Nordic Energy Research

Progress towards Nordic Carbon Neutrality

Tracking Nordic Clean Energy Progress

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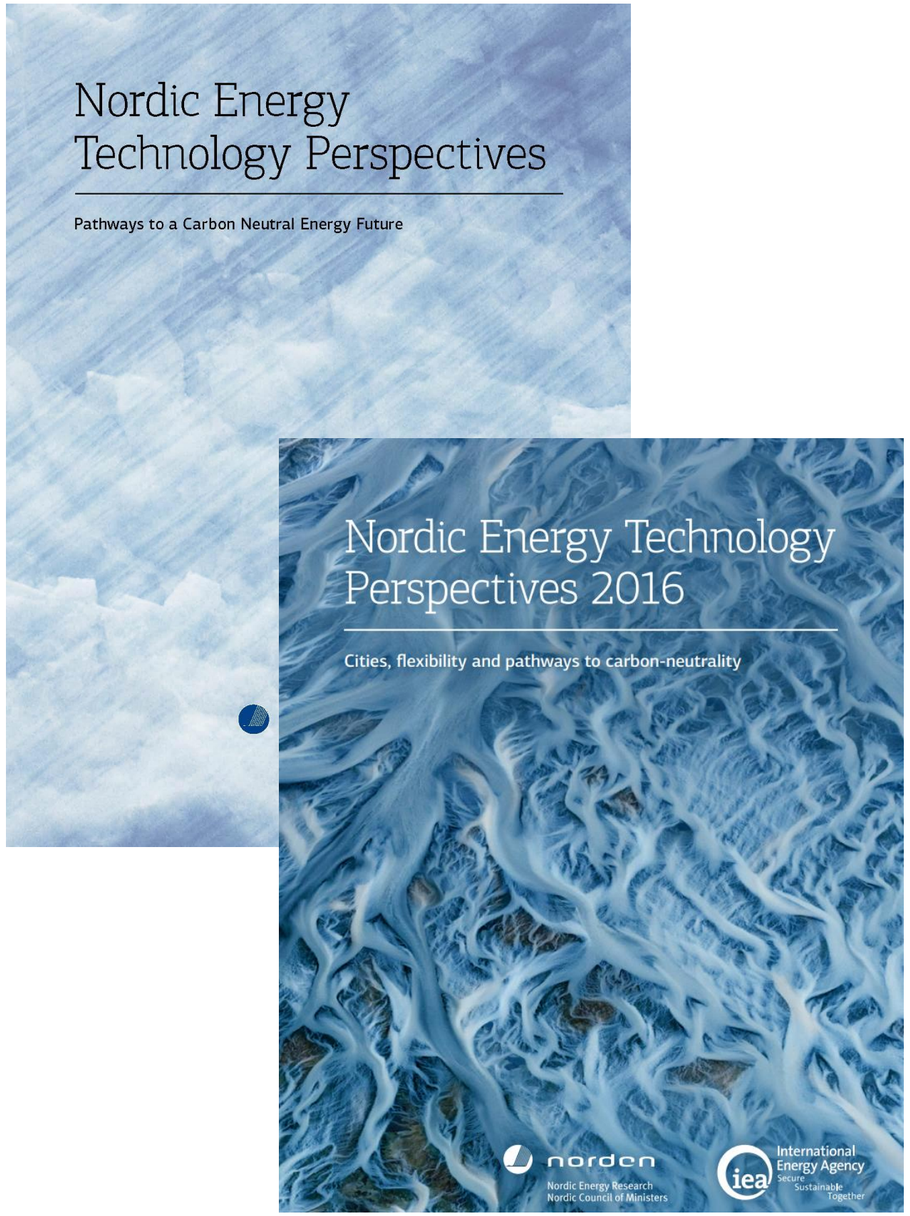
What we do

- We are the platform for cooperative energy research and policy development under the **Nordic Council of Ministers** – the intergovernmental body between Denmark, Finland, Iceland, Norway and Sweden.
- We fund R&D to promote a sustainable future
- We contribute to policy-making

Nordic Energy Technology Perspectives (NETP)

- NETP presents a detailed scenario-based analysis of how the Nordic countries can achieve a near carbon neutral energy system by 2050.

- The report is a Nordic edition of the International Energy Agency's (IEA) global Energy Technology Perspectives 2016 (ETP).



Carbon-Neutral Scenario establishes minimum requirements for mitigating CO_2 emissions

In October 2018, two years after the publication of the NETP, the **Intergovernmental Panel on Climate Change (IPCC) issued its Special Report on the impacts of global warming of 1.5°C** above pre-industrial levels. IPCC stresses that:

- The world **needs to limit climate change to 1.5°C** to reduce the likelihood of extreme weather events.
- **Emissions need to be curbed with far more urgency** than previously anticipated.

The analysis in NETP 2016 is based on a scenario where Nordic energy-related CO_2 emissions fall by 85% by 2050, named the **"Carbon Neutral Scenario" (CNS).**

Carbon-Neutral Scenario establishes minimum requirements for mitigating CO_2 emissions

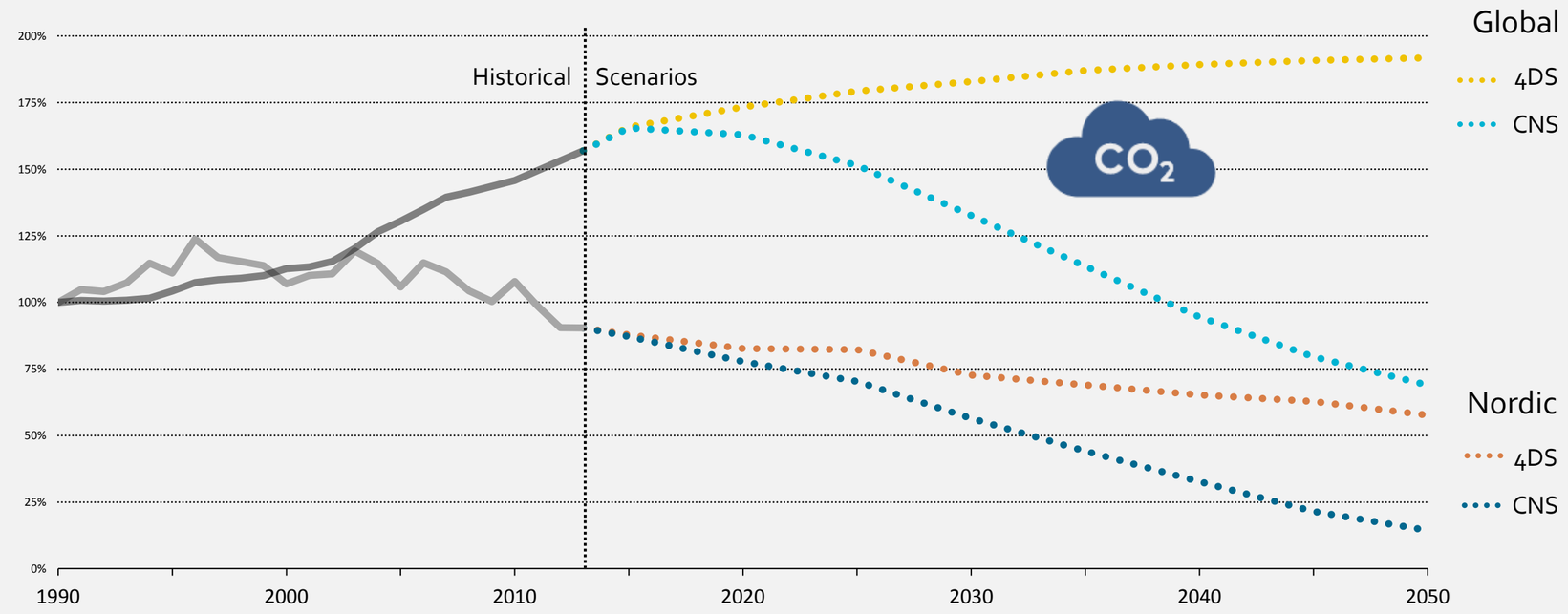
"The aim of the Nordic countries is to be carbon neutral and to demonstrate leadership in the fight against global warming."

