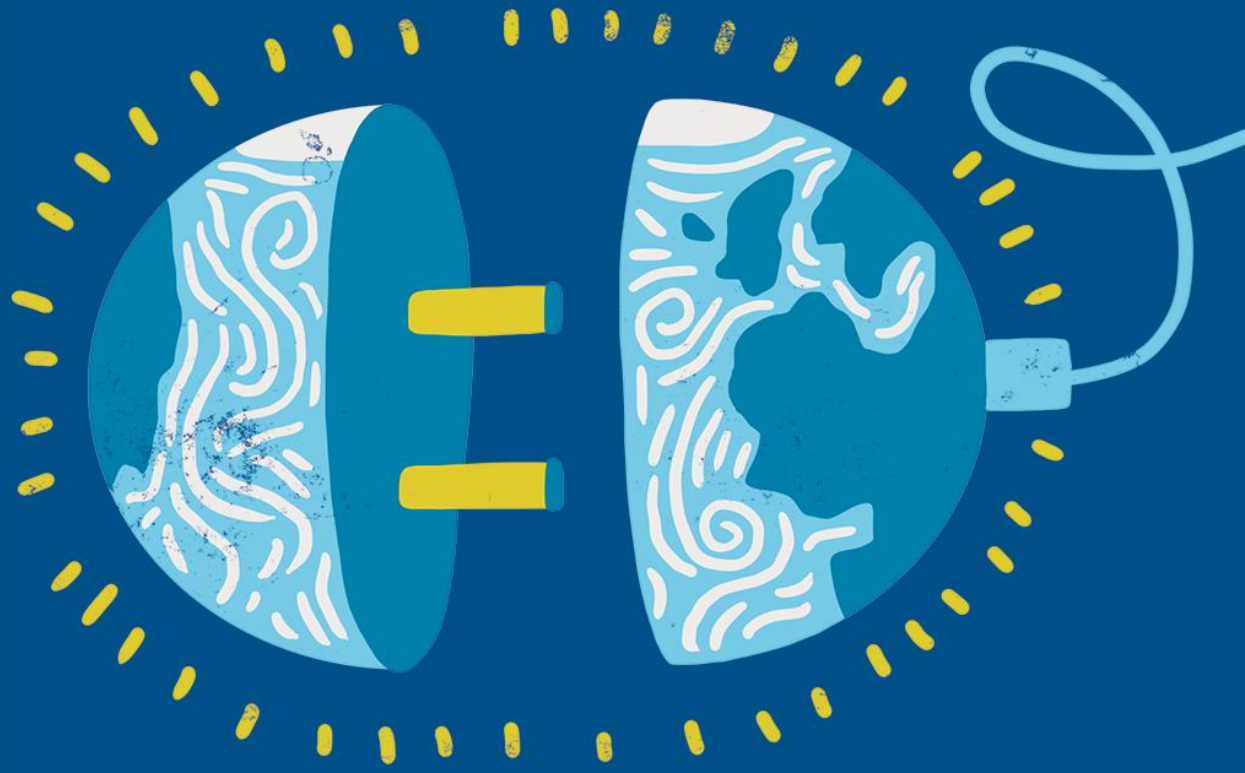
LOW EMISSIONS SCENARIO



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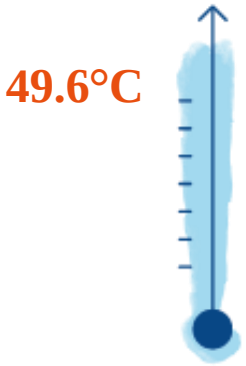
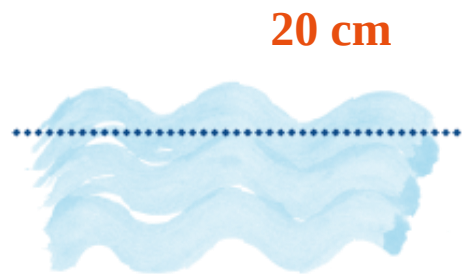
‘Code red’ for humanity



49.6°C was measured in June 2021 in Canada, which is a new record

At the end of July this year, there were over 80 forest fires in western USA

Over the course of three days, the same quantity as one year of rainfall happened in Zhengzhou, China



The average sea level rose by 20 cm between 1901 and 2018, and the rate of the sea level rise is increasing

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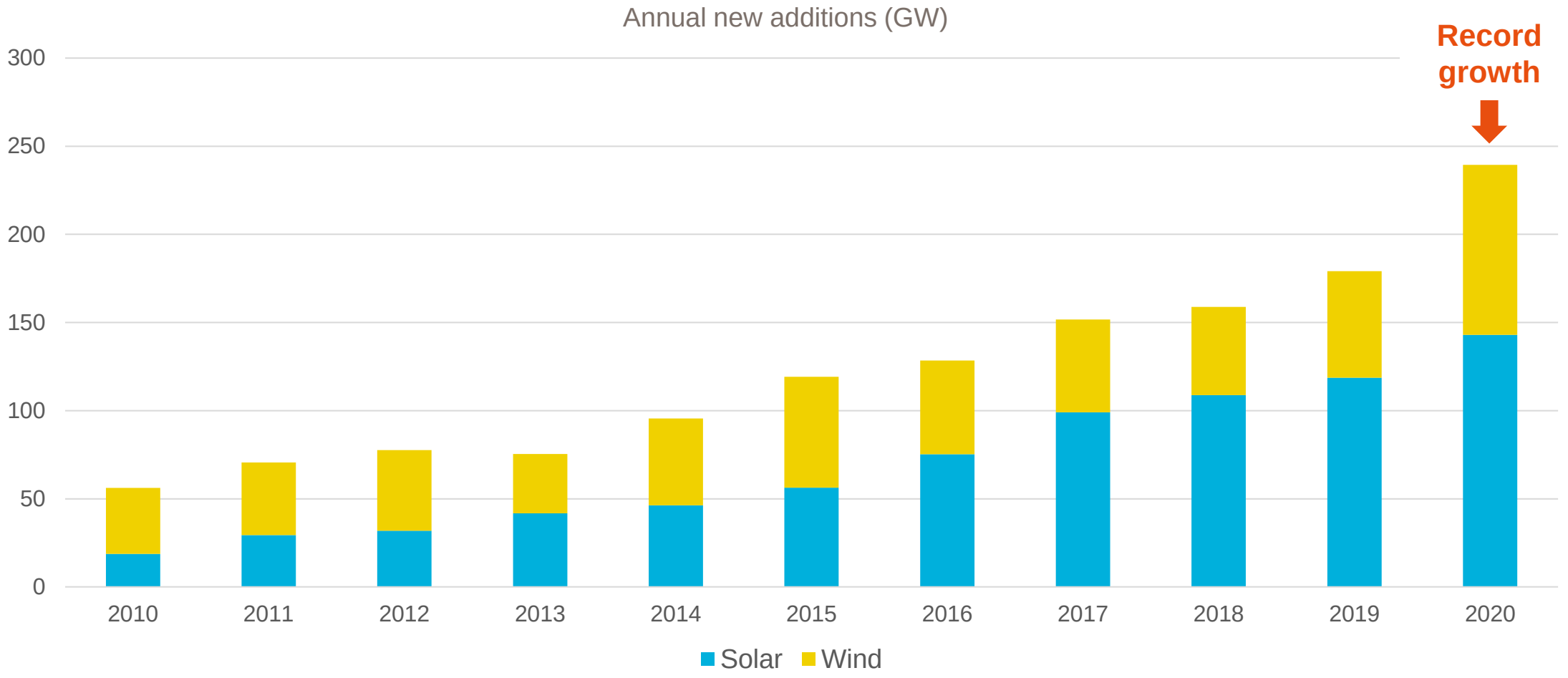
Renewable energy resilient to the corona crisis



