Next Steps for Climate Action

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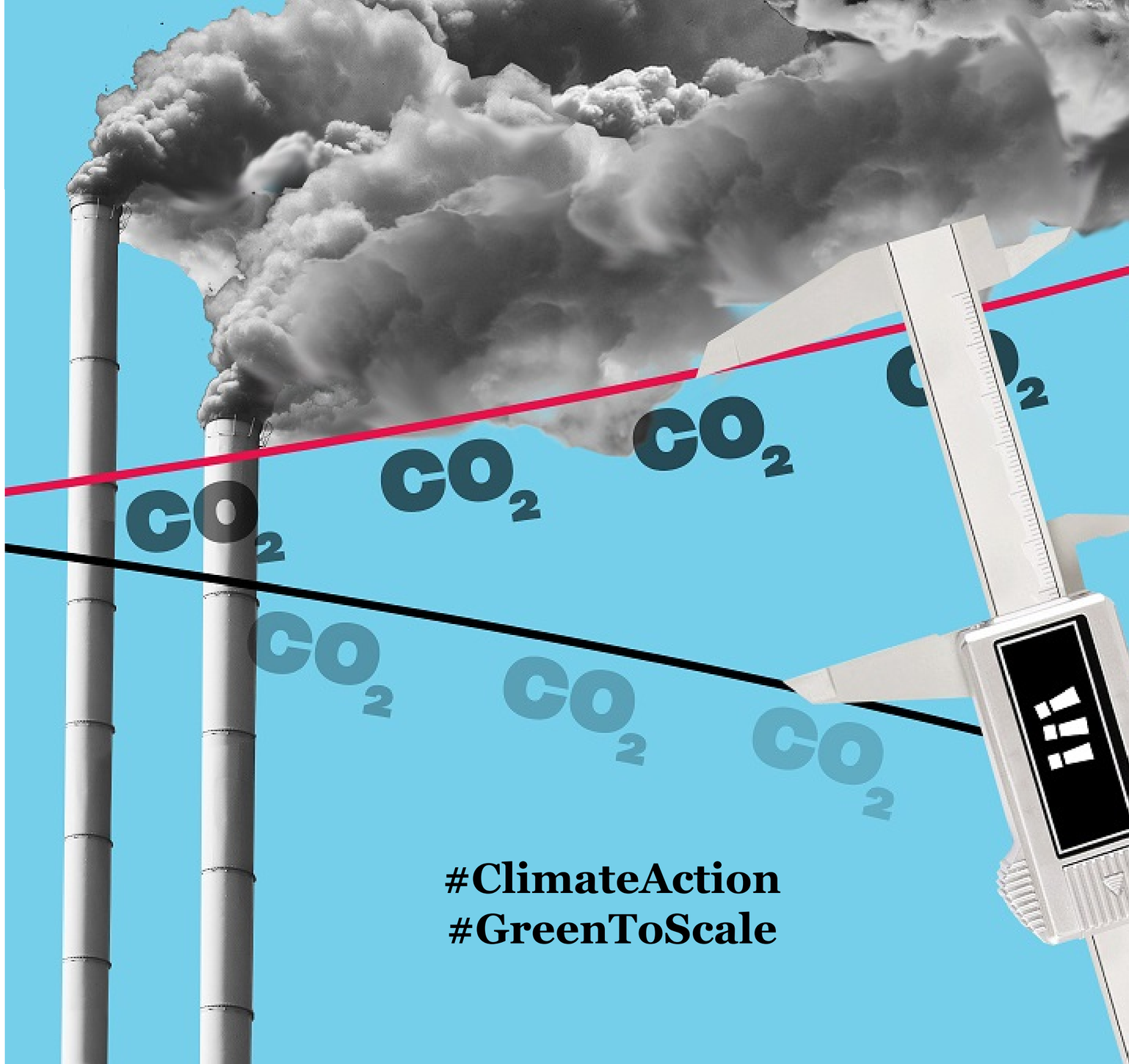

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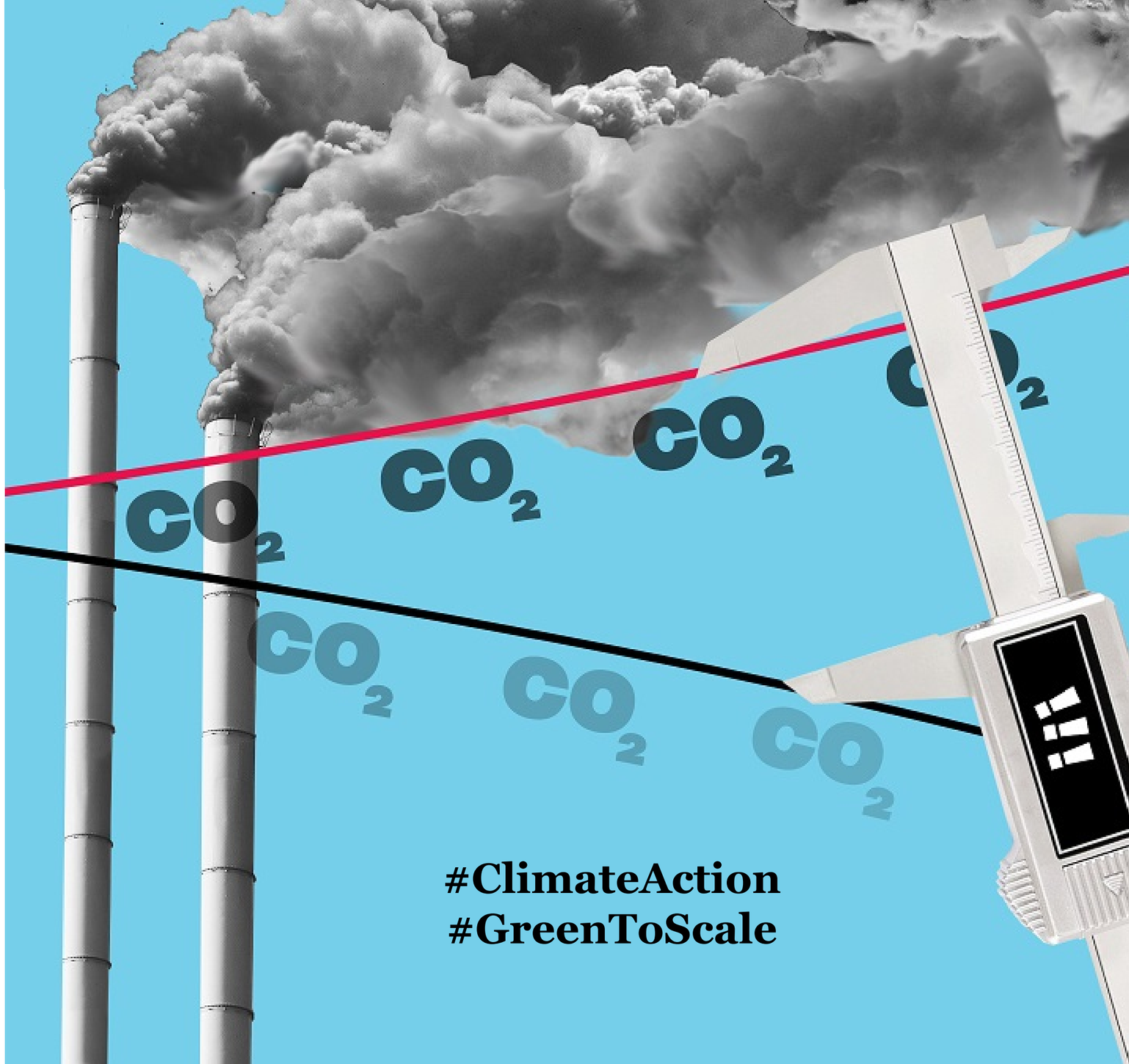

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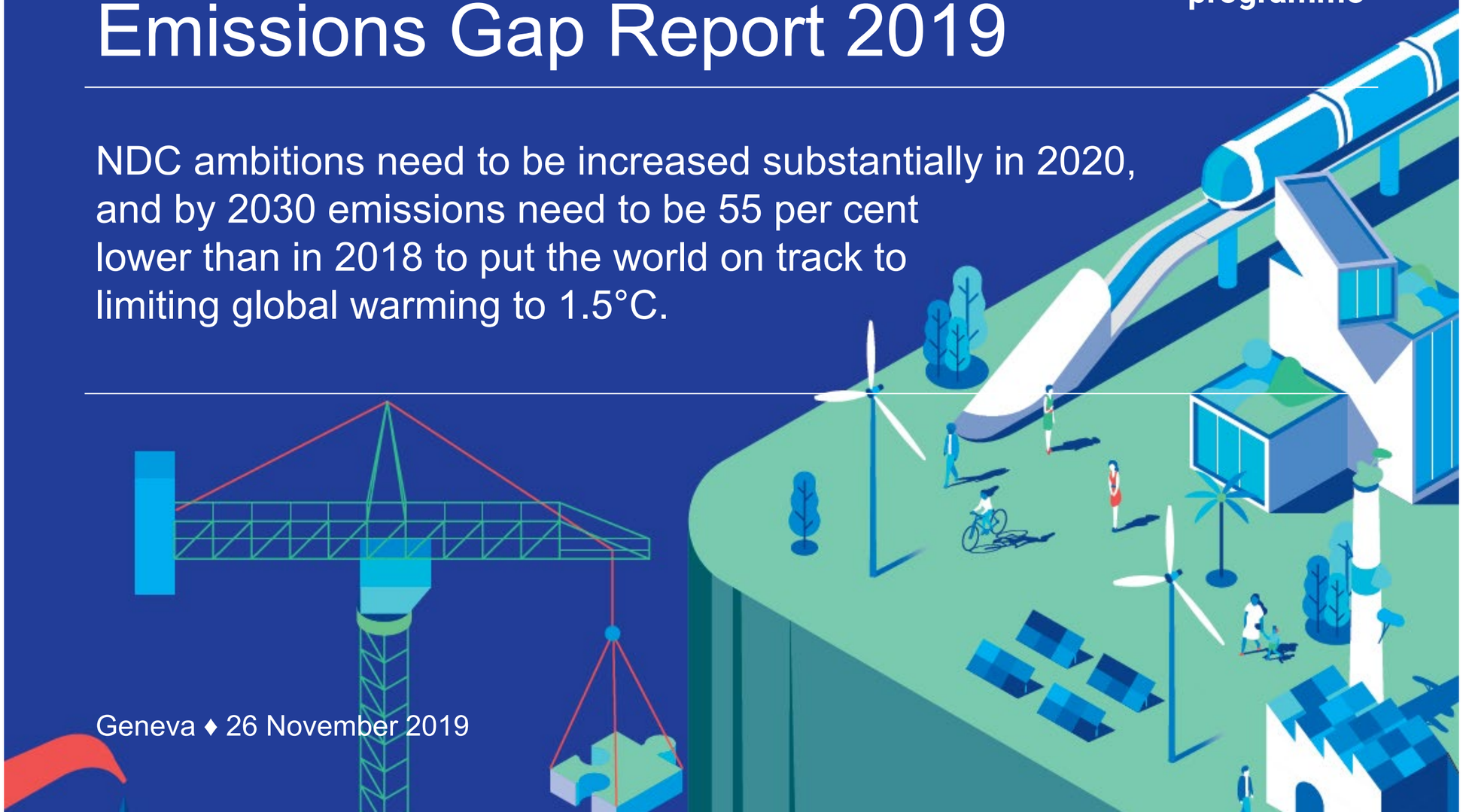
Emissions Gap Report 2019

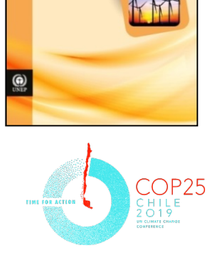
NDC ambitions need to be increased substantially in 2020, and by 2030 emissions need to be 55 per cent lower than in 2018 to put the world on track to limiting global warming to 1.5°C.

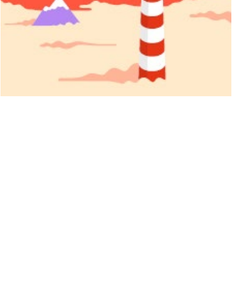


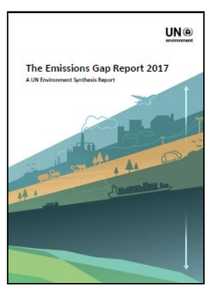
Geneva ♦ 26 November 2019

UNEP Emissions Gap Reports

10 years of emissions gap assessments





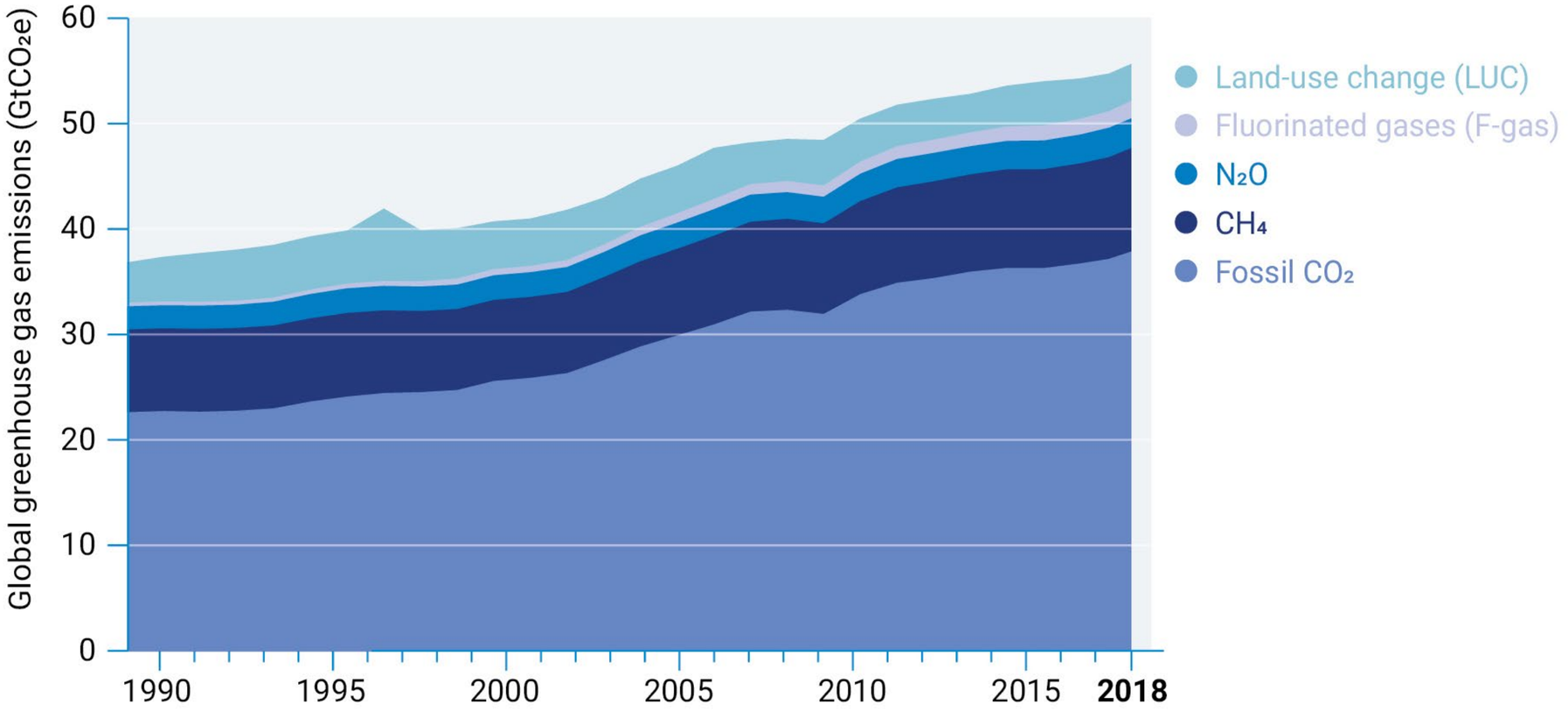


Emissions Gap Report 2019 - main questions

- What is the trend in global GHG emissions?
- Are countries on track to meet their NDC targets?
- What will the current NDCs contribute?
- Will this be sufficient to stay well below 2°C and pursue 1.5°C?
- Can the 2030 Gap be bridged - and how?

Global greenhouse gases have risen 1.5 per cent per year in the last decade and continue to increase

Global GHGs from all sources



Source: Olivier and Peters (2019), Houghton and Nassikas (2017) for land-use change emissions, and Friedlingstein *et al*. (2019) for updates from 2016 to 2018

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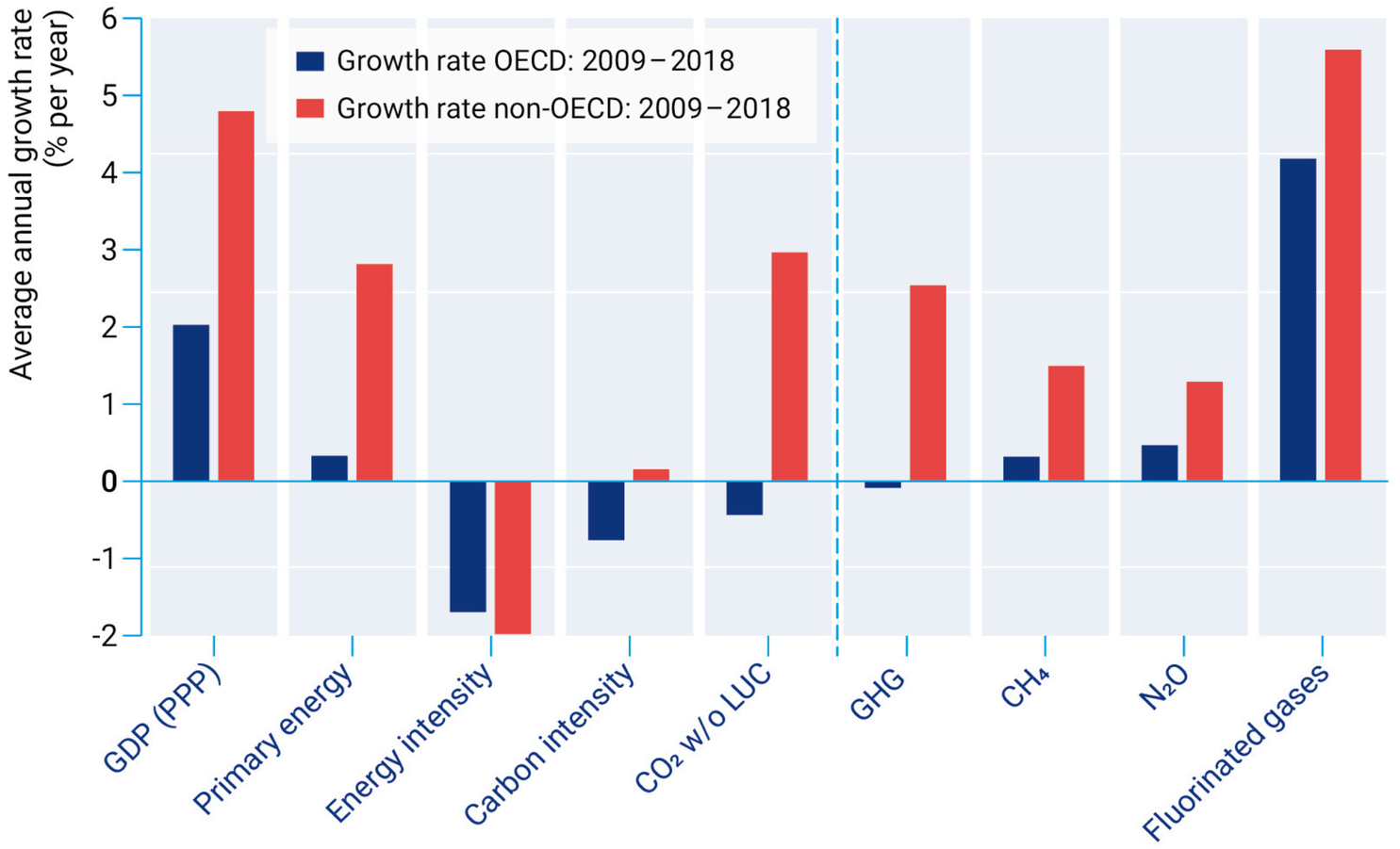
Average annual growth rates of key drivers of global CO_2 emissions (2009-2018)



Source: Olivier and Peters (2019) and Global Carbon Project (Friedlingstein *et al*. 2019) for energy and economic data