These were the words of the Nordic prime ministers in their declaration at a summit in Helsinki on 25 January 2019 as part of active Nordic climate cooperation under the auspices of the Nordic Council of Ministers.

Staying on track for a low carbon energy future

CO_2 emissions in NETP scenarios

Fig 1.1: Reduction pathways for energy-related CO_2 by scenario (indexed to 1990)



This publication **evaluates the progress being made towards Nordic Carbon Neutrality** and compares progress with the Carbon Neutral Scenario (CNS) in NETP 2016. The NETP publication and this publication deal with energy-related CO_2 emissions, which account for just under two-thirds of total greenhouse gas (GHG) emissions in the Nordic region.

Tracking Nordic Clean Energy Progress

Red – Not on track / Insufficient steps

Yellow – Greater effort is required but critical steps are being addressed

Green – On track / Sufficiently promising efforts and impact

THE BIG PICTURE

TRANSFORMING THE POWER SECTOR

BOOSTING BIOENERGY

DECARBONISATION OF INDUSTRY

ENERGY EFFICIENT & SMART BUILDINGS

ELECTRIFICATION OF TRANSPORT

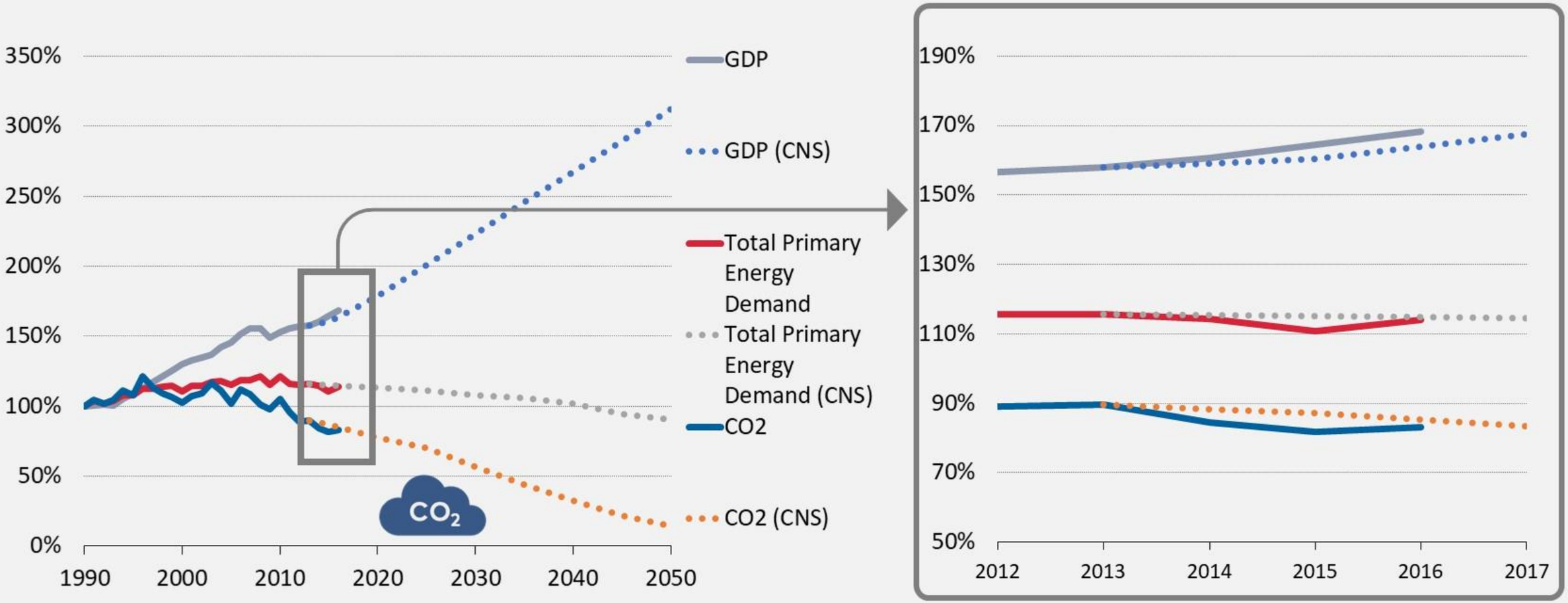
ELECTRIFICATION OF HEAT

GREEN MOBILITY

ENERGY STORAGE & CCS

THE BIG PICTURE

Current Progress compared to the CNS Scenario



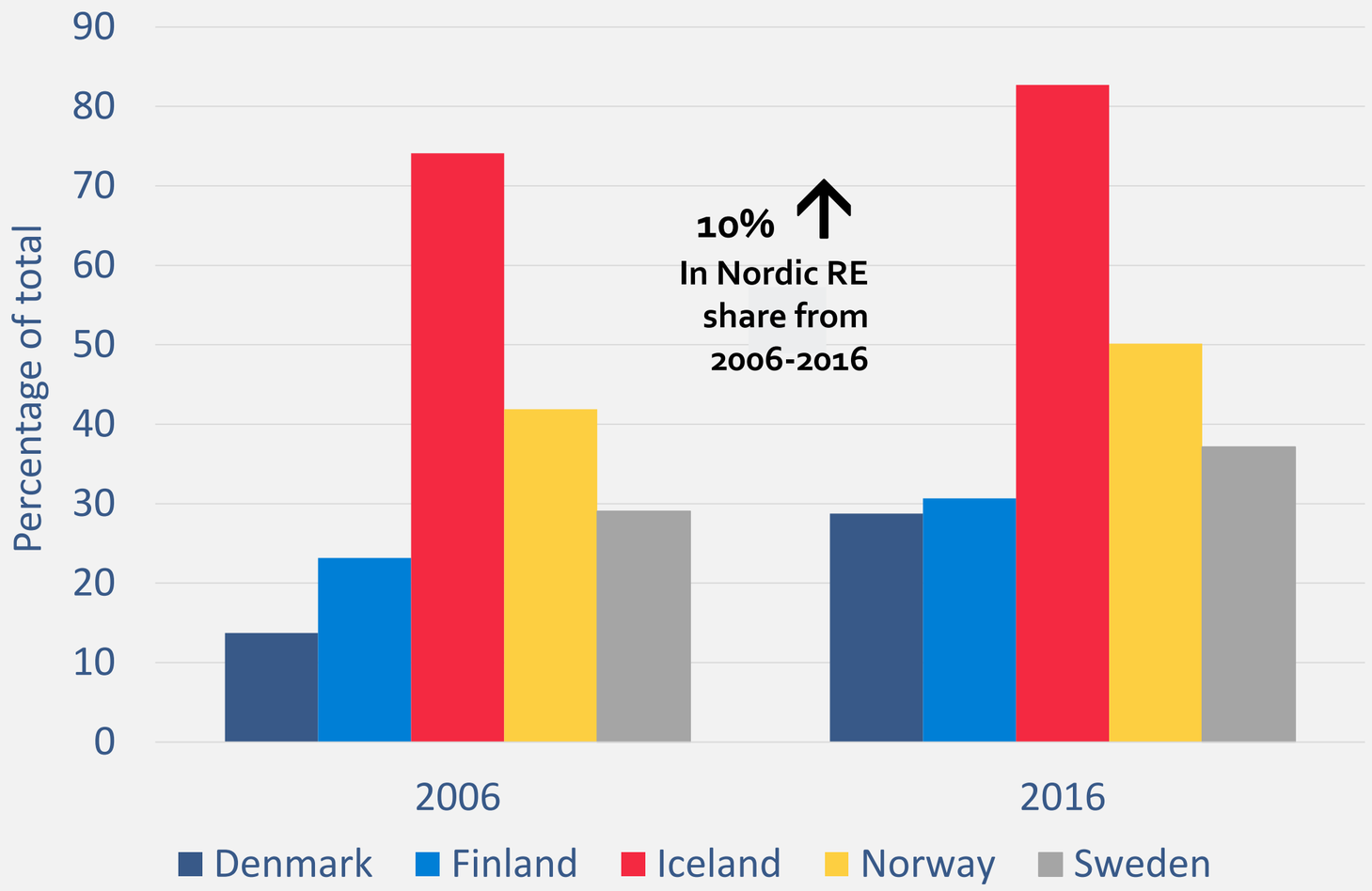
Higher GDP growth than expected, and lower emission growth. Emissions reductions have stalled recently.

Share of renewables has increased

All five Nordic countries have seen significant increases in the utilisation of renewable energy.

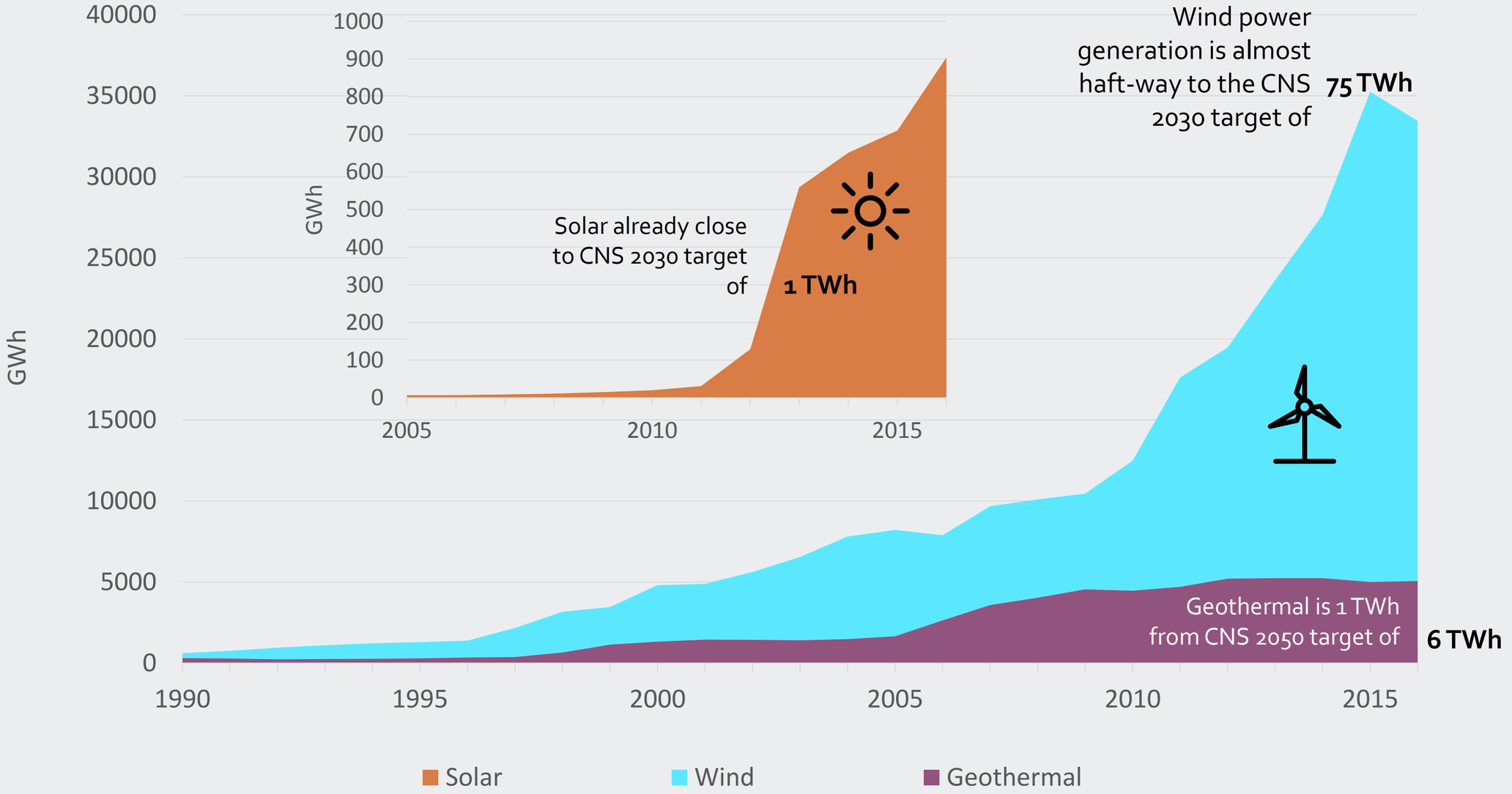
Compared to primary energy demand, the overall renewable share at Nordic level has risen from 29% in 2006 to 39% in 2016.

Increasing use of bioenergy is the main reason behind the upwards trend.



