

# How can the Nordic countries achieve a near carbon-neutral energy system?

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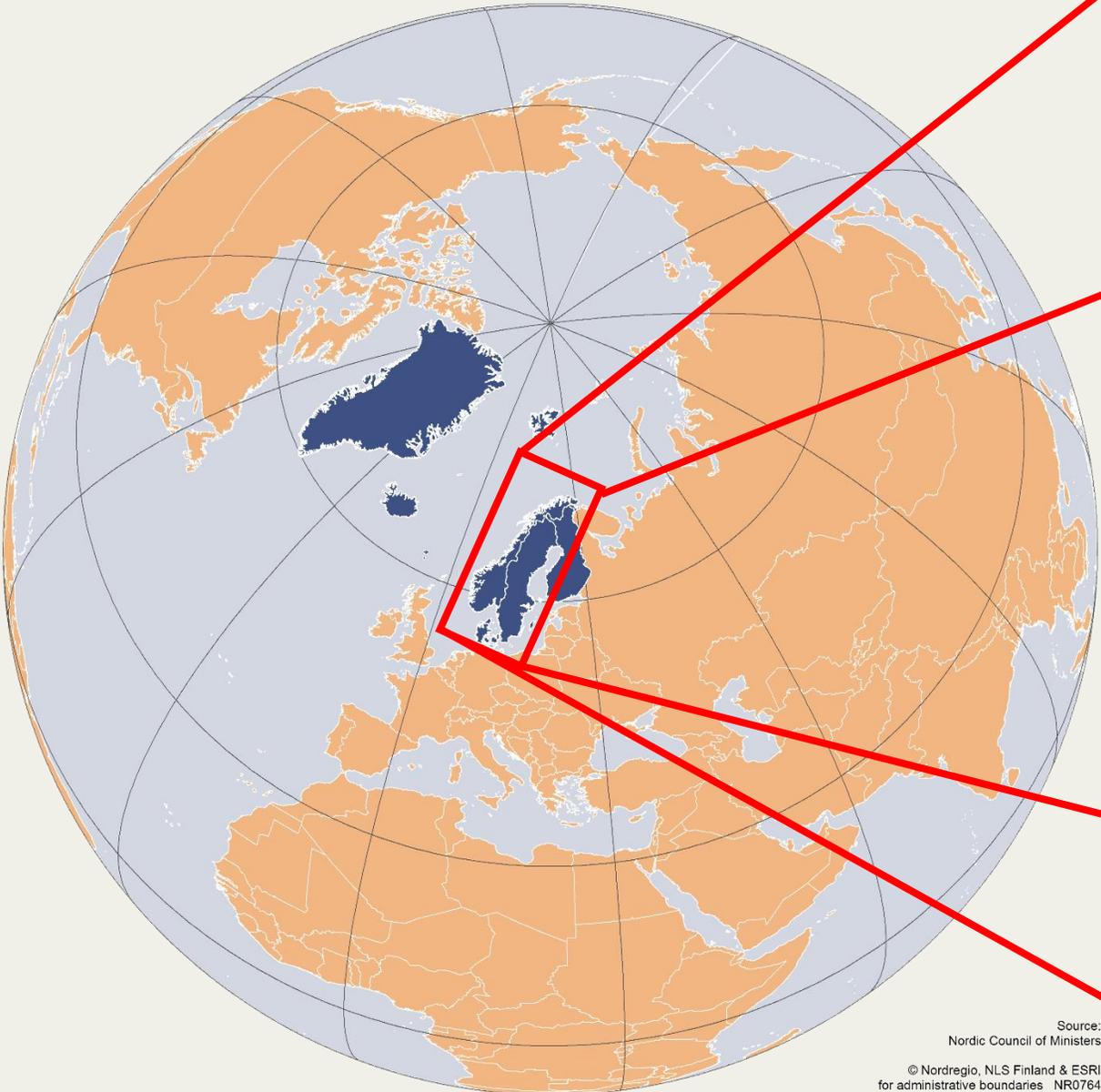
Nordic Energy Research  
and The Nordic Council of Ministers

# What is Nordic Energy Technology Perspectives?

The Nordic region  
in 2015



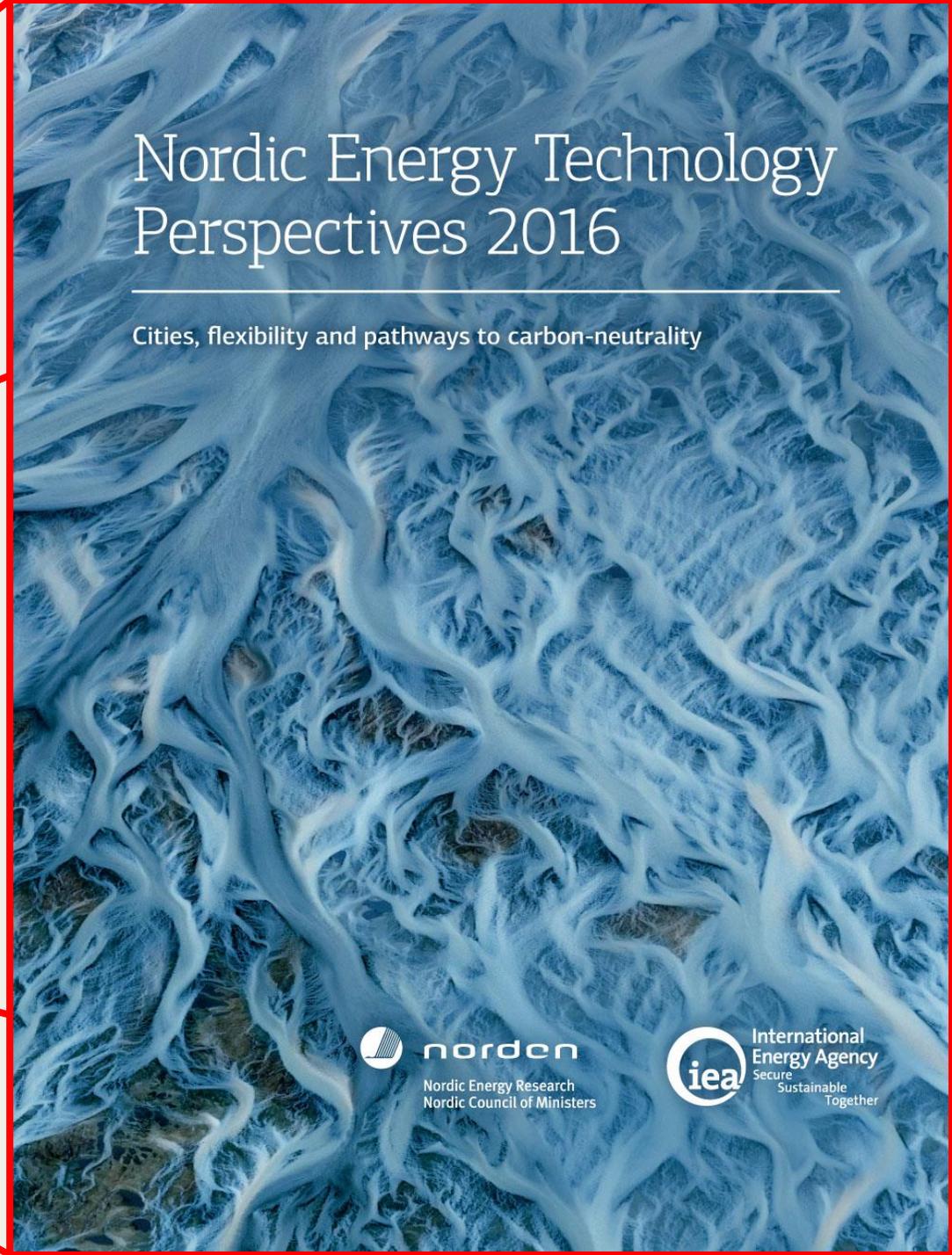
The Nordic region



Source:  
Nordic Council of Ministers  
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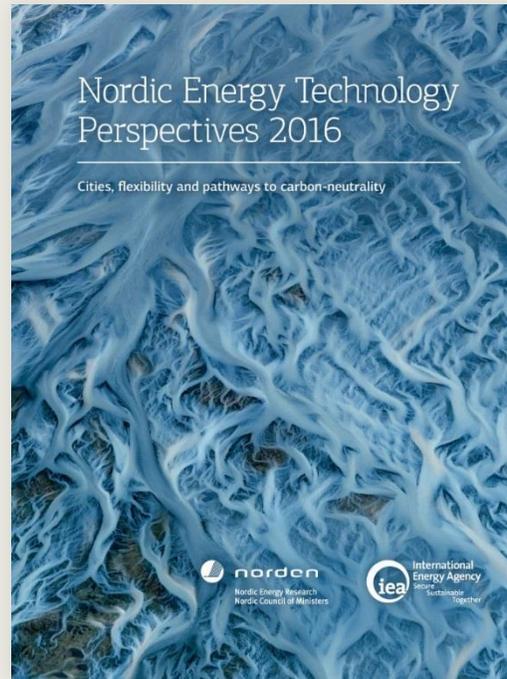
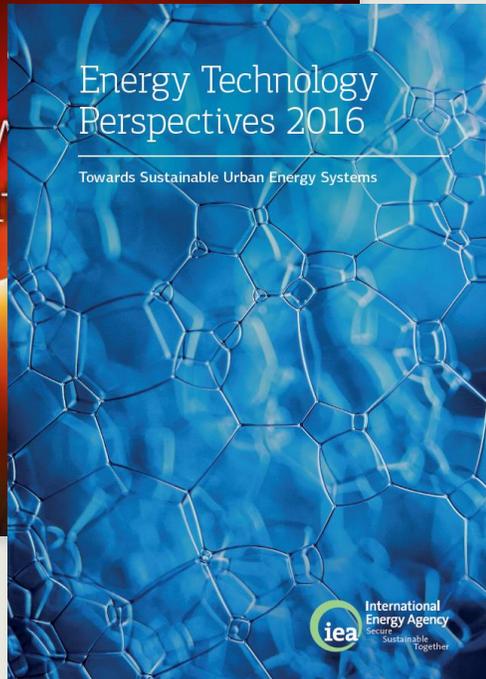
# Nordic Energy Technology Perspectives 2016