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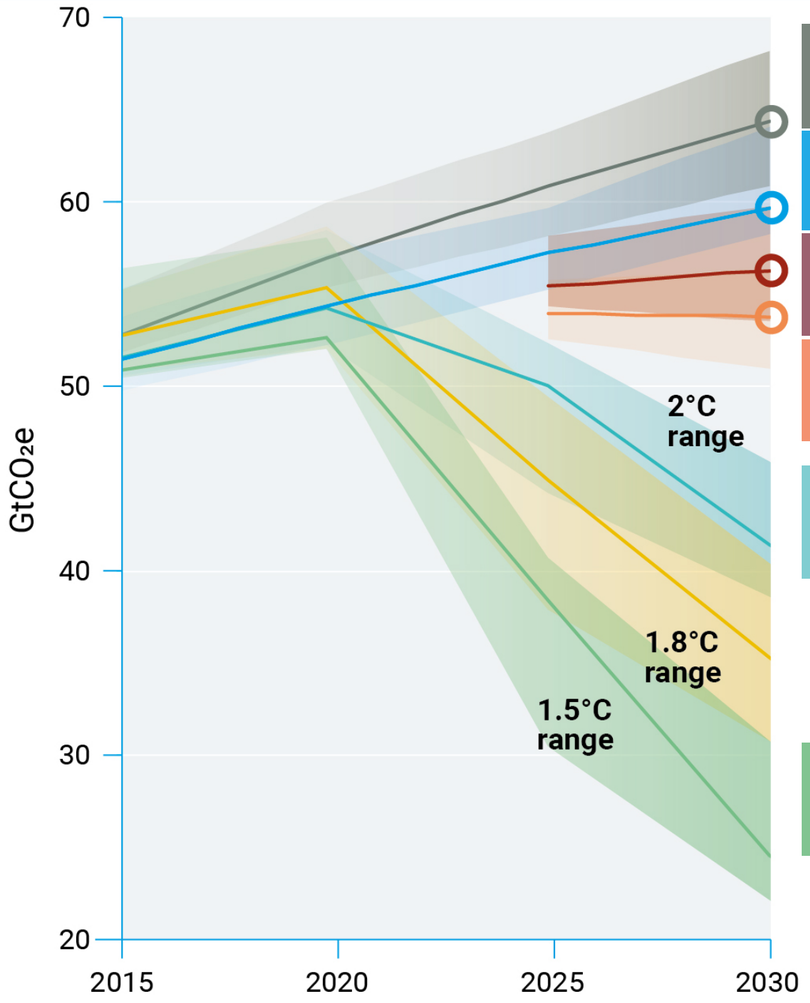
Progress towards achieving the NDC commitments of the G20 members

Projected to meet the unconditional NDC target with currently implemented policies		Expected to meet the unconditional NDC target with additional policy measures and/or stricter enforcement of existing policies		Uncertain or insufficient information
Overachievement of the target by more than 15 per cent, suggesting a weak target	Overachievement of the target by less than 15 per cent	Projected emissions 0–15 per cent above the NDC target	Projected emissions 15 per cent or more above the NDC target	
• **India** (6 of 6 studies) • **Russia** (3 of 3 studies) [1)] • **Turkey** (3 of 3 studies)	• **China** (3 of 5 studies, one uncertain) [2)] • **EU28** (1 of 3 studies, one uncertain) [1),2),3)] • **Mexico** (2 of 3 studies)	• **Australia** (3 of 4 studies) [1)] • **Japan** (2 of 3 studies) • **South Africa** (3 of 3 studies) [1), 4)]	• **Brazil** (4 of 4 studies) • **Canada** (3 of 3 studies) [1)] • **Republic of Korea** (3 of 3 studies) • **United States of America** (2025) (5 of 5 studies) [1)]	• **Argentina** (1 of 3 studies projected to meet the unconditional NDC; updated NDC in 2016) • **Indonesia** (3 studies disagree) • **Saudi Arabia** (2 studies disagree)

NDC contributions and the Emissions Gap



2005-Policies scenario
Global total emissions **64 $GtCO_2e$** (range: 60-68)

Current policy scenario
Global total emissions **60 $GtCO_2e$** (range: 58-64)

Unconditional NDC scenario
Global total emissions **56 $GtCO_2e$** (range: 54-60)

Conditional NDC scenario
Global total emissions **54 $GtCO_2e$** (range: 51-56)

2°C pathways
Global total emissions **41 $GtCO_2e$** (range: 39-46)

1.5°C pathways
Global total emissions **25 $GtCO_2e$** (range: 22-31)

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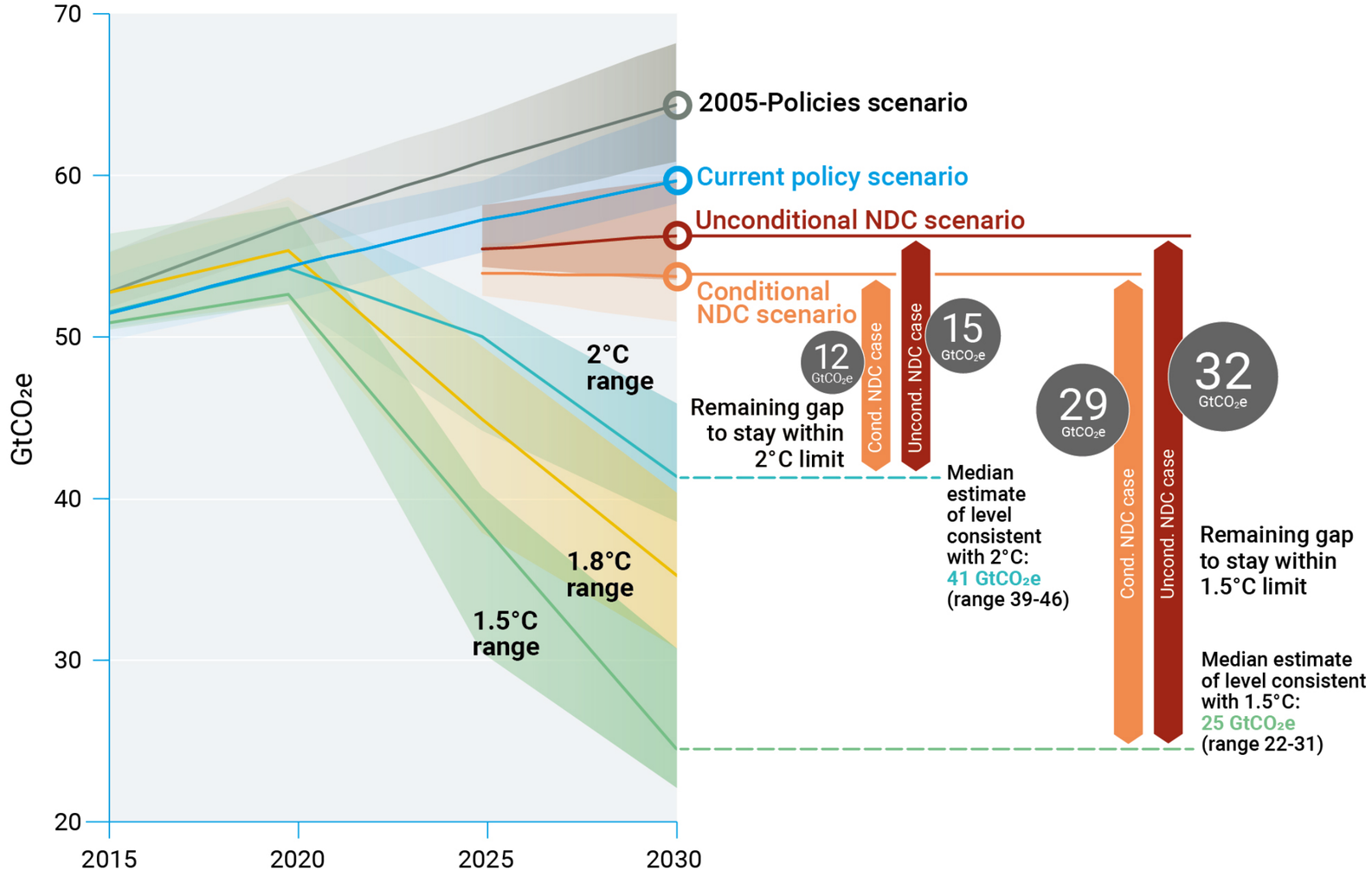
NDC contributions and the Emissions Gap



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The number of countries and states that are committing to zero emission targets is increasing, though it is still far from the scale and pace required and action is lacking in many areas

Target categories	G20 countries	Country level	Regional level
Zero emissions by year x	**2 G20** members (France, UK) have passed legislation **3 G20** members (EU and Germany and Italy as part of EU[1]) currently in process of passing legislation **15 G20** members have no binding (net-) zero-emission targets	**71 countries**	**11 regions**
Ambitious comprehensive CO_2 pricing in all sectors by year x [2]	**No G20** member has implemented ambitious comprehensive CO_2 pricing in all sectors, but 9 G20 members have implemented carbon pricing as ETS or carbon tax with partial coverage and/or lower CO_2 prices (as at August 2019)	**No country** ✖	**No regions** ✖
Phase out all fossil fuel sub-sidies by year x	**No G20** member has existing reform plans to fully phase out all fossil fuel subsidies, but the G20 took a decision in 2009 to gradually phase out fossil fuel subsides with an annual peer-review among G20 members	**No country** ✖	**No regions** ✖
Make all finance flows consistent with the Paris Agreement goals by year x *	**No G20** member has made all finance flows fully aligned with the Paris Agreement goals, but the UK has published a Green Finance Strategy in 2019 as an example of intermediate action	**No country** ✖	**No regions** ✖

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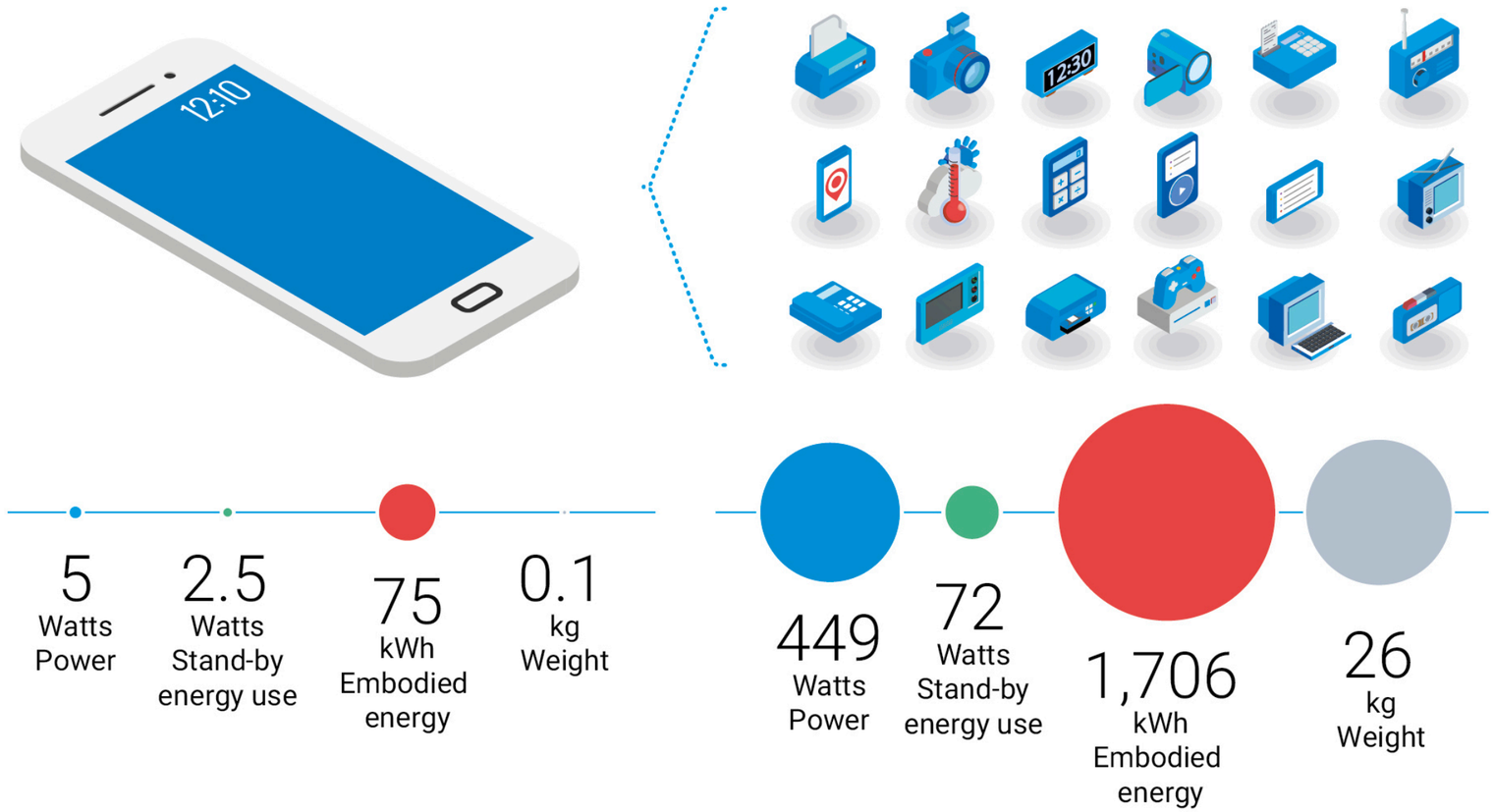
Global decarbonization requires fundamental structural changes, which should be designed to bring multiple co-benefits for humanity and planetary support systems

- Climate protection and adaptation investments will become a precondition for peace and stability and will require unprecedented efforts to transform societies, economies, infrastructures and governance institutions

Six major transformations assessed:

- air pollution, air quality, health;
- urbanization;
- governance,
- education, employment;
- digitalization;
- energy- and material-efficient services for raising living standards;
- land use, food security, bioenergy.

Example of transformation in the IT sector over the last few decades and the energy and material benefits achieved



Source: Grubler *et al*. (2018), based on a visualization by Tupy (2012)

UN environment programme

Options for transforming the global energy system

- Easy wins: expanding renewable energy for electrification

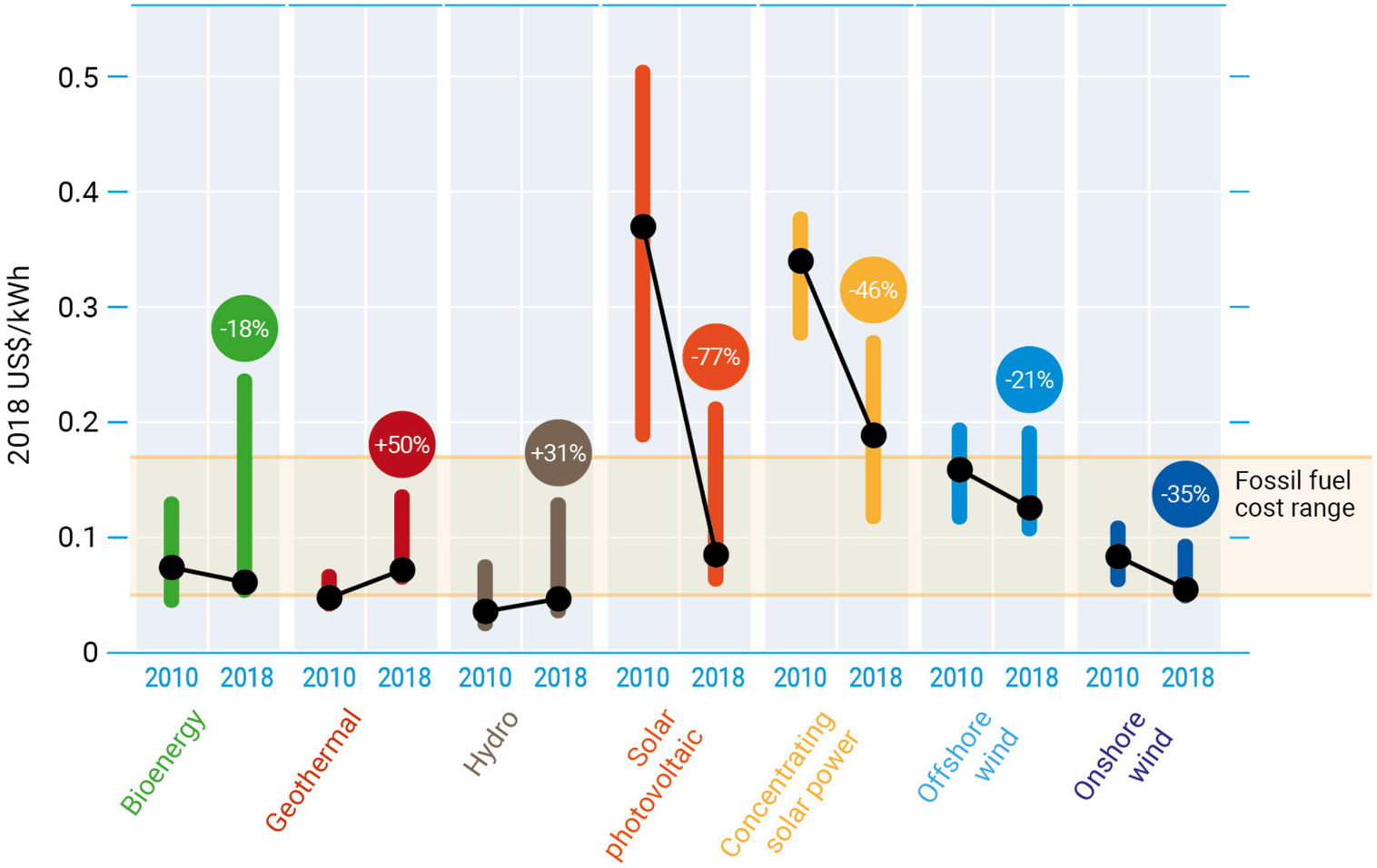
- Broad policy consensus: coal phase-out for rapid decarbonization of the energy system

- Large co-benefits: decarbonizing transport

- Hard to abate: decarbonizing energy-intensive industry
- Leapfrogging potential: avoiding future emissions and ensu energy access

UN environment programme

Global levelized cost of renewable energy continues to decrease and is competitive with fossil fuels



Source: Based on IRENA (2018)

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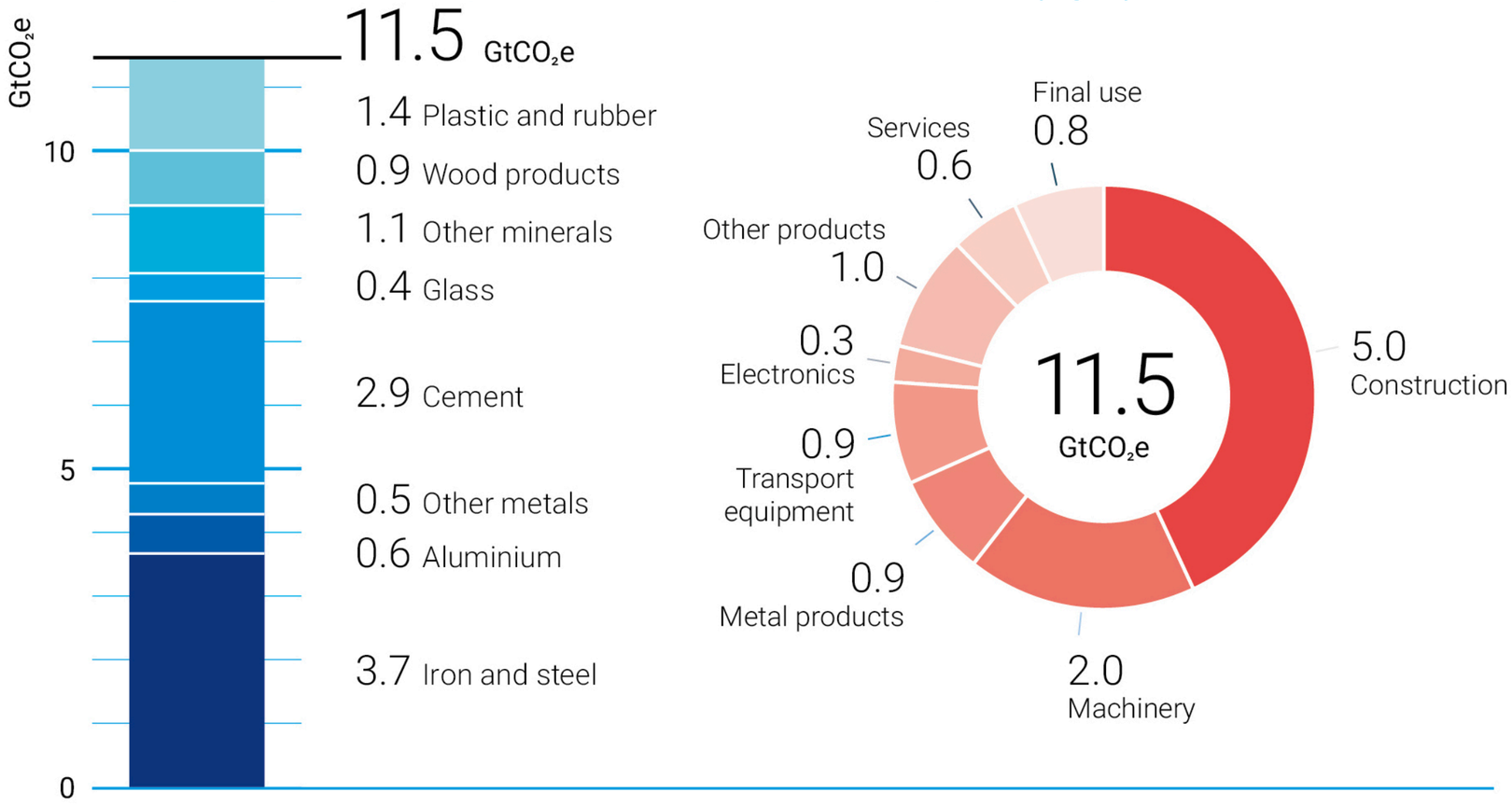
Material production and consumption is associated with significant CO_2 emissions

GHG associated with materials production by material (left) and by the first use of materials in subsequent production processes or final consumption (right)

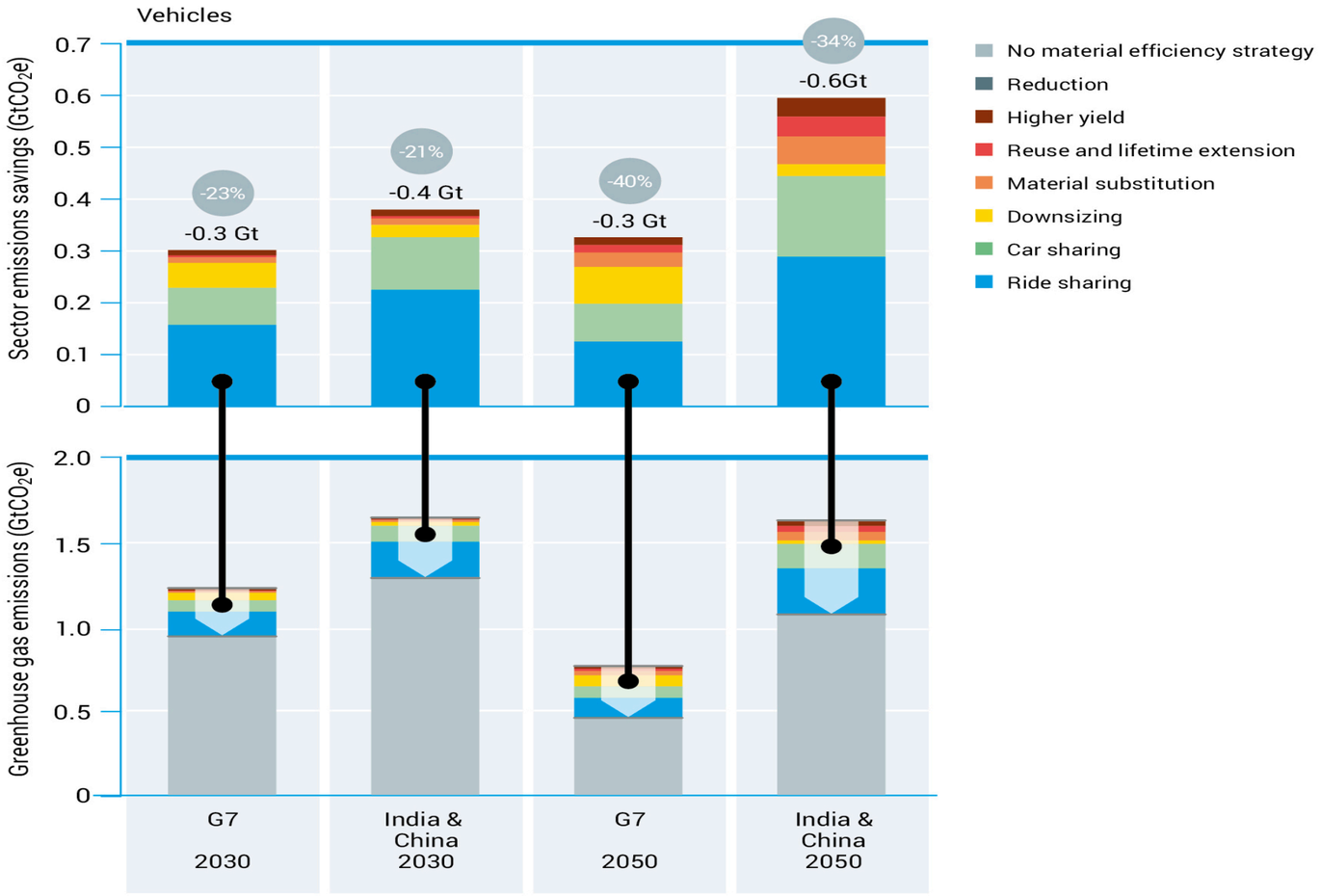


Note: The data excludes emissions from land-use change and credits for carbon storage.
Source: Based on Hertwich *et al*. (2019).