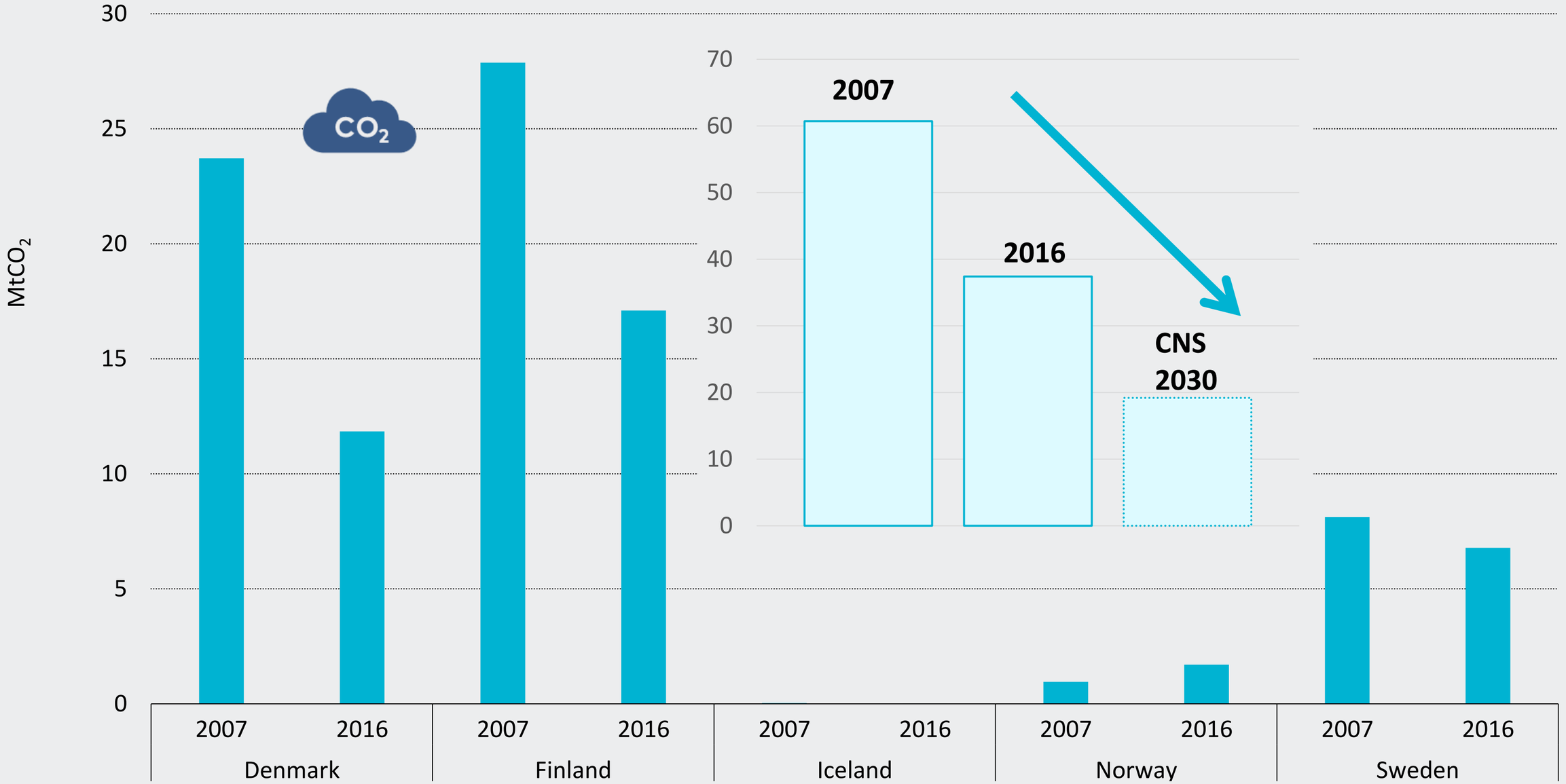
TRANSFORMING
THE POWER SECTOR

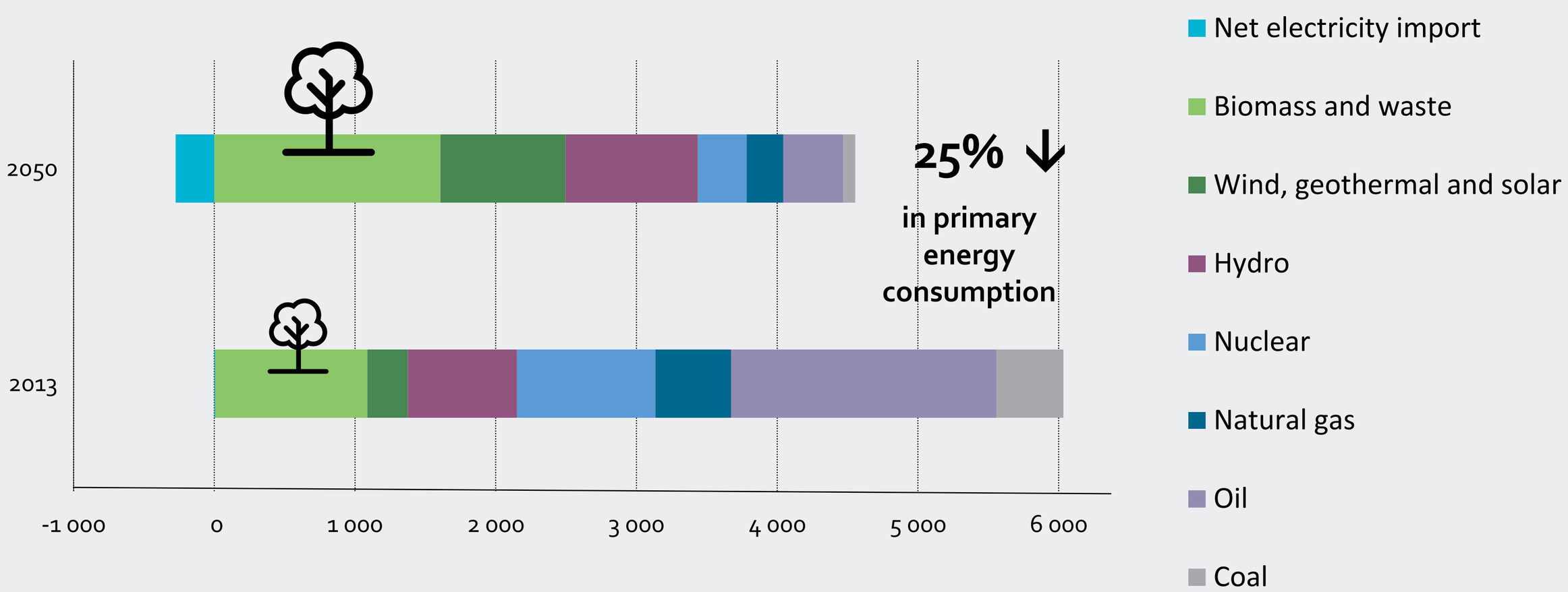
Nordic renewable electricity generation (excl. hydro)



