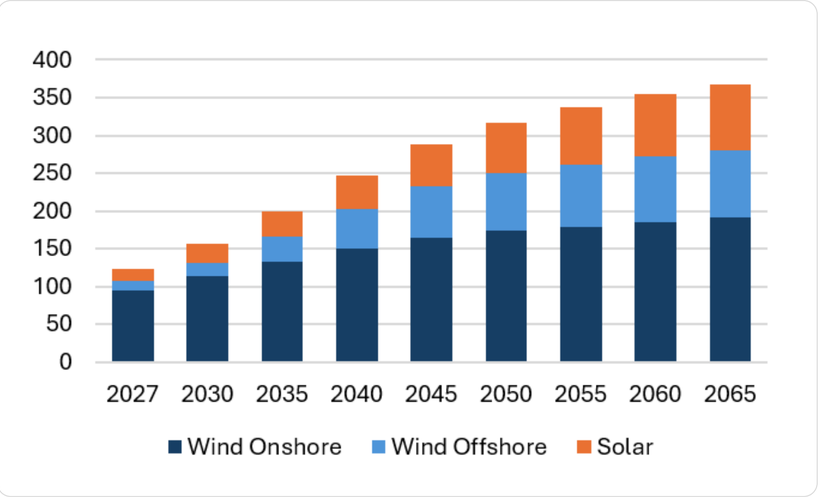
Power-to-X hubs

At North Sea wind landings — aviation/shipping fuels and potential export to DE. Plus Energy Island potential.

Renewable generation

Renewable generation to triple.

Offshore wind reduced and delayed. Onshore wind biggest contributor.



SE

Sweden

80 TWh

Offshore wind slashed

Onshore wind to double to above 80 TWh, PV growth x5 to above 26 TWh.

FI

Finland

60 TWh

Onshore wind close to 3x

Lowest offshore wind build-out (+8 TWh), PV growing 15 TWh.

DK

Denmark

60 TWh

Offshore wind 4x

PV +25 TWh. Onshore wind flat. Some energy island not connected to DK grid.

NO

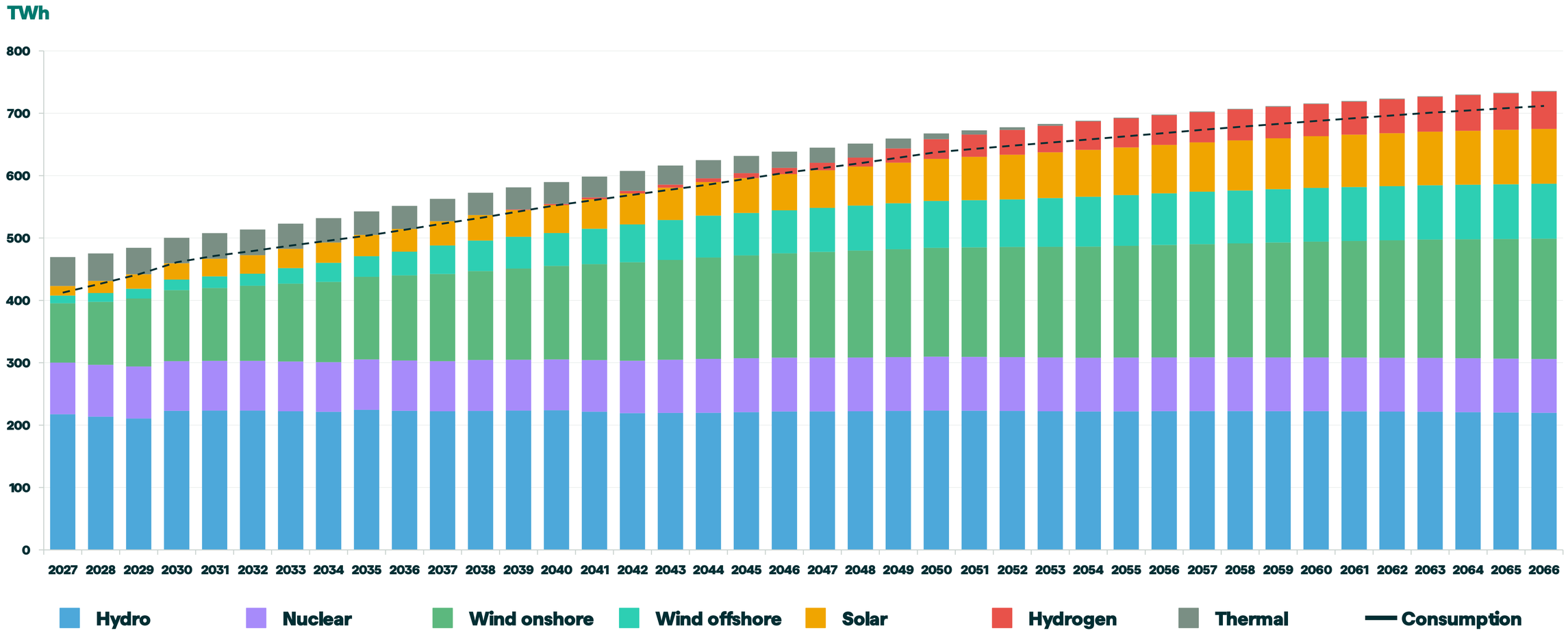
Norway

50 TWh

Onshore wind comeback

Offshore wind delayed (+18 TWh), PV growth lowest in the Nordics (+12 TWh).

