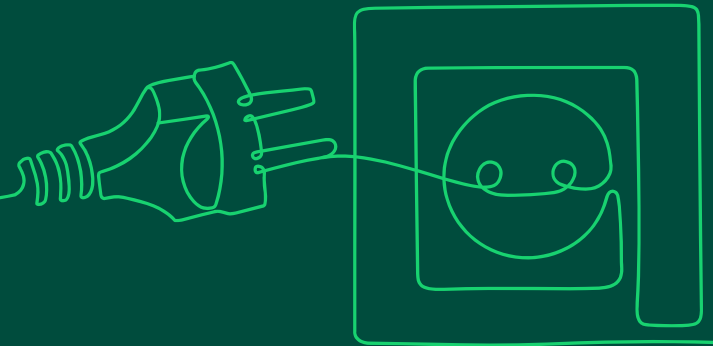


The future Nordic Energy System - a plate model

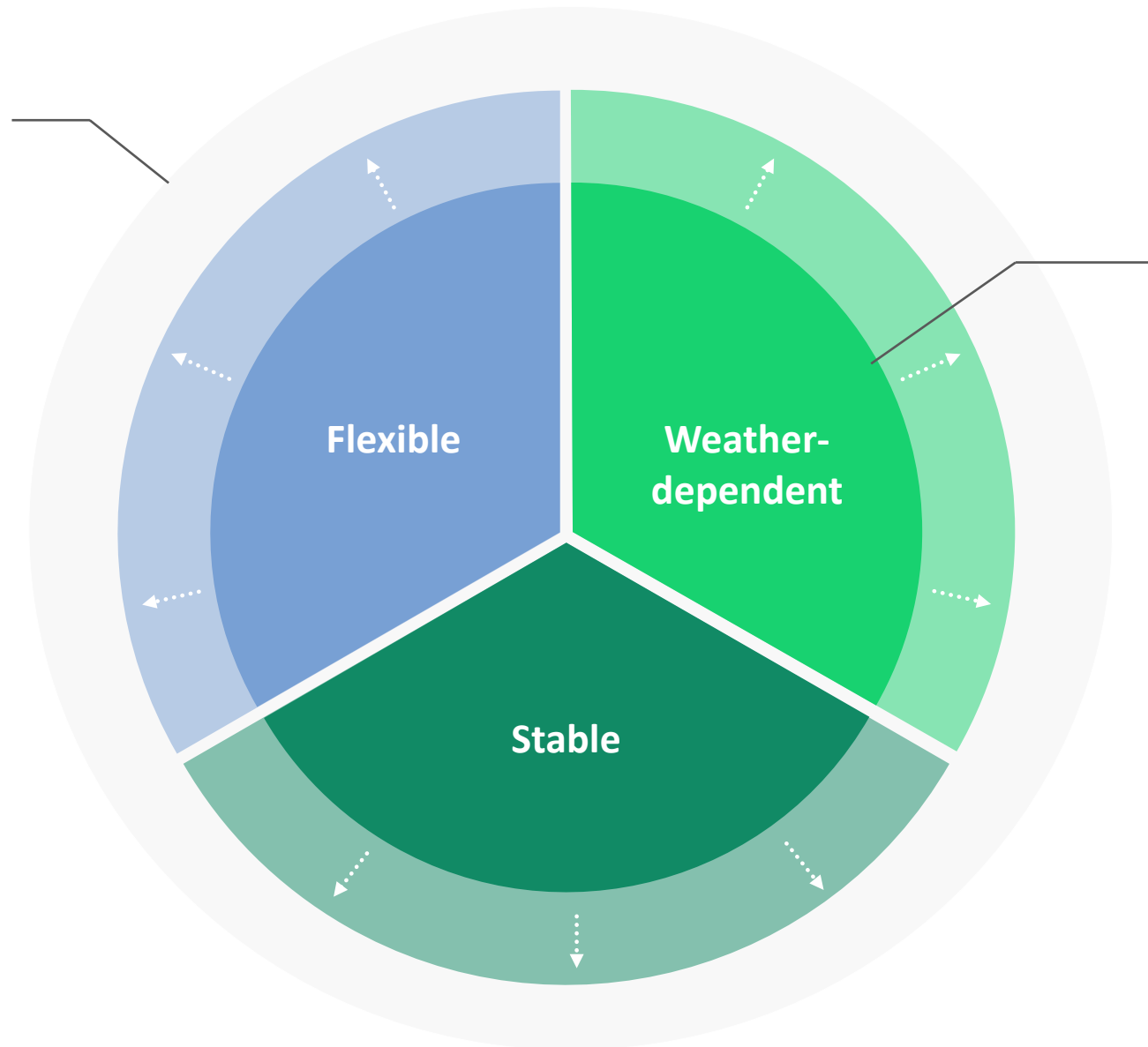
Mats Persson – SVP Portfolio Management & Markets