TRANSFORMING
THE POWER SECTOR

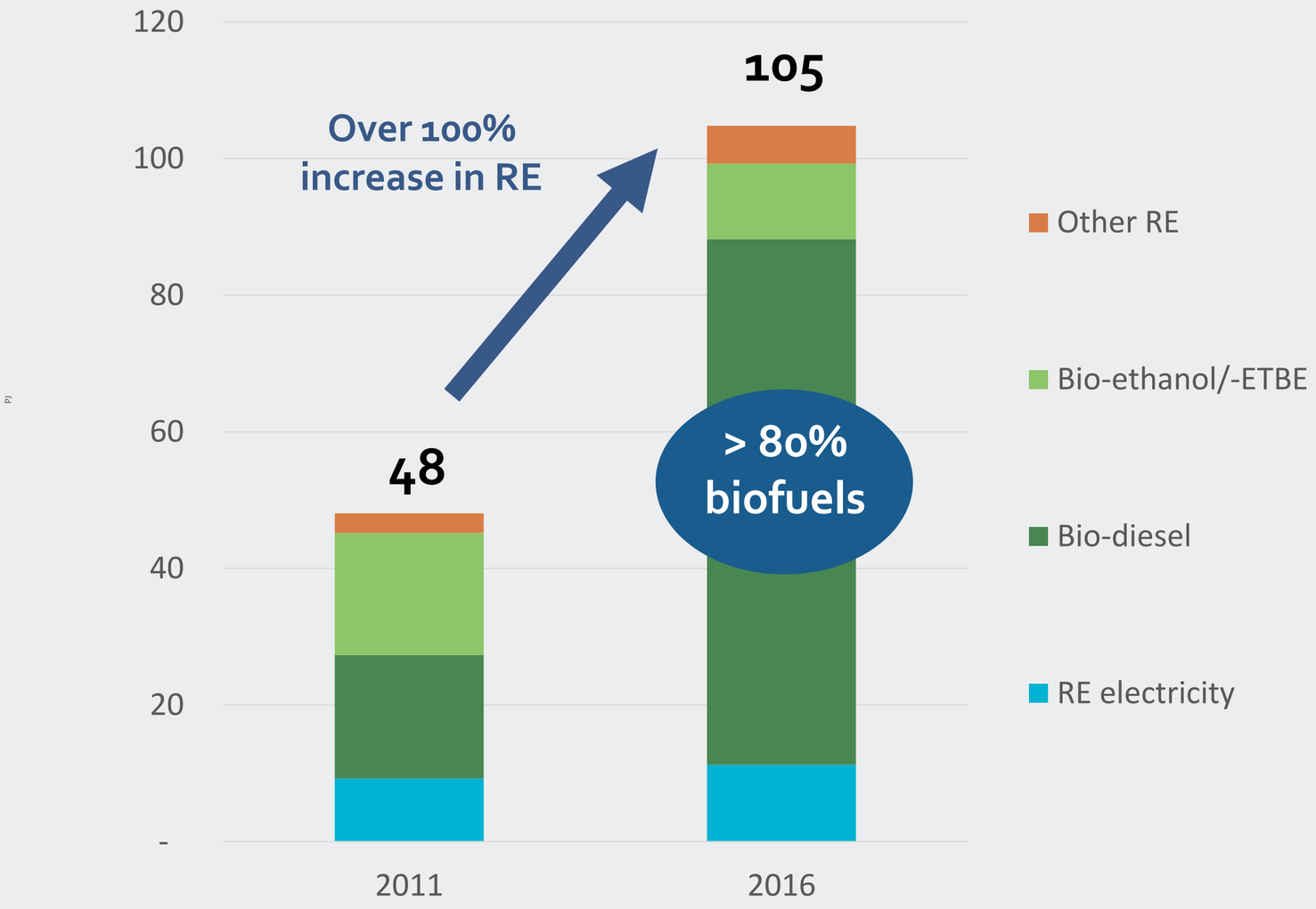
CO_2 emissions ($MtCO_2$) from power and district heat





Bioenergy production is increasing and is expected to be the single largest energy carrier in 2050.

BOOSTING BIOENERGY



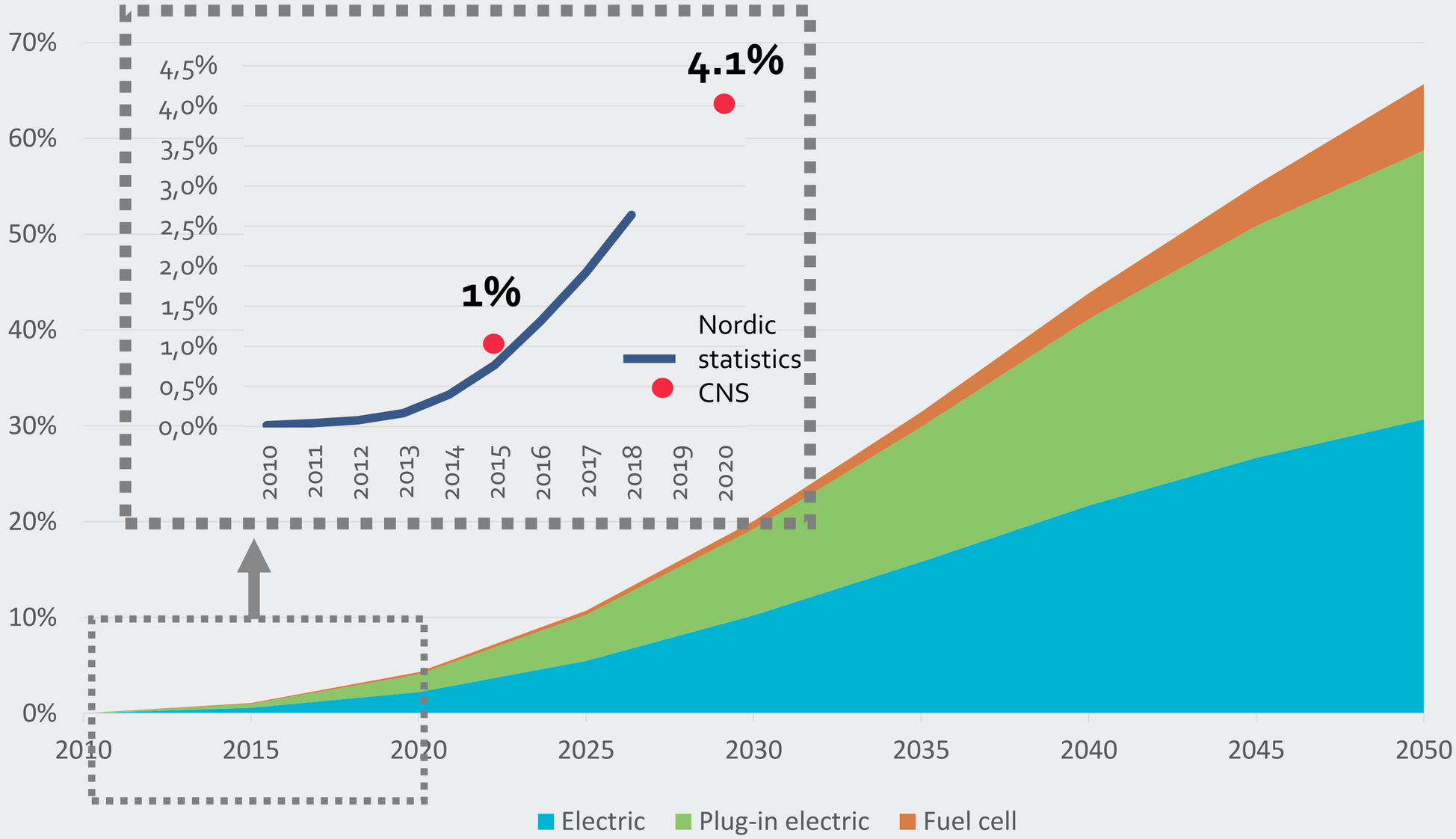
Requirements for renewable fuels begin to bite in the Nordics.

Securing sustainable production of biofuels is still a challenge.