Cities, flexibility and pathways to carbon-neutrality





# Bridging global and national analyses



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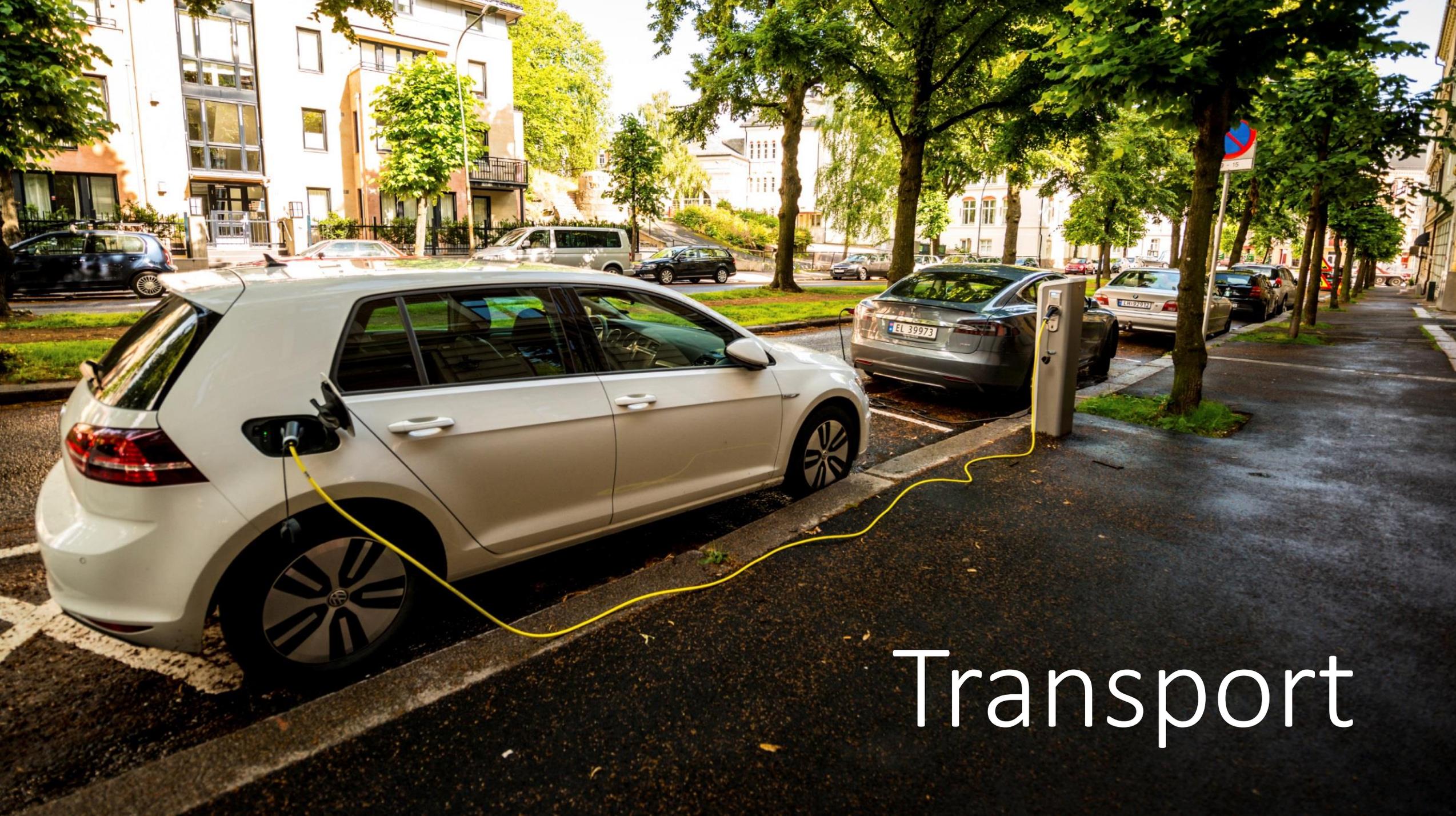
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# Buildings



# Electricity and heat





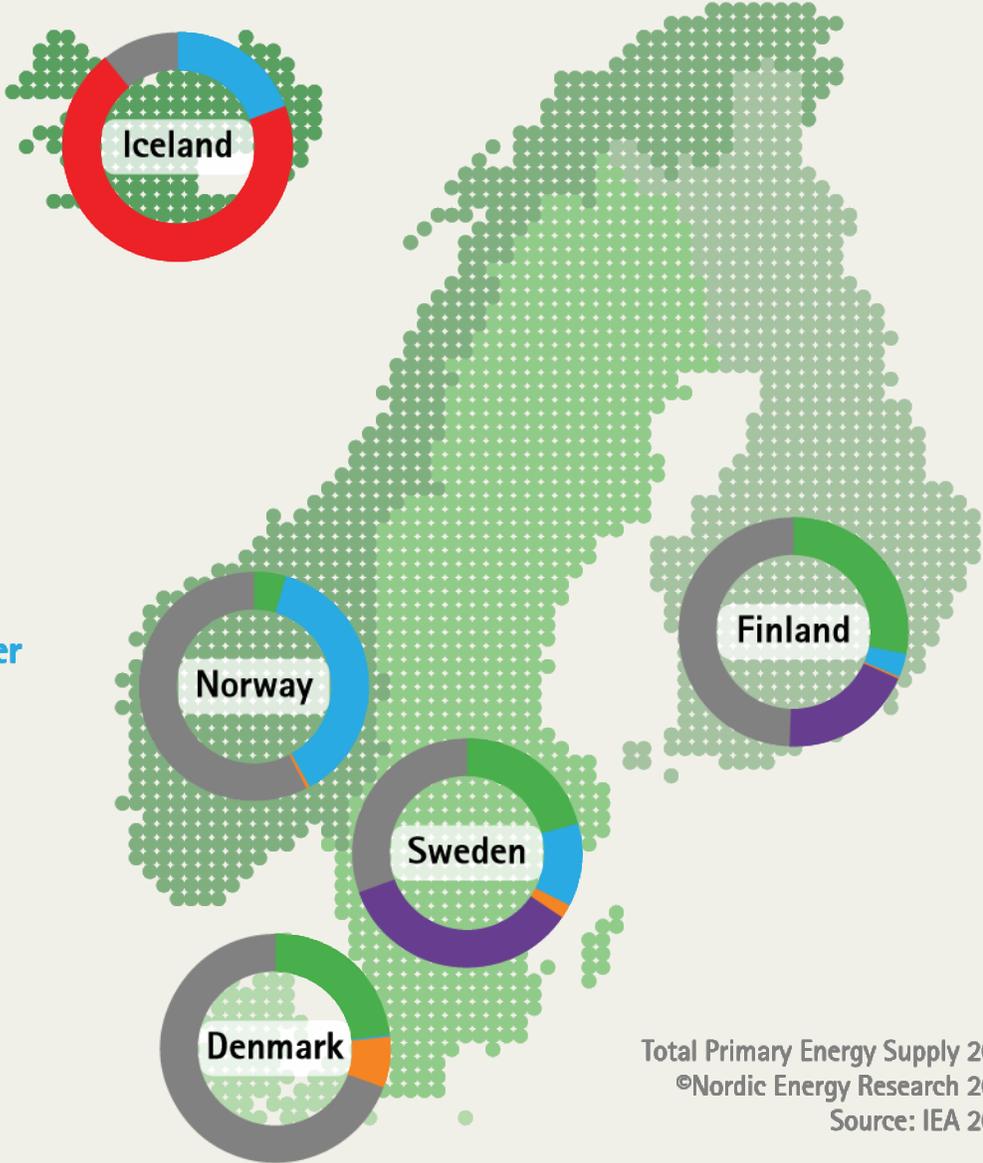
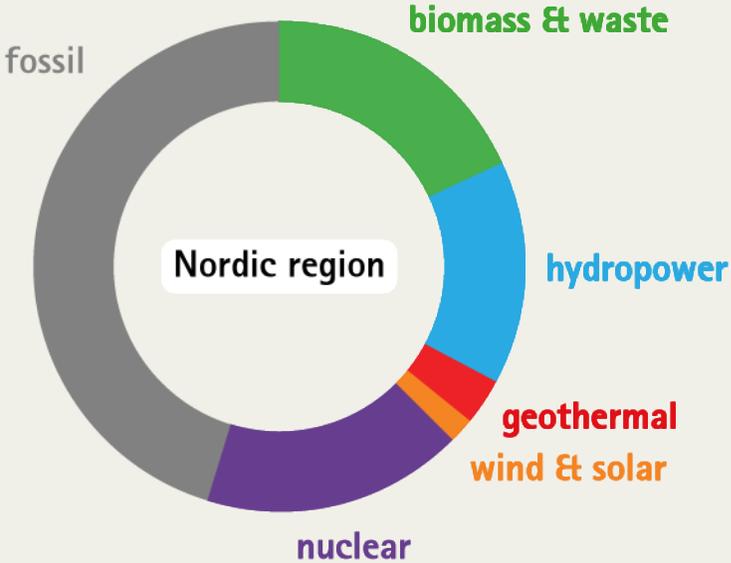
Transport