Source: Bloomberg New Energy Finance 2021

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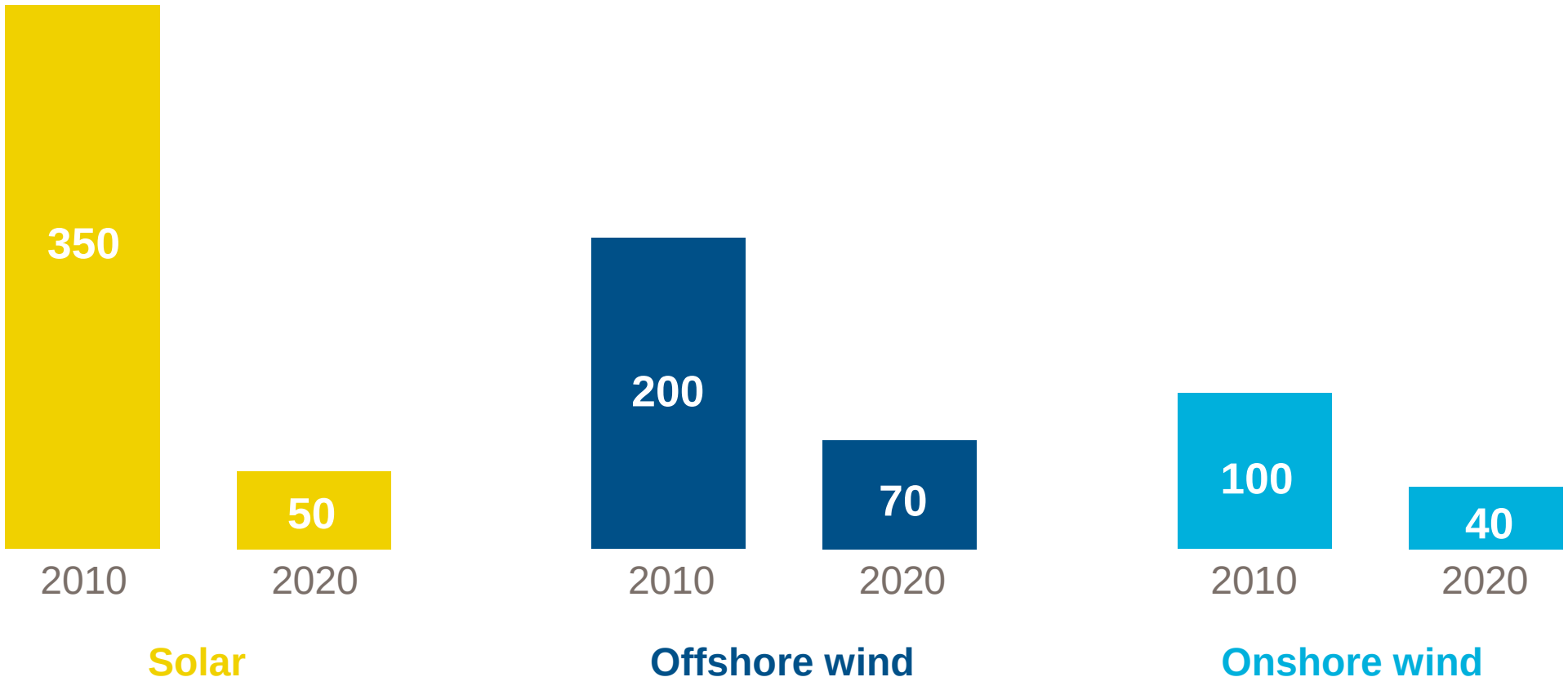
Now cheaper to reach net-zero than ten years ago

Cost of renewable technologies 2010-2020 [$/MWh]



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More countries are committed

Countries with net-zero ambitions

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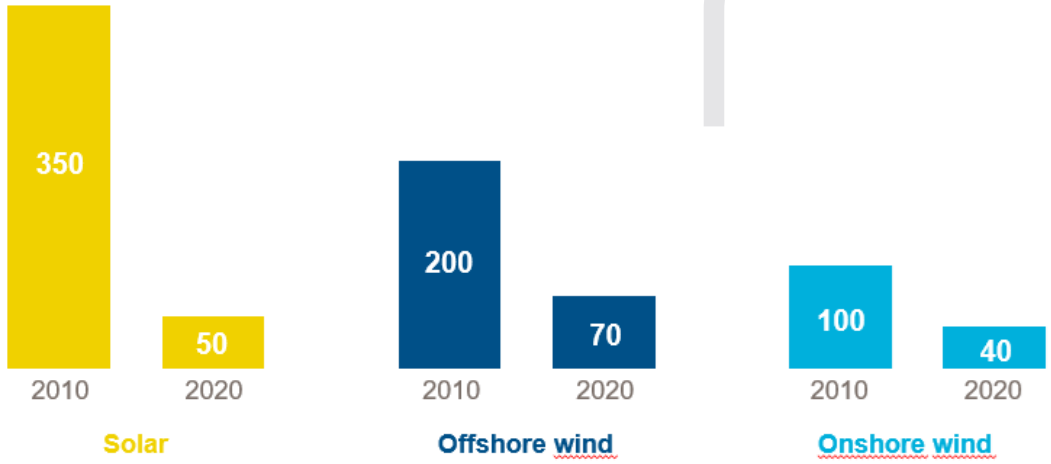
... and these dynamics reinforce each other



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2 TOWARDS A RENEWABLE AND ELECTRIC WORLD

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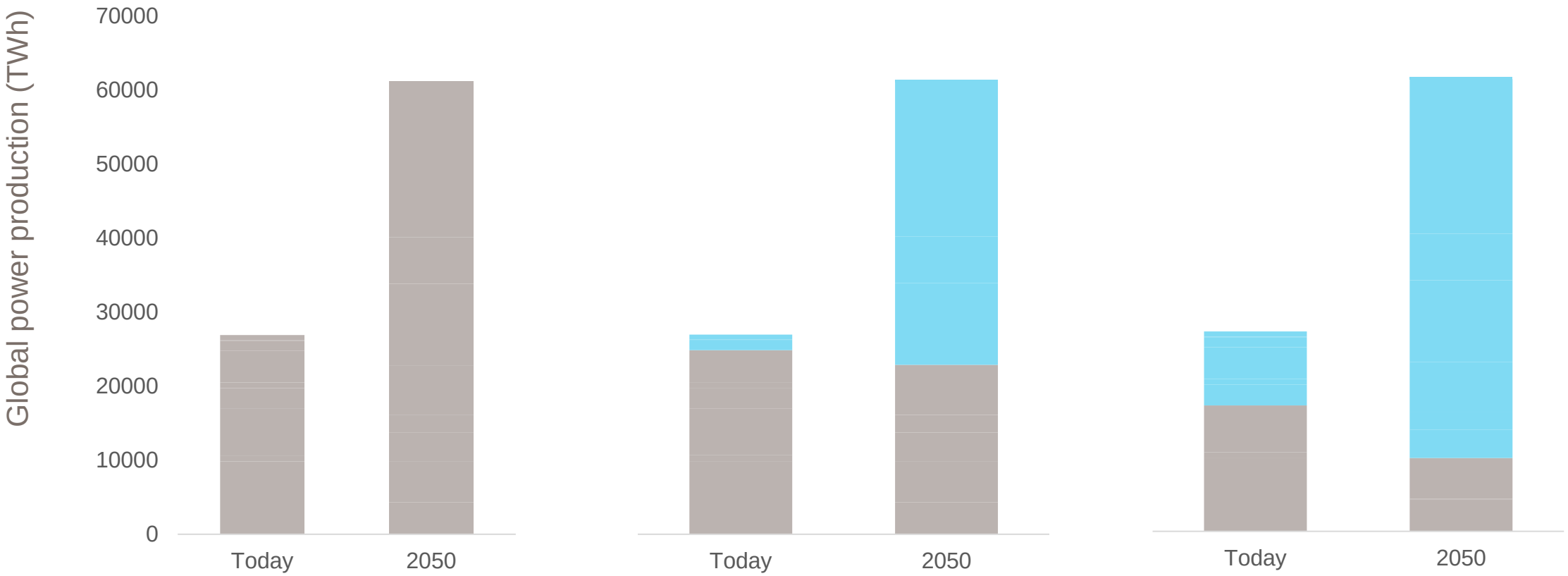
Alternative