ELECTRIFICATION OF TRANSPORT

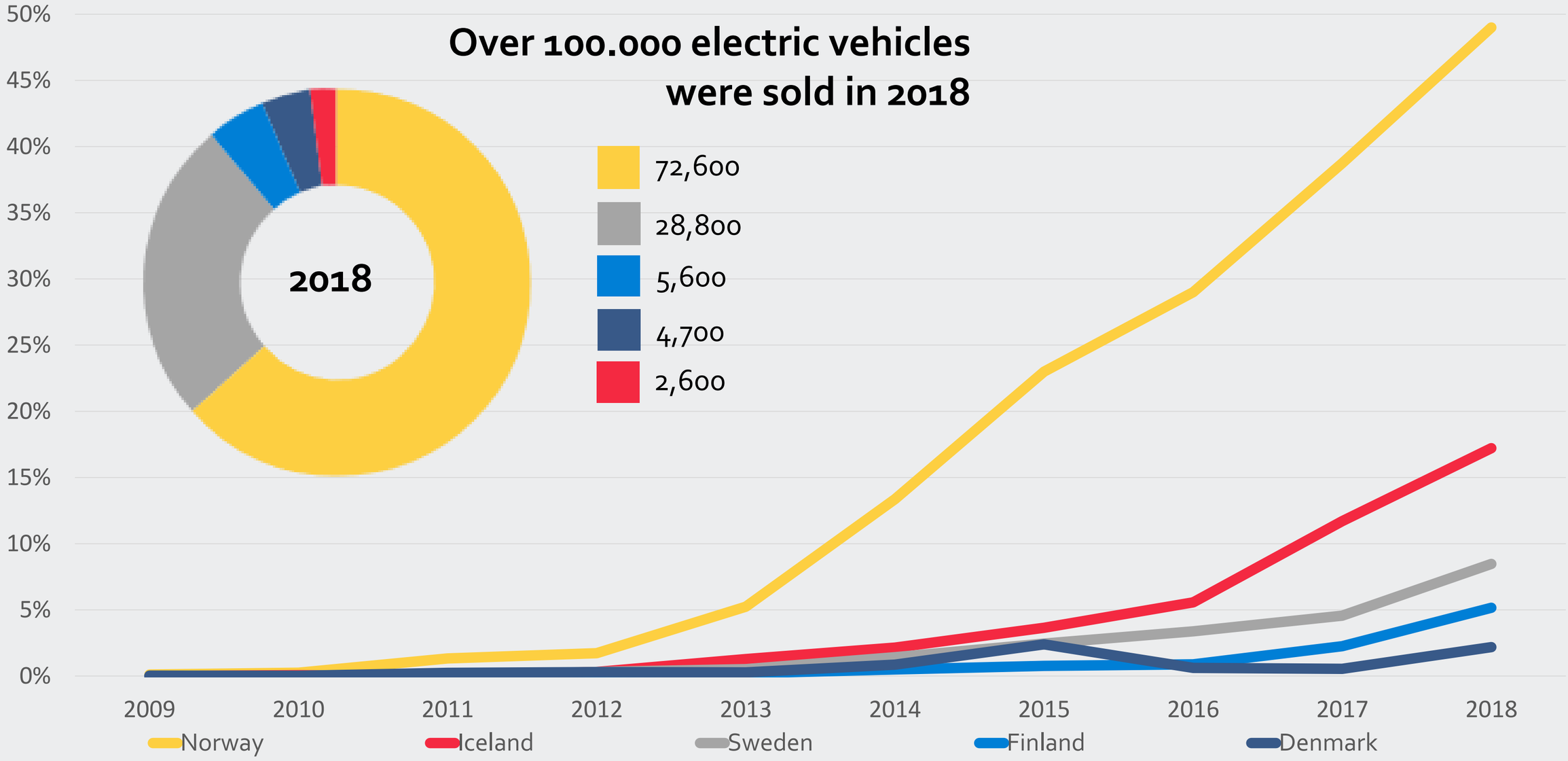
Share of electric vehicles in light-duty vehicle stock (CNS) and "zoom in" on the actual Nordic share from 2010-2018 in relation to CNS targets

Light-duty vehicles are on track



ELECTRIFICATION OF TRANSPORT

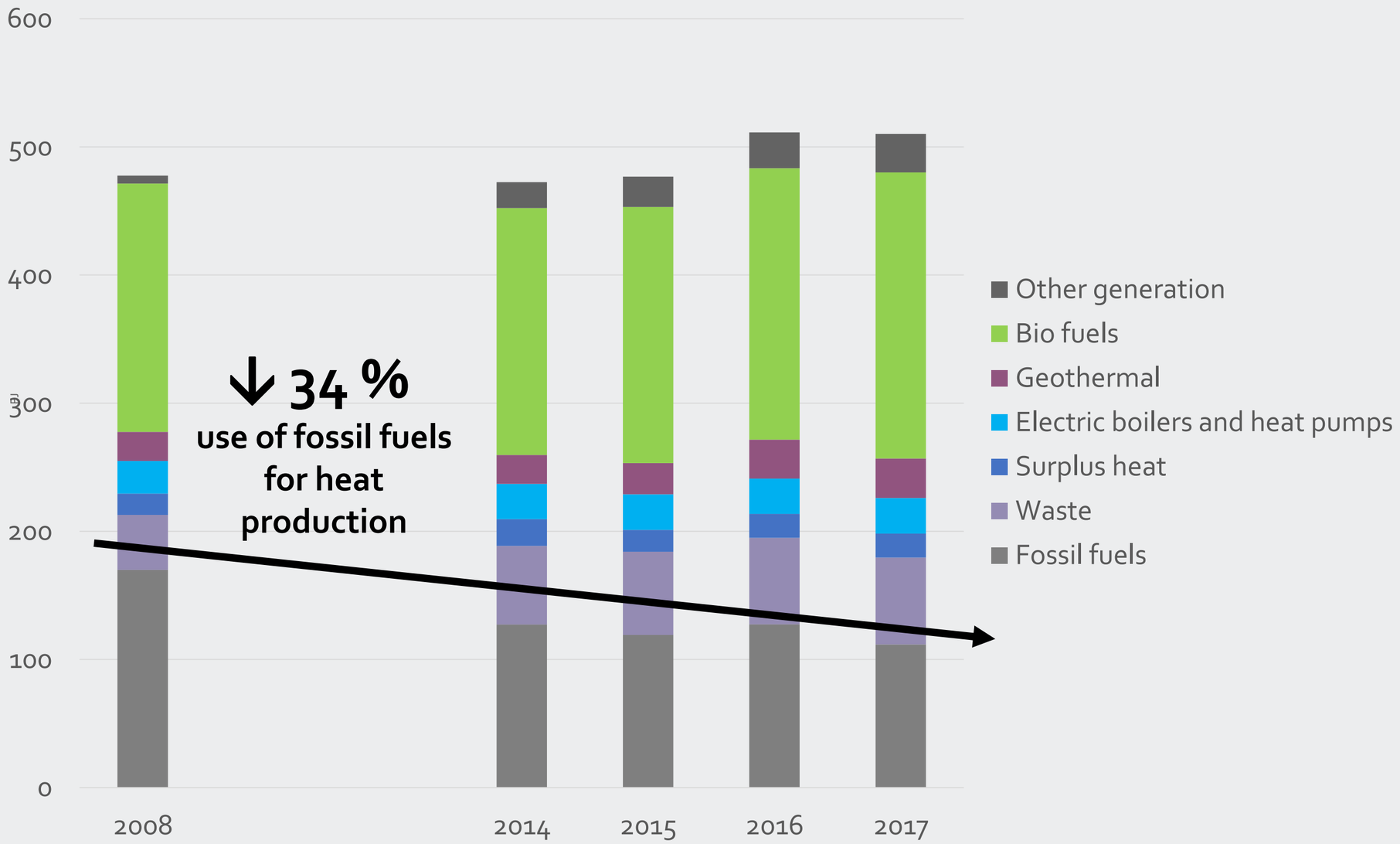
Battery and plug-in hybrid electric vehicles share of new passenger vehicle sales. Piechart: Number of new passenger vehicle sales (BEV and PHEV) in 2018