2024-08-29



How to increase the size of the plate whilst keeping it in balance?

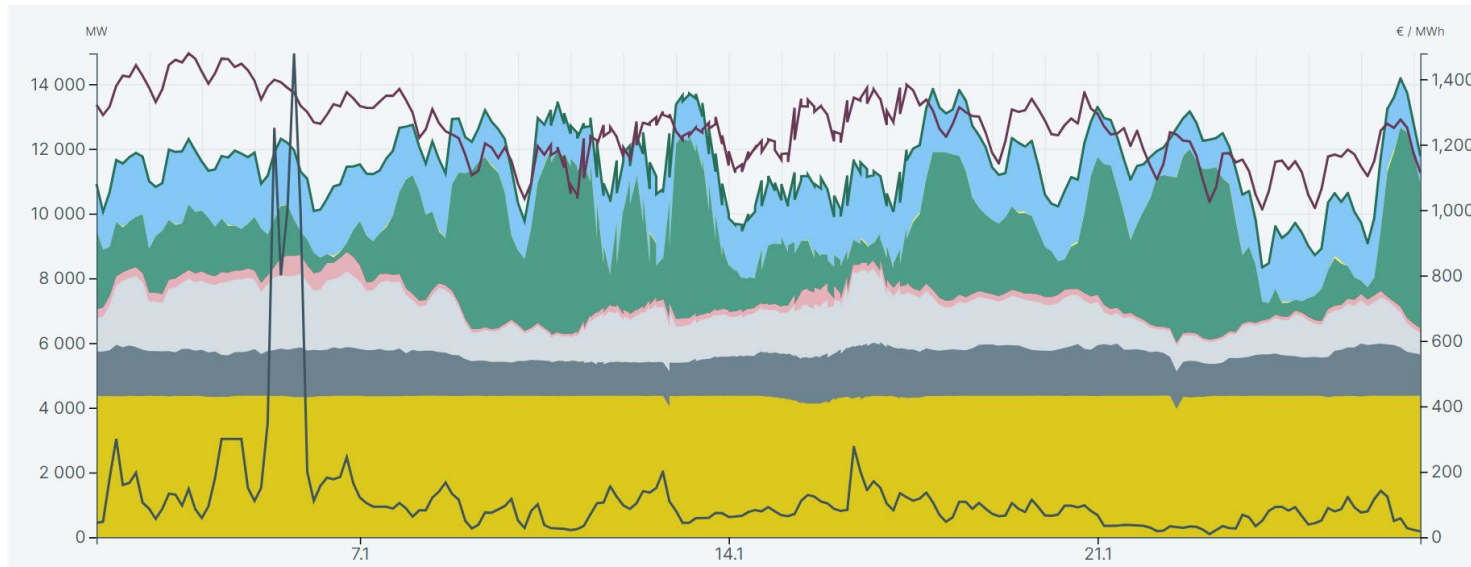
CO2-neutral society
2035-2040



Supply in 2024 –
how large is this
sector already?