# Industry



The Nordic energy system  
and the findings of NETP  
2016

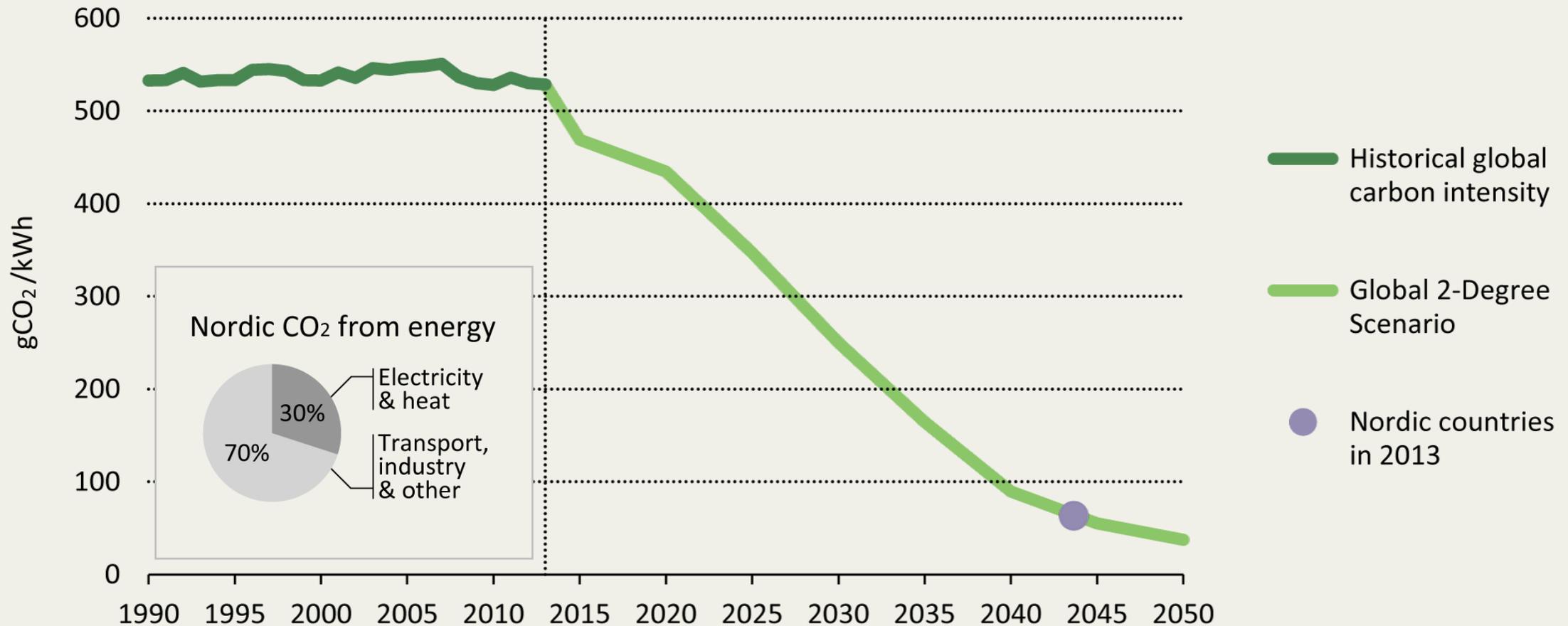
# The Nordic energy mix, 2014



Total Primary Energy Supply 2014  
©Nordic Energy Research 2015  
Source: IEA 2015

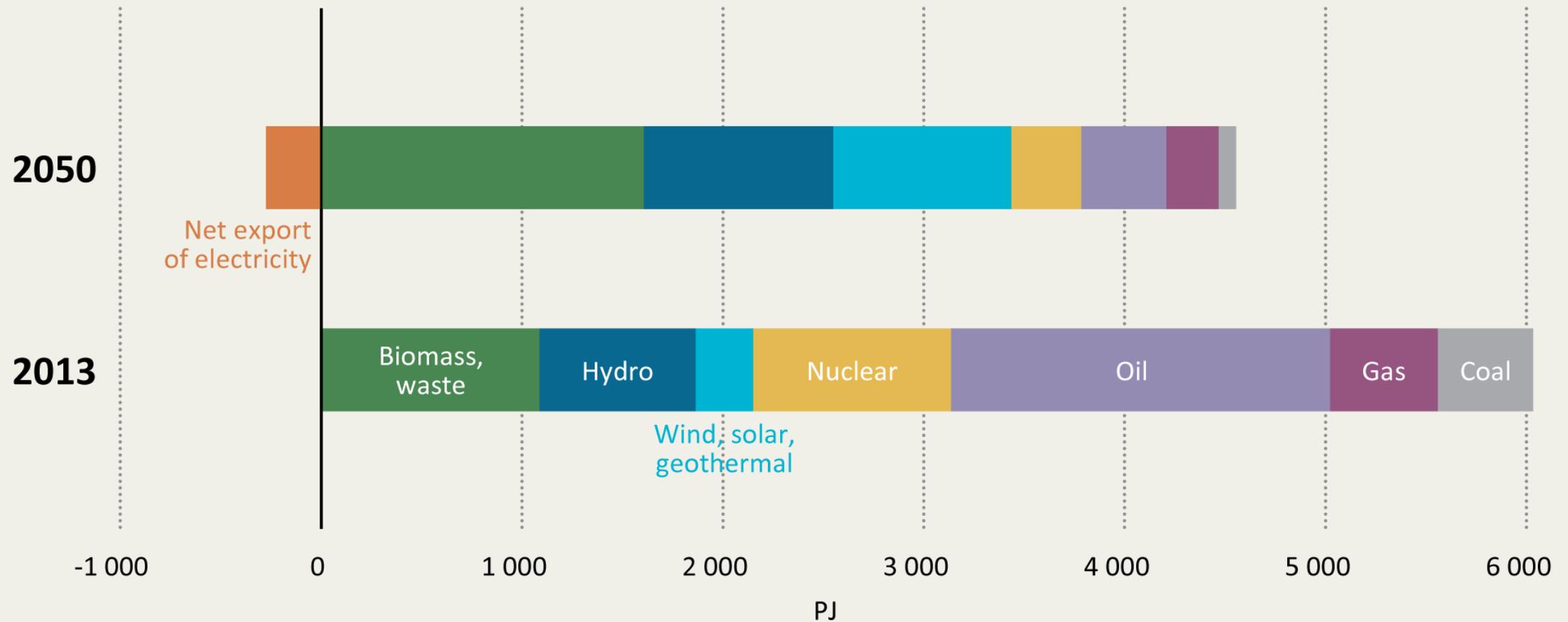
# 30 years ahead on electricity decarbonisation

Global carbon intensity of electricity (gCO<sub>2</sub>/kWh)

