



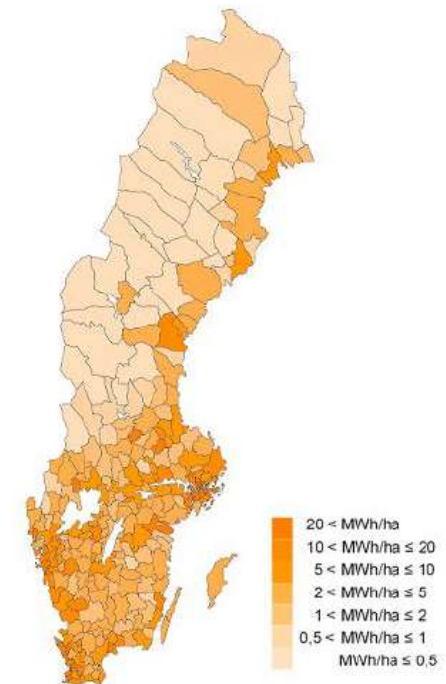
Renewables in the Swedish energy and electricity system

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Sweden

- A cold country in the north of Europe
- Area: 450 295 km²
 - Same as Sumatra
- Population: 10 million
- Capital: Stockholm (population: one million)
- GDP: 551 billion US dollars (2018)



About the Swedish Energy Agency

- Our mission is to promote a sustainable energy system
- National authority for energy policy issues
- Sorts under the Ministry of Infrastructure
 - Minister: Anders Ygeman
 - Director General: Robert Andrén
- Government funded
 - around 200-300 m€ per year in transfer of funding, R&D, grants, etc.
- Around 400 employees