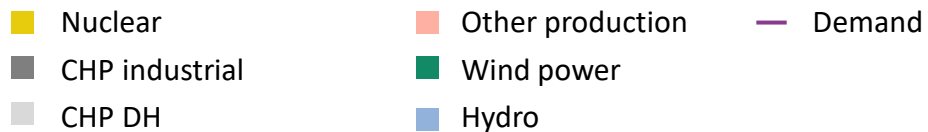
Where are we today – Example Finland with extreme price volatility

Finnish demand and supply, January 2024



Outlook

- Electrification of heating further, increasing the maximum demand
- Consumer and industrial flexibility is limited.
- CHP being decommissioned to reduce emissions and fuel cost.
- Hydro capacity will not increase significantly in the years to come
- Coming new production capacity is weather-dependent.
- New nuclear and pumped hydro can be in place in mid 2030s only
- Capability to import from Sweden and Estonia during constrained hours will decrease as their own capacity adequacy situation deteriorates.



The Nordic Power system is one of the cleanest around – but is it fit for the future?

- Affordably priced clean energy is an undisputed resource for the Nordics, nevertheless electrification investments are delayed
 - Increased price volatility and forecasted decreased security of supply negatively impacts the attractiveness for electrification investments in the Nordics
- The energy-only market does not provide sufficient incentives for investments in flexibility, which would improve SoS and decrease volatility in a sufficient manner
- According to ENTSO-e(20240823):
 - “Lower and more uncertain spot prices + decreasing running hours + no acceptability of (very high) scarcity pricing => high risk premiums for capital costs with risk of no business for back-up generation capacity needed in period of low RES generation(“Dunkelflaute”)”
 - “Stronger LT investment signals needed => Capacity Remuneration Mechanisms likely to be necessary in most EU countries”

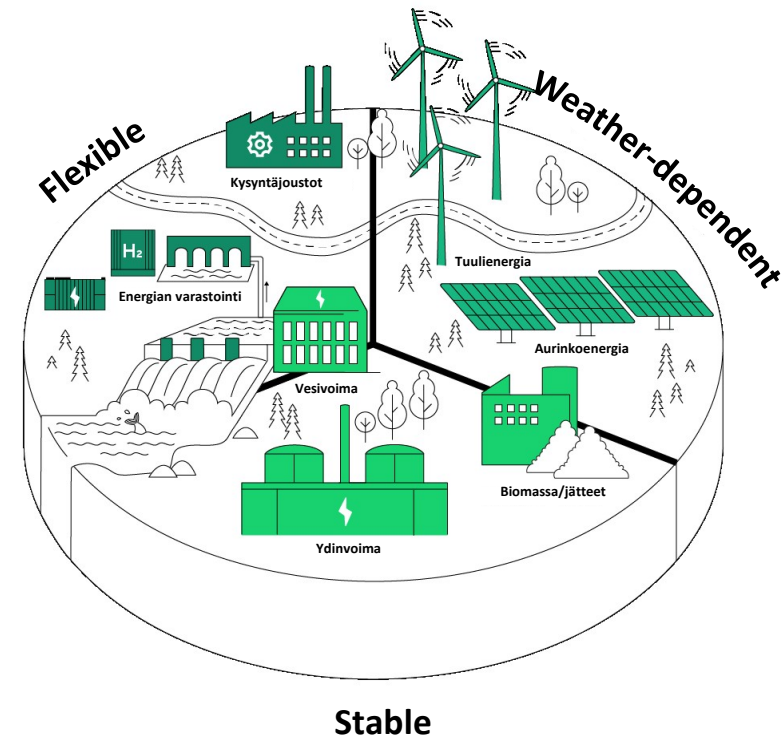


Decarbonisation of society requires a flexible and balanced power system

Power markets need to provide more long-term visibility and stability

- Uncertainty impacts both supply and demand and delays broad investments into electrification of society which are needed to reach decarbonisation targets
- Power companies are willing to invest but society will need to play its part if we want to attract demand-side investments, jobs, GVA by doubling power generation.
- Investments do not happen in a vacuum, the right tools and mechanisms are needed to make investments bankable.