UN environment programme

Material efficiency can bring significant emission reductions from the manufacturing and use of passenger vehicles

Annual emissions and potential reductions from the manufacturing and use of passenger vehicles in the G7 and in China and India



Note: The scenario follows the Shared Socioeconomic Pathway SSP1 to mitigate emissions to below 2°C

Source: International Resource Panel (*forthcoming*)

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Emissions Gap Report 2019 - answers to the main questions

- **What is the trend in global GHG emissions?**
  - Global emissions continue to rise and show no signs of peaking
  - Collectively countries are on track to meet their Cancun pledges, but these are **not** sufficiently ambitious to establish a path that will get the world to 2030 emission levels consistent with the well below 2°C and 1.5°C goal
- **Are countries on track to meet their NDC targets?**
  - Collectively, G20 members are **not** on track to meet their 2030 NDC commitments.
  - Individually, six countries are on track, but seven countries are currently not on track, and for a further three, it is not possible to say
- **What will the NDCs contribute?**
  - Emission levels resulting from NDCs are 4 to 6 $GtCO_2e/yr$ lower than the current policy trajectory in 2030, but the remaining Gap is in the order of 12 to 15 $GtCO_2e/yr$ compared with 2°C scenarios and 29 to 32 $GtCO_2e/yr$ compared with 1.5°C

Emissions Gap Report 2019 - answers to the main questions

- **Will this be sufficient to stay well below 2°C and pursue 1.5°C?**
  - **NO** - without enhanced ambition the likely global average temperature increase will be in the range of 3.0 - 3.2°C by the end of the century.
  - The carbon dioxide budget for the 2°C scenario will be close to depleted by 2030, and the 1.5°C budget exceeded by far
- **Can the 2030 Gap be bridged - and how?**
  - There are plenty of opportunities for all countries to enhance NDCs significantly
  - Transformational change is required and must support sustainable development goals
  - Power systems will need to be decarbonised in the next few decades and much of transport electrified. Enhanced energy efficiency will be key to success.
  - Material efficiency can make important contributions

Kiitos!

UN environment programme

Takeshi Kuramochi
NewClimate Institute
t.Kuramochi@newclimate.org

United Nations Avenue, Gigiri
PO Box 30552 – 00100 GPO Nairobi, Kenya

www.unep.org

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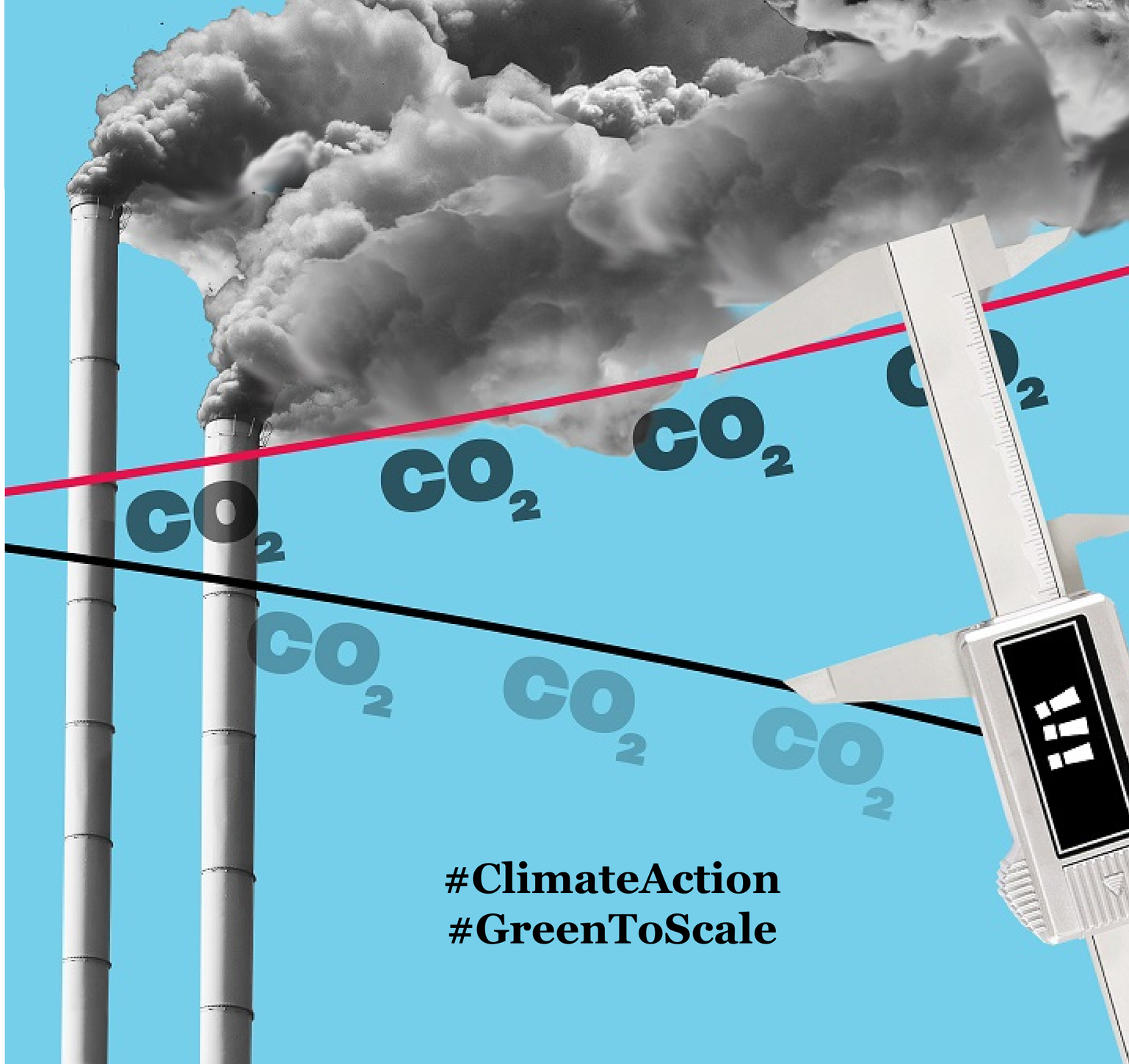


Nordic Energy Research

Progress towards Nordic Carbon Neutrality

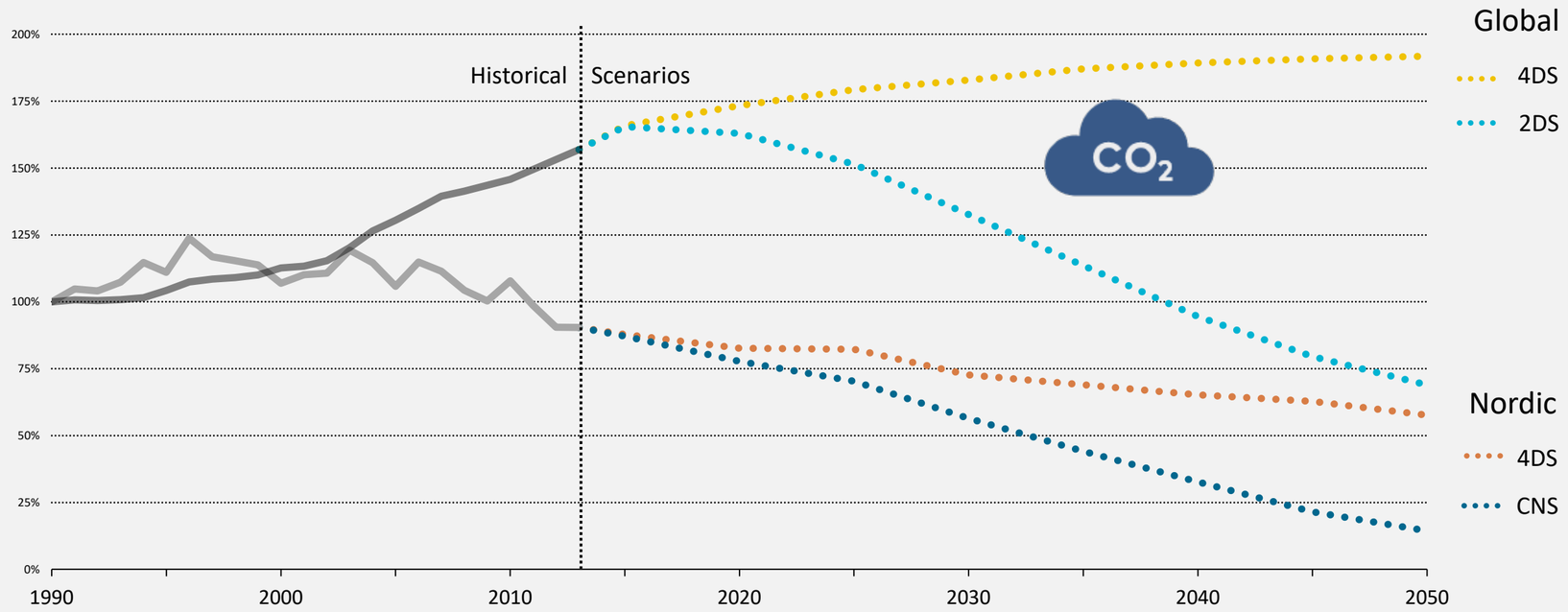
Tracking Nordic Clean Energy Progress

Kevin Johnsen
Senior Adviser, Nordic Energy Research

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)



The five Nordic countries have some of the most ambitious energy and climate policies in the world. Despite this, achieving the Paris Climate Agreement's vision of maintaining the global temperature rise "well below two degrees" will require radical change.

Nordic Energy Technology Perspectives 2016 (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).

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.

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.

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

ELECTRIFICATION OF TRANSPORT

ELECTRIFICATION OF HEAT

DECARBONISATION OF INDUSTRY

ENERGY EFFICIENT & SMART BUILDINGS

GREEN MOBILITY

ENERGY STORAGE & CCS

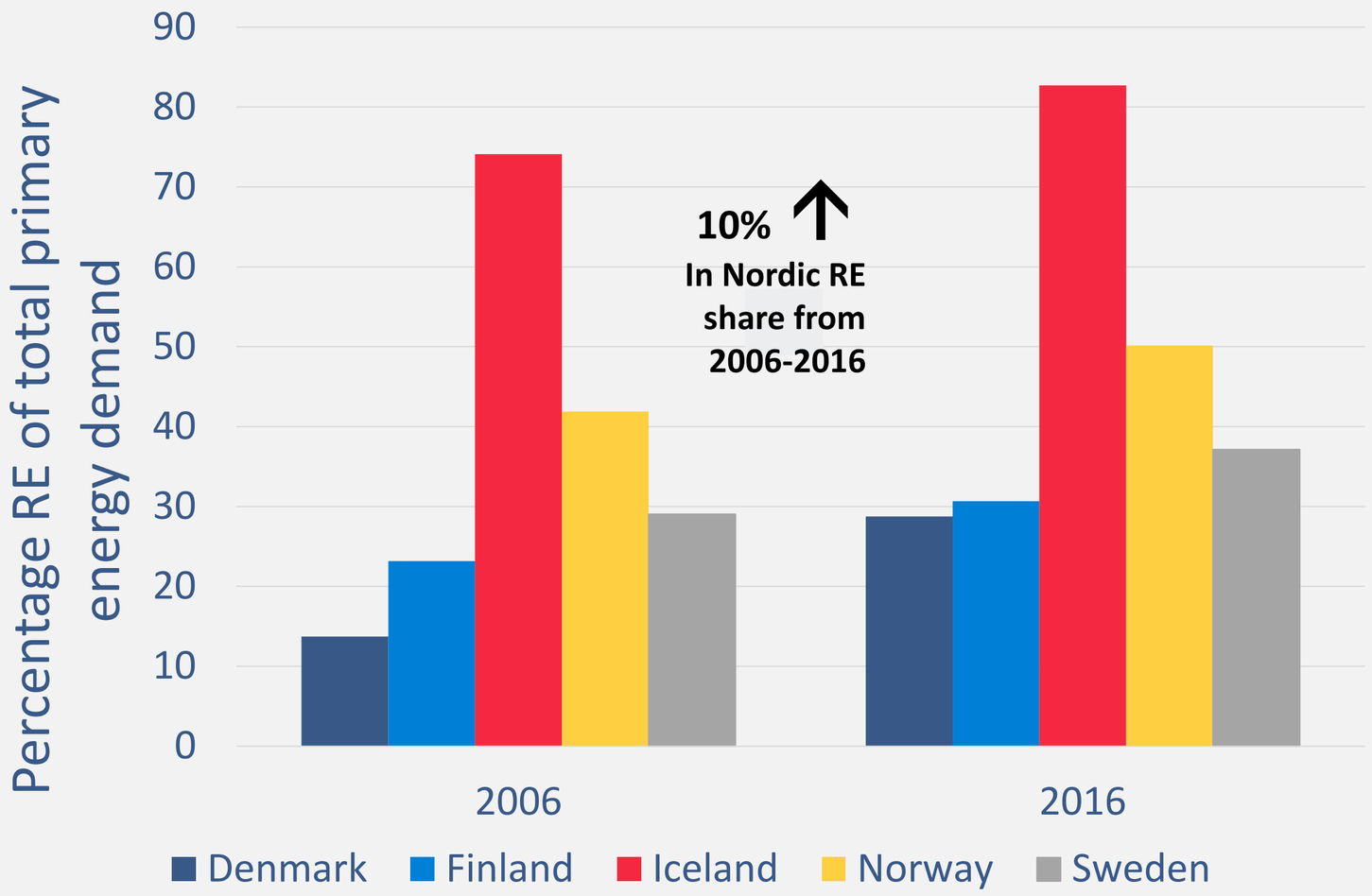
THE BIG PICTURE

Share of renewables has increased

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

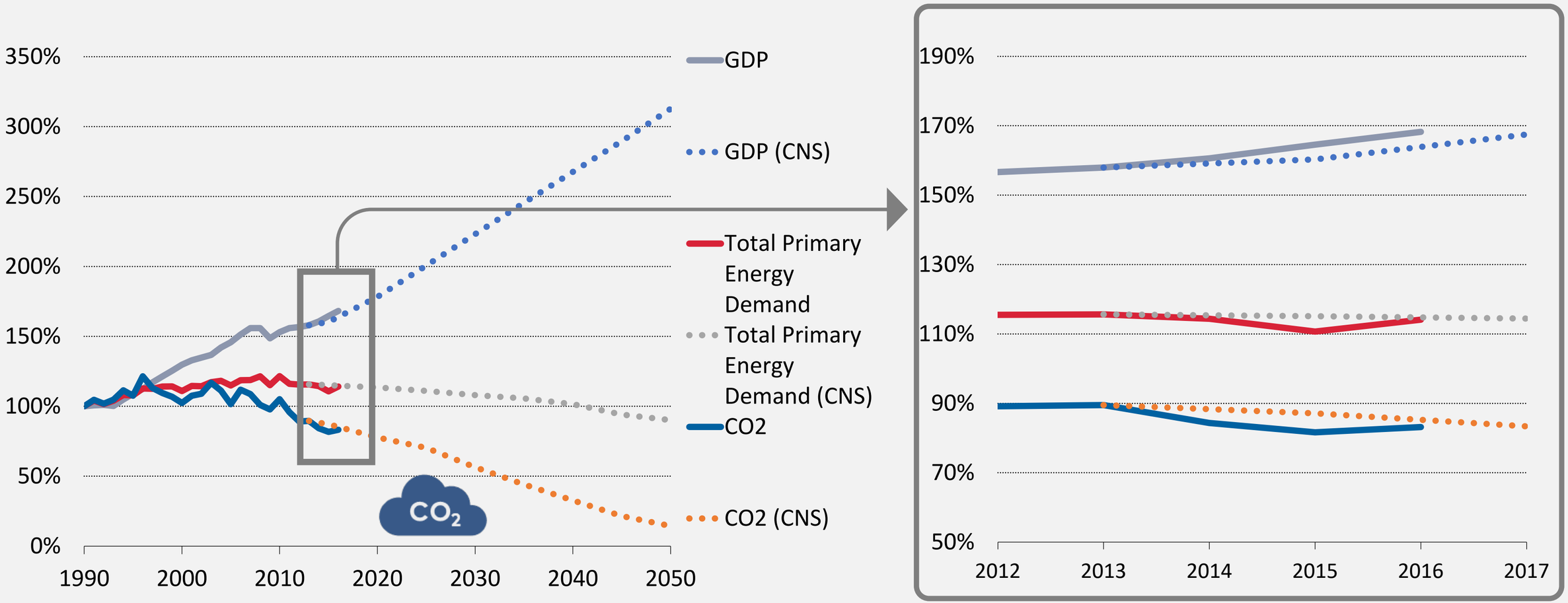
Compared to primary energy demand, the overall renewable share at Nordic level has risen from 29% in 2006 to 39% in 2016.