The future energy world is renewable

Power demand is doubling

2/3 from solar and wind

83% from emission free



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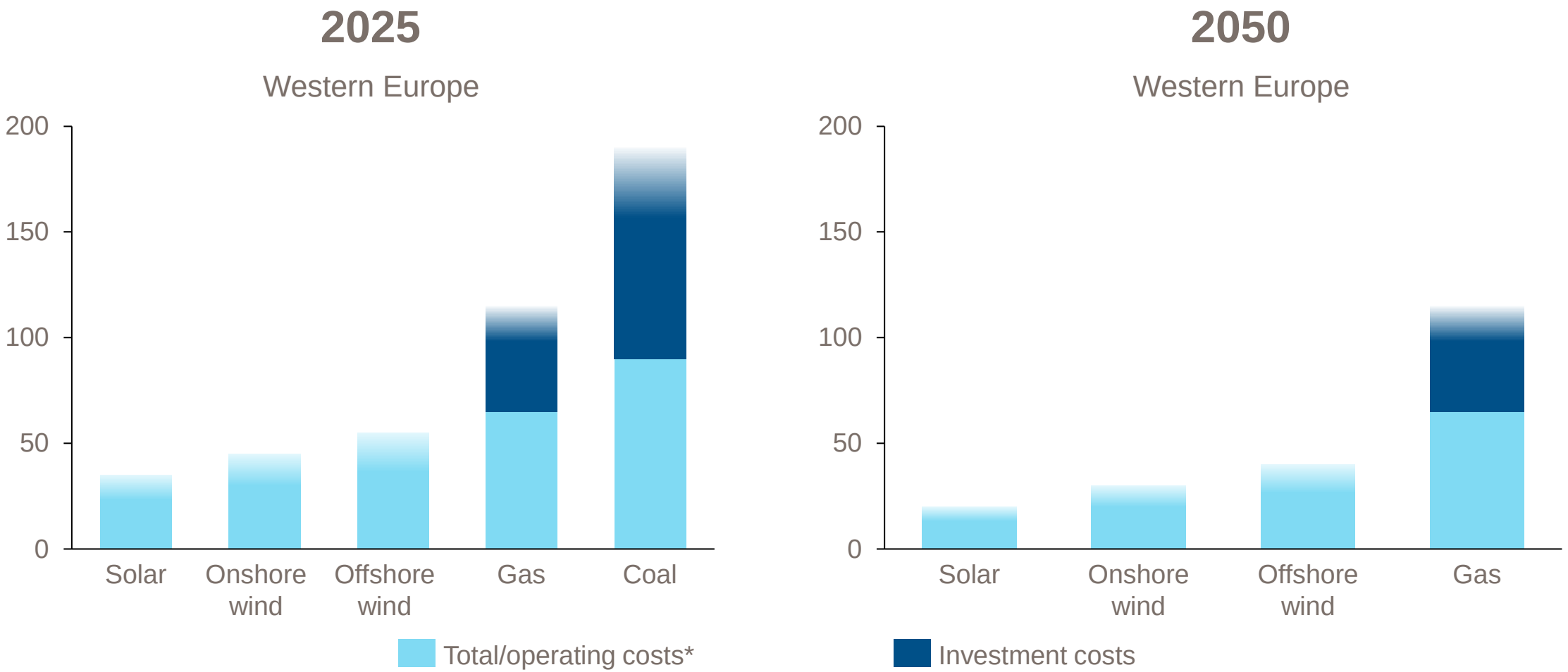
Costs of renewables already competitive with gas and coal – and will continue to decline



* For renewables: total costs; for gas and coal: operating costs

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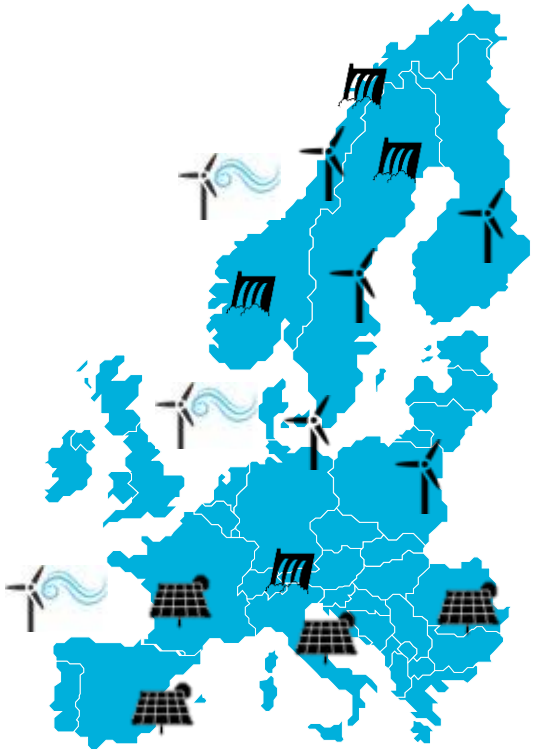
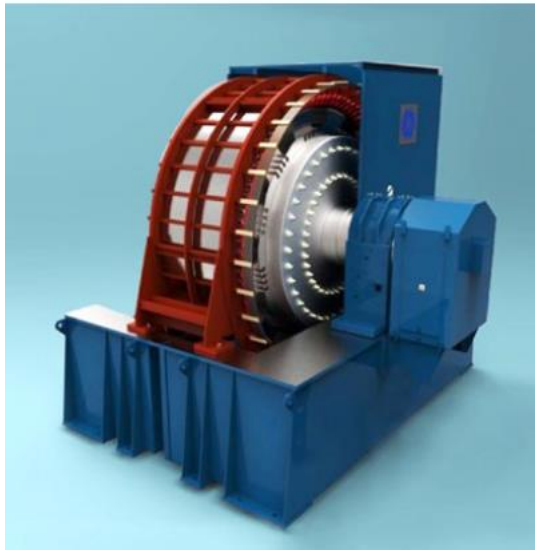
The power markets are able to handle the high share of variable power

International collaboration enables increased share of renewables



Flexible demand will allow higher share of variable RES in the power market

Technical solutions must be engineered to ensure grid stability



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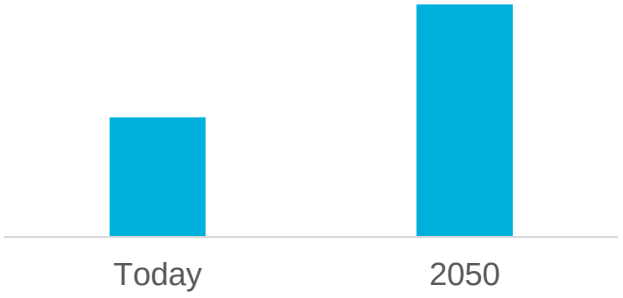
Clean power is used to decarbonize other sectors

Industry: +50%

Transport: x19

Buildings: x2



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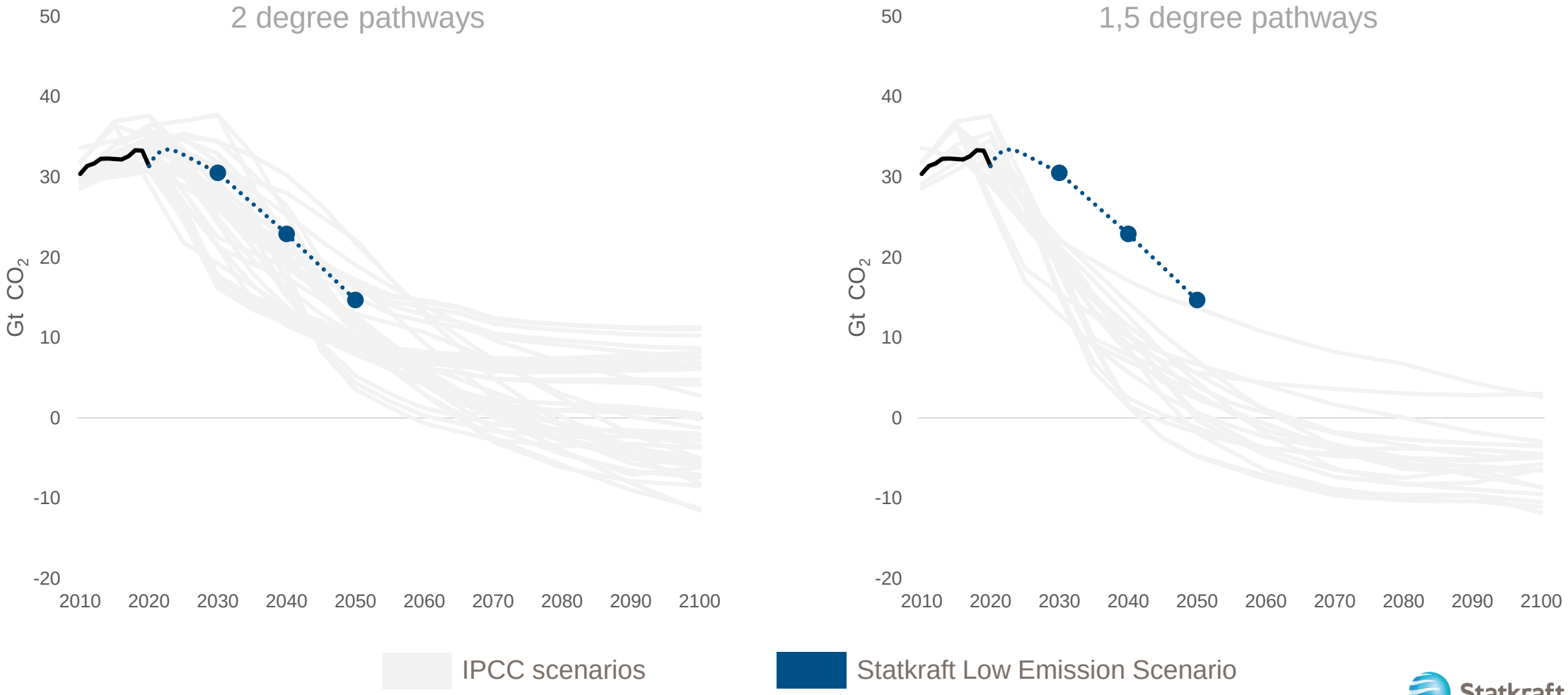
The Low Emission Scenario takes us is in line with a 2 degree pathway