A system which has a proper balance between capabilities delivers the best results for the customers

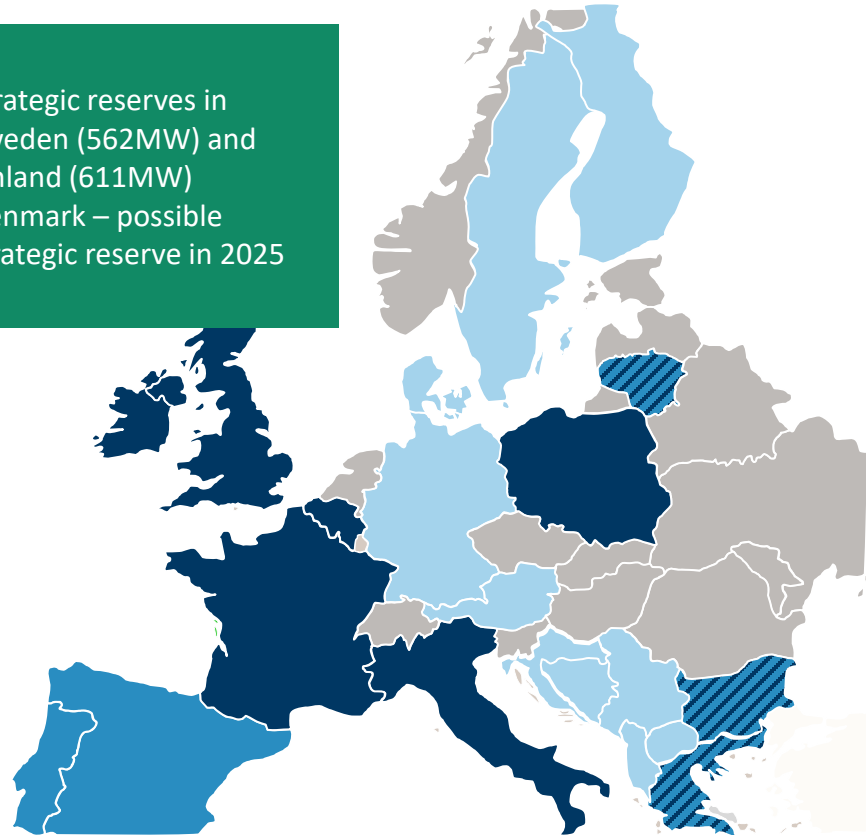


Example of missing coordination in investment support leading to distortions: national Capacity Mechanisms and RES support schemes