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



THE BIG PICTURE

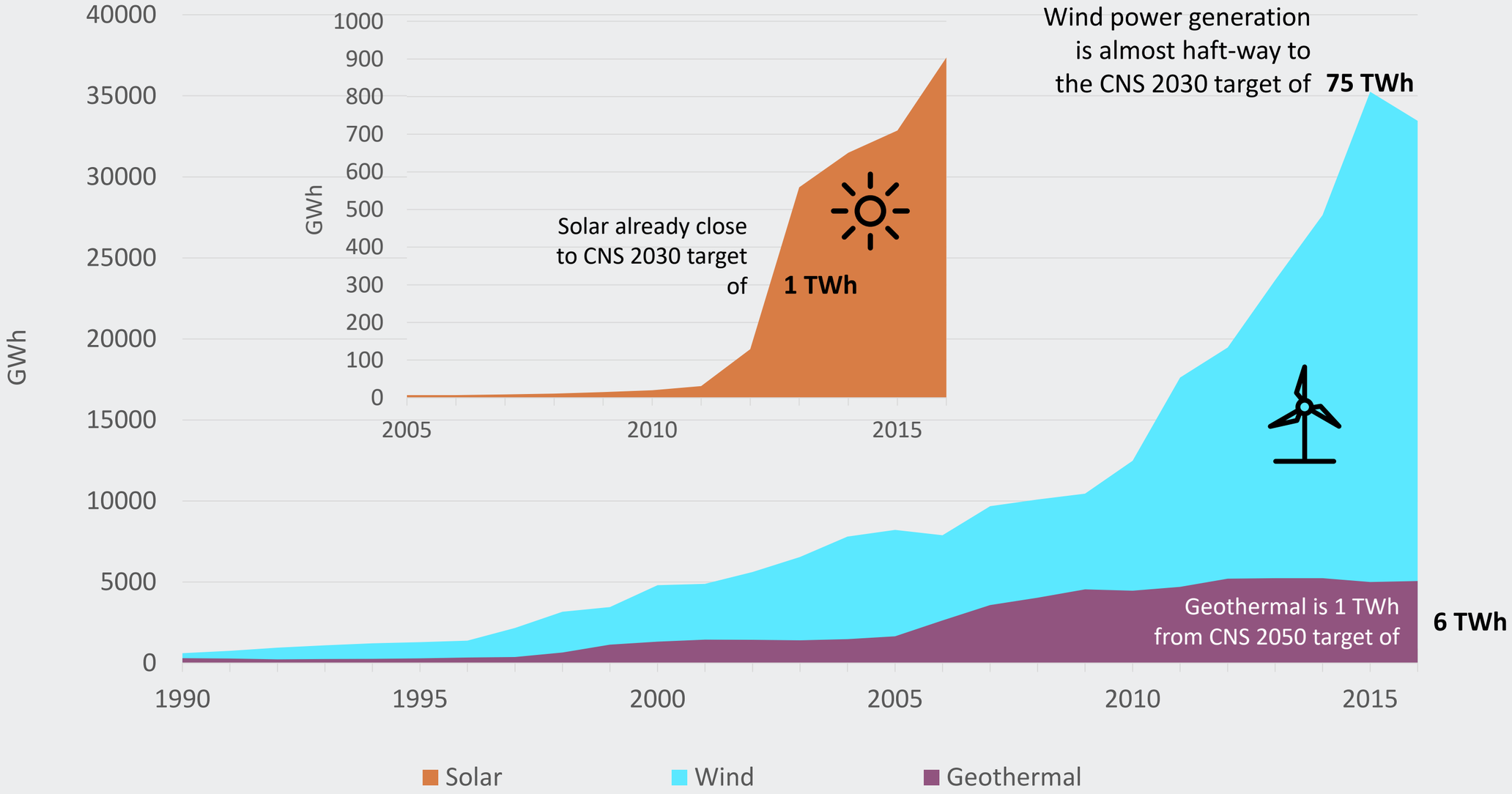
Current Progress



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

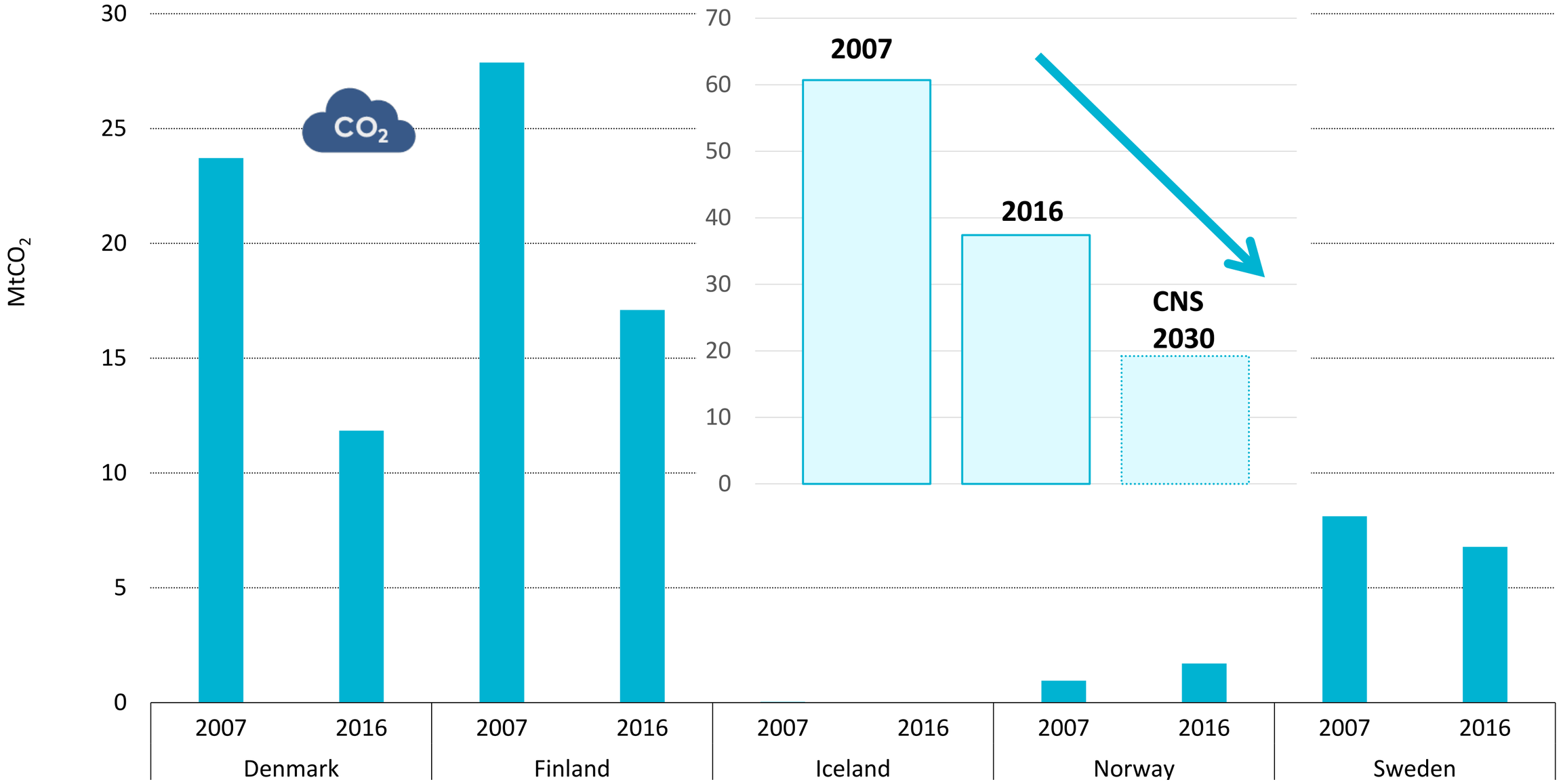
TRANSFORMING
THE POWER SECTOR

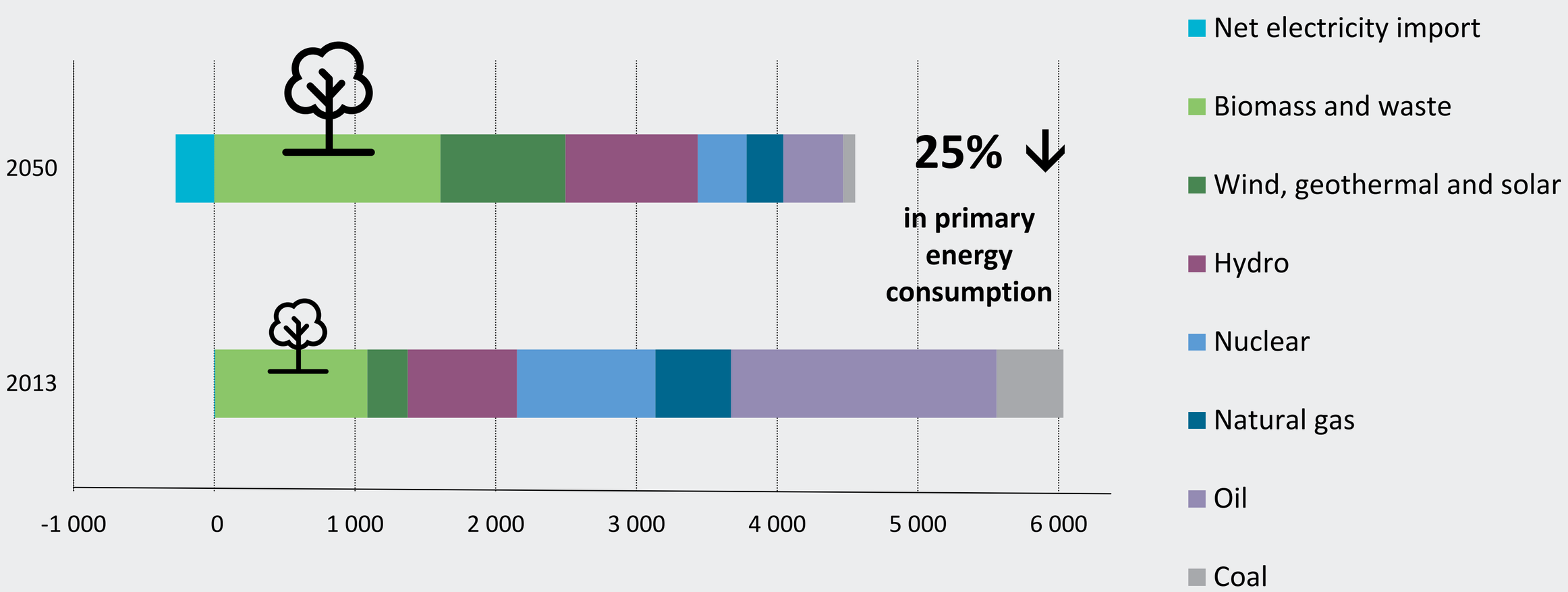
Nordic renewable electricity generation (excl. hydro)



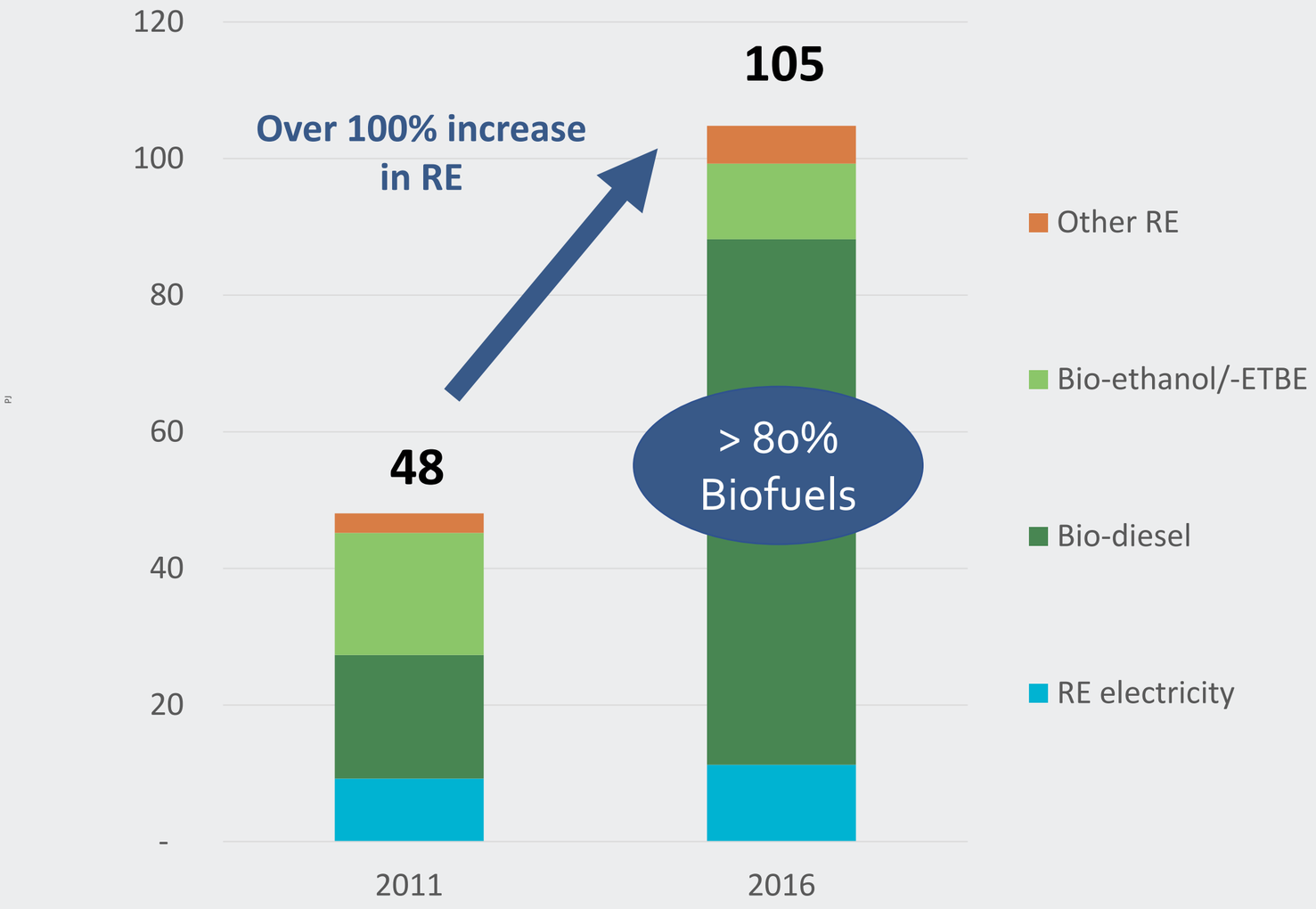
TRANSFORMING
THE POWER SECTOR

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





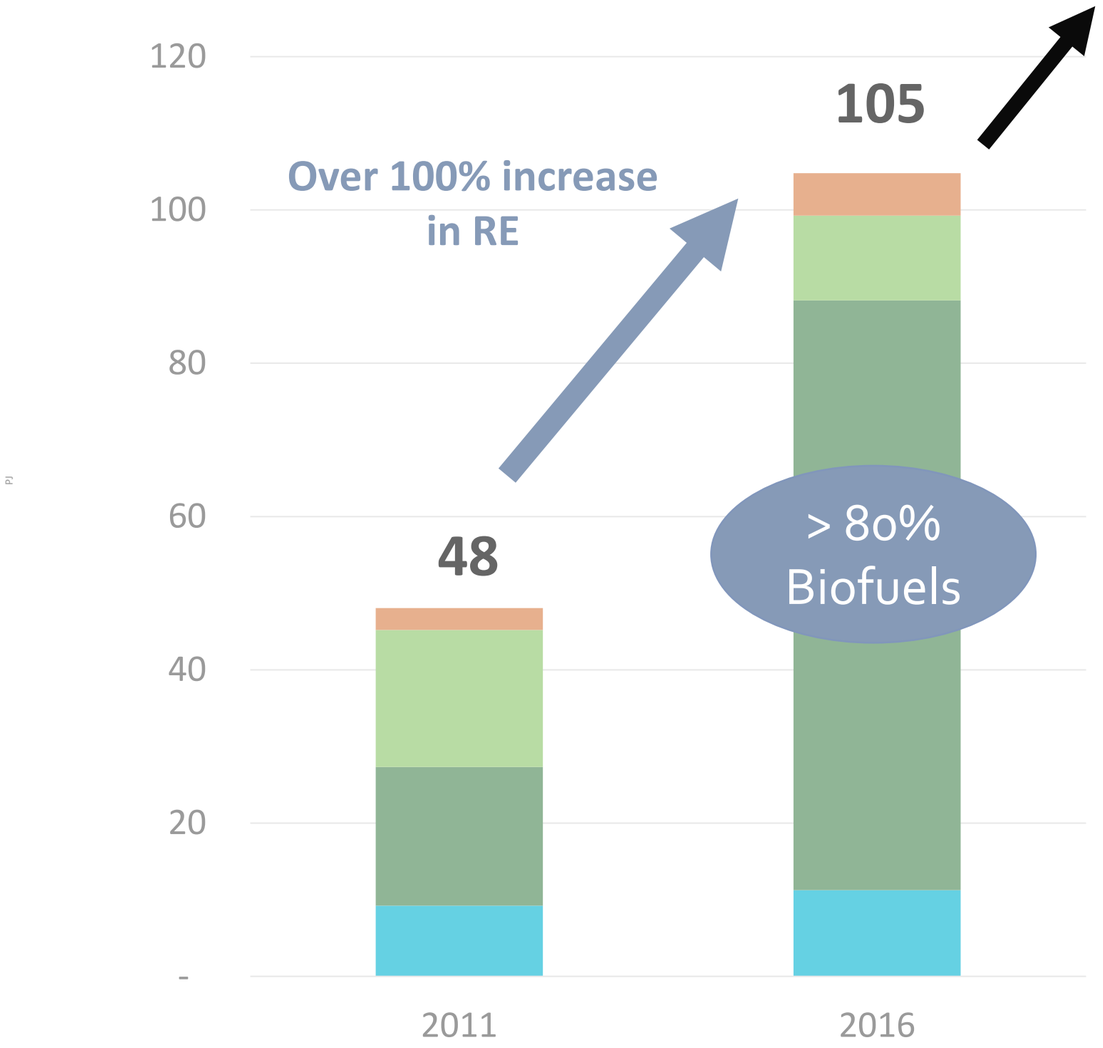
Bioenergy production is increasing and is expected to be the single largest energy carrier in 2050.



Renewable consumption in the transport sector (PJ)

Requirements for renewable fuels begin to bite in the Nordics.

BOOSTING BIOENERGY



Renewable consumption in the transport sector (PJ)

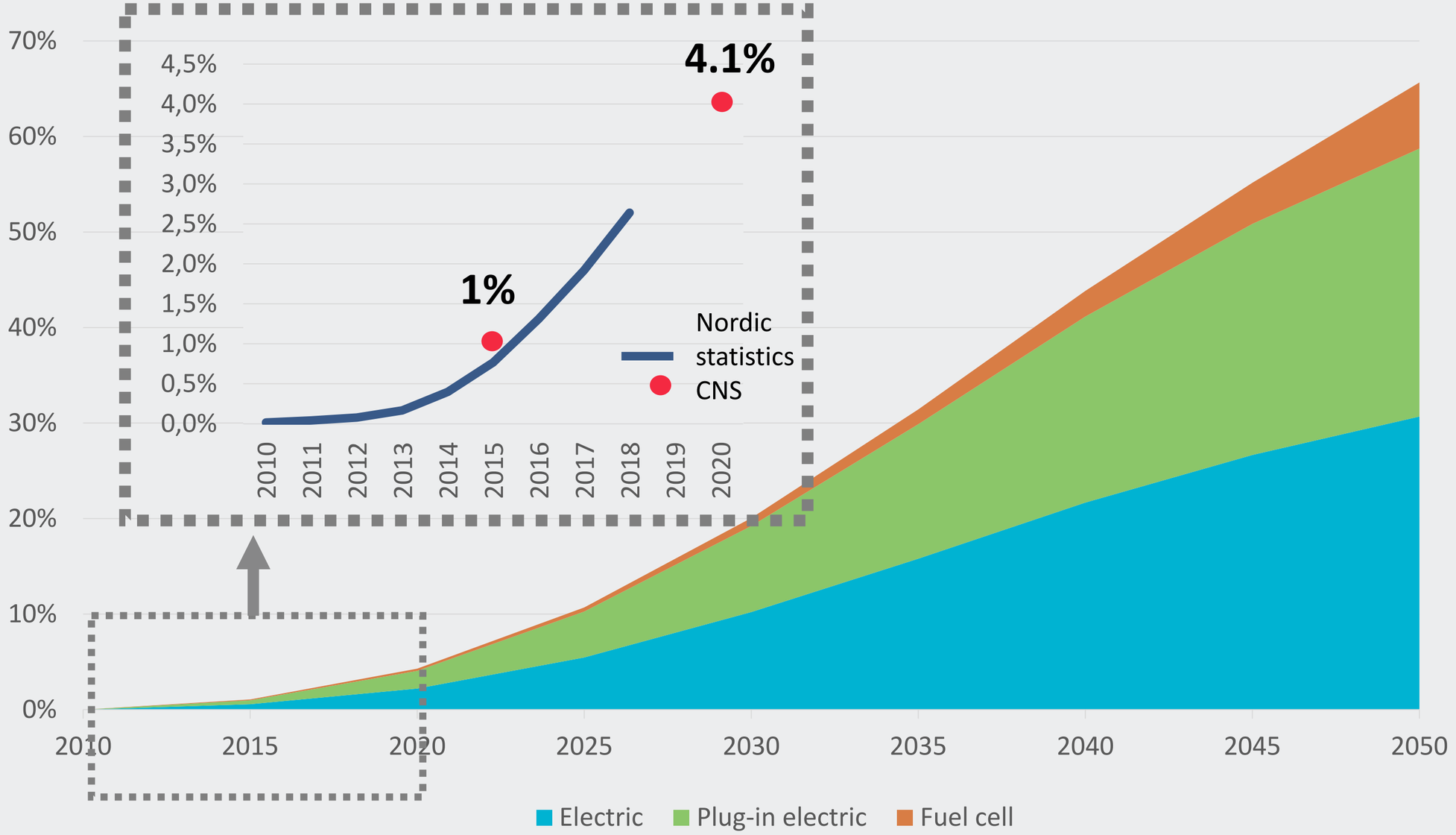
In 2050 the CNS expects biofuels for transport to reach 470 PJ

Requirements for renewable fuels begin to bite in the Nordics.

Securing sustainable production of biofuels is still a challenge.

