



How can the Nordic energy system facilitate long term security of supply and a low carbon economy?

Energy Norway
Oluf Ulseth, CEO
August 28, 2017

Energy Norway vision for 2050: Norway as the first fully electrified society



VEIKART FOR GRØNN VEKST
i norsk fornybarnæring mot 2050

News > Science

Norway could become world's first fully electric powered country

Sustainability can soothe problems of climate change and oil industry job losses, says analyst

Gabriel Samuels | @gabs_samuels | Thursday 17 August 2017 23:39 BST | 60 comments



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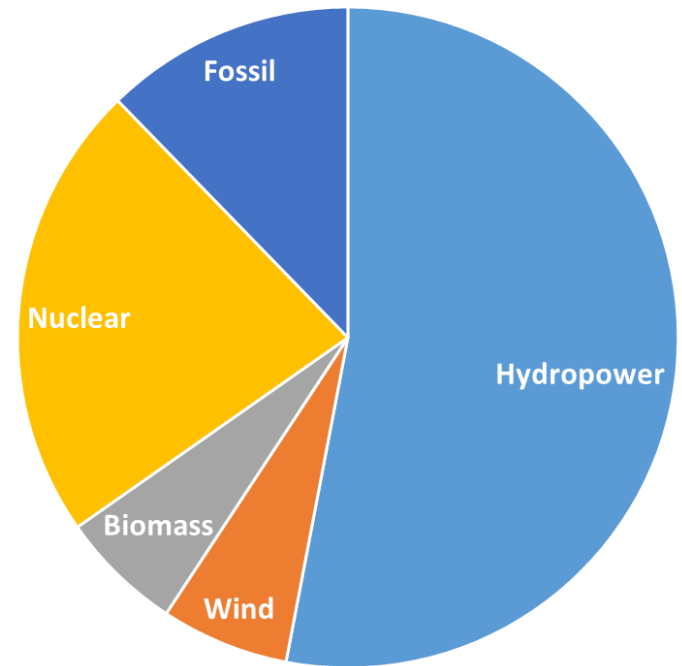


Strategies For An Adaptive Nordic Energy System

- The Nordic countries and market well suited to meet challenges; with power surplus, interconnectors and flexibility
- Measures for increased robustness and electrification should have a Nordic perspective, stressing the importance of flexibility and well functioning markets
- Meeting national and EU energy union will require strong political leadership at Nordic level.

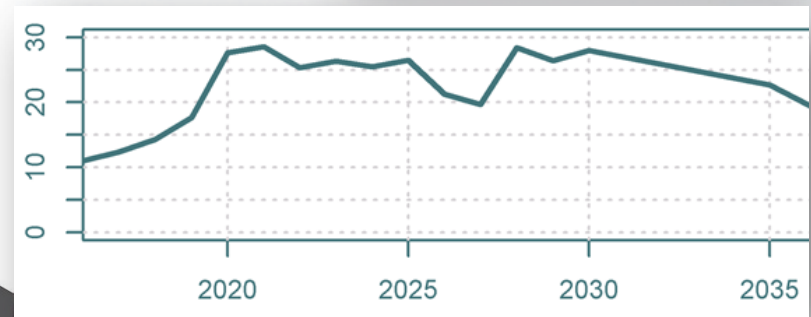
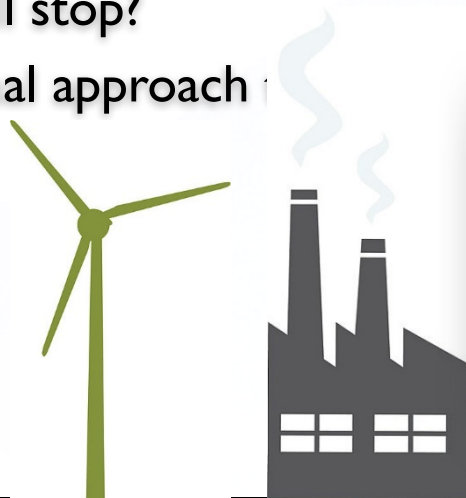
Nordic electricity market with low carbon footprint and abundant supply