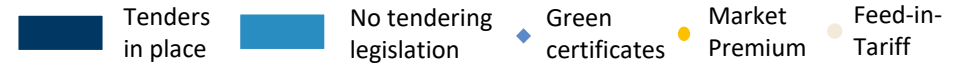
Capacity remuneration mechanisms



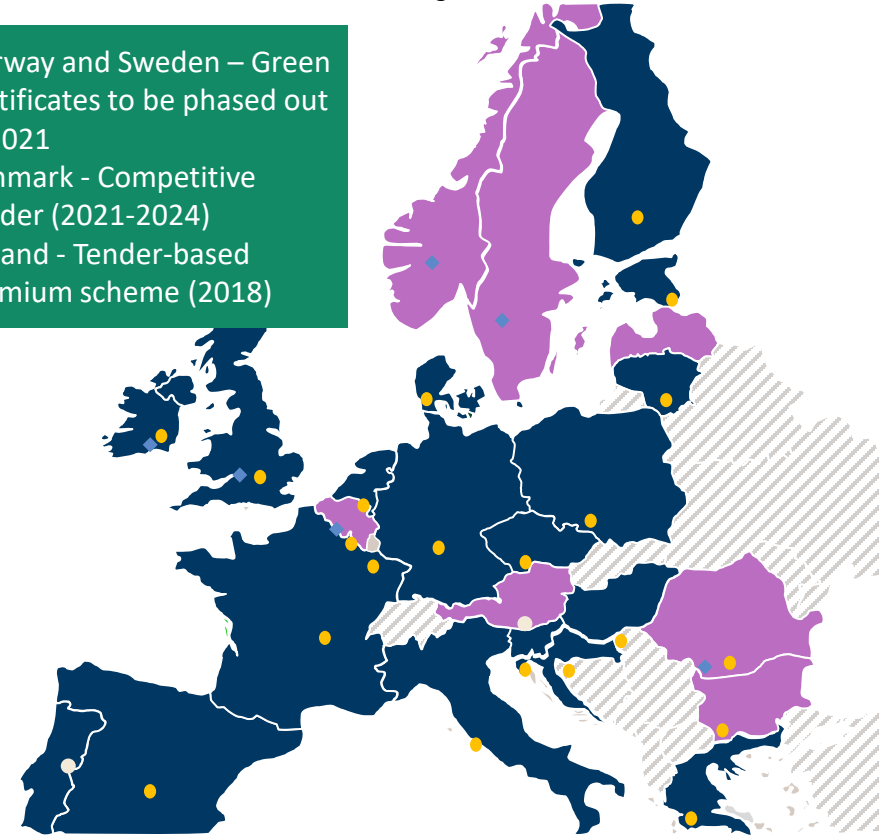
- Strategic reserves in Sweden (562MW) and Finland (611MW)
- Denmark – possible strategic reserve in 2025



Support schemes for utility-scale RES



- Norway and Sweden – Green Certificates to be phased out in 2021
- Denmark - Competitive Tender (2021-2024)
- Finland - Tender-based premium scheme (2018)



Sources :
 European Commission - Final Report of the Sector Inquiry on Capacity Mechanisms
 European Commission - RES Legal CEER - 2nd CEER Report on Tendering Procedures for RES in Europe
 CEER - Status Review of Renewable Support Schemes in Europe for 2016 and 2017
 European Commission - Final Report of the Sector Inquiry on Capacity Mechanisms
 CEEM – Capacity Remuneration in power markets : an empirical assessment of the cost of production
 CL Intelligence