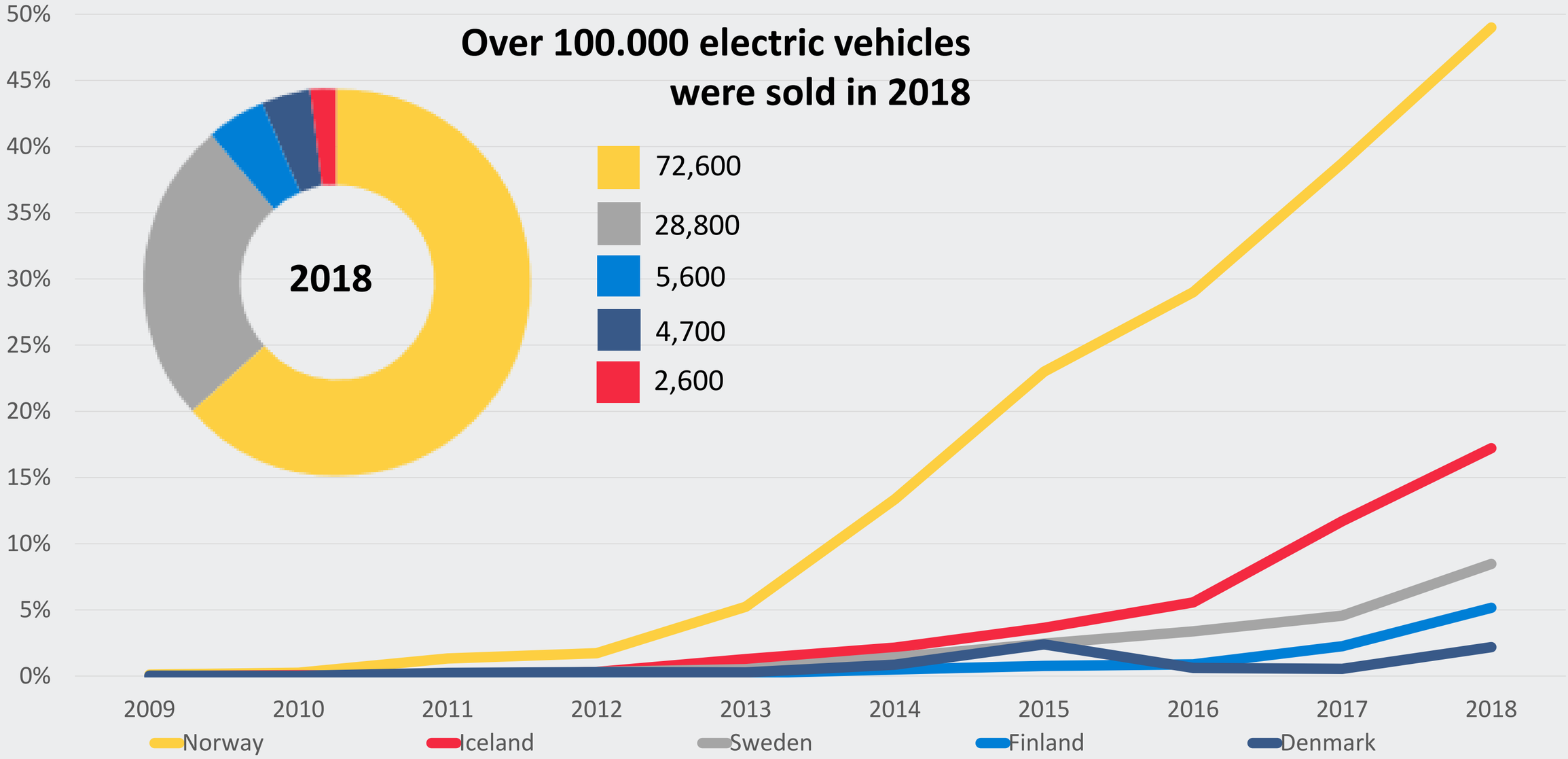
Share of electric vehicles in light-duty vehicle stock (CNS) and “zoom in” on the actual Nordic share from 2010-2018 in relation to CNS targets

Light-duty vehicles are on track



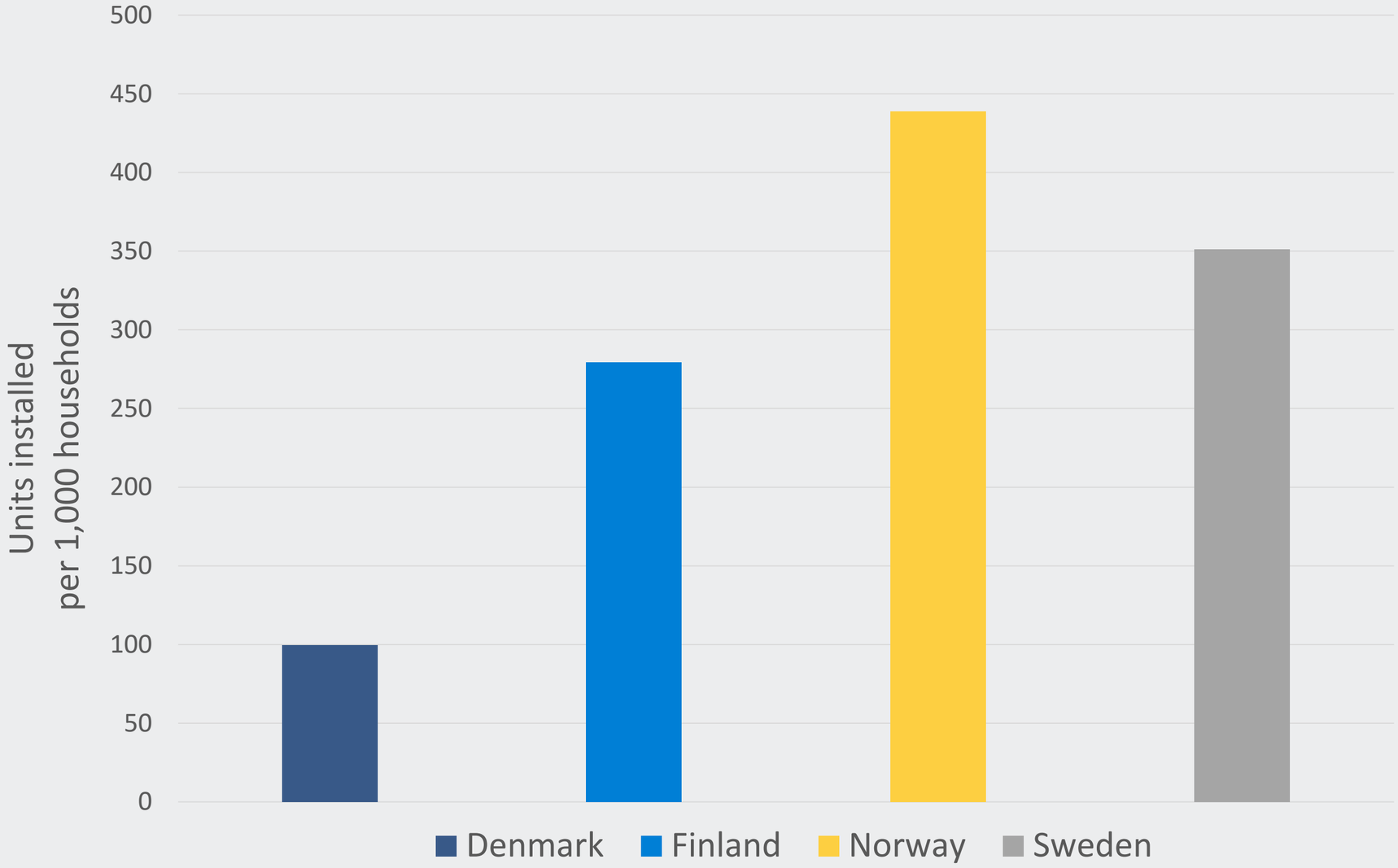
ELECTRIFICATION OF TRANSPORT

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



Number of heat pumps installed per 1,000 households in 2016

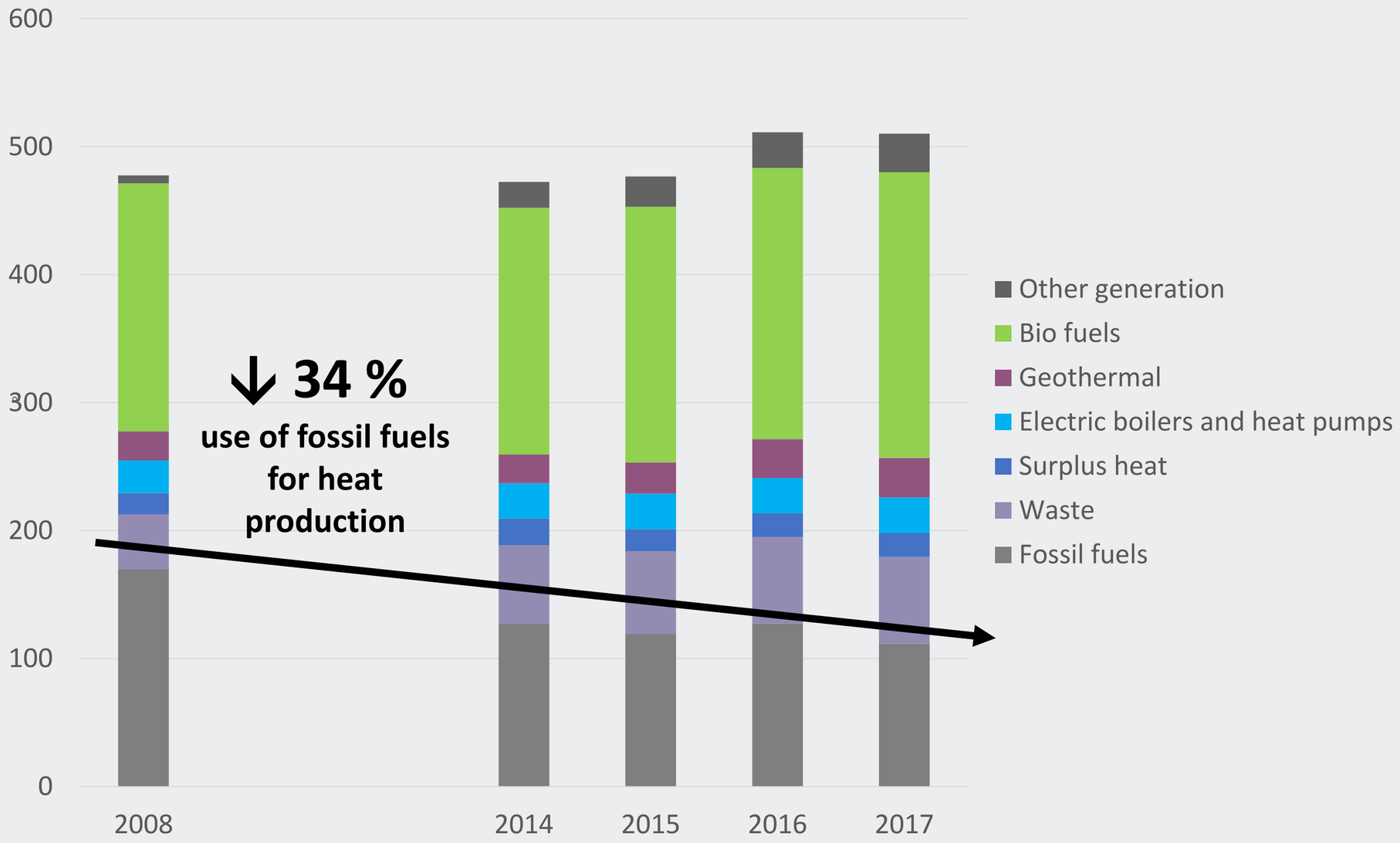
Heat pumps have largely replaced oil furnaces in Nordic households



ELECTRIFICATION
OF HEAT

Nordic district heat generation (PJ) by fuel

Steady decline in use of fossil fuels for heat production

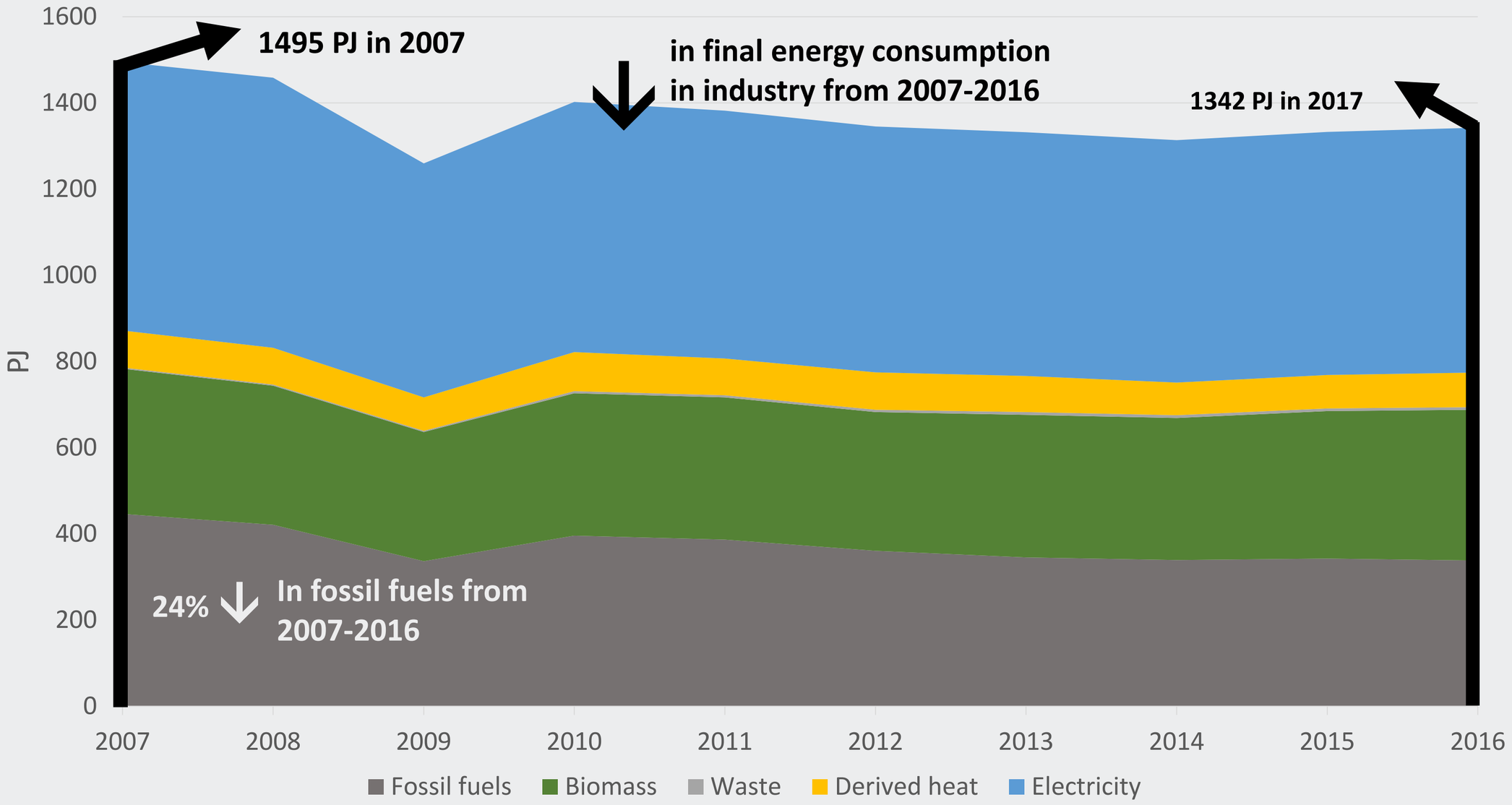


ELECTRIFICATION
OF HEAT

The St1 Otaniemi geothermal project will drill to a depth of around 6.5 kilometers to produce up to 40 MW of geothermal heat

DECARBONISATION
OF INDUSTRY

Final energy consumption (PJ) in industry



ENERGY EFFICIENT
& SMART BUILDINGS

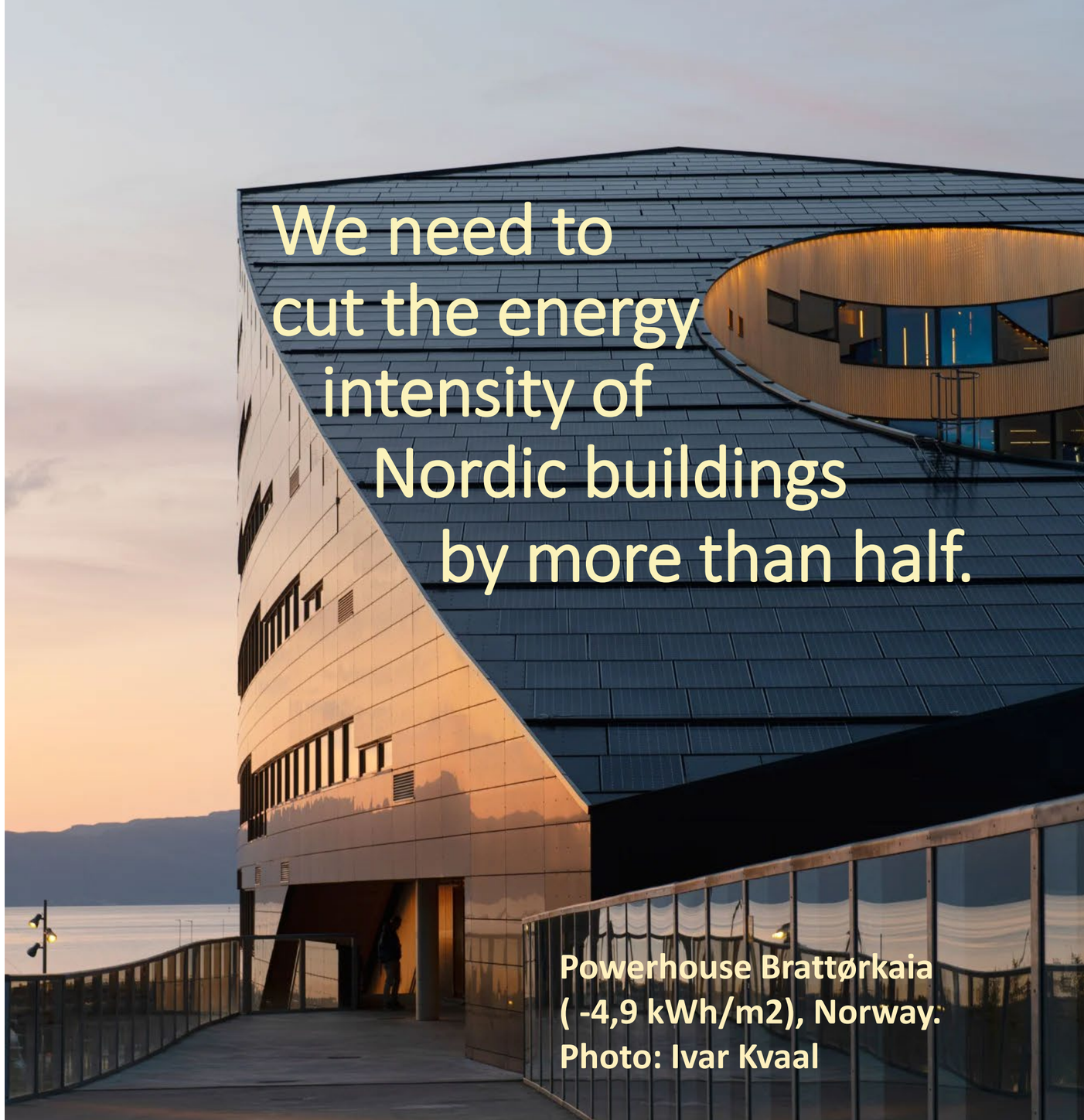
Average energy intensity in Nordic buildings