- Well working wholesale market, and fast developing retail market
- Increased share of variable renewables and reduced fossil generation
- Interconnection capacity expected to triple to/from Nordic region by 2030
- Expected power surplus in Nordic region of 27 TWh by 2030
- Cost of electricity to consumers dominated by taxes and grid charges



Strong and uncoordinated energy policies

- Renewables: Sweden with high ambitions for growth post 2021, Norway to end subsidies. Offshore wind key part of Danish policy.
- Nuclear power: Phasing out in Sweden, building up in Finland
- Solar PV: Significant development in Danmark
- Electric vehicles: Norway largest European EV market, Danmark: full stop?
- Diverging and national approach interconnectors



Source: Thema

Increased share of renewables

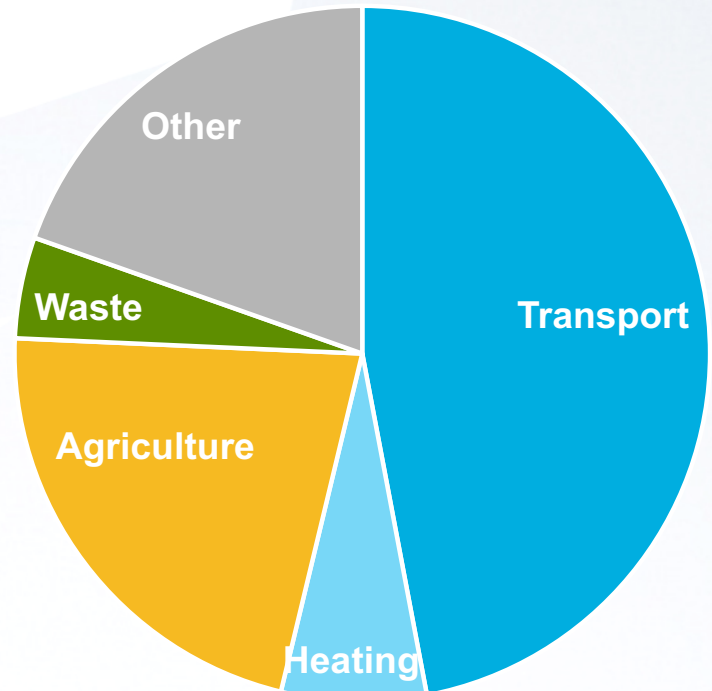
- some implications

- Increased price variations
- Bigger and quicker changes in generated effect due to inherent instability of sun- and wind-power
- Increased need for reserve capacity to compensate for structural and unforeseen imbalances
- Extended periods of RES generation – need for energy back-up
- Increased value of flexible resources



Transport represents almost half of Nordic emissions outside ETS

- More than half of GHG emissions in Nordic countries are outside EU ETS
- Non-ETS emissions require national measures to meet national 2030 targets
- EU 2030 climate targets imply 35-40% reductions in non-ETS sectors in Nordic region
- Any credible strategy for non-ETS reductions must include major effort on transport



Nordic GHG emissions non-ETS (128 Mt)

Source: Nordic council of ministers report and European Environment Agency (2015b).

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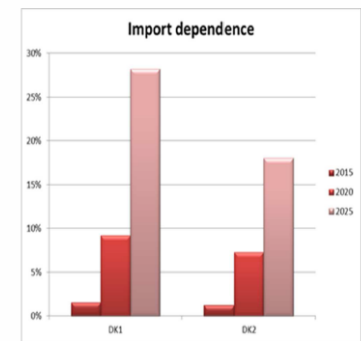
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Security of supply - the Nordic perspective

- A Nordic perspective provides better resource utilisation and higher quality
- "Capacity adequacy" should be considered in a fully integrated system with a common frequency
- Nordic perspective more demanding with regard to policies and governance