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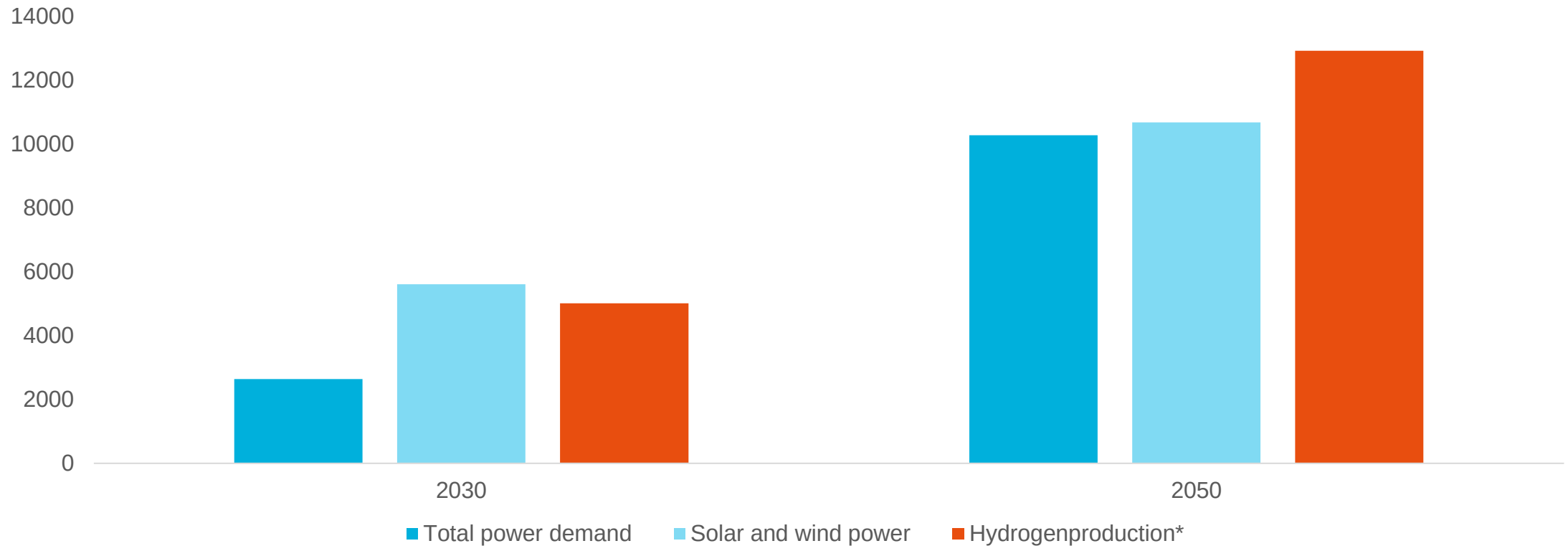
From Low Emissions to 1.5 degrees scenario
- more electrification, renewables, and clean hydrogen needed

Delta Low Emissions Scenario vs IEA Net Zero Energy (TWh)



*TWh hydrogen based on higher heating value (HHV), 142 MJ/kgH2

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3 CLEAN HYDROGEN: FUELING THE RACE TO NET ZERO

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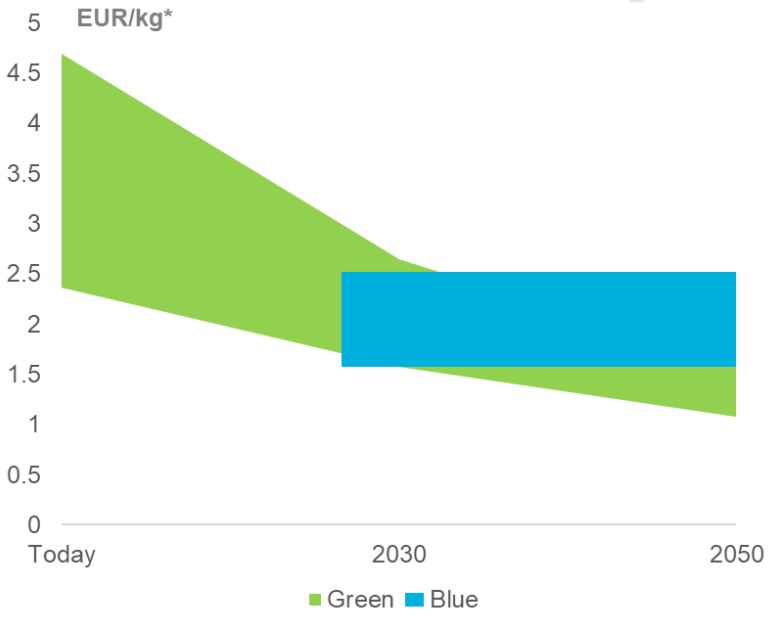
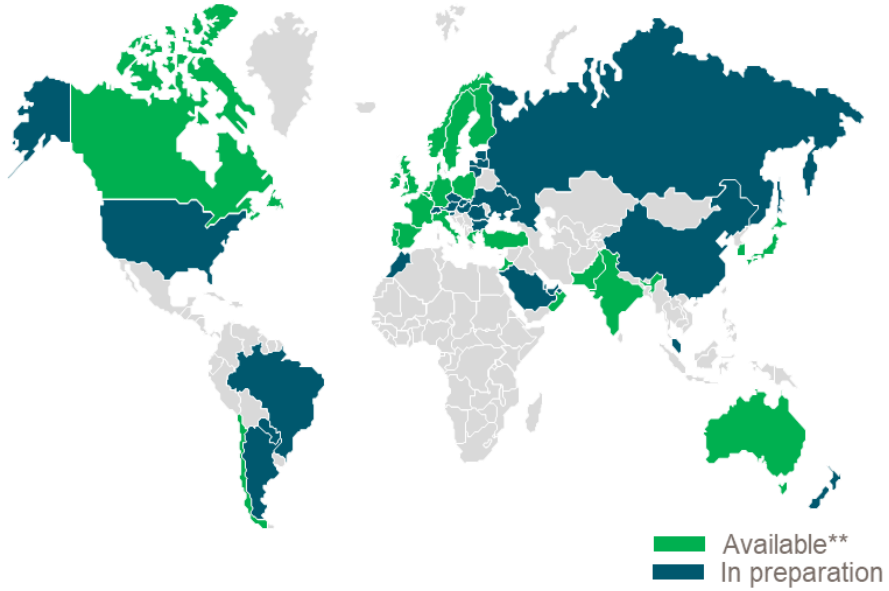
Countries are committed and green hydrogen costs decrease ... and these dynamics reinforce each other