213

kWh/m^2 in **2016**

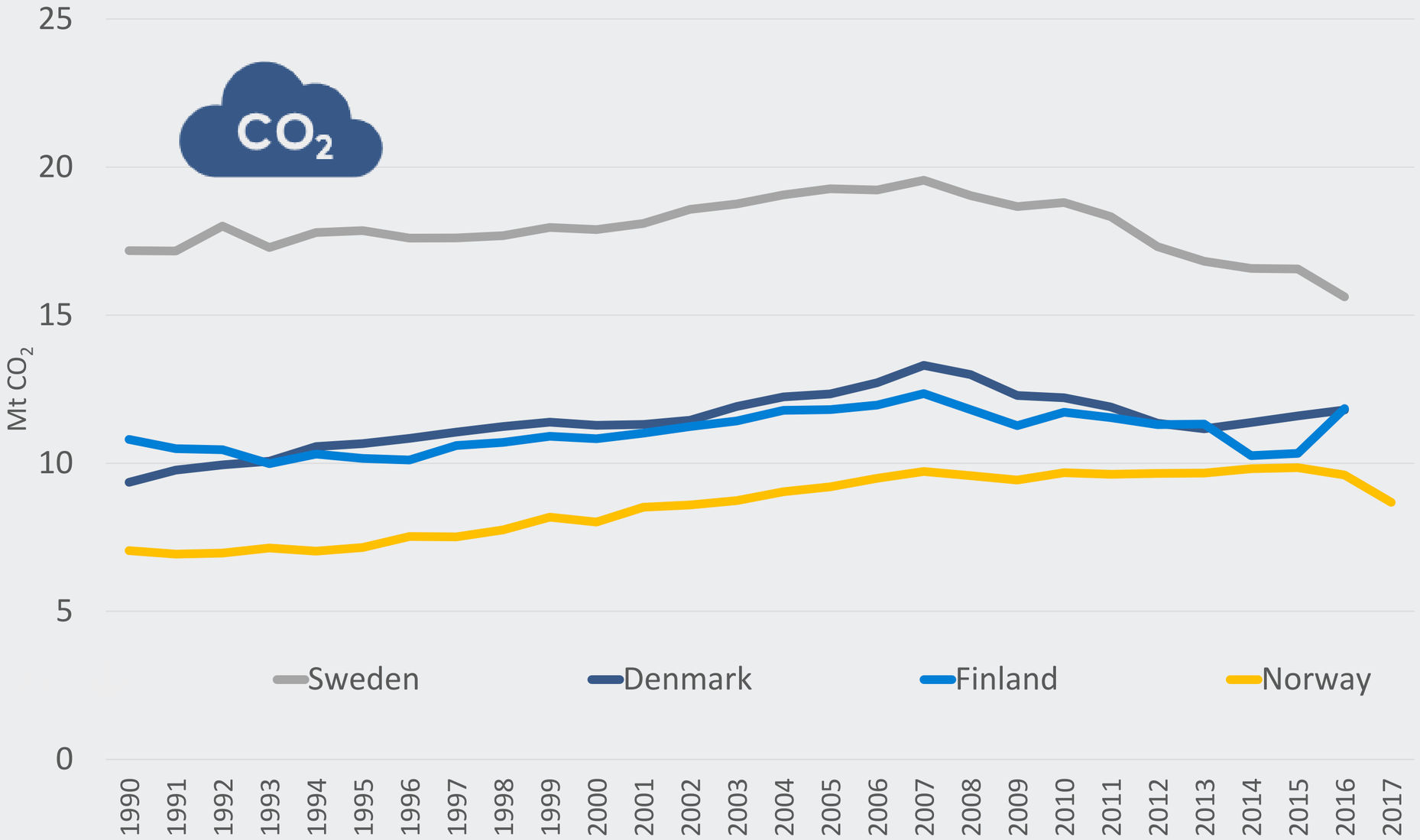
89

kWh/m^2 in **2050**



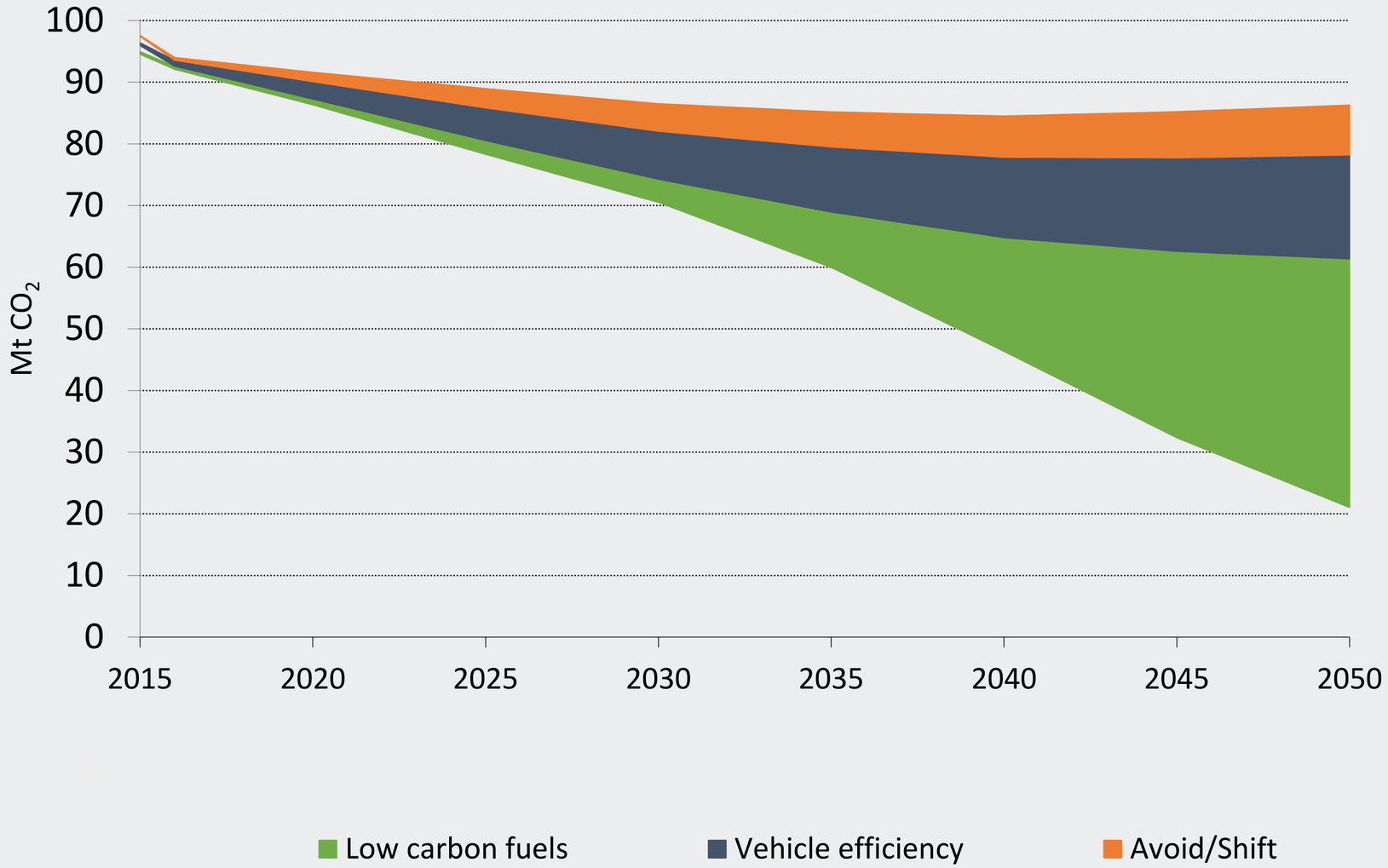
Powerhouse Brattørkaia (-4,9 kWh/m2), Norway. Photo: Ivar Kvaal

CO2 emissions (MtCO2) from road transport



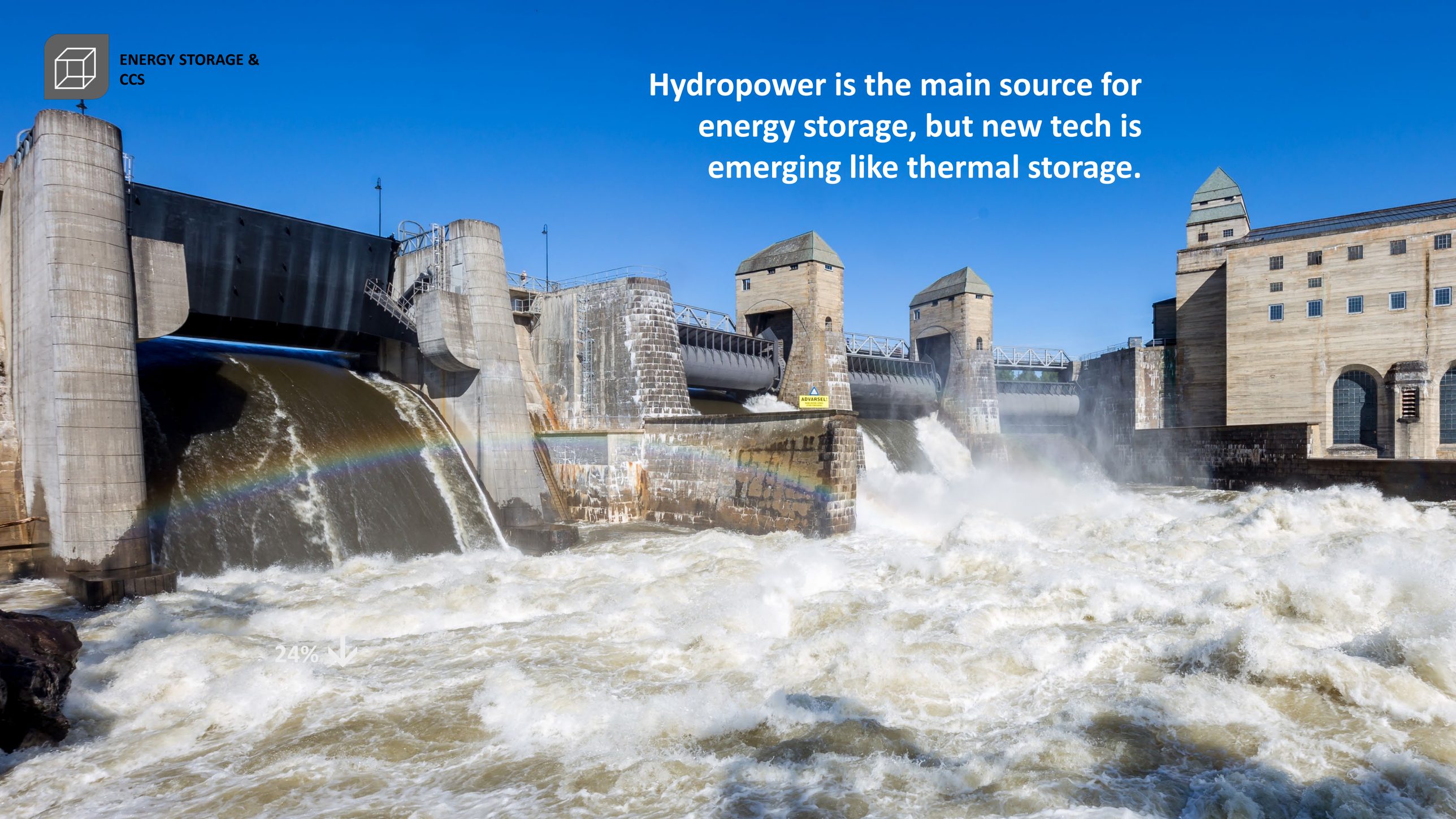
GREEN MOBILITY

Transport GHG emission reductions (MtCO2) in the CNS, by mode



ENERGY STORAGE & CCS

Hydropower is the main source for energy storage, but new tech is emerging like thermal storage.



24%

Carbon Capture and Storage in Industry

Total

20 Mt CO_2

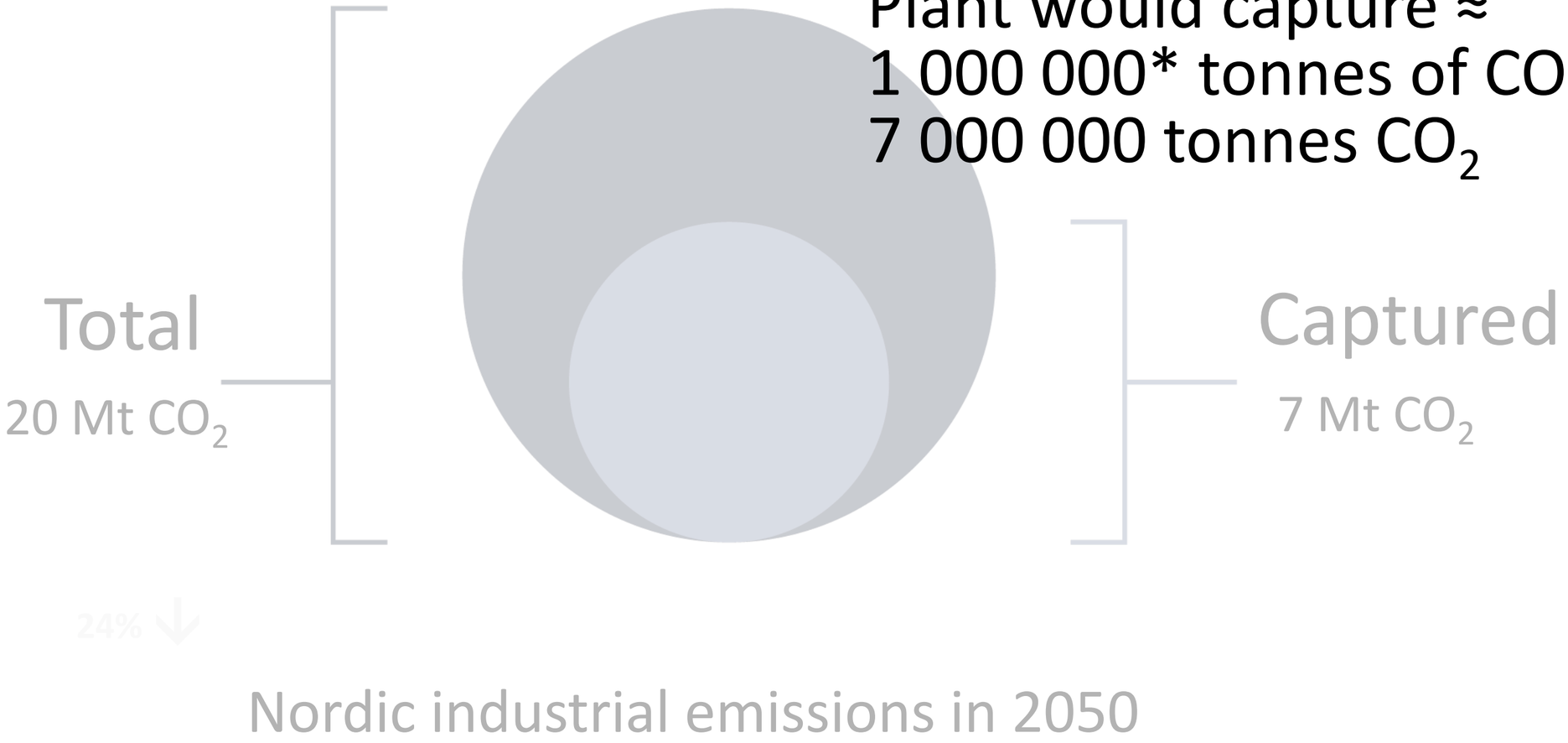
Captured

7 Mt CO_2

Nordic industrial emissions in 2050

Hanasaari Power Plant :

Capturing all CO2 at the Hanasaari Power Plant would capture ≈
1 000 000* tonnes of CO_2 of the necessary 7 000 000 tonnes CO_2



*Europe Beyond Coal: European Coal Plant Database, 17 Sep 2018 (Average 2005-2017)

Tracking Nordic Clean Energy Progress

Red – Not on track / Insufficient steps

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

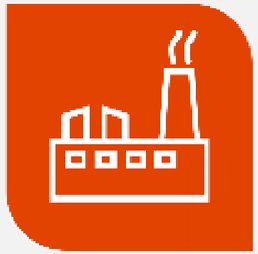
Green – On track / Sufficiently promising efforts and impact

THE BIG PICTURE

TRANSFORMING THE POWER SECTOR

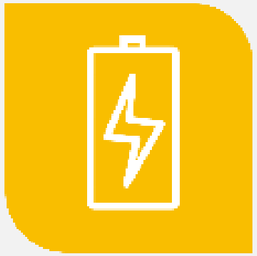
BOOSTING BIOENERGY

DECARBONISATION OF INDUSTRY



ENERGY EFFICIENT & SMART BUILDINGS

ELECTRIFICATION OF TRANSPORT



ELECTRIFICATION OF HEAT

GREEN MOBILITY

ENERGY STORAGE & CCS

Next Steps:

1. The Nordic countries have come far but need to go further

- Increased ambition needed in all sectors

2. Continue the power sector transformation

- Phase out coal as fast as possible, prepare for renewables

3. Policy must be used to speed up the green transition

- Many sectors await higher CO_2-prices and taxes

4. Prepare for emission reductions in the hard-to abate sectors

- Finance research, innovation and pilot-projects


Nordic Energy
Research
Progress towards Nordic Carbon Neutrality
Tracking Nordic Clean Energy Progress
Download
Kevin Johnsen
Senior Adviser, Nordic Energy Research

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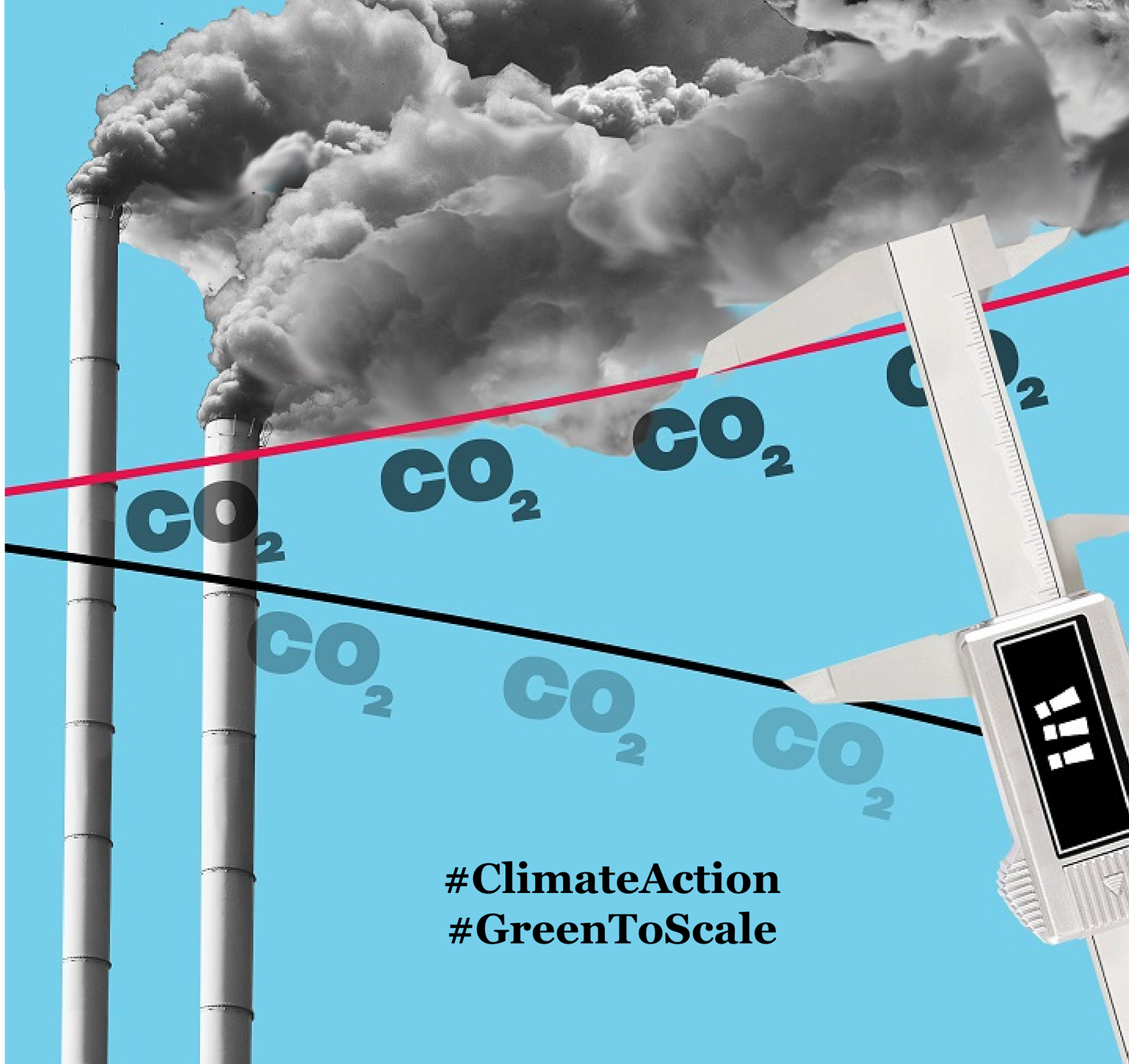


#GreentoScale

Nordic Green to Scale for Cities and Communities

26 November 2019

Oras Tynkkynen & Mariko Landström
Finnish Innovation Fund Sitra

Who is behind Nordic Green to Scale

- Project run by the Finnish Innovation Fund Sitra
- Partners include University of Iceland (IS), CICERO (NO), CONCITO (DK), Stockholm Environment Institute (SE) and C40 Cities
- Funding kindly provided by the Nordic Council of Ministers (NCM)
- Nordic Green to Scale included in the Nordic Prime Ministers' Initiative Nordic Solutions to Global Challenges

#GreentoScale

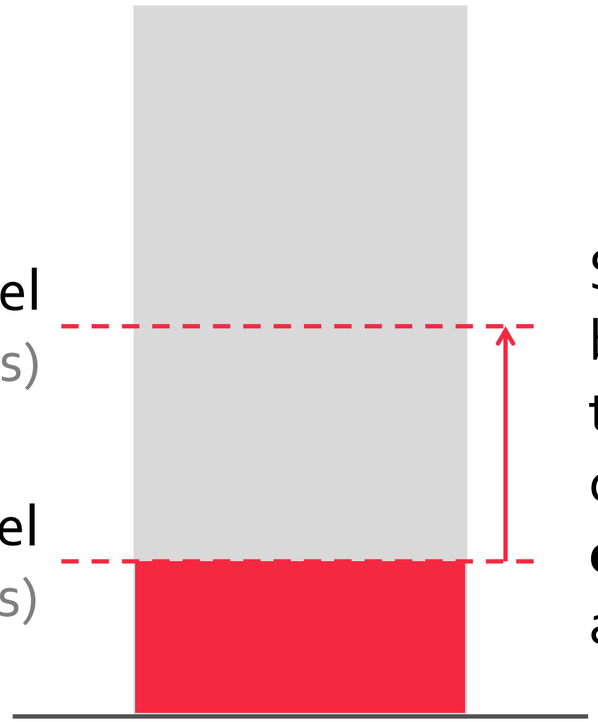
Green to Scale: how far can we go with what we already have?

#nordicsolutions
to global challenges

How does scaling up work?

Benchmark implementation level
(e.g. Oslo's 12% EVs)

Baseline implementation level
(e.g. Finnish average 0.1% EVs)



Total possible implementation pool
(e.g. Finnish car fleet)

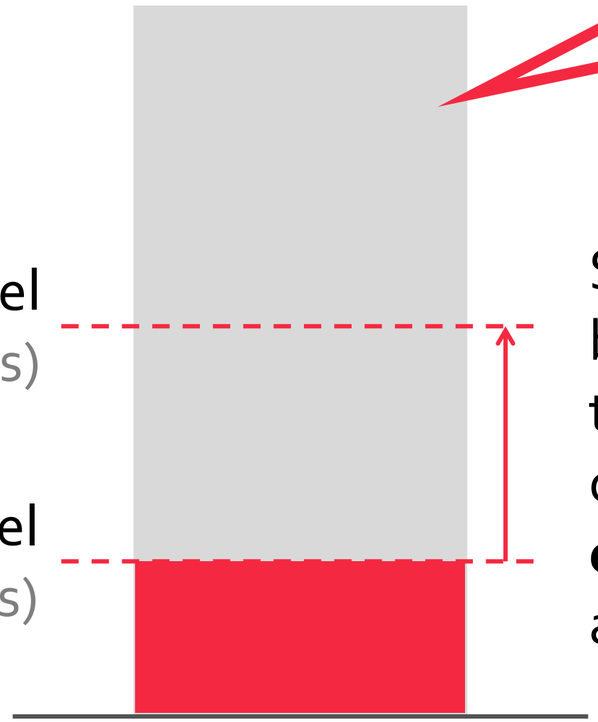
Scaling the implementation to benchmark level replaces current technologies (e.g. gasoline cars) and causes an **emissions effect** and a **cost effect**, which determine unit abatement cost

How does scaling up work?