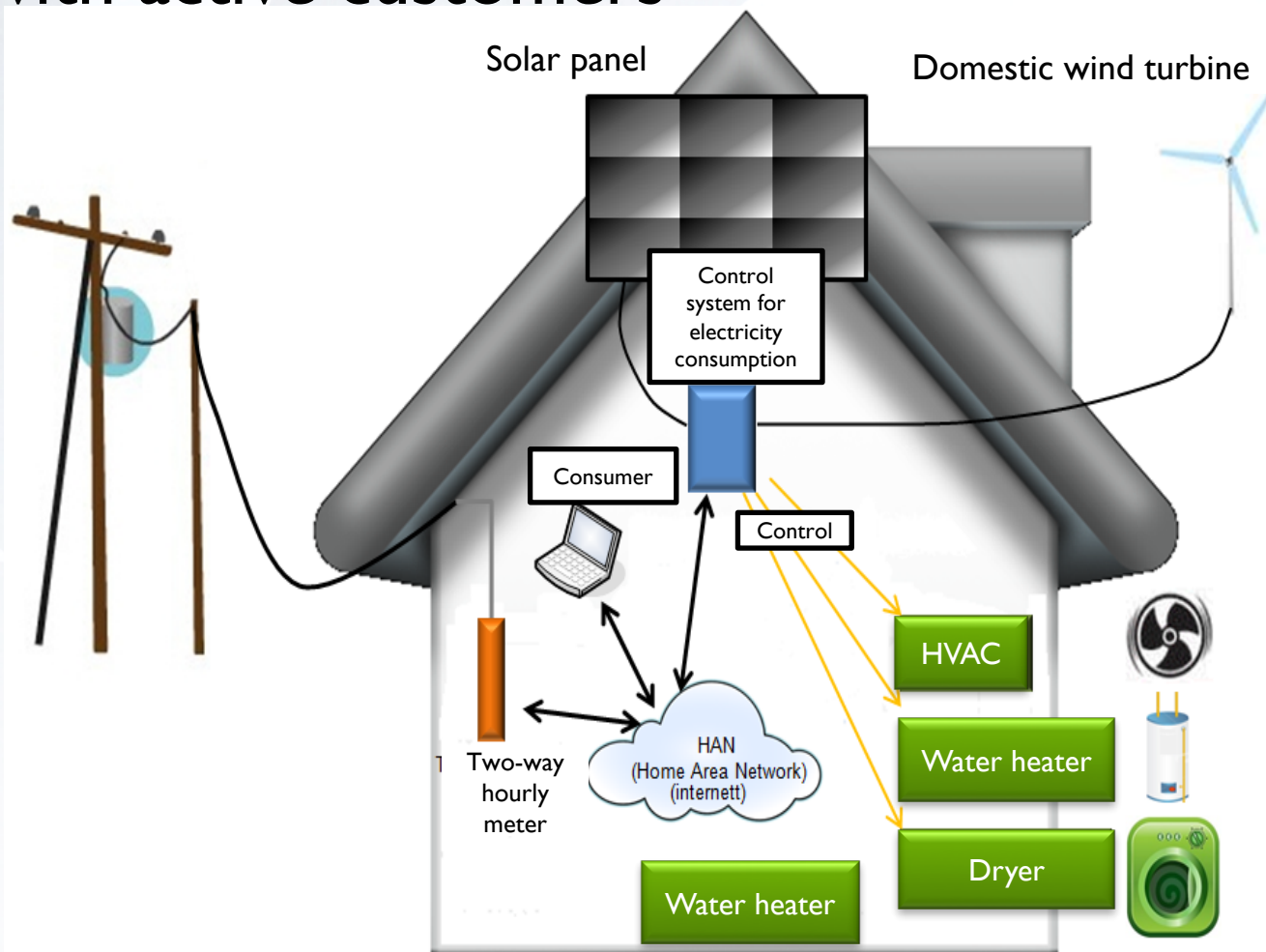
Results

- Dependence on neighbouring countries increases
- Capacity adequacy is good – potential challenges in East Denmark in 2025
- Regional calculations give a better adequacy than national calculations