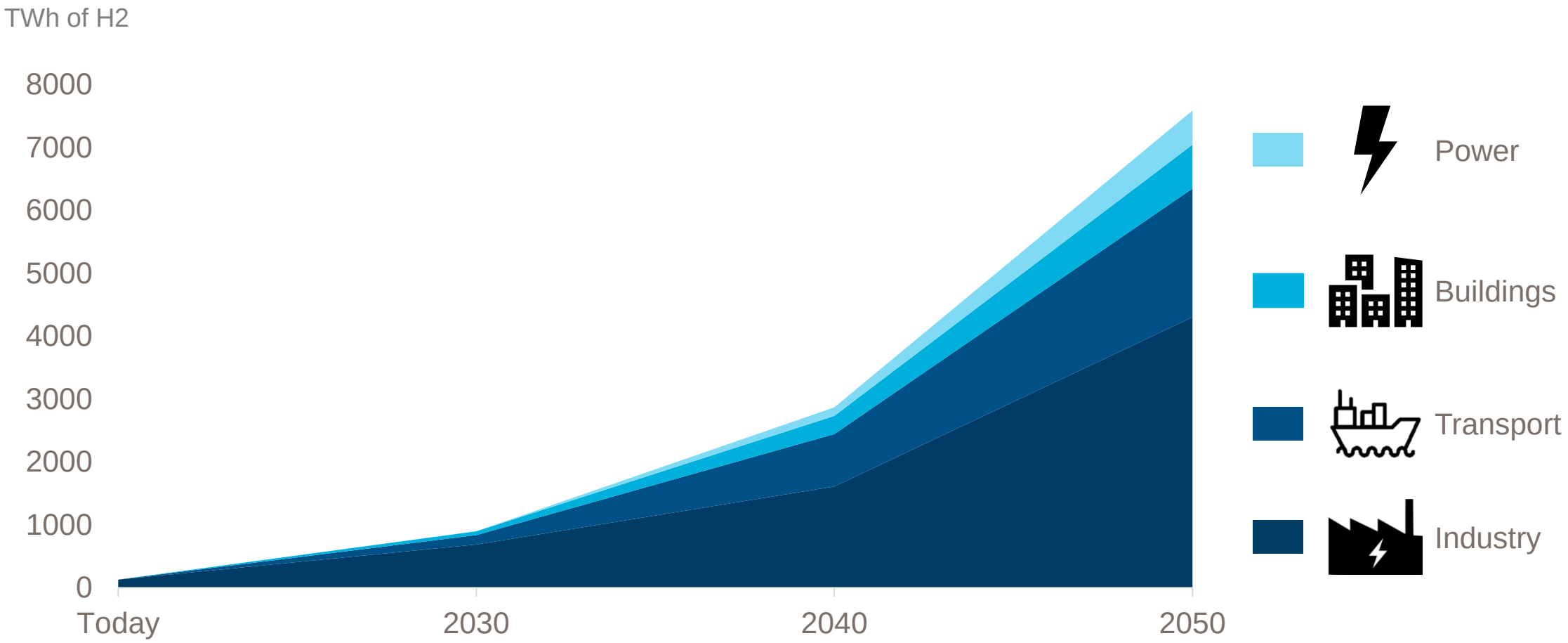




*Source: Statkraft Low Emissions Scenario, ex storage and transport of hydrogen

**Source: National hydrogen strategies. Bloomberg New Energy Finance 2021

Clean hydrogen is a key technology in Statkraft's Low Emission Scenario



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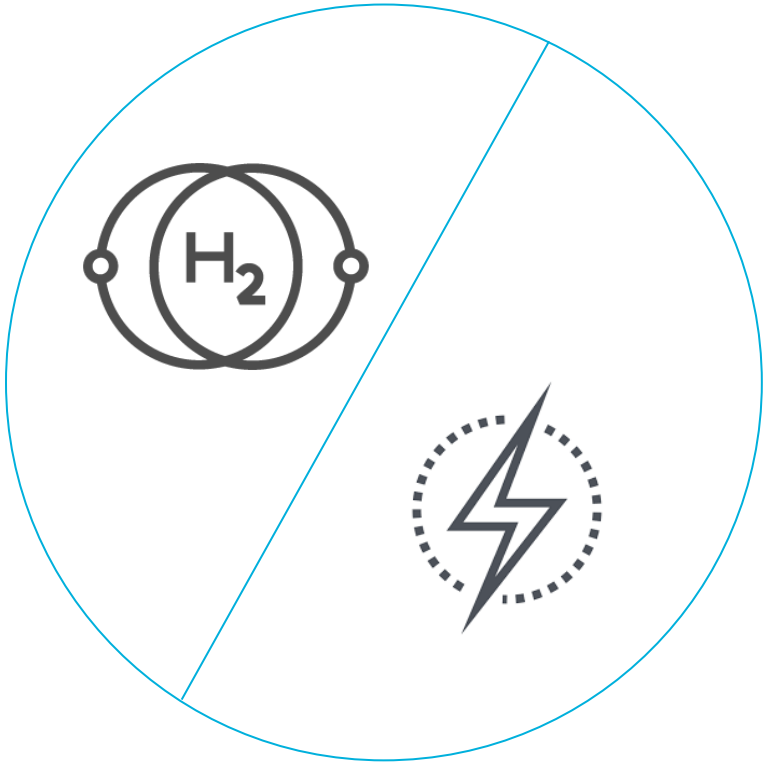
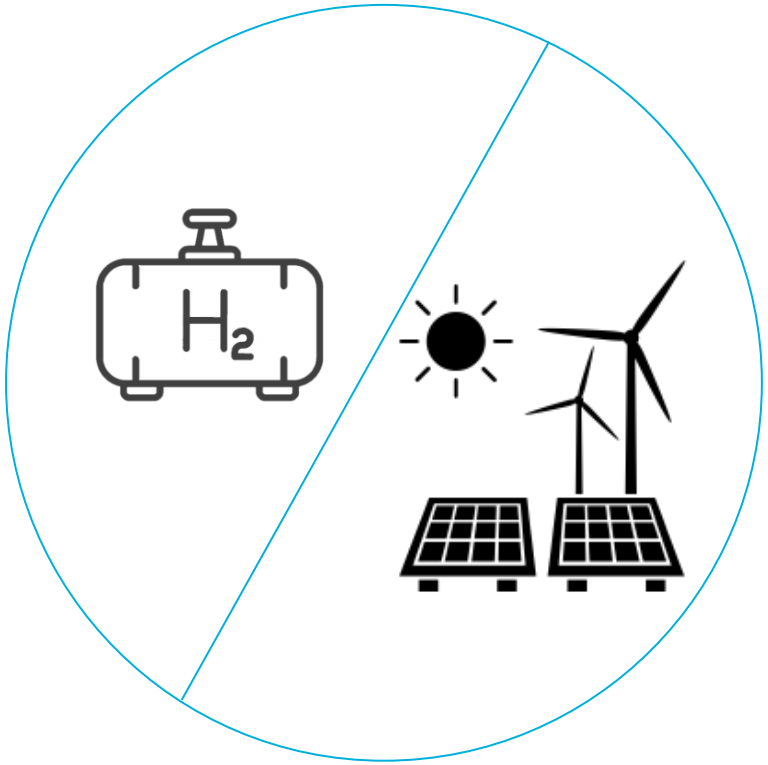
Three examples of interplay between H2 production and power production

Between **hydrogen production** and **power demand**



Between **storage size** of hydrogen and **intermittency** in power sector



Between **H2 peak power** and other **flexible assets**

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Need to quickly scale up the transition

- The energy world will be cleaner and more efficient in 2050 than today.
- We need 2 times as much solar and wind capacity every year to 2050 compared to the 2020 record to follow 2 degrees.
- Stopping global warming at 1.5 degrees requires a swift increase in ambitions and pace.
- Green hydrogen is fuelling the race to net zero, need to quickly ramp-up for a 1.5°C pathway.