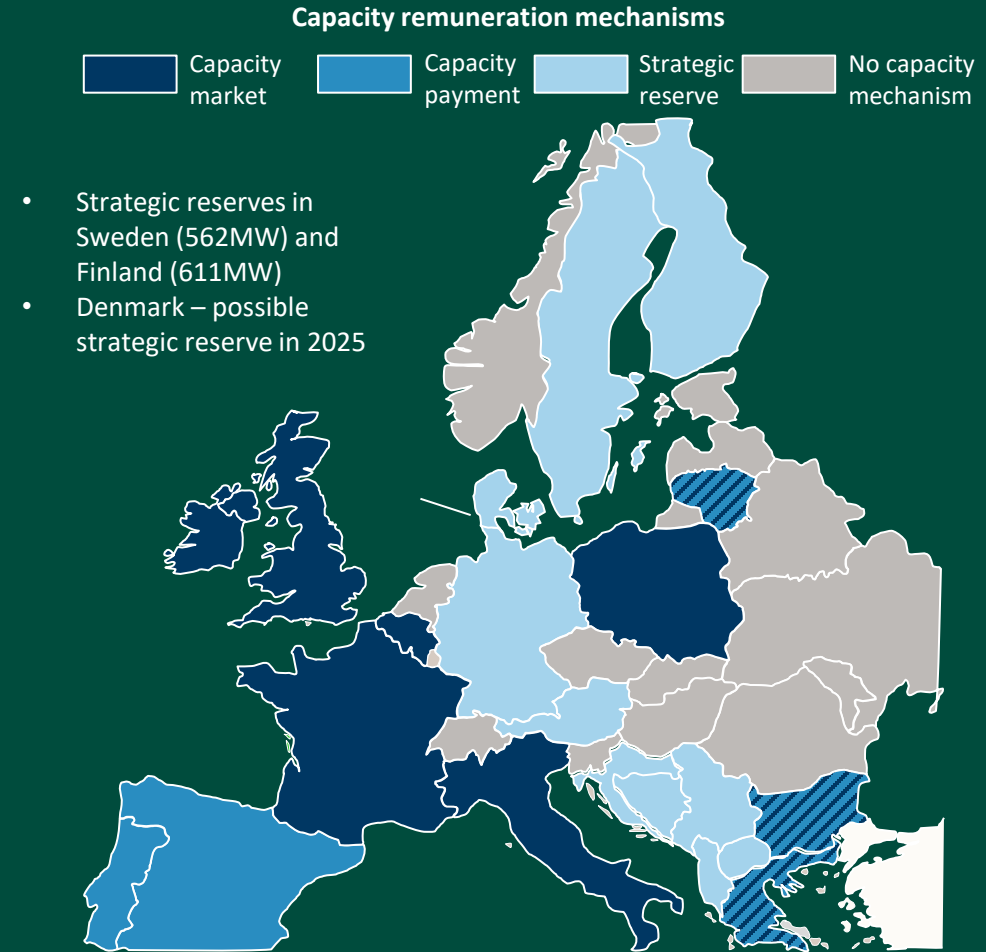
In practice most countries have put in place some form of tendering and/or long term contracts to support investment in clean technologies and/or conventional plants.

Relevant EU policy instruments enabling a power system which attracts investments in electrification

What	How	Why
<p>1 Capacity adequacy – increasing flexibility in the system to cope with SoS and delivery acceptable price levels</p>	<ul style="list-style-type: none"> Organise technology-neutral market-wide capacity auctions(capacity tickets, no RO) with up to 20 year contract periods Use non-fossile flexibility support scheme(NFFSS) as a fast track to tackle capacity adequacy Utilize the national TSO as a central buyer for capacity Coordinate regionally when this does not hamper implementation Distribute cost to consumers based on power consumption during peak demand time periods 	<ul style="list-style-type: none"> Enable cost-efficient supply of flexibility in the power system with competition between technologies, new and existing assets Fast-track the investments in flexibility with a dedicated scheme for non-fossile flexibility additions Bi-lateral contracting likely to require changes to retail market design – which would delay Sharing flexibility across national borders would lead to a lower-cost system Secure that competitiveness of flexible demand is preserved
<p>2 Affordable energy – enable large scale investments in TWh needed for electrification</p>	<ul style="list-style-type: none"> Public credit guarantees for PPA’s which support electrification Tailored solutions for nuclear and offshore wind 	<ul style="list-style-type: none"> Actively promote electrification with a well-designed risk-sharing mechanism without direct budgetary impact Enable policy-driven build-out of selected technologies with tailored solutions such as CfD, RAB, loans or credit guarantees

Summary

- Investments in both demand and supply require stability, and the current market model does not provide this.
- Price volatility will increase over the coming years, and we will need large scale flexibility to deal with this. Only demand-side flexibility will not be sufficient for security of supply.
- Dunkelflaute periods are especially important to consider when designing flexibility mechanisms
- Long-term we need a power market which provides bankable price signals for all the capabilities that are needed to maintain and develop a stable, clean and affordable power system.
- => New mechanisms are likely to be implemented in several Nordic countries to deal with the aforementioned challenges. Sufficient capacity / flexibility will safeguard consumers from price spikes . Improve security of supply and is likely to attract more demand-side investments.
- With a power system in balance scarcity pricing will deliver publicly accepted prices.



Thank you

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