The result does not indicate the full potential of the solution!

Benchmark implementation level
(e.g. Oslo's 12% EVs)

Baseline implementation level
(e.g. Finnish average 0.1% EVs)



Scaling the implementation to benchmark level replaces current technologies (e.g. gasoline cars) and causes an **emissions effect** and a **cost effect**, which determine unit abatement cost

Total possible implementation pool
(e.g. Finnish car fleet)

Exciting results in three studies

- **Global Green to Scale** in 2015 in the run-up to the Paris conference
- Covered 17 solutions from both the global North and the South
- Emission reduction potential about a quarter of today's global emissions

- **Nordic Green to Scale** in 2016
- Analysed the potential of scaling up 15 Nordic climate solutions
- Emission reduction potential equal to the current emissions of the EU

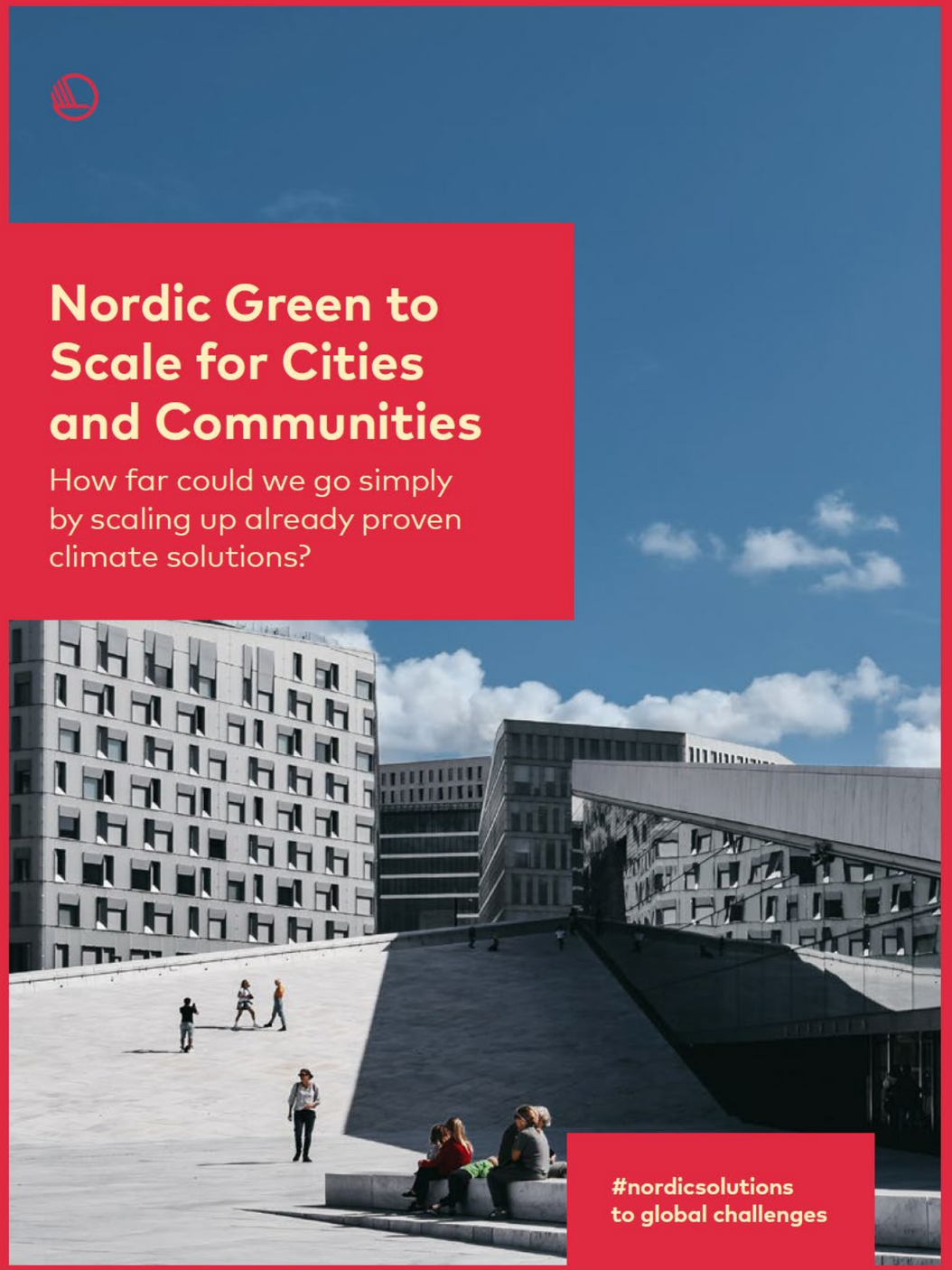
- **Nordic Green to Scale for Countries** in 2018
- Looked again at Nordic solutions, focusing on scalability in five European and two African countries

#nordicsolutions to global challenges

Released today:

Nordic Green to Scale for Cities and Communities

How far could ***Nordic cities and communities*** *go by scaling up proven Nordic climate solutions?*



Cities can be game changers and drivers of ambitious climate action.

#nordicsolutions to global challenges

14 solutions analysed

Energy

1. Onshore wind – Ringkøbing, DK
2. Offshore wind – Copenhagen, DK
3. District heating from waste water – Turku, FI
4. District heating from sea water – Drammen, NO
5. Solar district heating – Marstal, DK
6. District heating from data centre waste heat – Mäntsälä, FI
7. Geothermal district heating – Reykjavík, IS

Buildings

8. Ground source heat pumps – Stockholm, SE

Transport

9. Public transport in urban areas – Helsinki, FI
10. Electric vehicles – Oslo, NO
11. Cycling in urban areas – Copenhagen, DK
12. Electric ferries – Sognefjord, NO

Food and waste

13. Biogas from food waste – Oslo, NO
14. Reduction of retail food waste – Vantaa, FI

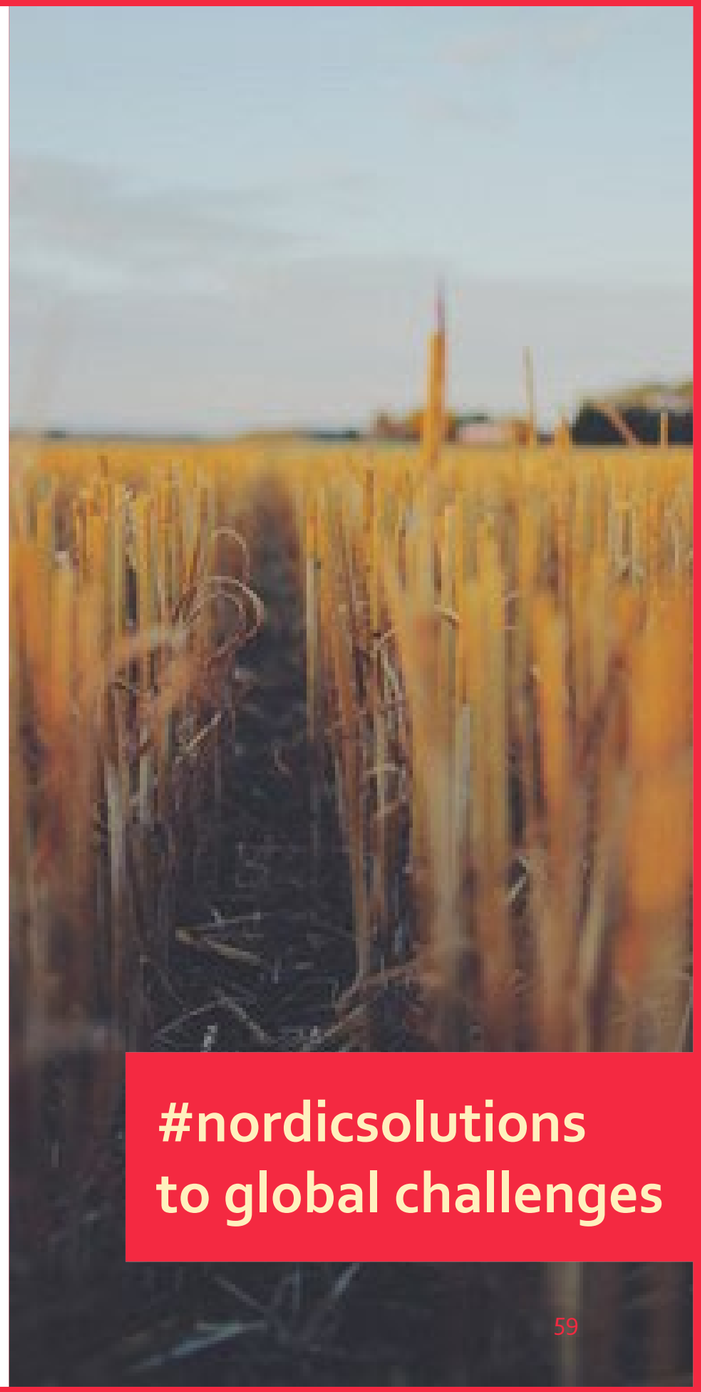
But there is more emerging

Energy
- Two-way district heating – Turku, FI
- System integration in EnergyLab Nordhavn – Copenhagen, DK
- Carbon capture and storage in rock – Reykjavík, IS

Buildings
- Renovations of old buildings to plus-energy houses – Sandvika, NO
- Wood construction – Växjö, SE
- Semi-deep geothermal heat for buildings – Espoo, FI

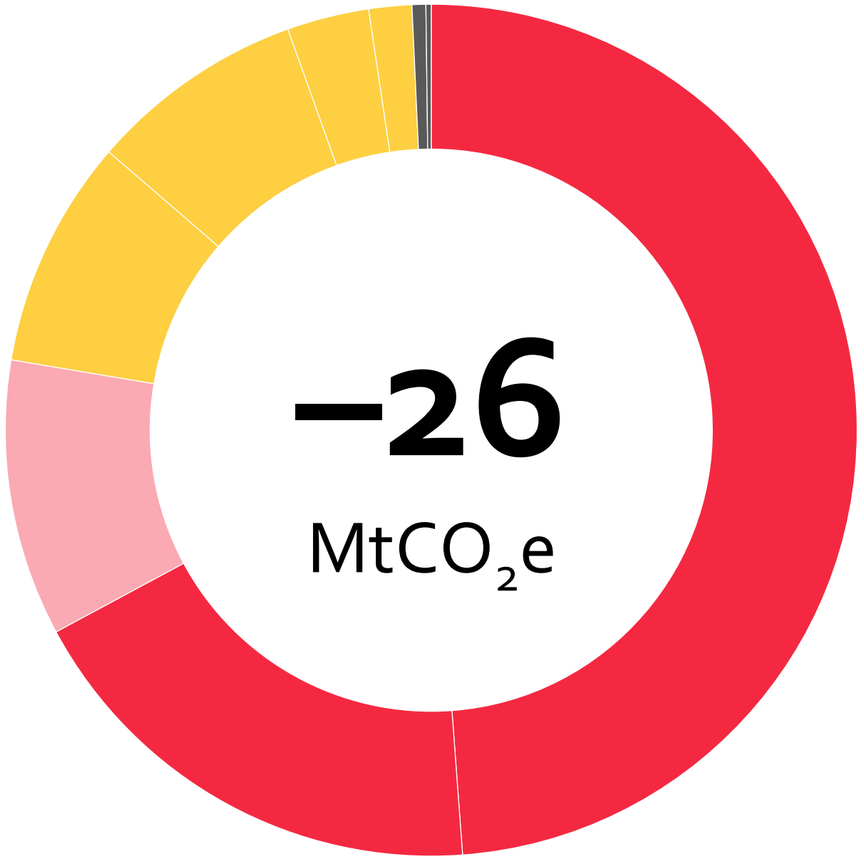
Transport
- Renewable methanol – Grindavík, IS
- Mobility as a service – Helsinki, FI
- Shared electric cars – Aarhus, DK
- Electric buses – Reykjavík, IS

Food and waste
- Reduction of city meat and dairy consumption by 50% – Helsinki, FI
- Biochar – Stockholm, SE
- Increased reuse and efficient waste sorting for recycling – Eskilstuna, SE




#GreentoScale
Results
#nordicsolutions
to global challenges

Significant emissions reduction if other Nordic communities adopt the 14 solutions

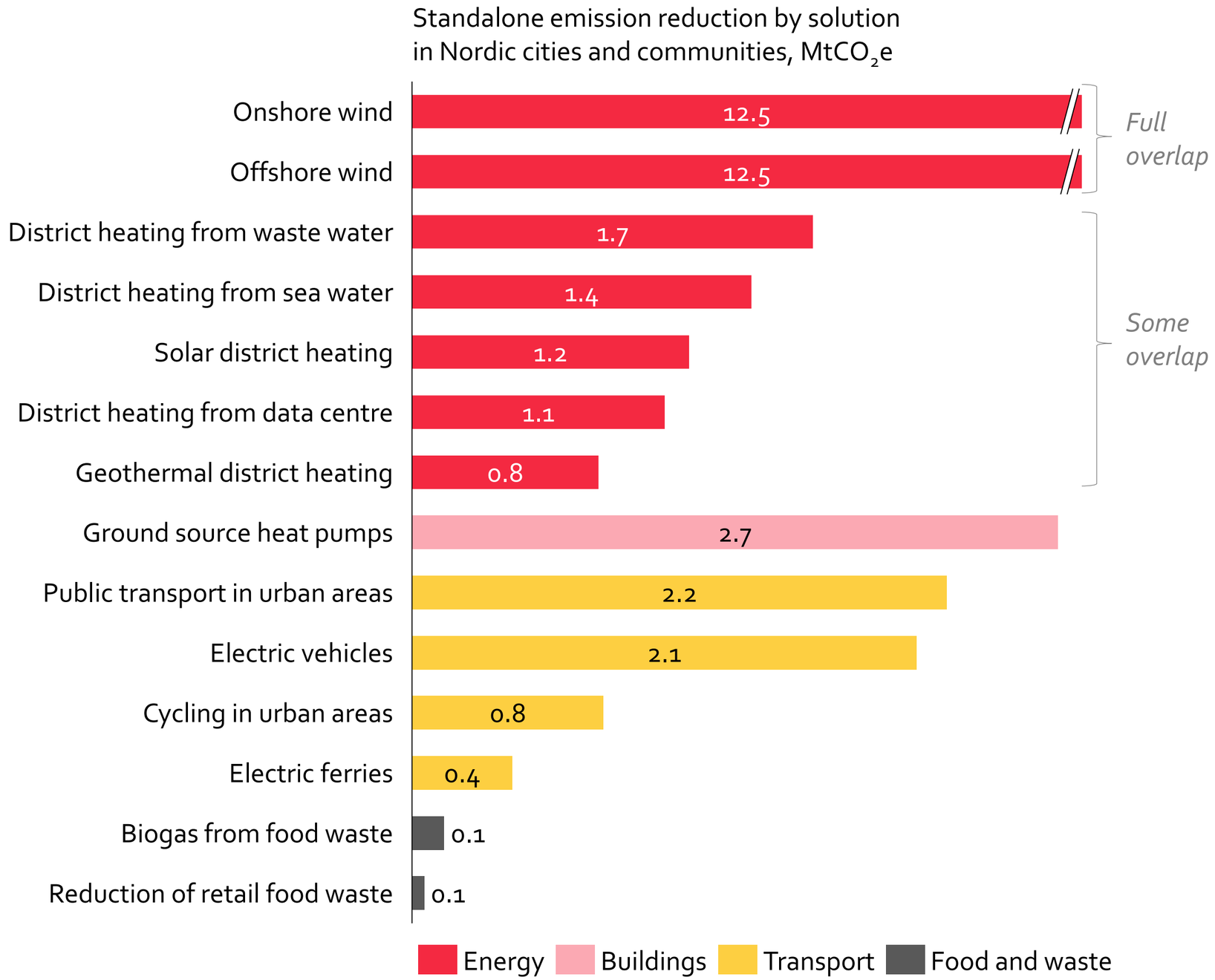


- Energy
- Buildings
- Transport
- Food and waste

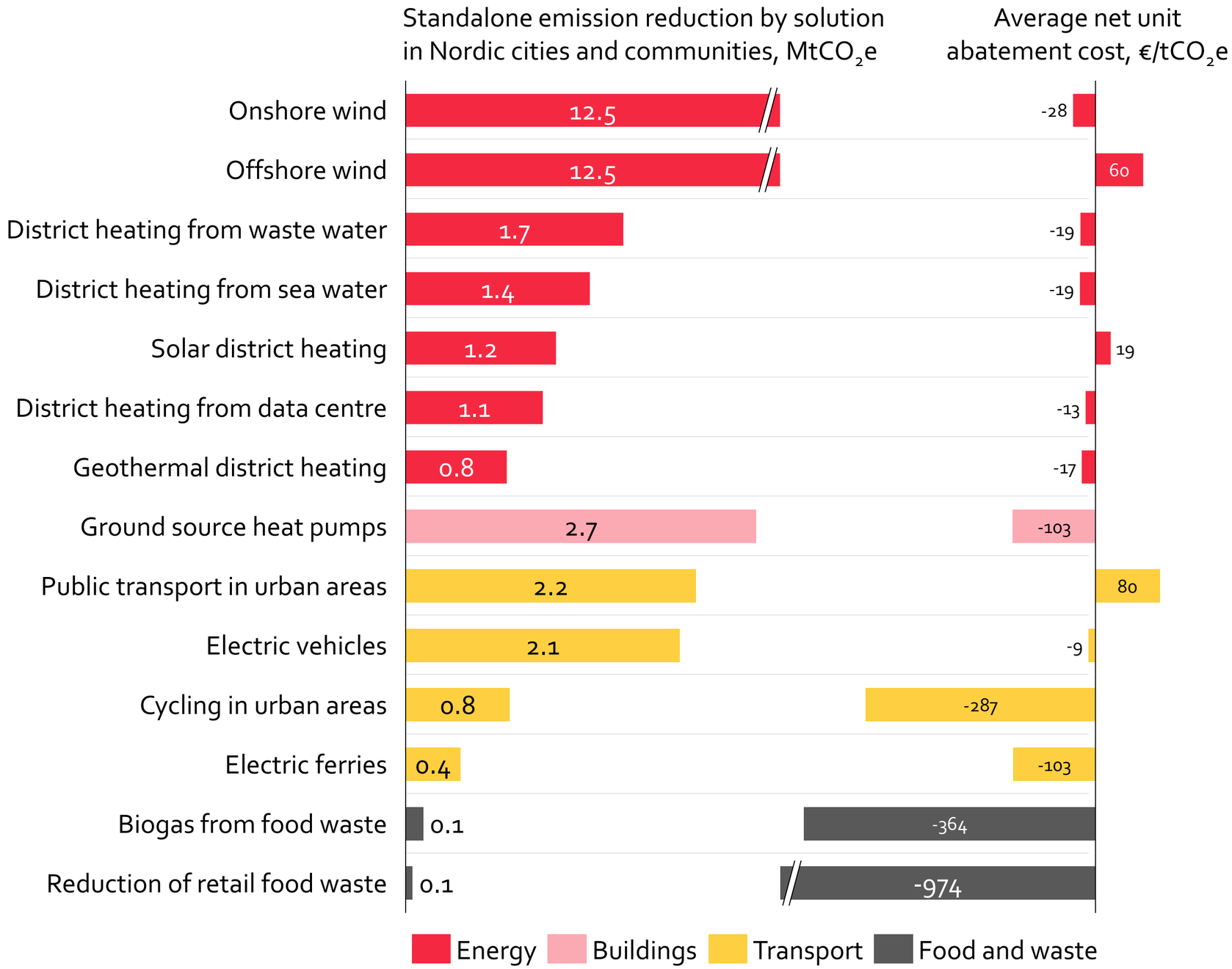
#nordicsolutions to global challenges

Annual emission reduction in Nordic cities and communities when overlap of solutions is accounted for, but synergies are not.