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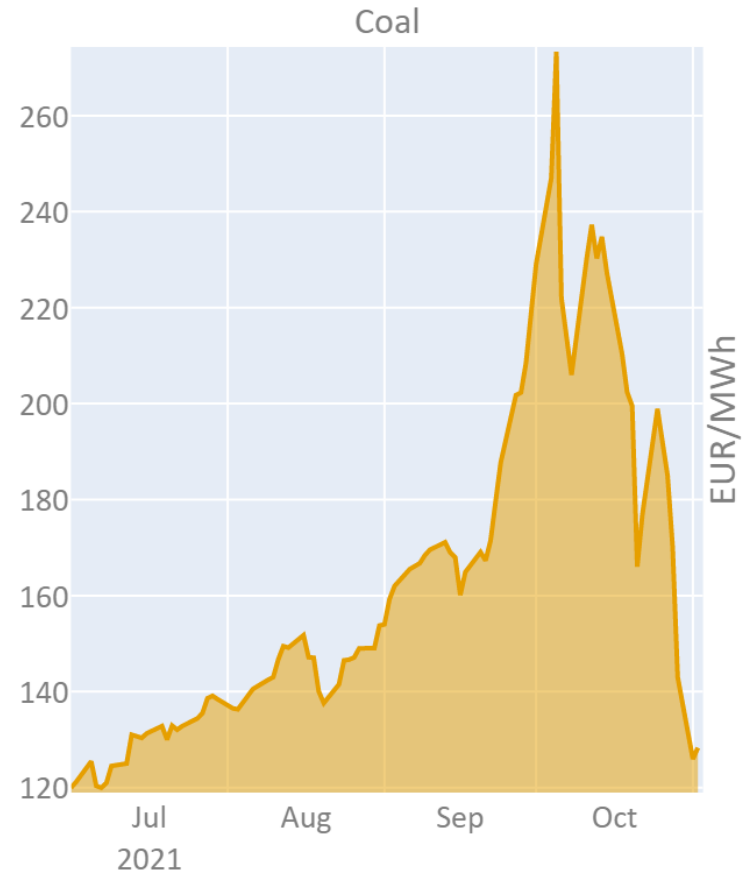
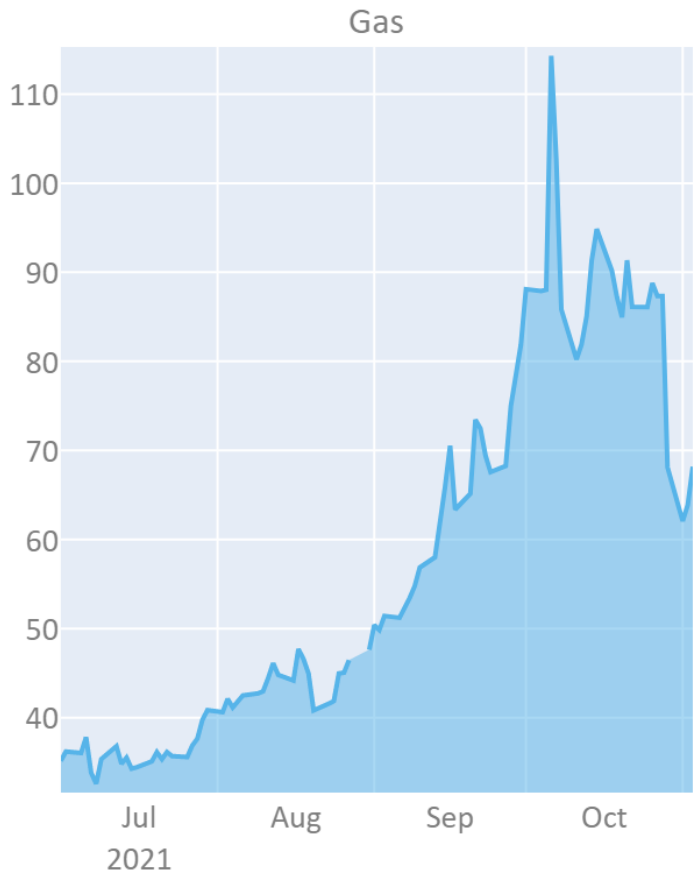
The role of hydropower in a low emissions market

ARILD TANEM
SINTEF USER MEETING 2021

The dominant situation now: Extremely volatile gas and coal markets.

Tight global situation; movements driven by news on Russian gas supply & Chinese fuel procurement plans





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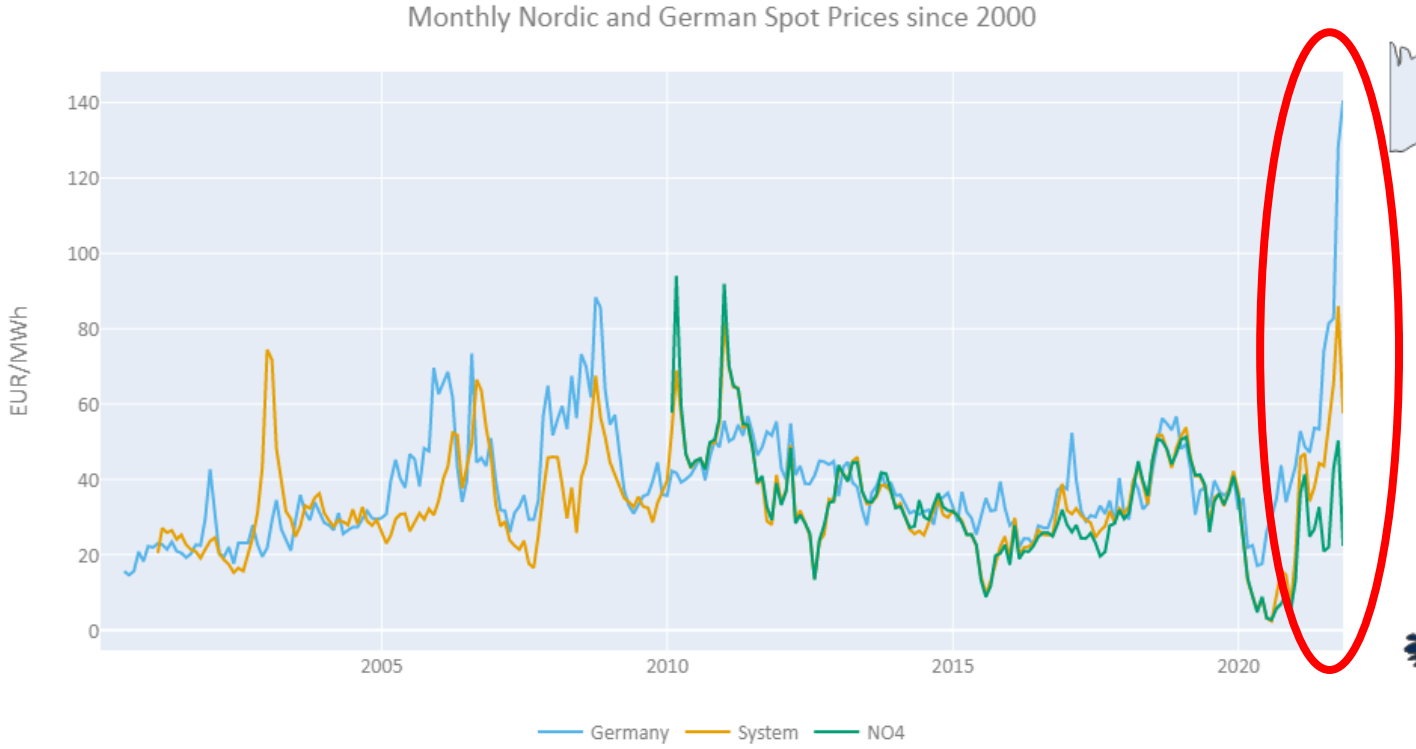
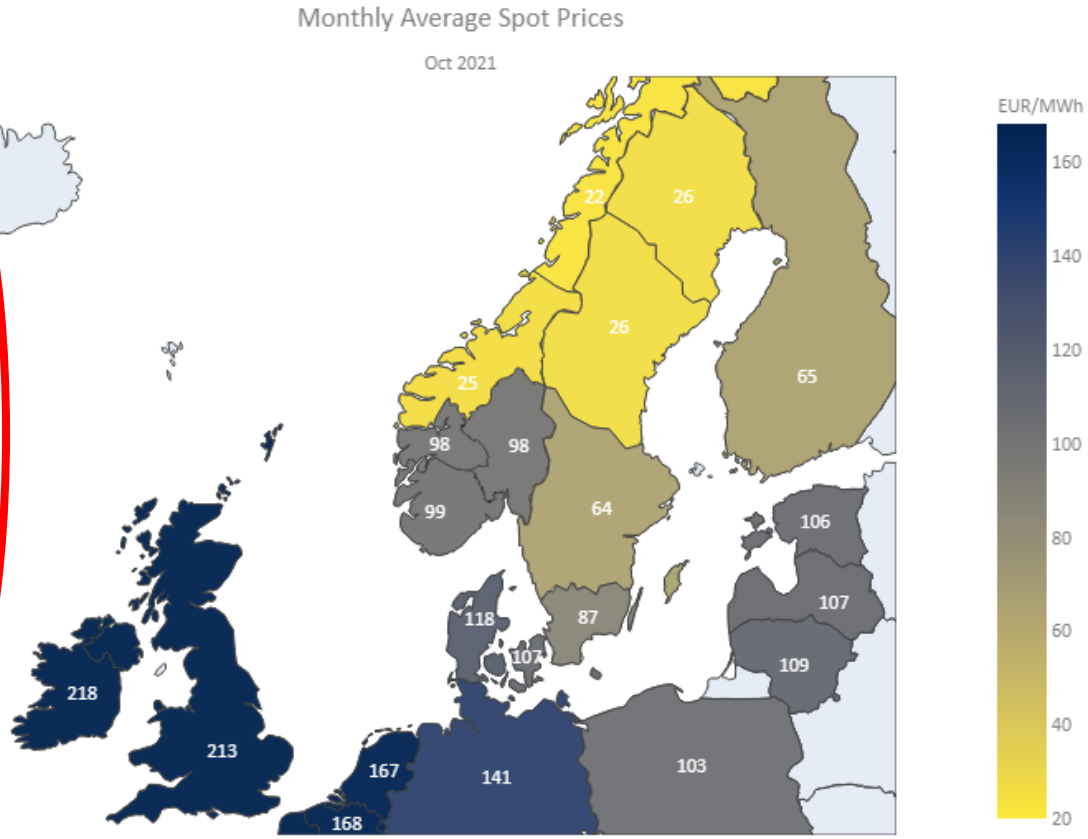
Record high spot prices for Germany and System in September and October. Significant increase in area price differences.