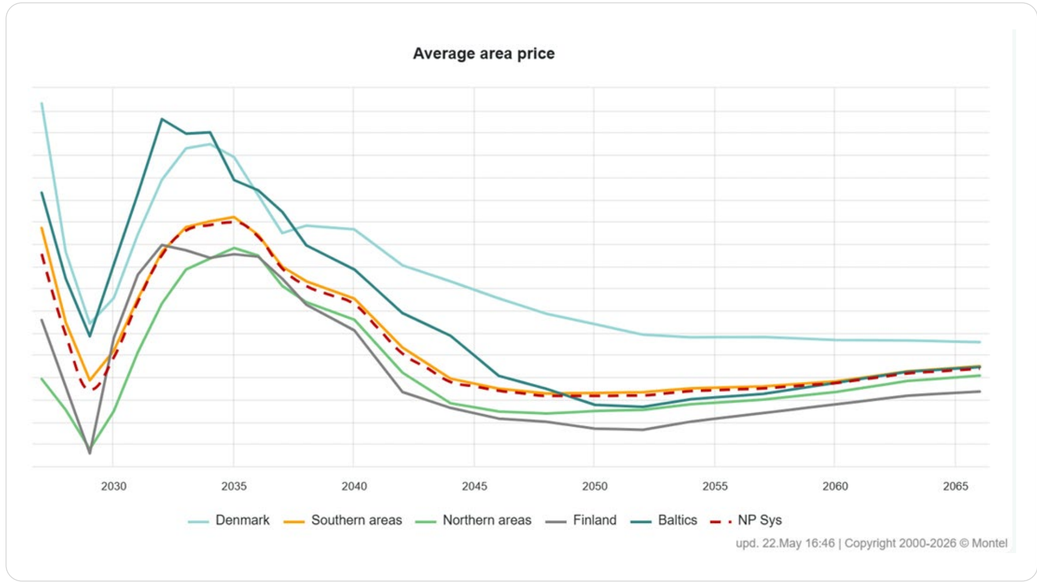
Nordic Power Balances



Average real system price: €59/MWh

EMPS model with fundamentals, RES build-out, commodity prices and grid configuration as input. 30 historical weather years generate the scenario percentiles.

1) **To 2030 – prices fall from today's highs as gas prices ease.**
2) **Early 2030s – a tighter balance lifts prices: electrification, new demand and CO_2 costs, while RES build-out lags.**
3) **Late 2030s – RES, nuclear and grid build-out improve the balance; prices ease and area prices converge.**
4) **Late 2040s – green H_2 displaces thermal and the CO_2 impact fades. Denmark stays structurally highest, Finland lowest.**

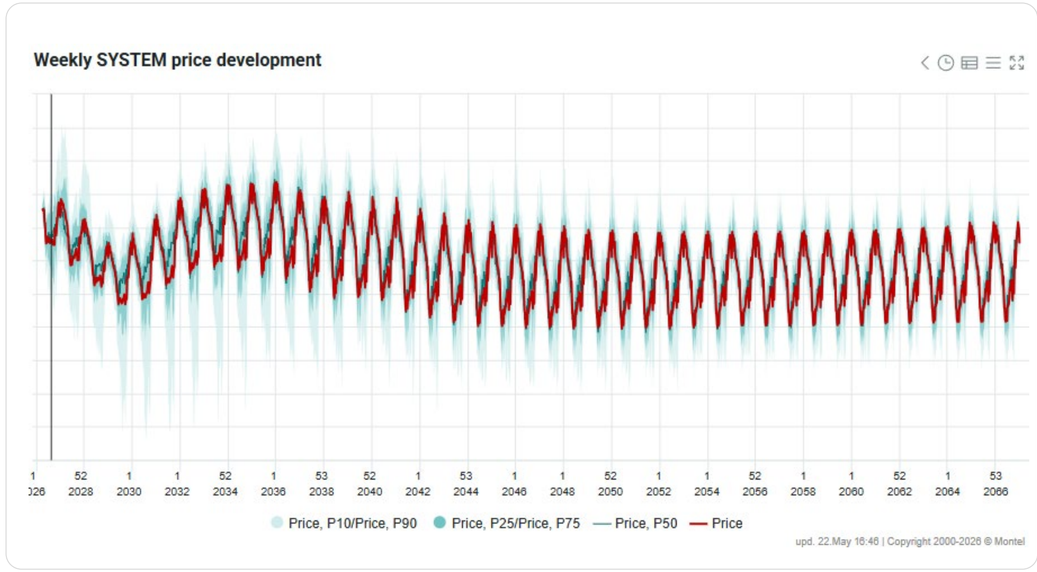


Uncertainty

Consumption growth, RES and grid build-out, gas and CO_2 prices, weather years and policy frameworks – all still unresolved.

Structural transition

Thermal gives way to RES, nuclear and green H_2. Balances tighten in the early 2030s, then ease as build-out catches up – Denmark highest, Finland lowest.



Q&A

Christian Sjødin
Senior Consultant · Montel Advisory

christian.sjodin@montel.energy

Thank you

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