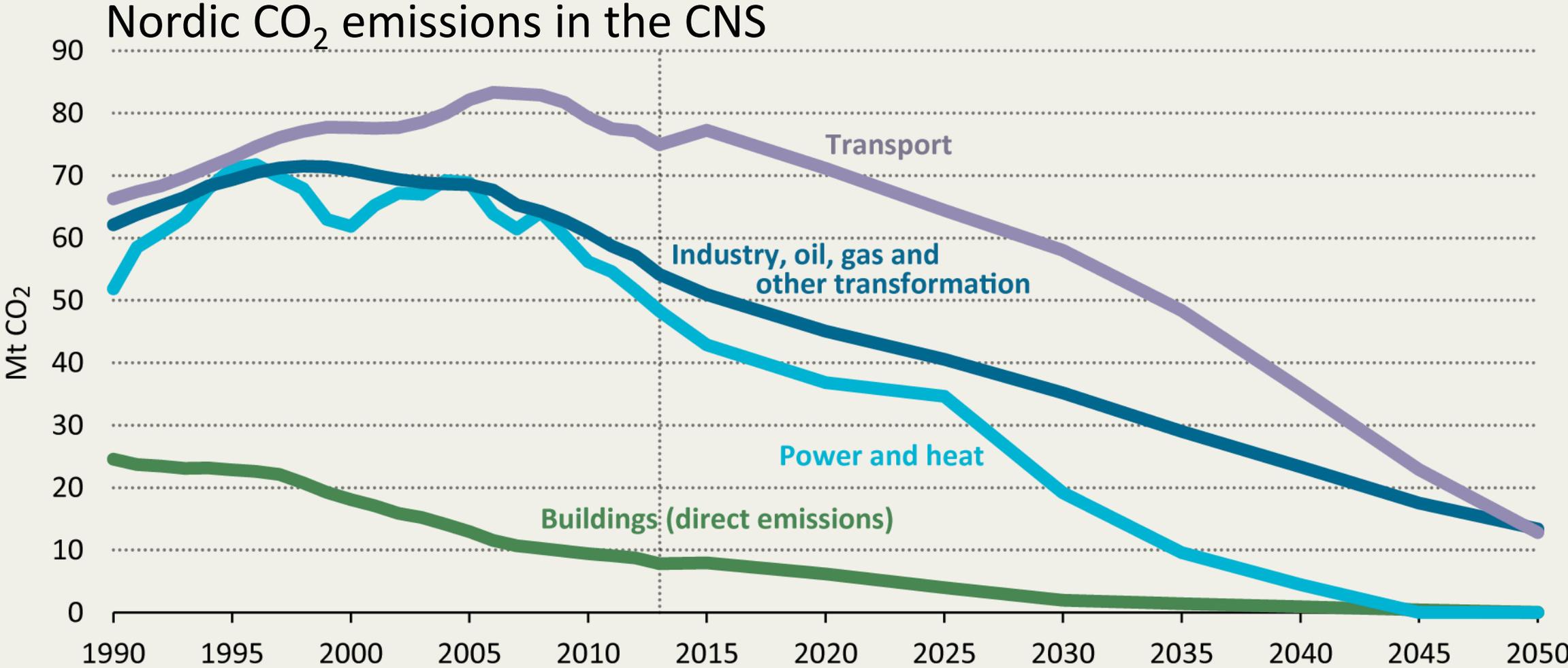


# Transforming the energy system

## Nordic Total Primary Energy Supply in the CNS



# Demand sectors most challenging



# Three strategic actions

1. Incentivise and plan for a more distributed, interconnected and flexible energy system
2. Tap into the positive momentum of cities in transport and buildings
3. Ramp up decarbonisation of long-distance transport and the industrial sector