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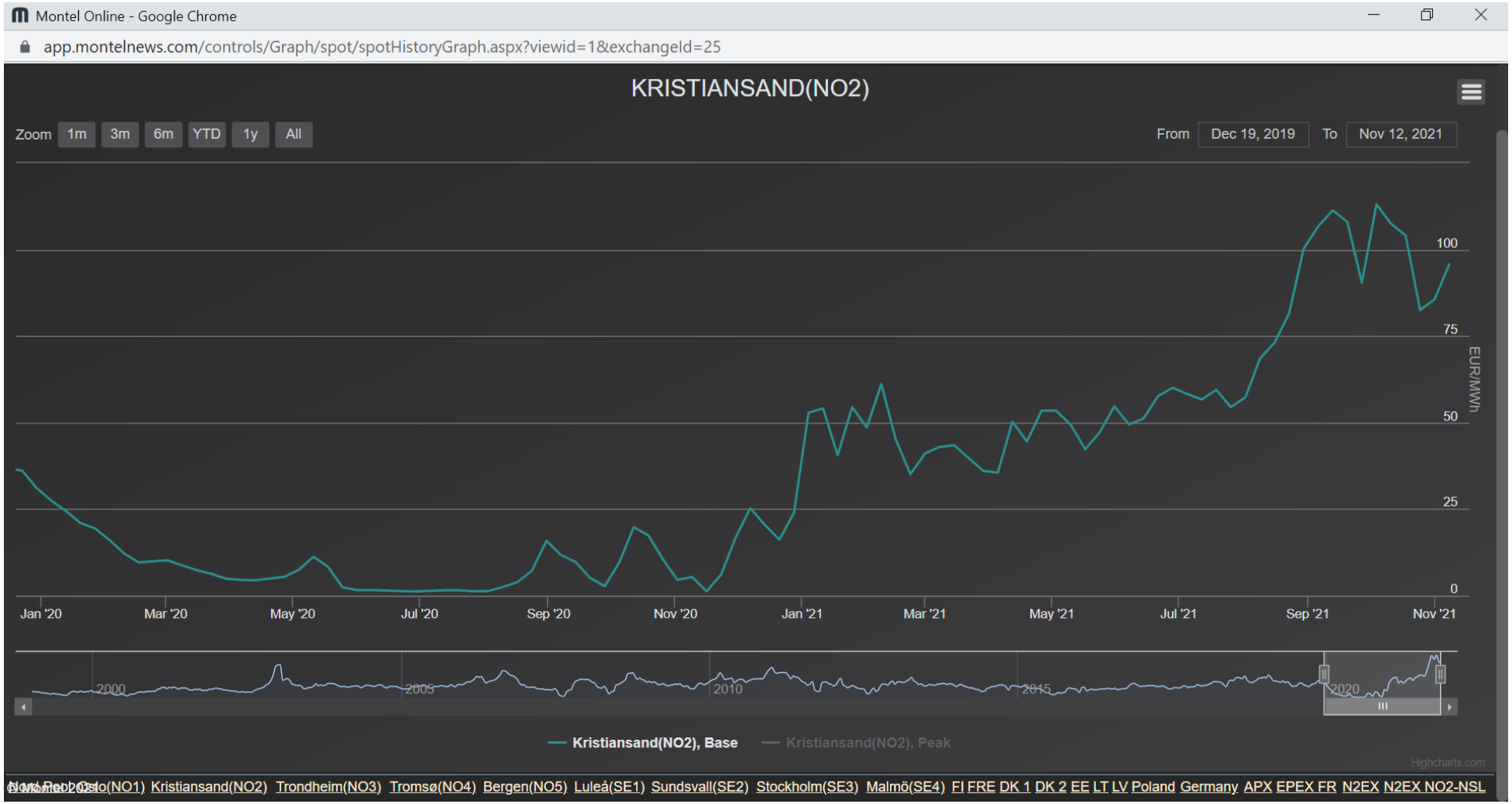
Volatile spot prices will demand more from flexible hydropower
Example; over the 2 last years



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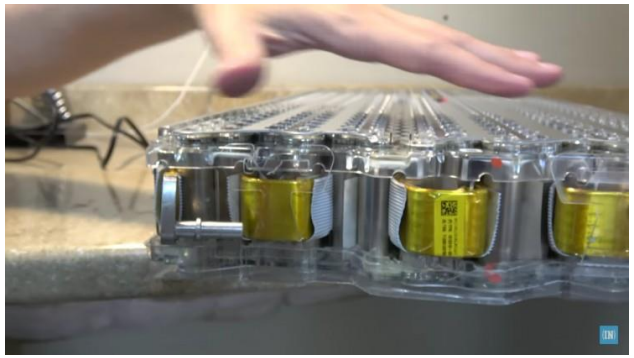
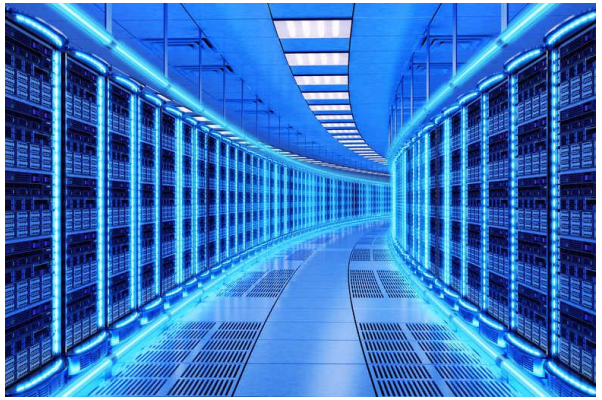
Huge uncertainties in consumption development