ELECTRIFICATION
OF HEAT

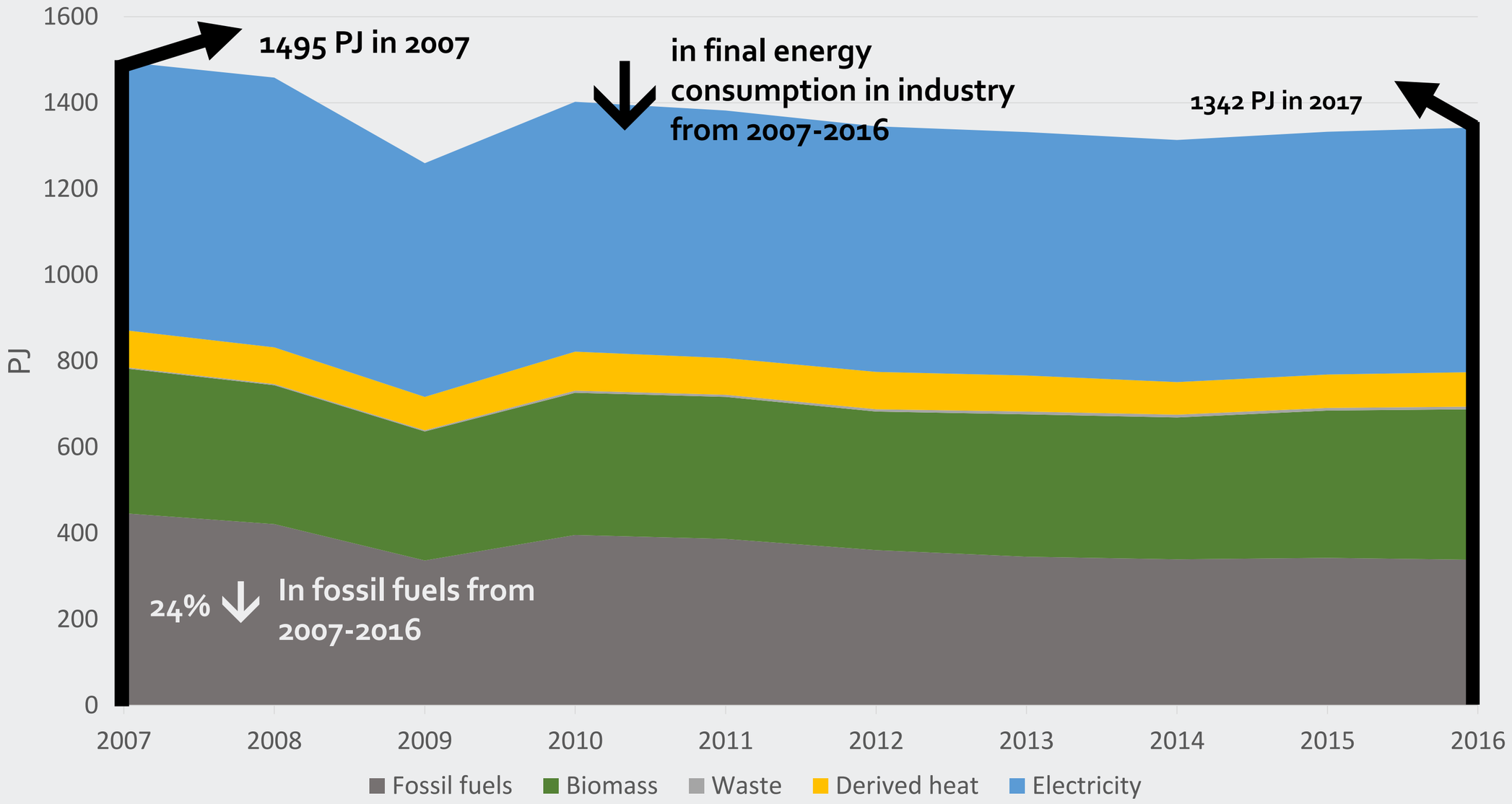
Nordic district heat generation (PJ) by fuel