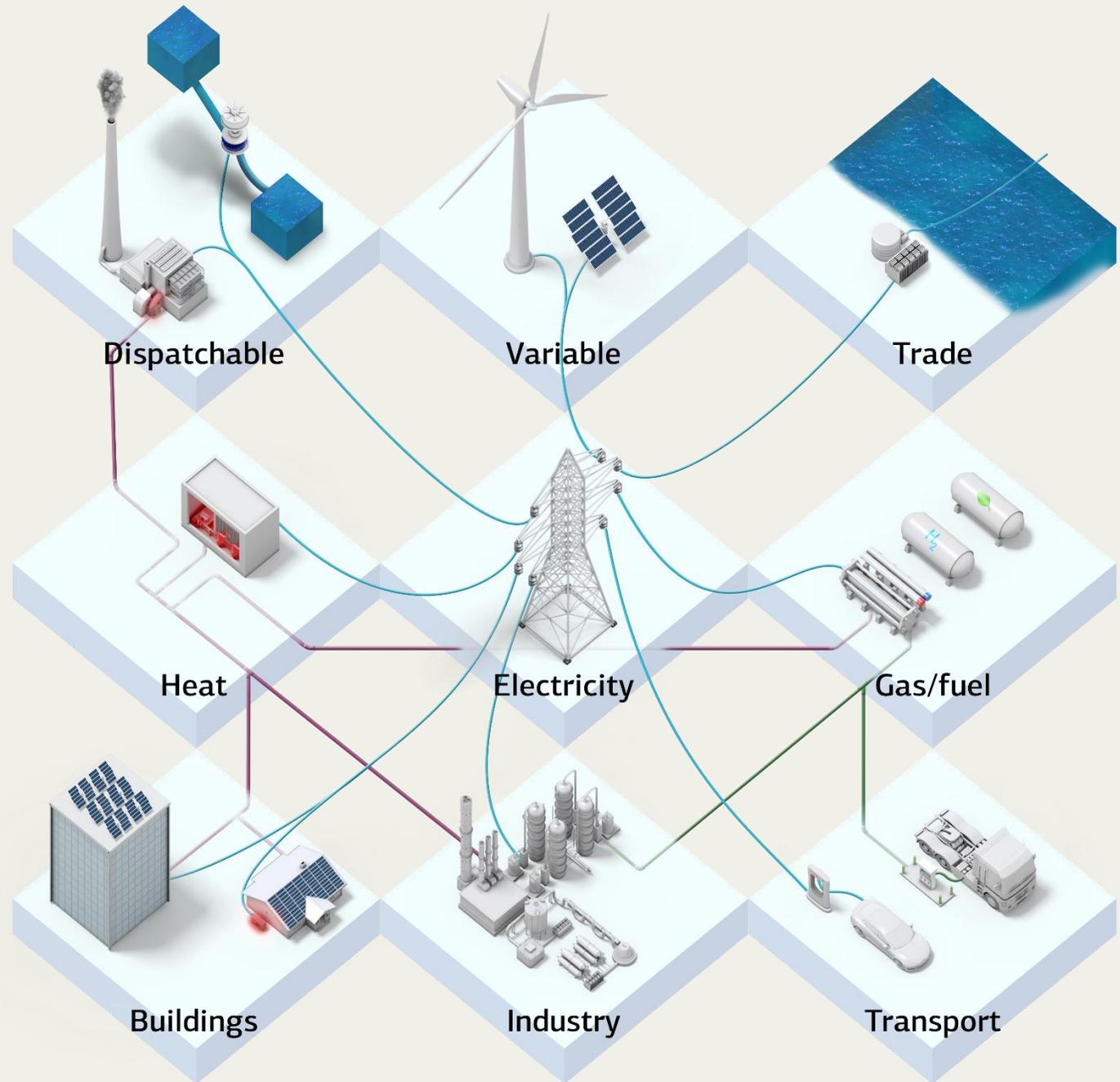
# Three strategic actions

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# Supply

# System

# Demand

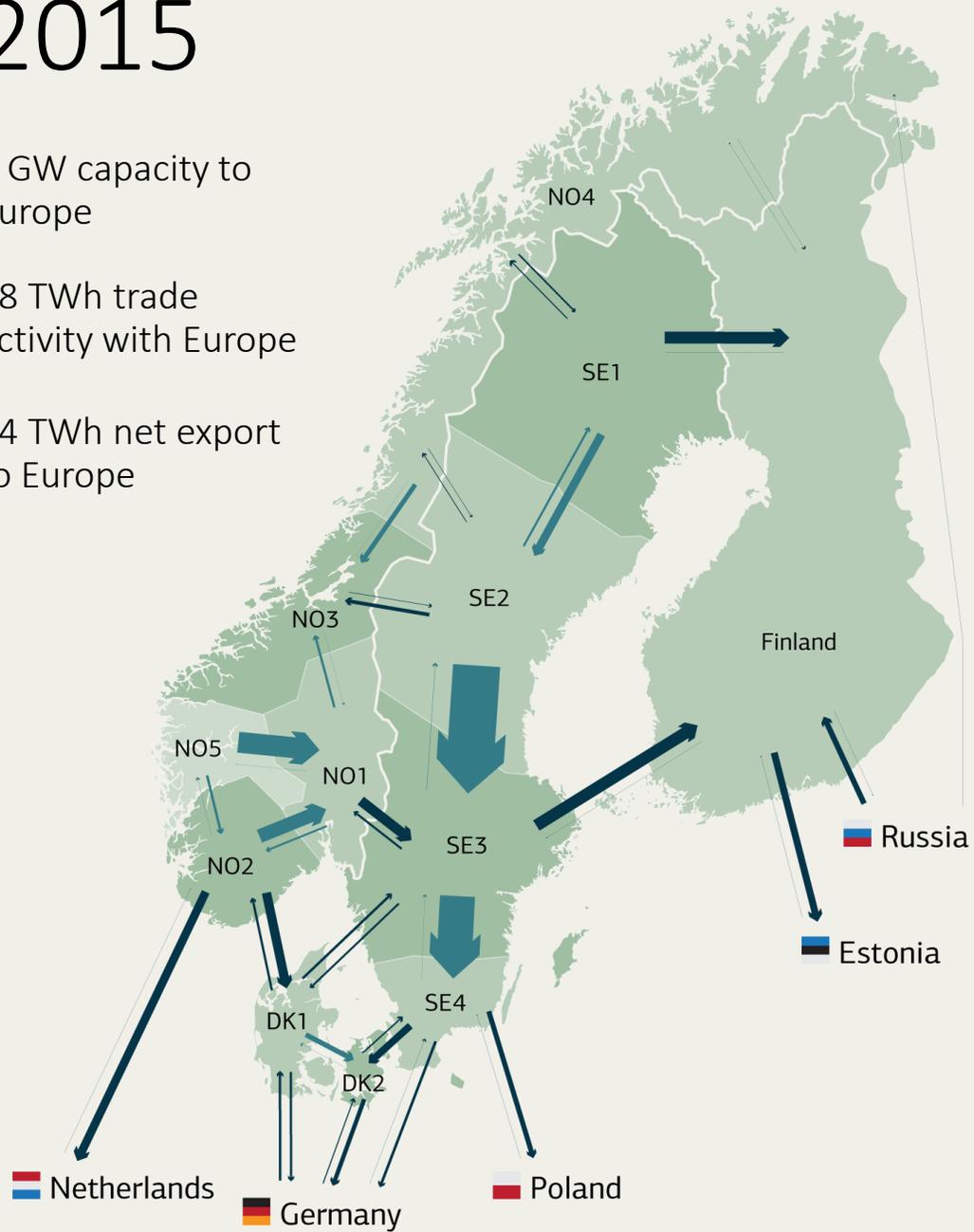


# 2015

5 GW capacity to Europe

28 TWh trade activity with Europe

14 TWh net export to Europe

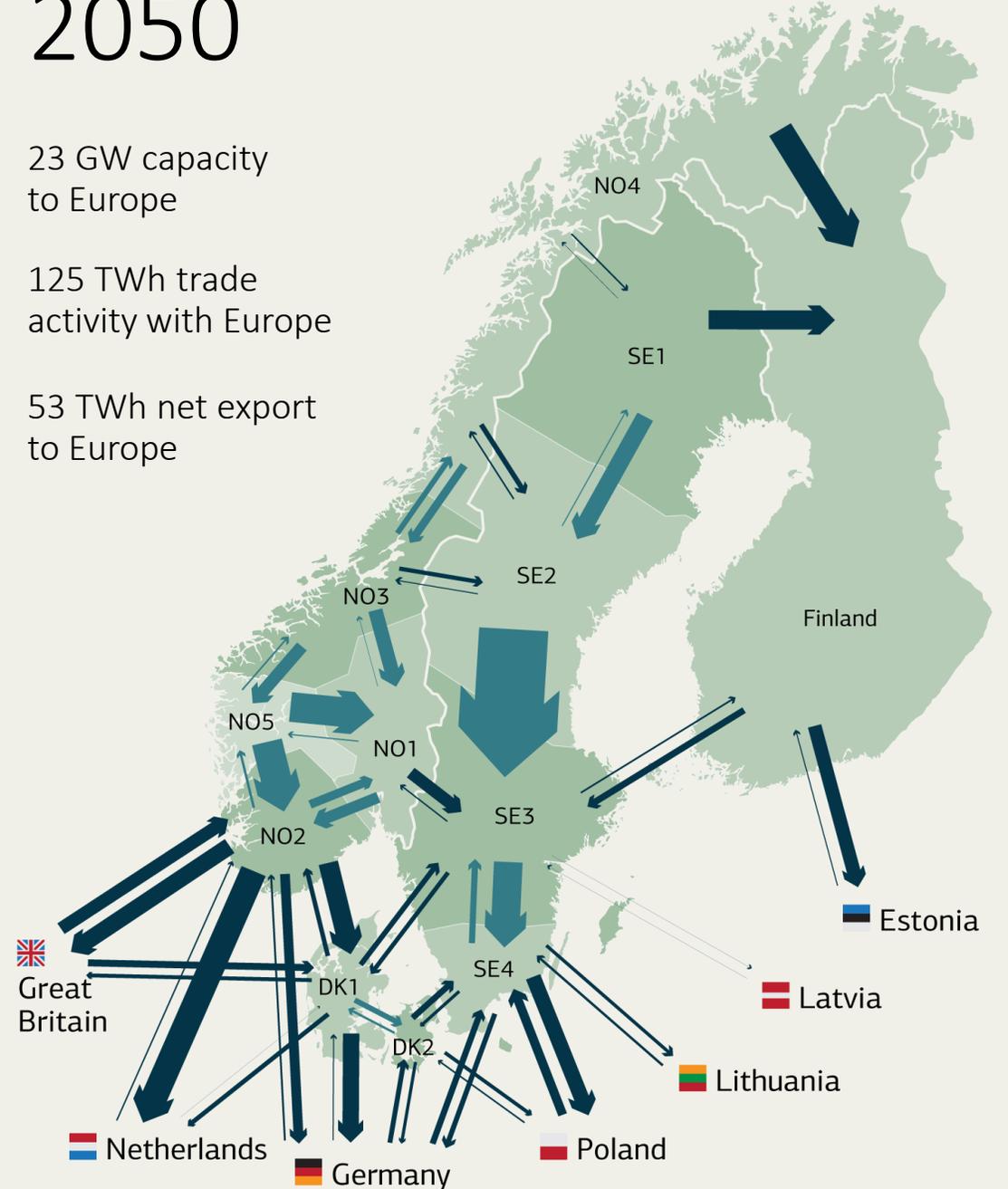


# 2050

23 GW capacity to Europe

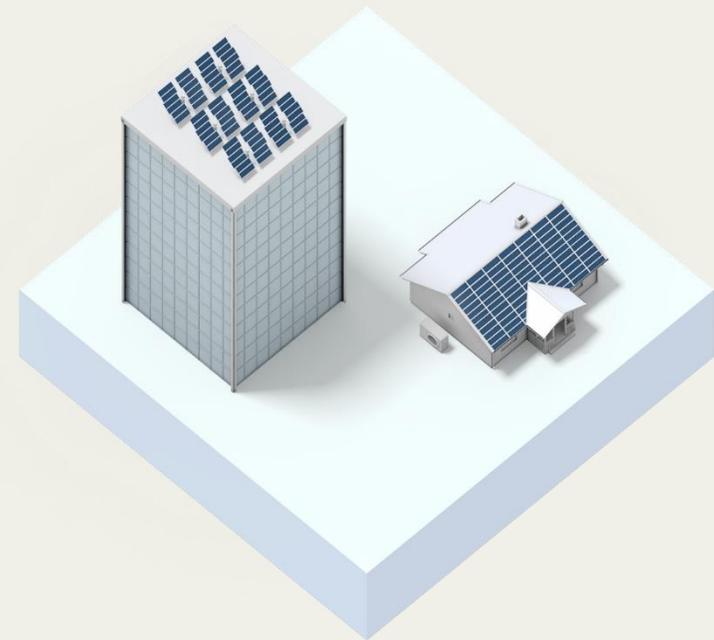
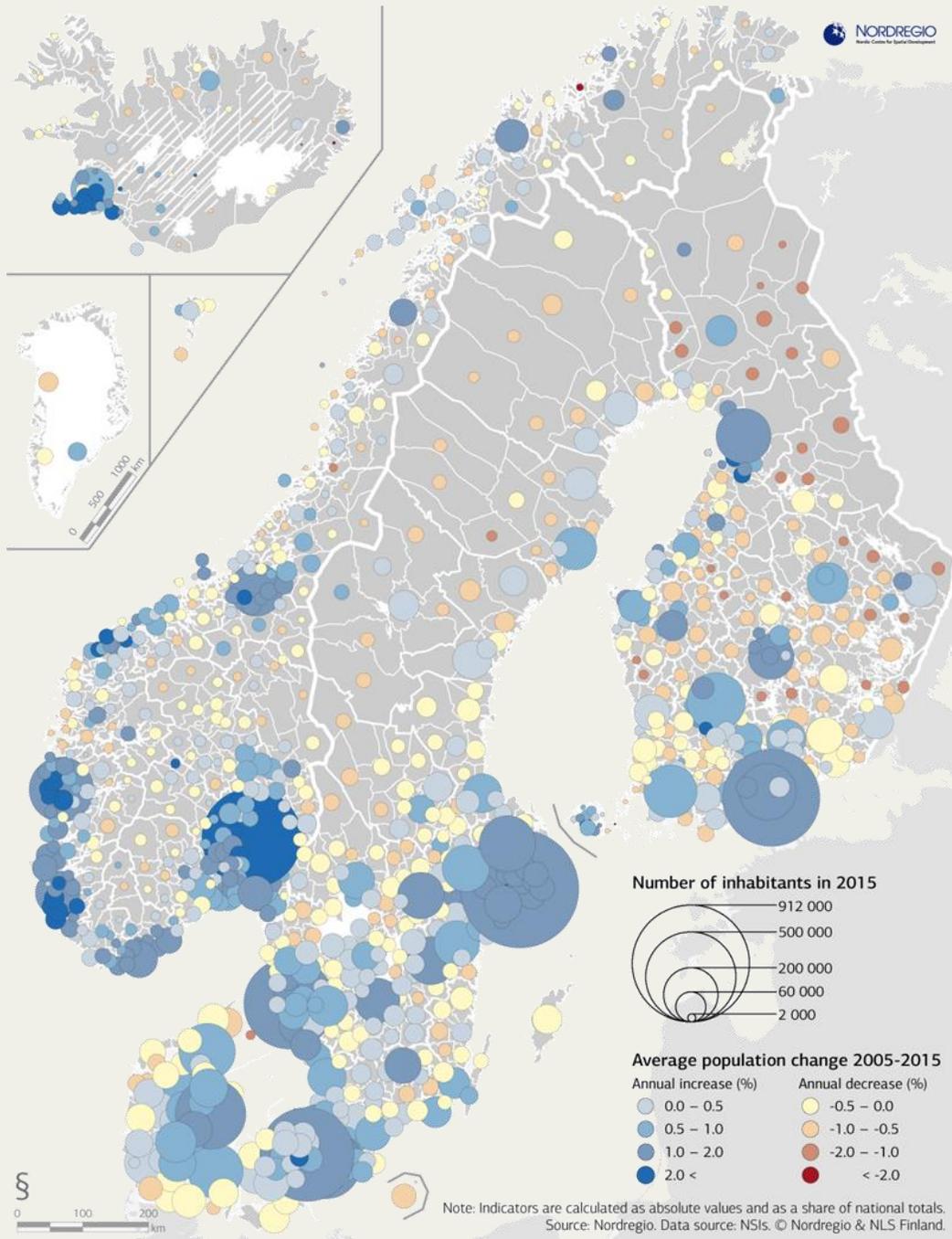
125 TWh trade activity with Europe