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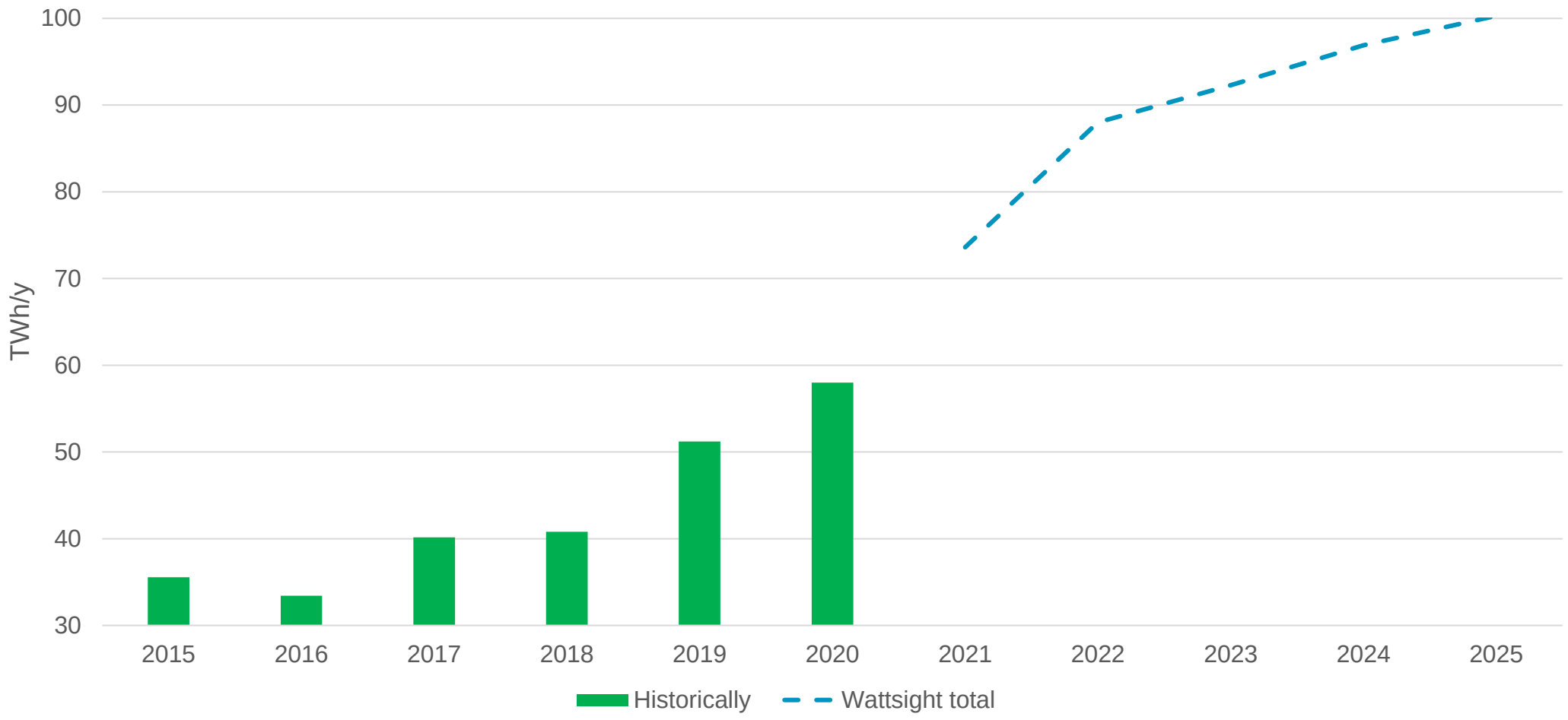
Rapid development of supply, uncertain growth rates

Wind in the Nordics – history and future



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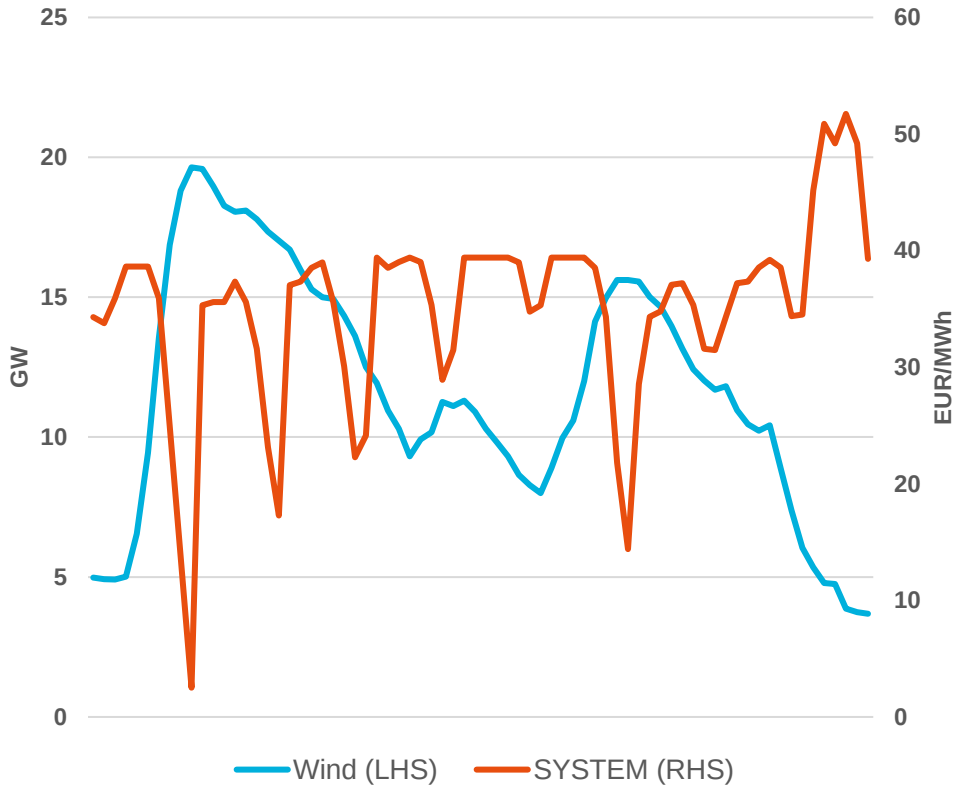
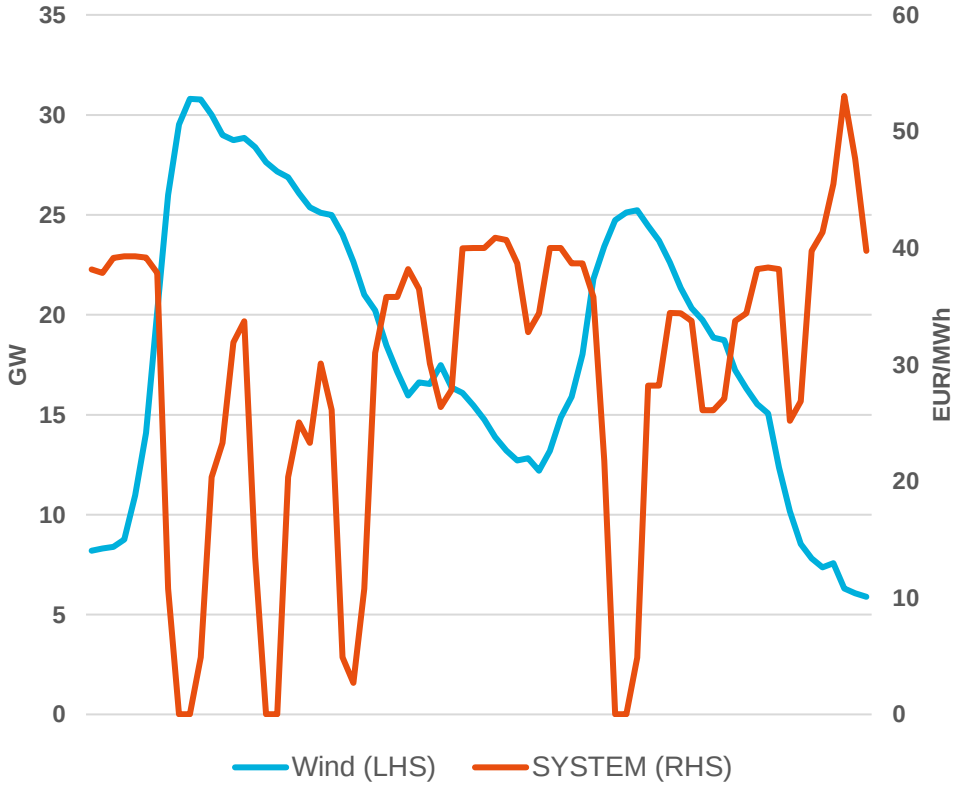
More intermittent production gives even higher price volatility

Total windpower production and system price historical month with 2014-weather year



Total windpower production and system price future month with 2014-weather year



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