Steady decline in use of fossil fuels for heat production



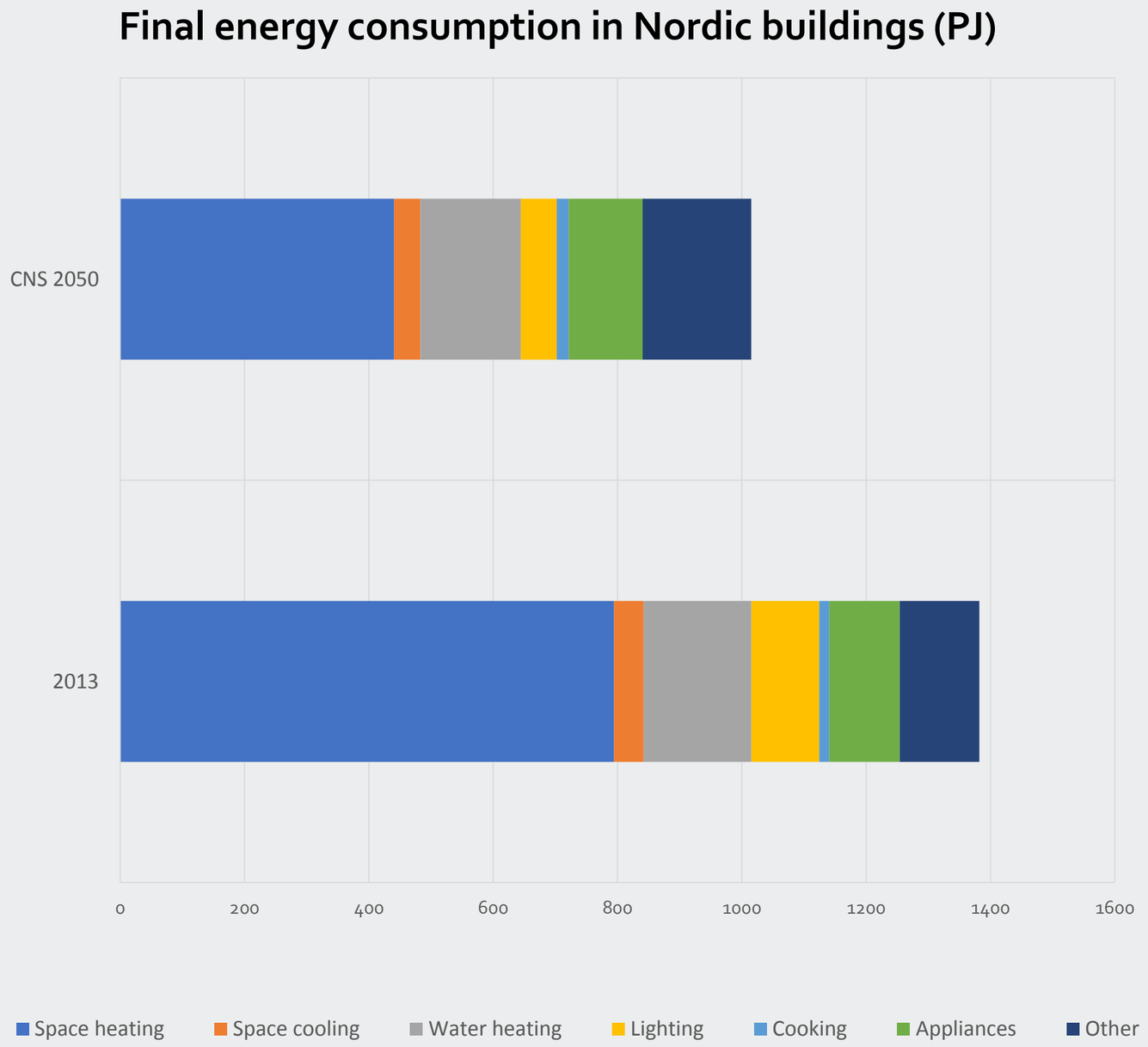
DECARBONISATION
OF INDUSTRY

Final energy consumption (PJ) in industry

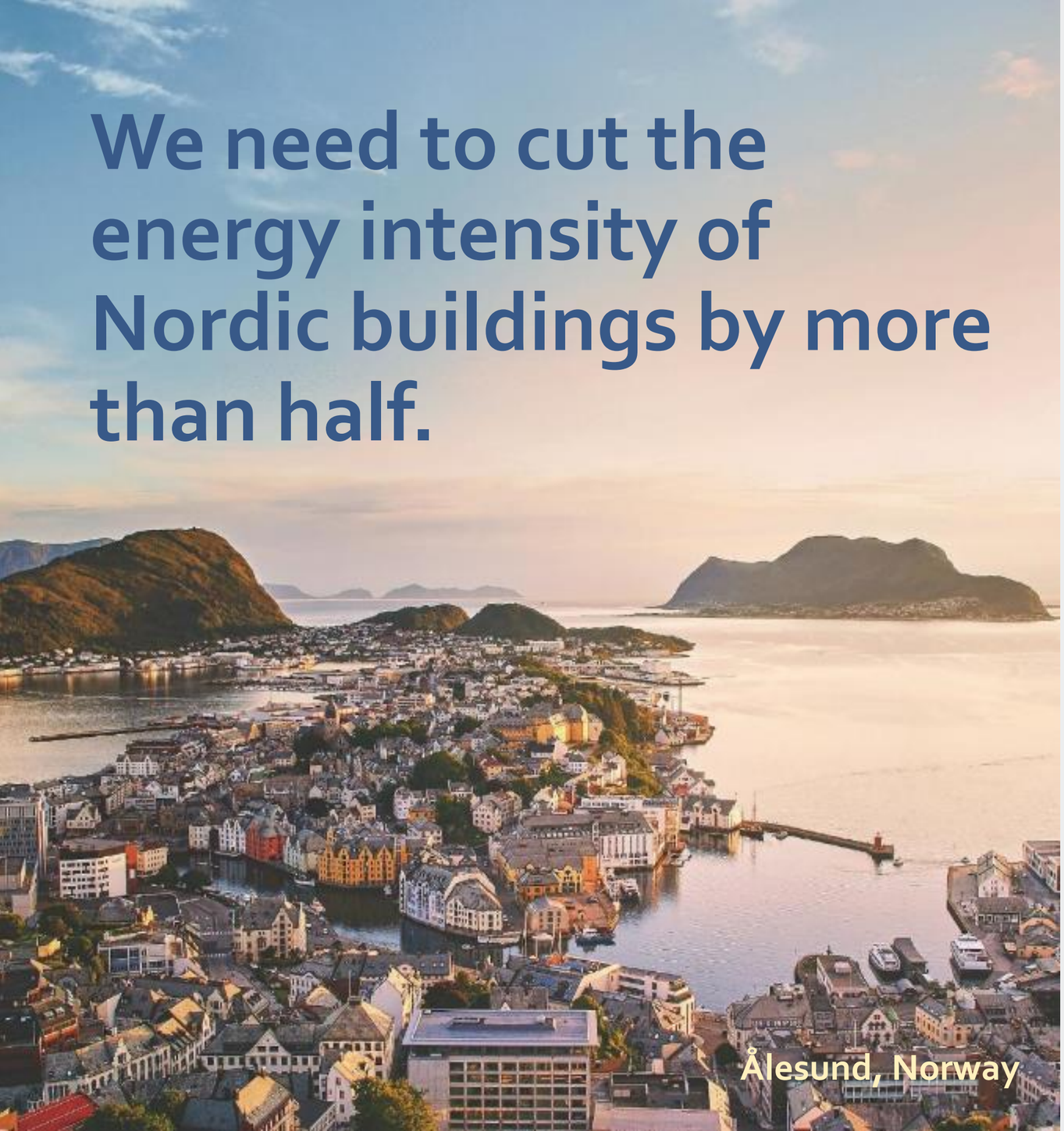


KEY MESSAGE: We have most of the tools but there is still a long way to go

With Nordic **urban areas expected to grow** at twice the rate of previous decades, an opportunity exists to transition to efficient low-carbon systems. **Building codes** continue to be an important tool for the green transition. However, the low turnover of the building stock means that emphasis should also be given to retrofitting older buildings. Fossil fuels only play a marginal role in today's Nordic heat supply. Yet efficiency gains **may provide multiple benefits for the green transition and hold significant economic potential**. Improving building efficiency can unlock biomass to substitute fossil fuels in transport, avoid grid infrastructure investments, facilitate electricity exports, and enable deployment of new technologies such as low-temperature district heating/cooling.



We need to cut the energy intensity of Nordic buildings by more than half.



Average energy intensity in Nordic buildings

213

kWh/m² in **2016**

89

kWh/m² in **2050**

Carbon Capture and Storage in Industry

Total

20 Mt CO_2

Captured

7 Mt CO_2

Nordic industrial emissions in 2050

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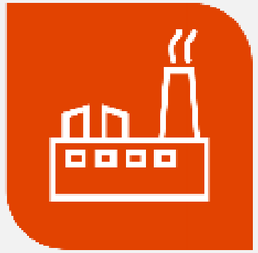
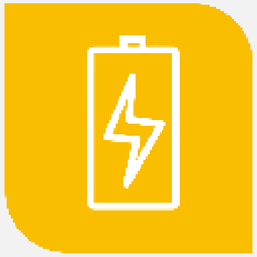


ENERGY EFFICIENT & SMART BUILDINGS

ELECTRIFICATION OF TRANSPORT



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