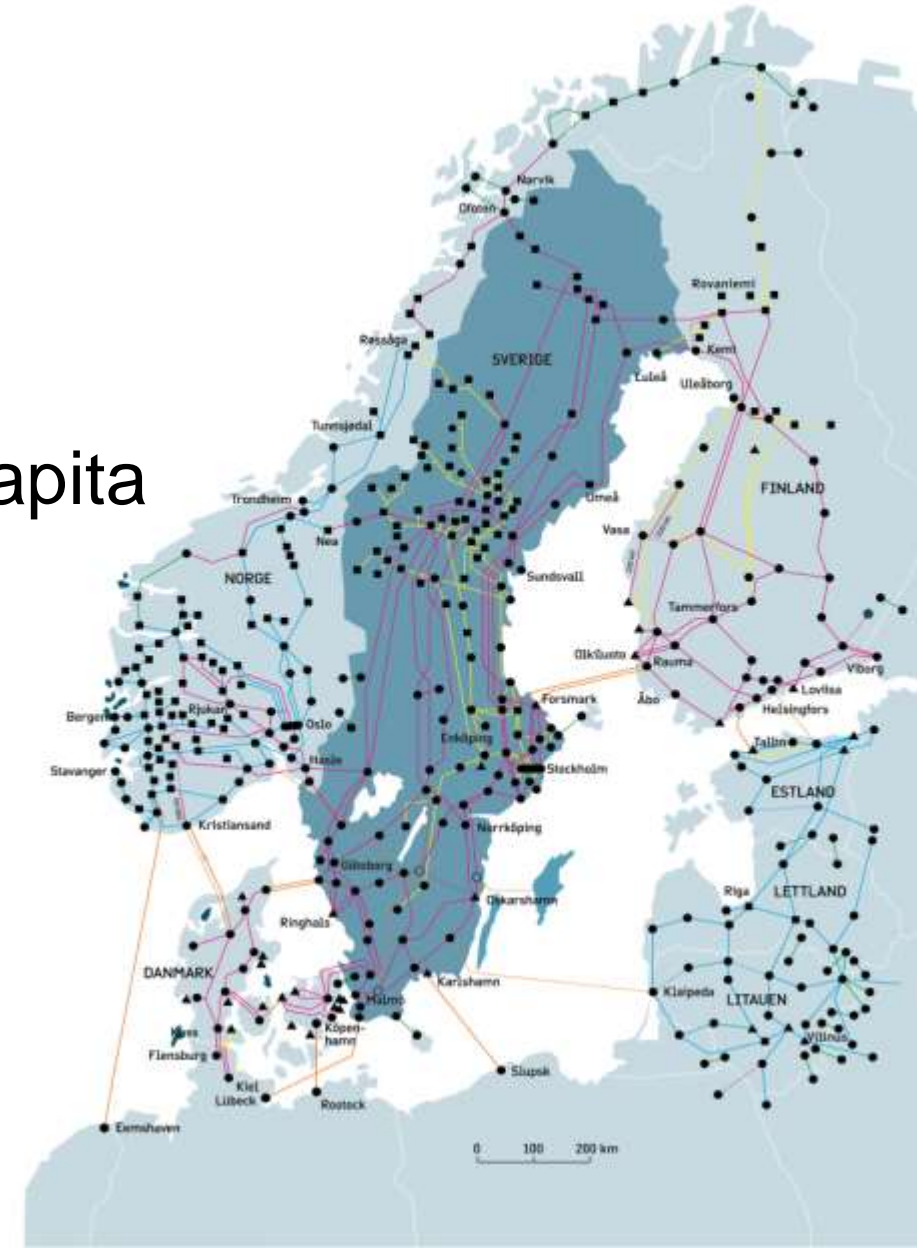
The Swedish Energy Agency in Indonesia



- Government-to-Government Cooperation (Under MoU), also with regional and local governments
 - Implementing authority Secretariat of the National Energy Council
- Promoting Renewables, Energy Efficiency and Waste Management improvement through B2B or B2G-cooperations
- Funding and promoting policy studies on energy and climate policies, historically also with direct climate investment programmes
- Collaborate with organisations such as APINDO, METI, MASKEII, Eurocham and others