53 TWh net export to Europe



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# Space heating energy intensity in Nordic buildings

126

kWh/m<sup>2</sup> in 2013

0.8%

annual improvement,  
1990-2013

60

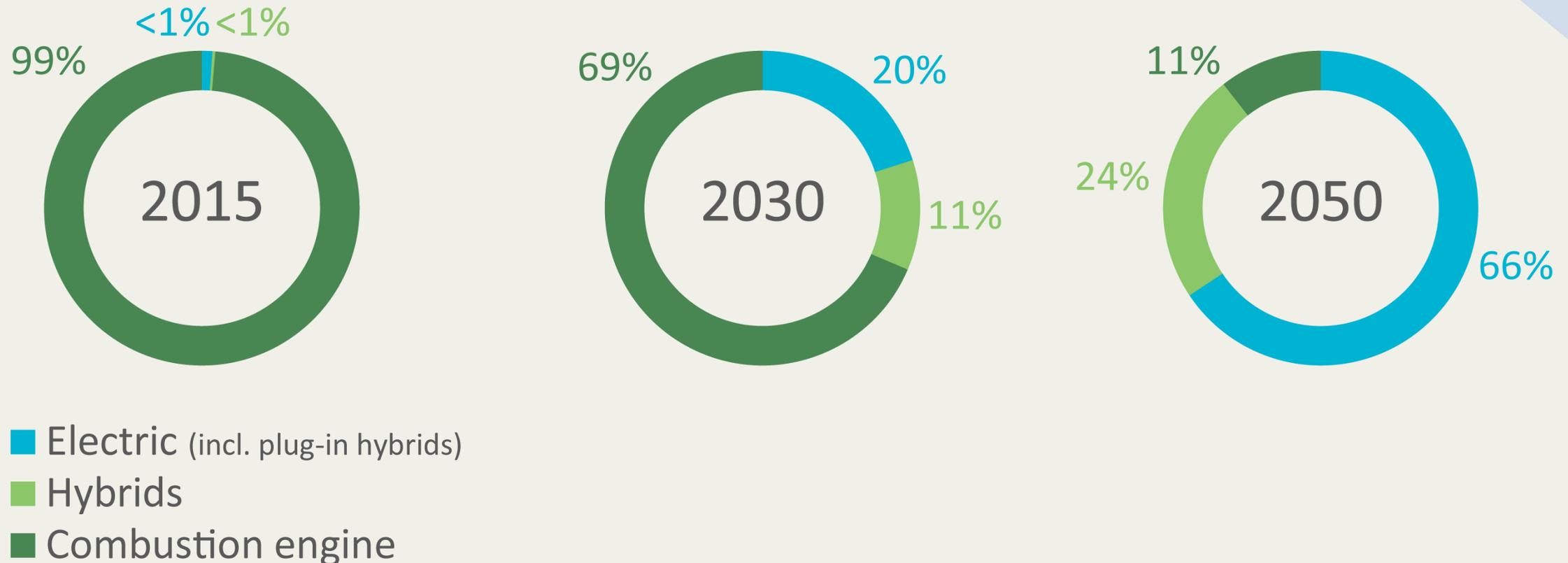
kWh/m<sup>2</sup> in 2015

2.2%

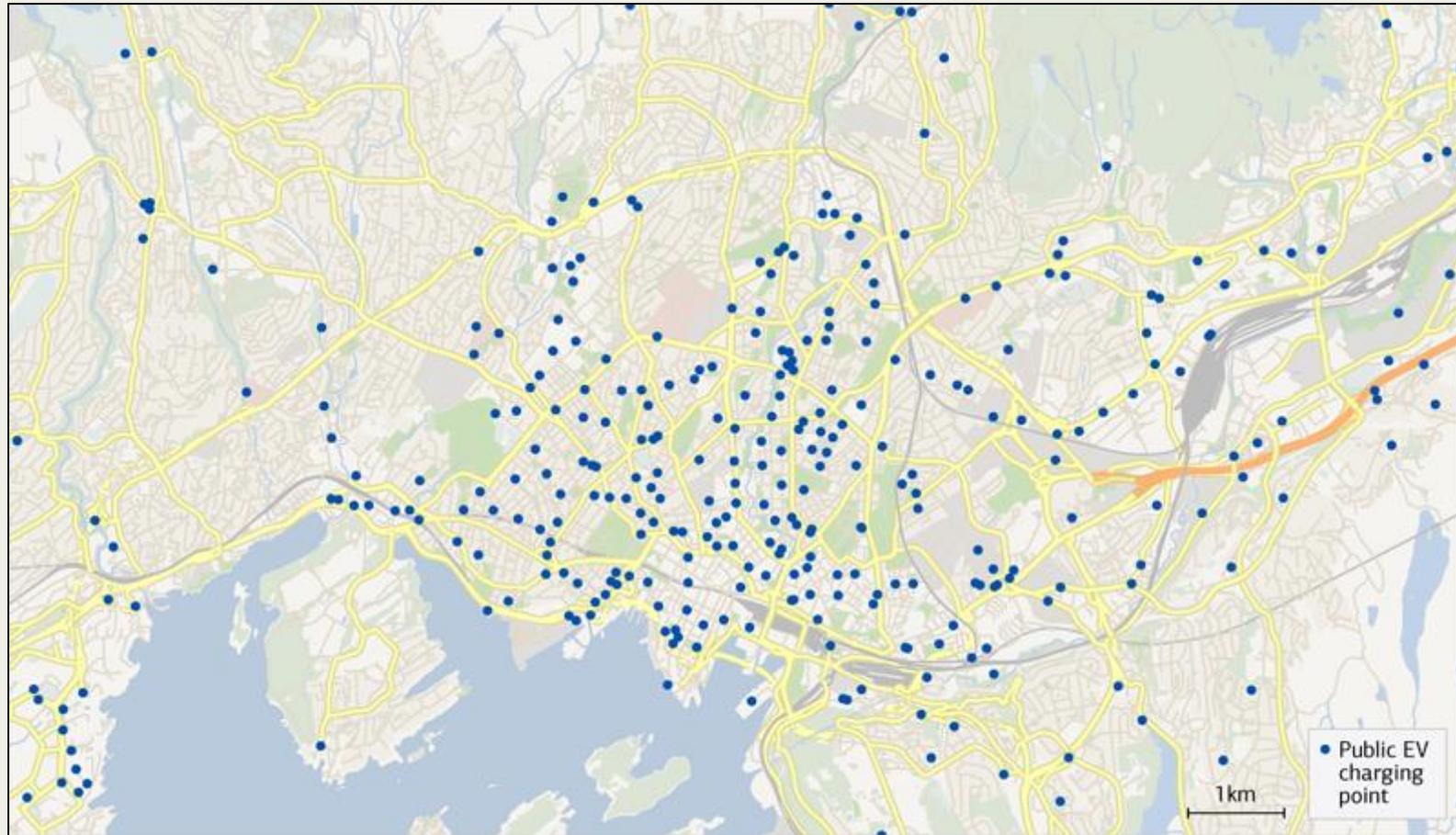
annual improvement,  
2013-2050