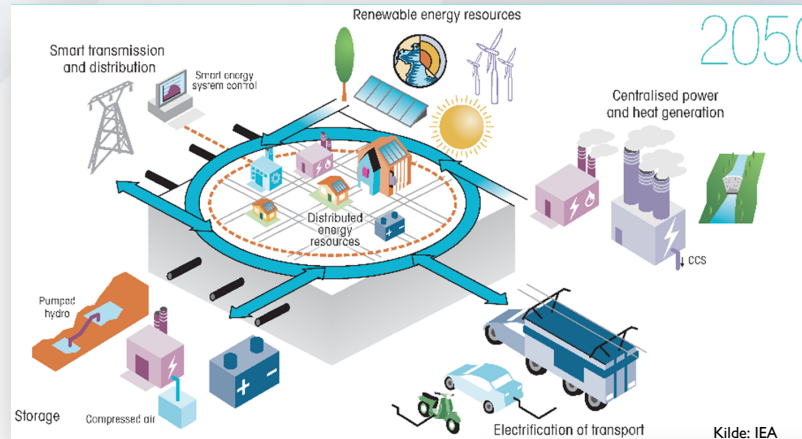
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Building the future end user market with active customers

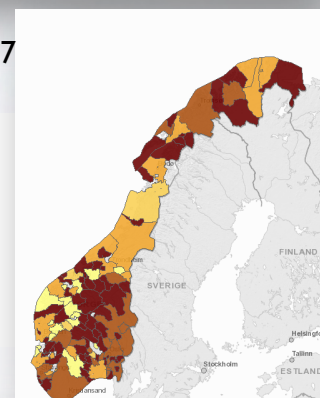
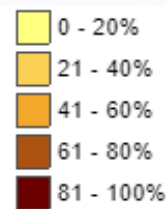


From centralised to decentralised control – by smart grids and digitalisation

- DSOs with key role as buyer of flexibility for congestion management and providing platform for flexibility
- Active system management on DSO level
- Huge amounts of metering data
 - Data-collection and storage
 - Processing and interpretation
 - Active control and follow-up
- Aggregators and other actors
- Will influence central handling of balancing

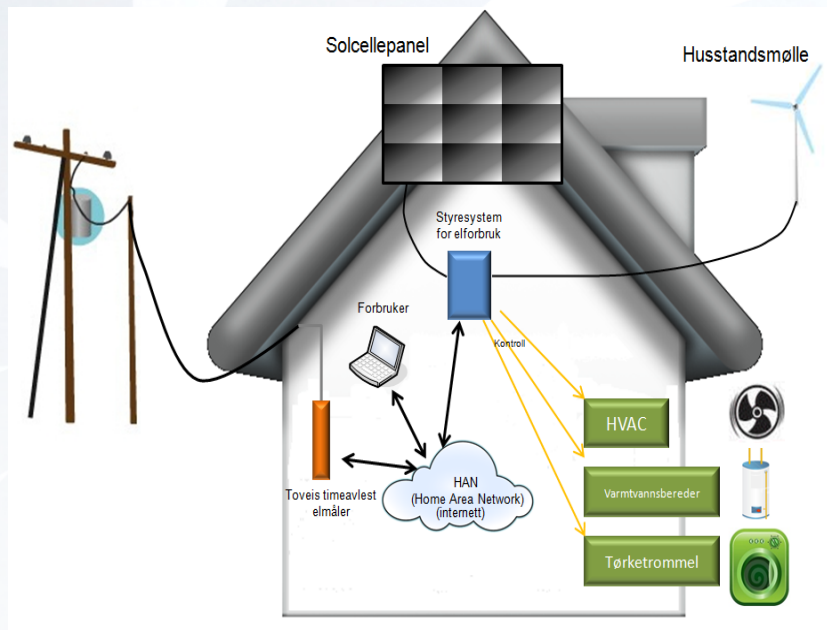


Smart meter roll-out status 2017



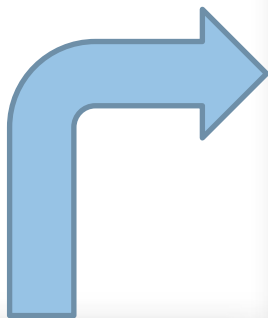
Unleashing investments in flexibility

Nordic consumers are used to open markets,
and are increasingly digitised
Substantial hydro power capacity increase
potential in southern Norway



Securing well working markets across borders is neither automatic nor easy.