Sweden today

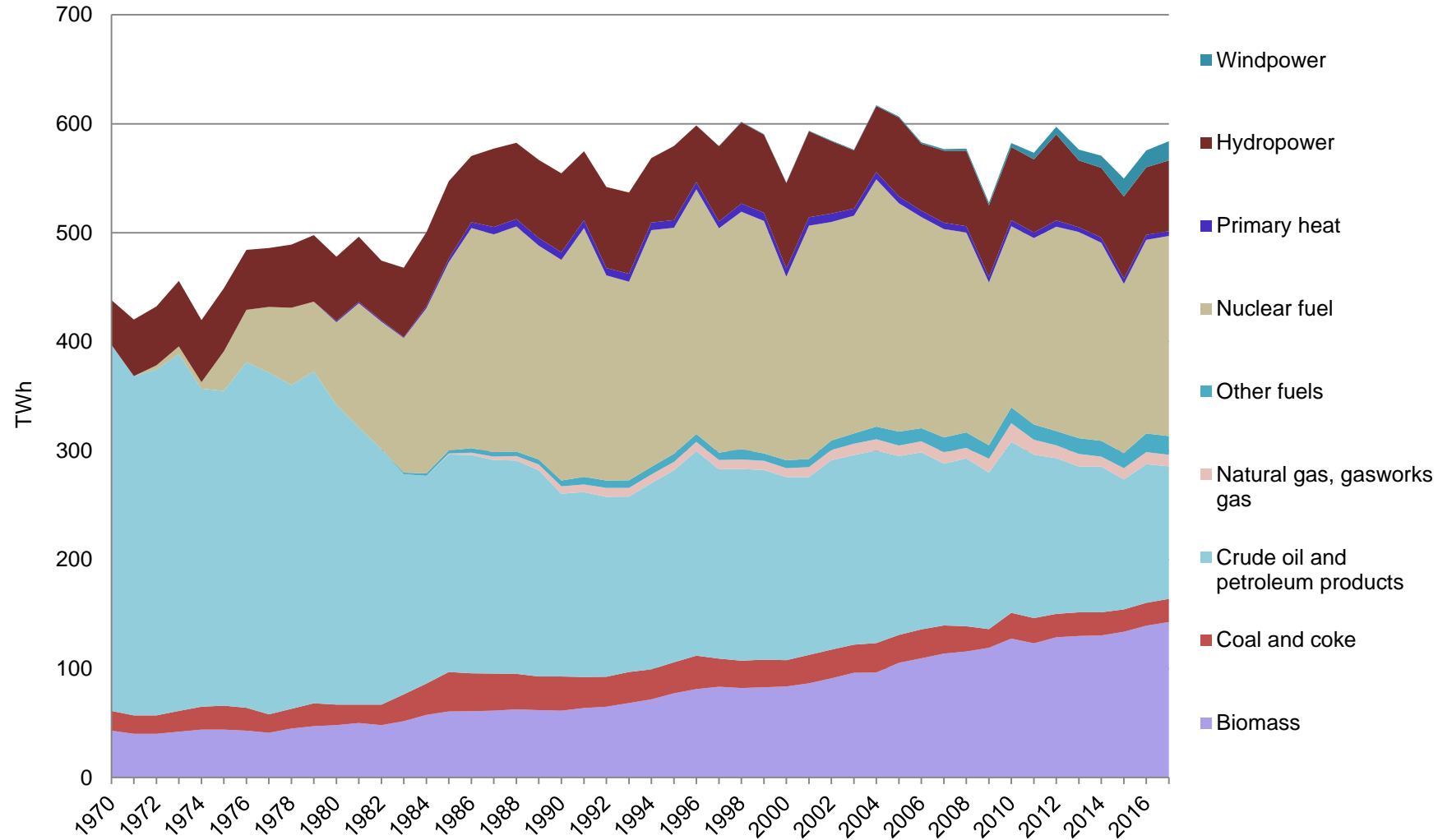
- Almost fossil-free electricity production
- Almost fossil-free heat production
- Low CO₂ emissions from production per capita
 - In 2017, the greenhouse gas emissions in Sweden were around 5 tonnes CO₂ per capita. The emissions have decreased by 26 % since 1990.
- Energy intensive industry - energy use per value has decreased