# Rapid electrification of transport

Nordic stock of cars and light commercial vehicles in the CNS



# Electrification and public transport

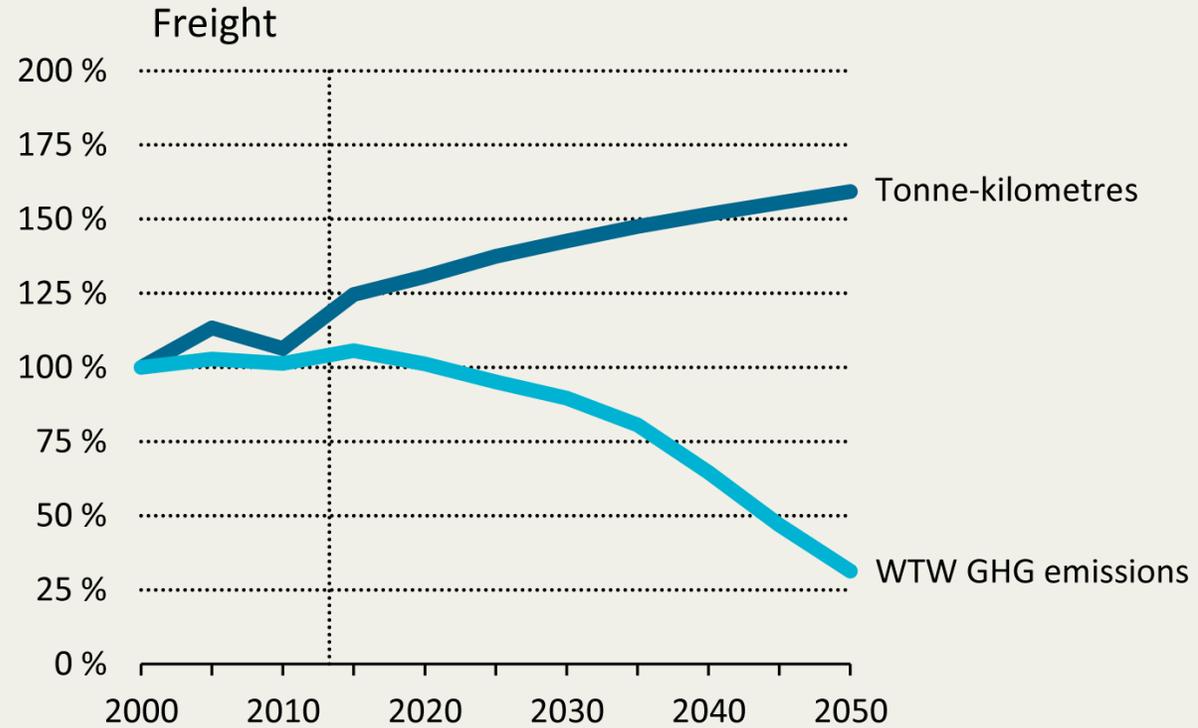
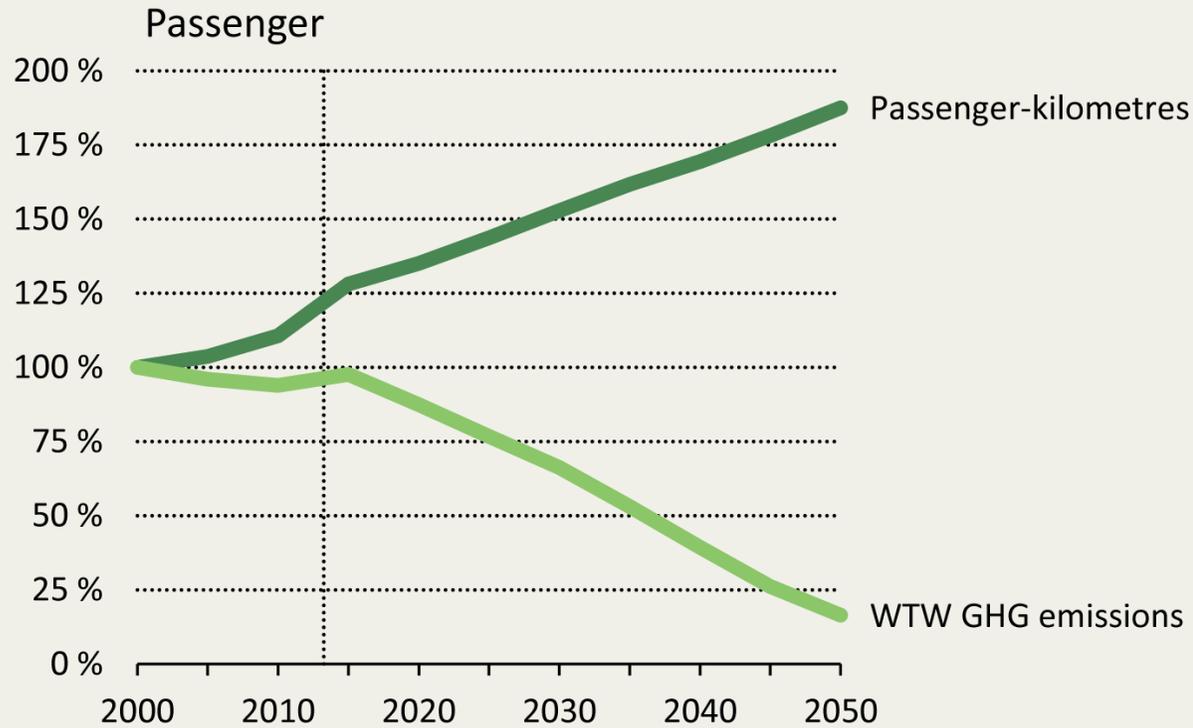


Map of the Oslo area with public EV charging points

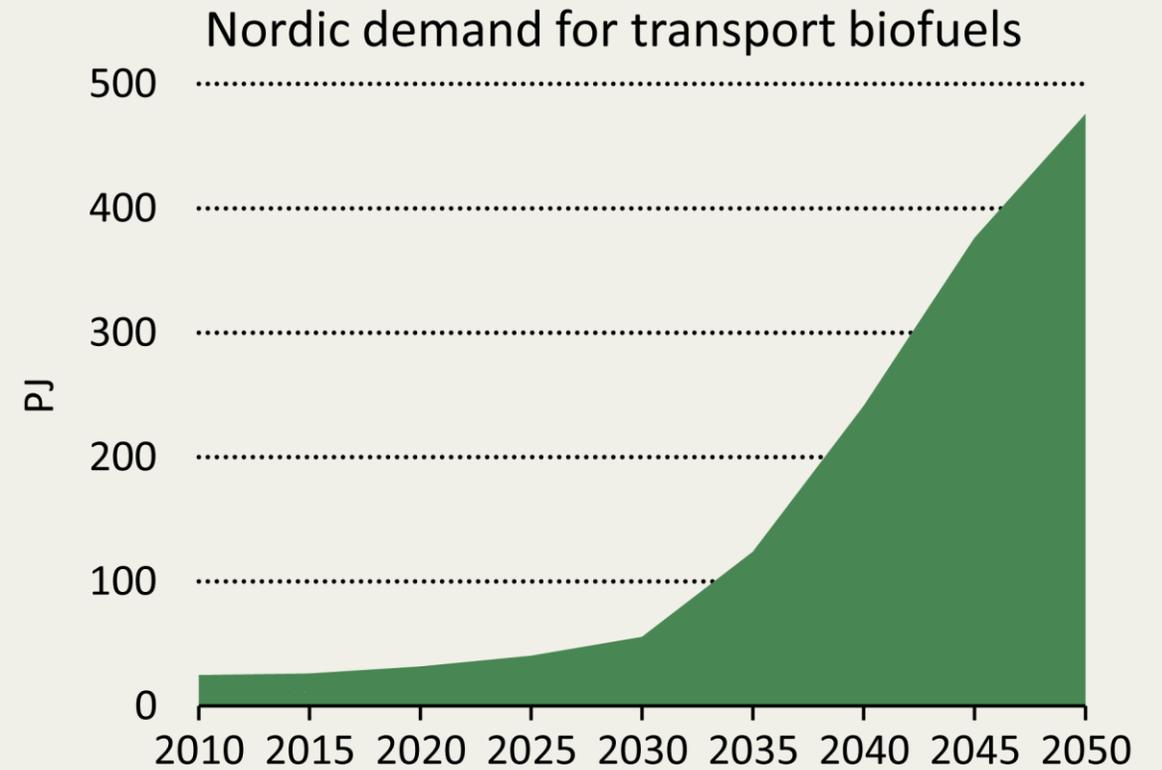
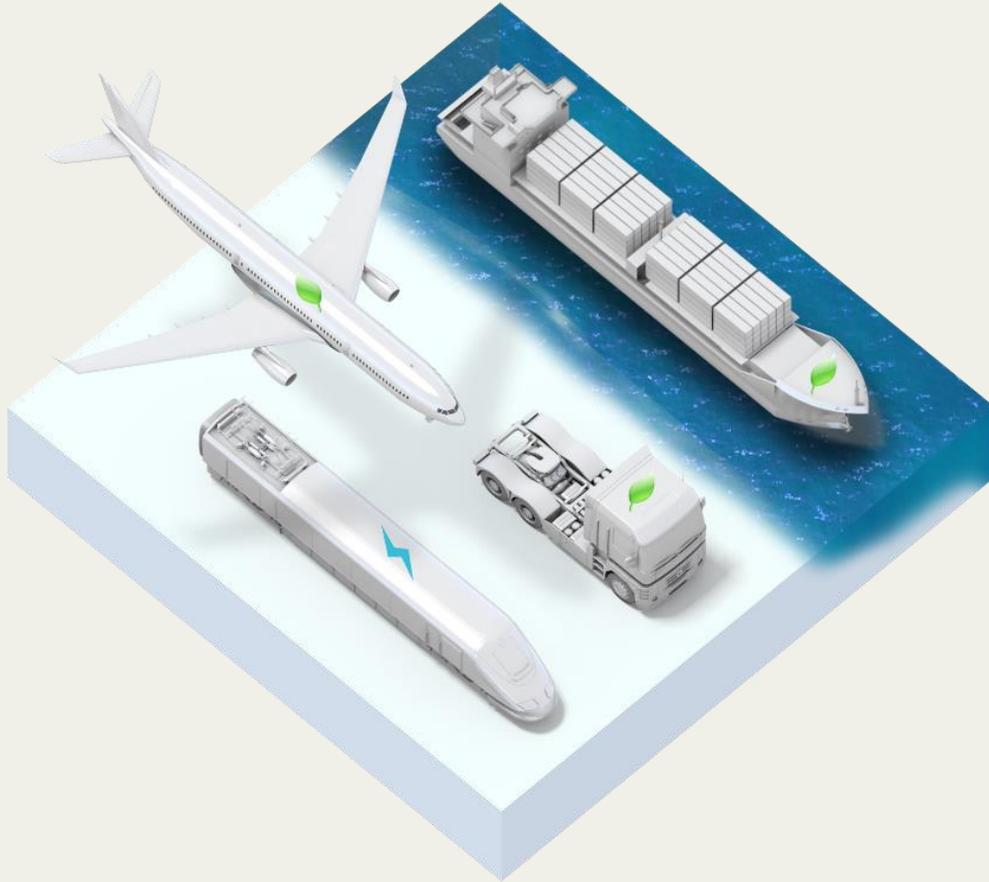
# Three strategic actions