How to secure electricity flowing both ways across Danish-German border


ENERGINET

TenneT
 Taking power further

Press information

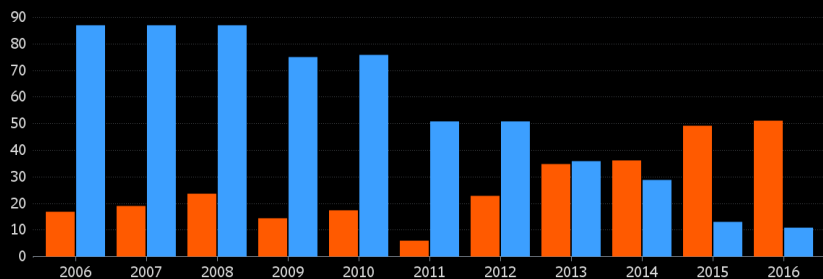
Capacity on Germany-Denmark West border will increase to 1100 MW

Bayreuth/Germany, Fredericia/Denmark; 14 June 2017. Today, the German and the Danish transmission system operators TenneT and Energinet welcomed a joint declaration between the German ministry of Economics, the Danish ministry of Energy, Utilities and Climate and the regulators Bundesnetzagentur and Energitilsynet on cooperation in the field of electricity trade between Denmark and Germany. TenneT and Energinet will commonly work on its timely implementation.

Germany Blocks Nordic Power Exports to Set Own Record

Lowest available capacity from Denmark since at least 2000

■ German net export (TWh) ■ Available Capacity from West Denmark (%)



A more closely integrated Nordic power system

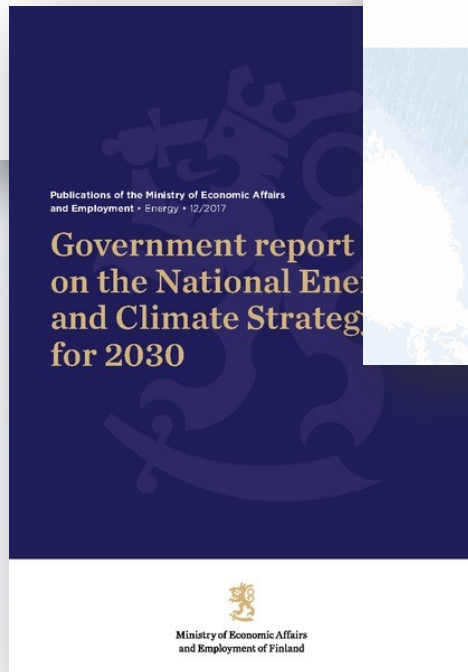
- Energy Union proposal supporting further Nordic TSO cooperation
 - Regional Operational Centers (ROCs)
 - Ollila report discusses possibility of common vision on Nordic system operator
- A closer cooperation between Nordic TSOs will provide:
 - Improved security of supply through common systems and operations
 - Reduce the need for investments through improved planning and power exchange
 - Improved competitiveness and flexibility through support of integrated markets
- Governance: Nordic regulators with key role



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National approaches - common vision?



Kraftsamling för framtidens energi

Betänkande av Energikommissionen
Stockholm 2017



A Call for Stronger Nordic Political leadership



- ⑥ A common vision and enhanced policy co-ordination line with the regional approach in the EU Energy Union
- ⑥ Positive with a call for higher ambition on energy research and innovation, and turning knowledge into value creation in international markets
- ⑥ Nordic Electricity Market Forum to be established as soon as possible
- ⑥ More ambition on electrification needed

Developing Nordic solutions

- Nordic consideration of electricity security of supply
- Facilitate Nordic markets for balancing and system services
- Facilitate a market driven end user flexibility particularly in challenged regions
- Common Nordic push for strengthening EU ETS
- Opportunities for for common approach to non-ETS policies should be developed, in particular electrification of transport
- Closer Nordic cooperation between TSOs, and increased transmission capacities both within and out of the Nordics
- Reduce gap in taxes on renewables to optimise investments