Energy use in Sweden, 2017

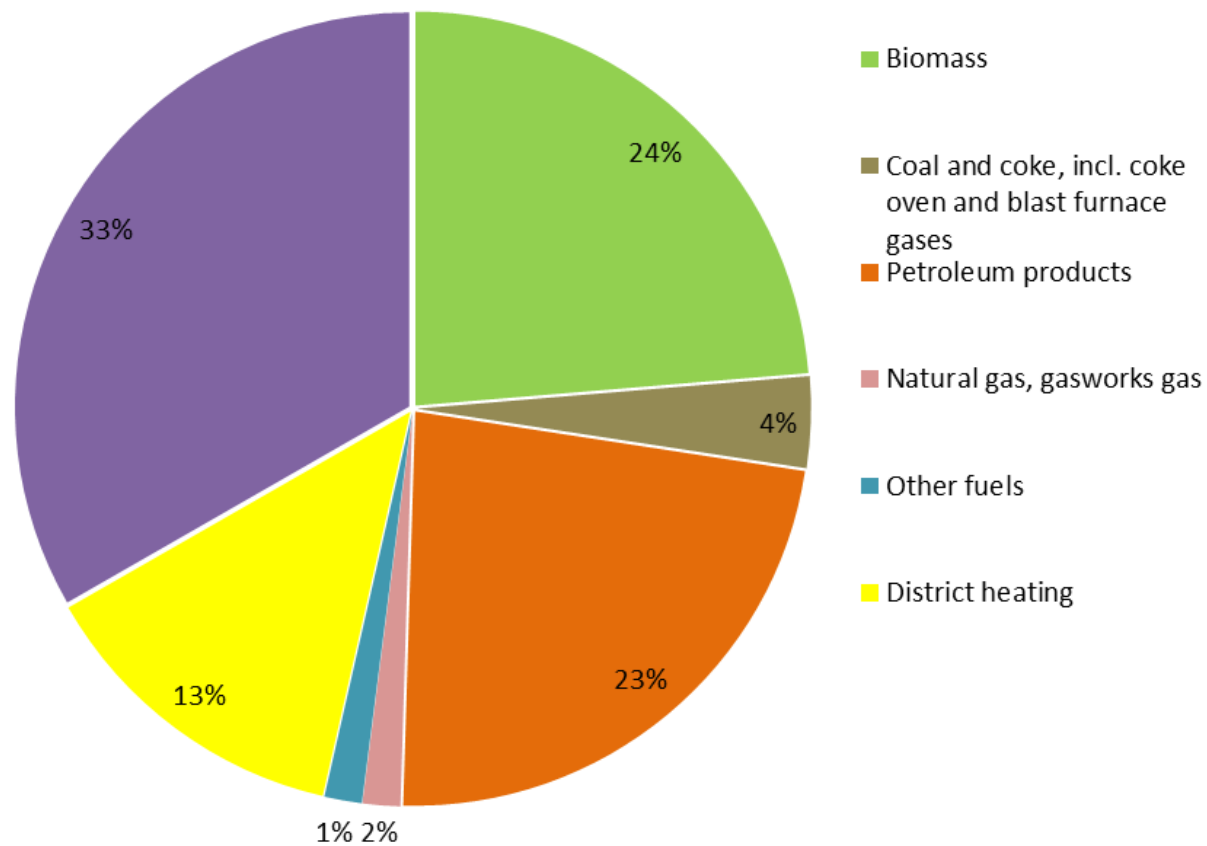


Energy supply by energy commodity 1970–2017, TWh

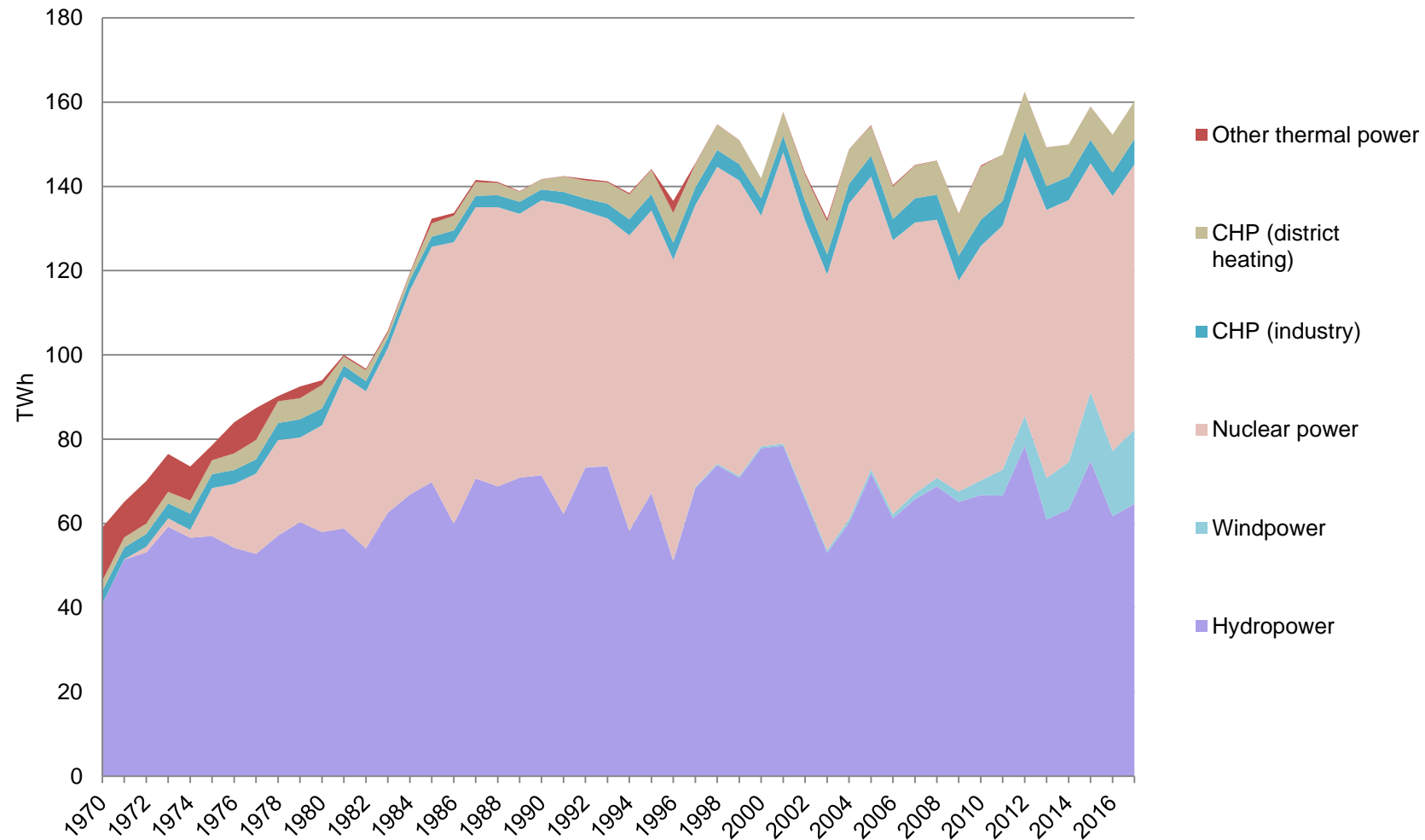


Final energy use in Sweden

Total final **energy** use, by energy carrier 2017,
378 TWh, in percent



Electricity production by type of power 1970-2017



How did we get here?

Market-based and general instruments:

- Energy tax on electricity and fuels
- Carbon dioxide taxation
- Green certificate system for renewable energy
- Dissemination of information
- Research and innovation
- Programmes and support schemes

Energy policy targets for Sweden

100 % renewable
electricity by 2040

No net emissions
of greenhouse
gases by 2045

50 % more
efficient use of
energy in 2030
(compared with
2005)

70 % less
emissions from
transports 2030
(compared with
2010)