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# Decoupling transport activity from emissions

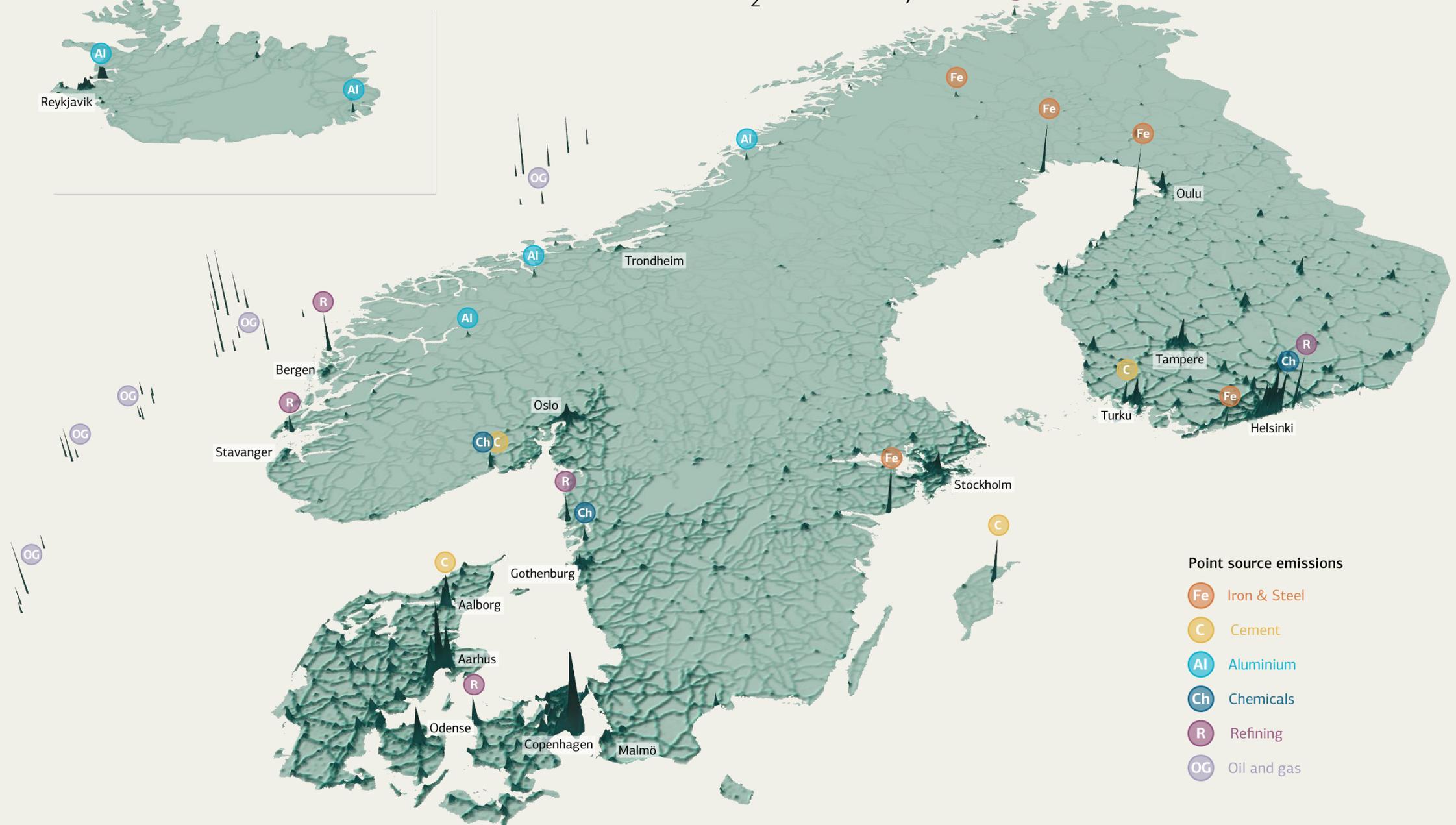
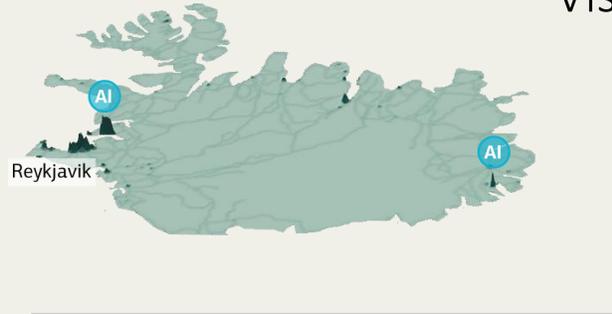


# Long-distance transport



# Visualisation of Nordic CO<sub>2</sub> emissions, 2013

R

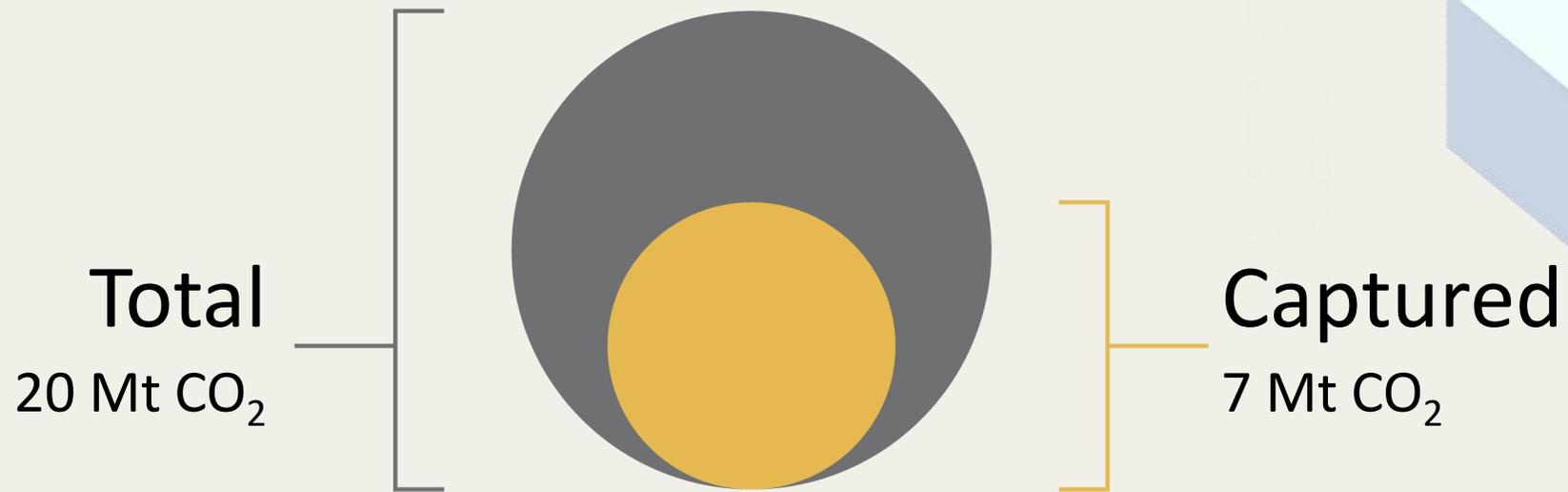


## Point source emissions

- Fe Iron & Steel
- C Cement
- AI Aluminium
- Ch Chemicals
- R Refining
- OG Oil and gas

# CCS critical in industry

Nordic industrial emissions in 2050



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# Nordic Energy Technology Perspectives 2016

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Thank you

Download figures, data and slides at

[www.NordicETP.org](http://www.NordicETP.org)



**Nordic Energy Research  
and The Nordic Council of Ministers**