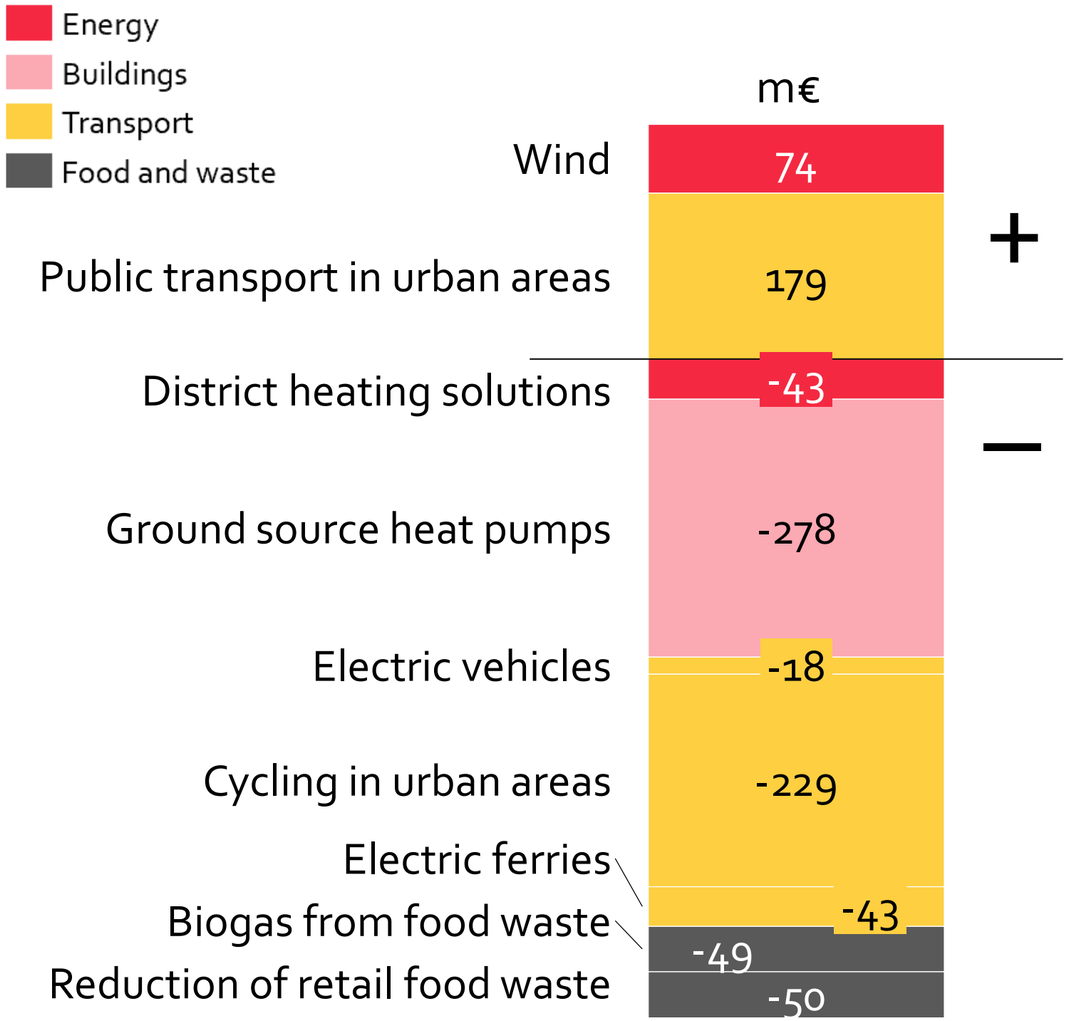
Many solutions have a large climate impact



On average, solutions are affordable compared to current technologies



Overall net savings to communities



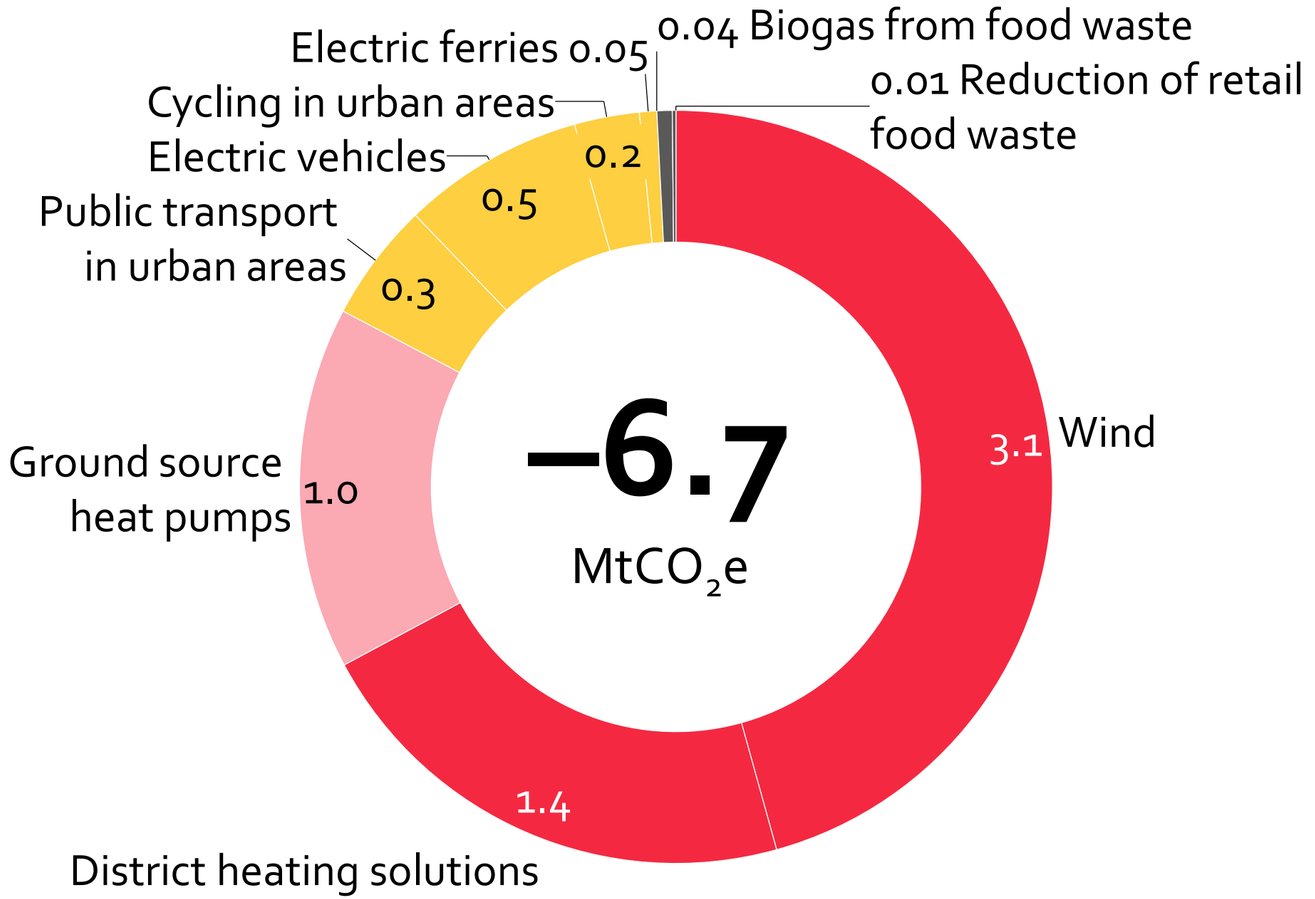
In total

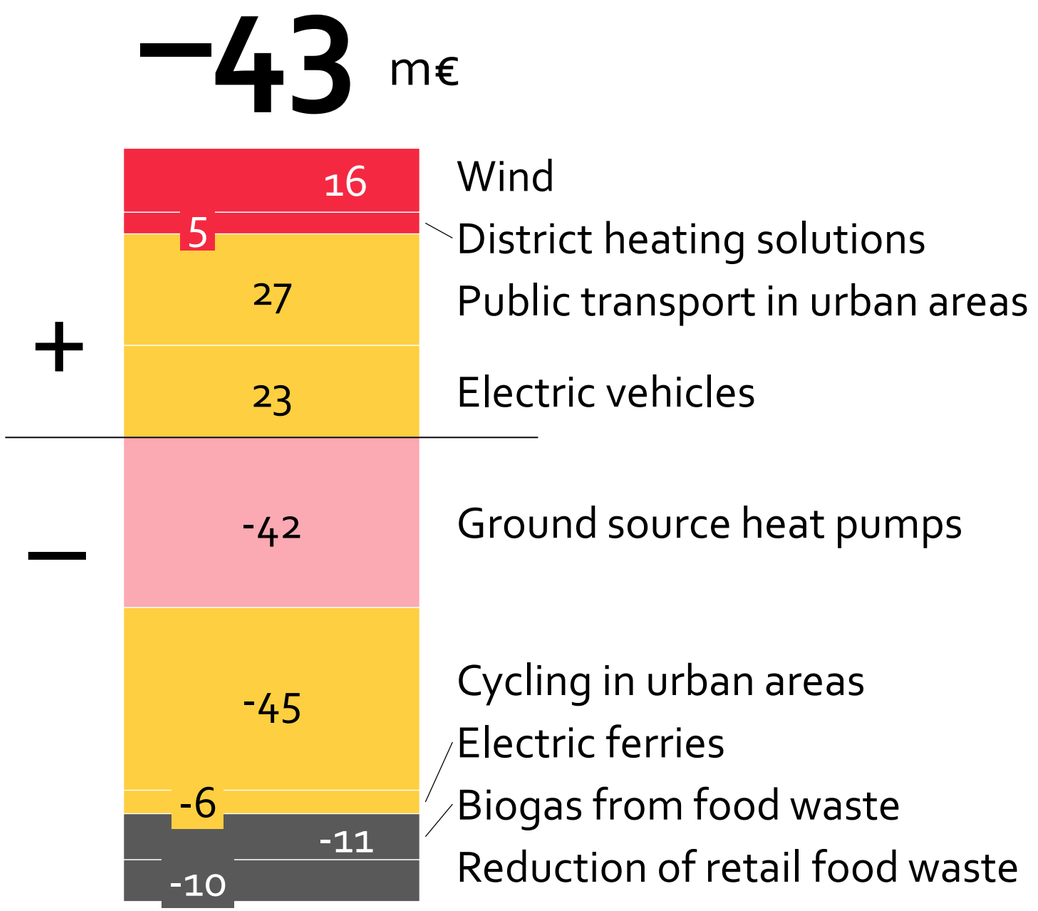
−460 m€

#nordicsolutions to global challenges

Annual net costs in Nordic cities and communities when overlap of solutions is accounted for.

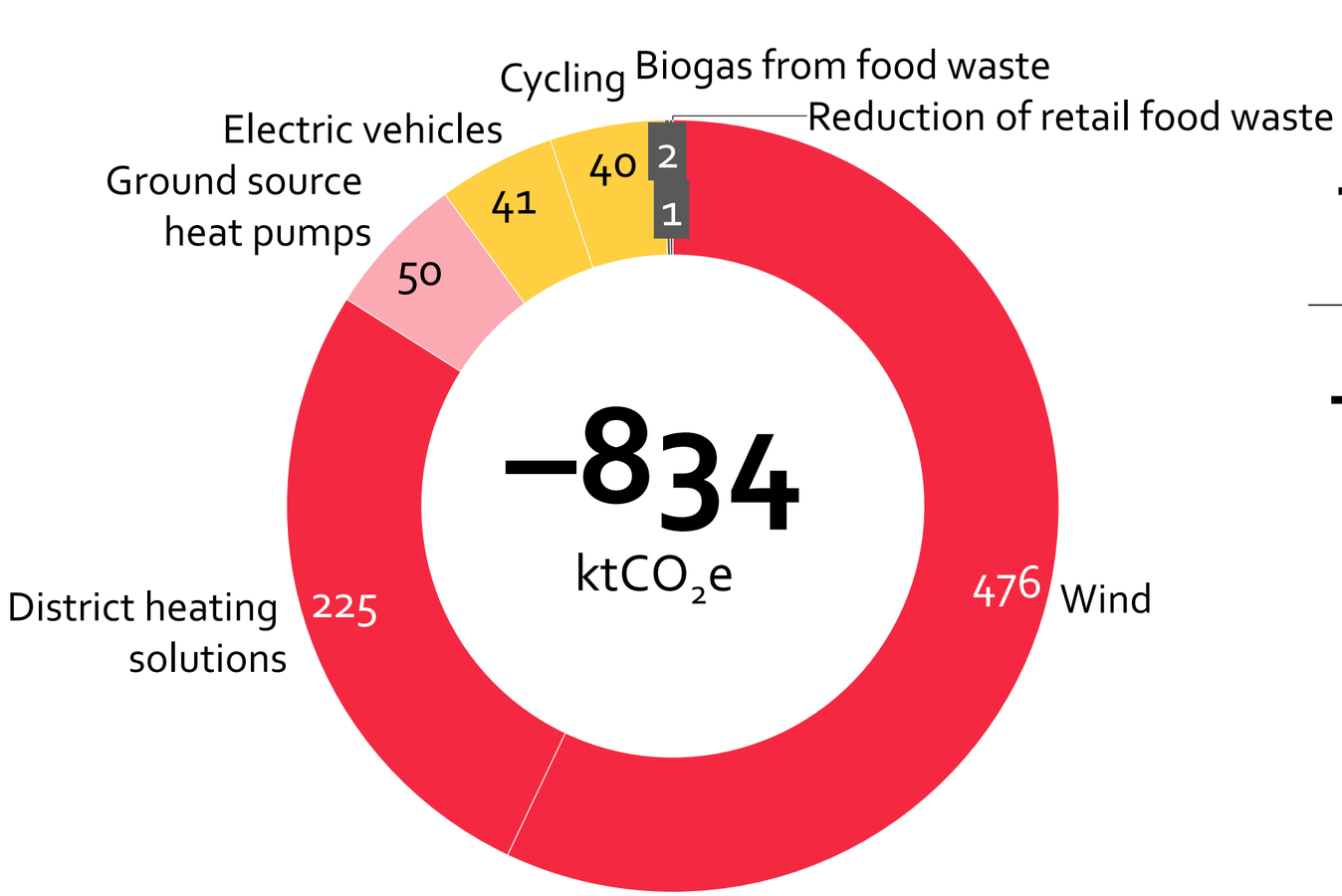
Reductions in Finland equal to 12% of current emissions

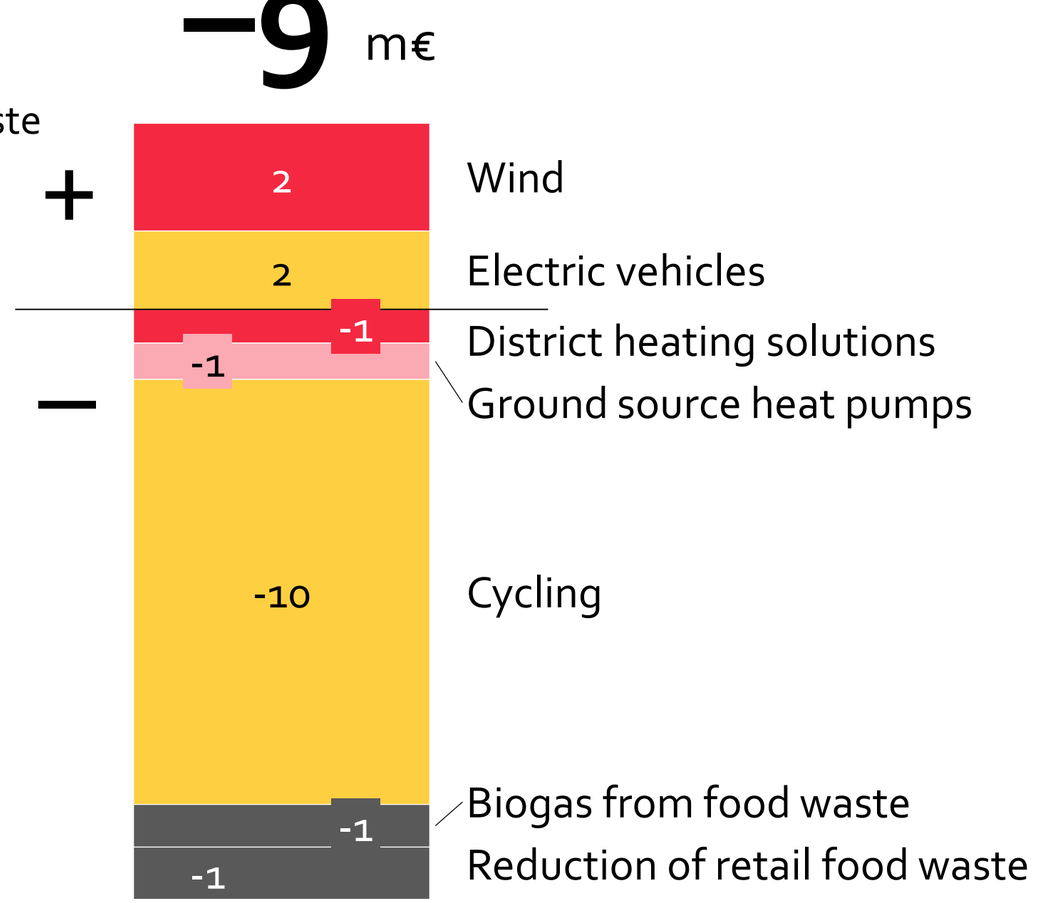




Energy Buildings Transport Food and waste

Reductions in Helsinki equal to 33% of current emissions





Energy Buildings Transport Food and waste

Learnings for Finland

Compared to other Nordic countries, Finland has…

- lower taxes on fossil fuels in heating and transport, which makes switching to new solutions more expensive for the users. Finland has by far the most fossil and peat power and heat production, oil heating and fossil passenger cars left
- a high electricity tax for heat pumps, which eats profitability
- small incentives for EVs

Learnings from Finland

Compared to other Nordic countries, Finland has…

- well available data!
- high use of public transport in urban areas
- high separate collection rate of biowaste

#nordicsolutions to global challenges

Local policy plays a key role in success

Recommendations based on successful cases

1

Set a good framework

- Emission targets and budgets
- Sector-specific strategies and roadmaps
- Mechanisms to monitor progress
- Dialogue with stakeholders and citizens, involve in decision making
- Collect and publish data

2

Harness your tools

- Spatial planning
- Financial incentives
- Public procurement - use the municipality as a testbed for climate solutions
- Municipality-owned companies
- Cooperation with other municipalities, authorities and the private sector

3

Ensure future success

- Develop electricity distribution grid
- Recognize and build capabilities necessary for decarbonization
- Raise awareness of climate solutions and activate local companies and citizens
- Share experiences with peers


#GreentoScale
Solutions exist.
Now we need leadership.
#nordicsolutions
to global challenges

Next steps

— Adopt climate neutrality roadmaps in all municipalities

— Integrate peer experiences into all climate policy making at national and local levels

— Set enabling regulation and align incentives at the national level – for Finland e.g. raise carbon tax, phase out subsidies to peat and lower large heat pump electricity tax

#GreentoScale

Thank you

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to global challenges

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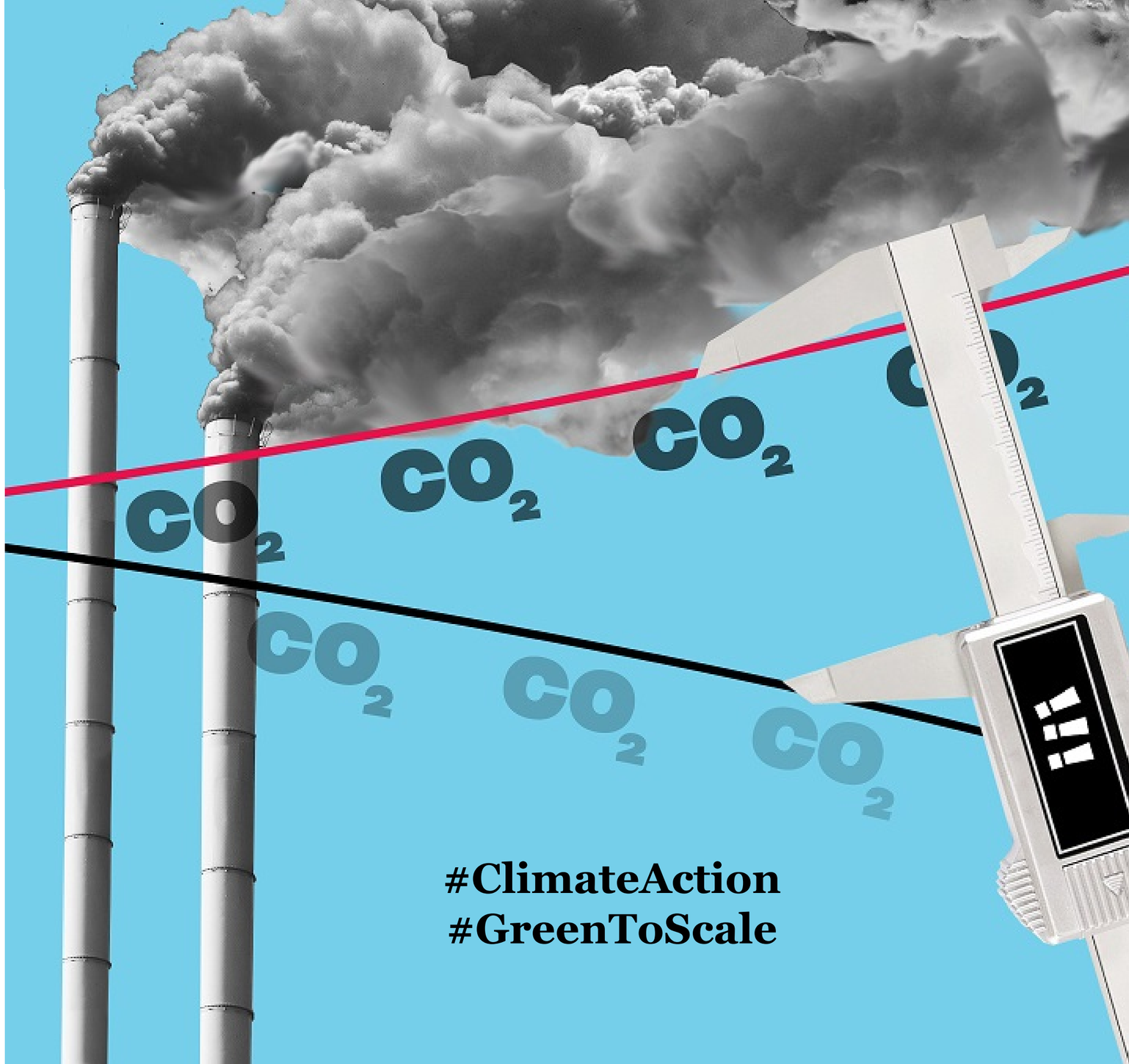

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