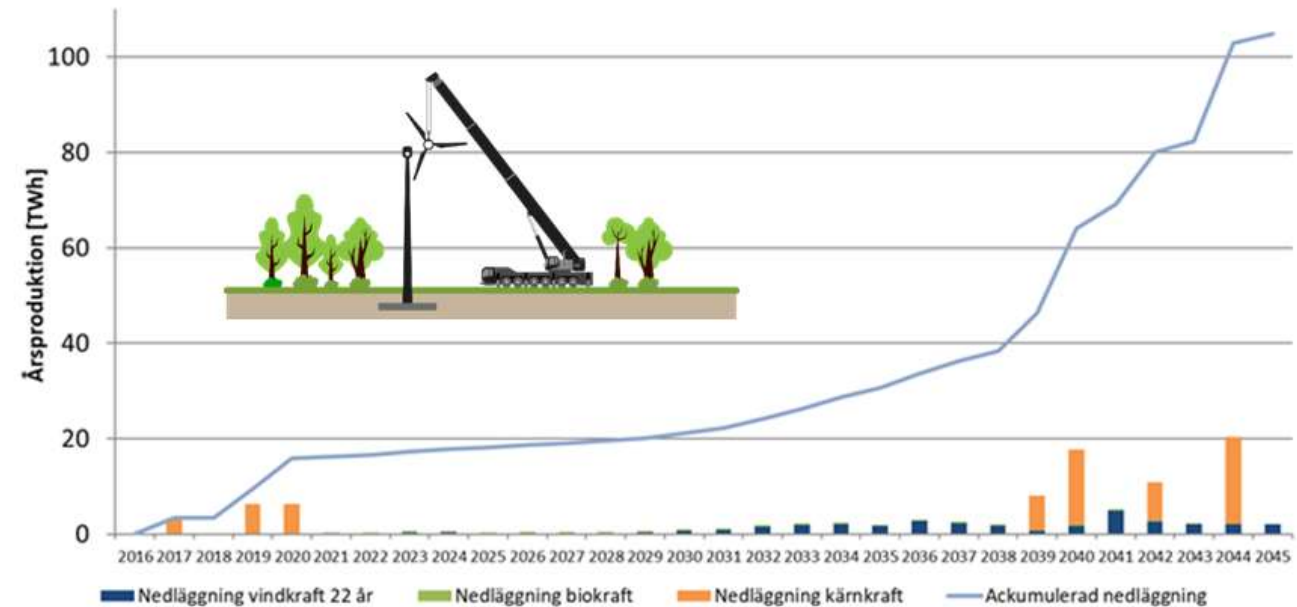


Three pillars of Sweden's energy policy: • ecological sustainability • competitiveness • security of supply

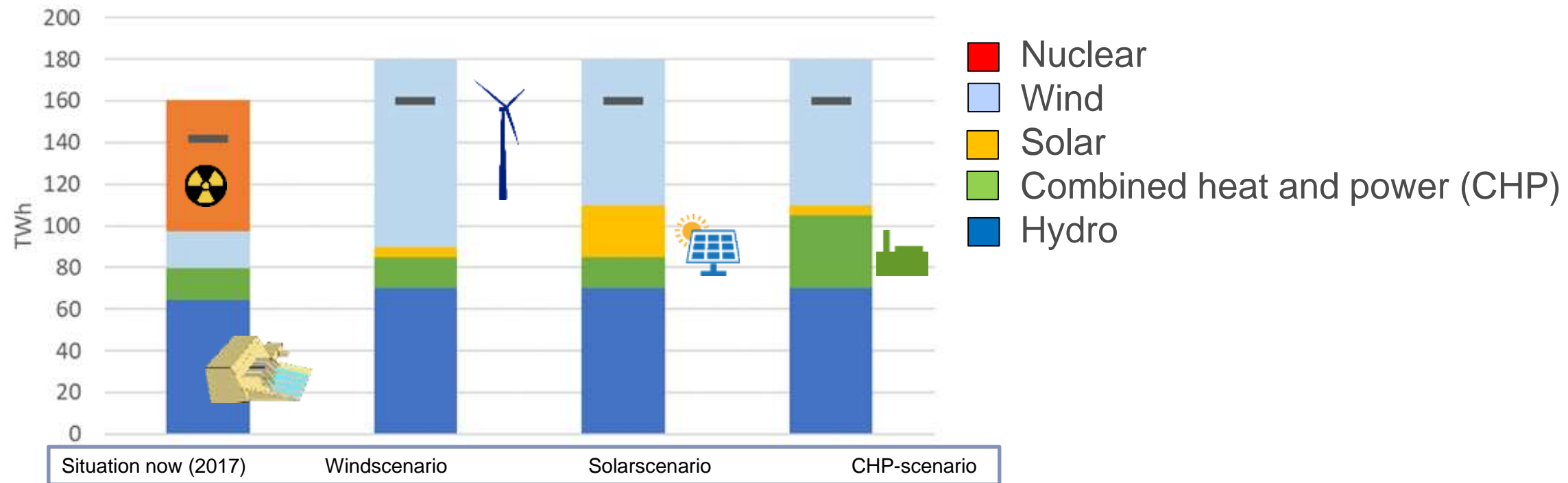
Together, several trends provide a major change

In the next 20 to 30 years:

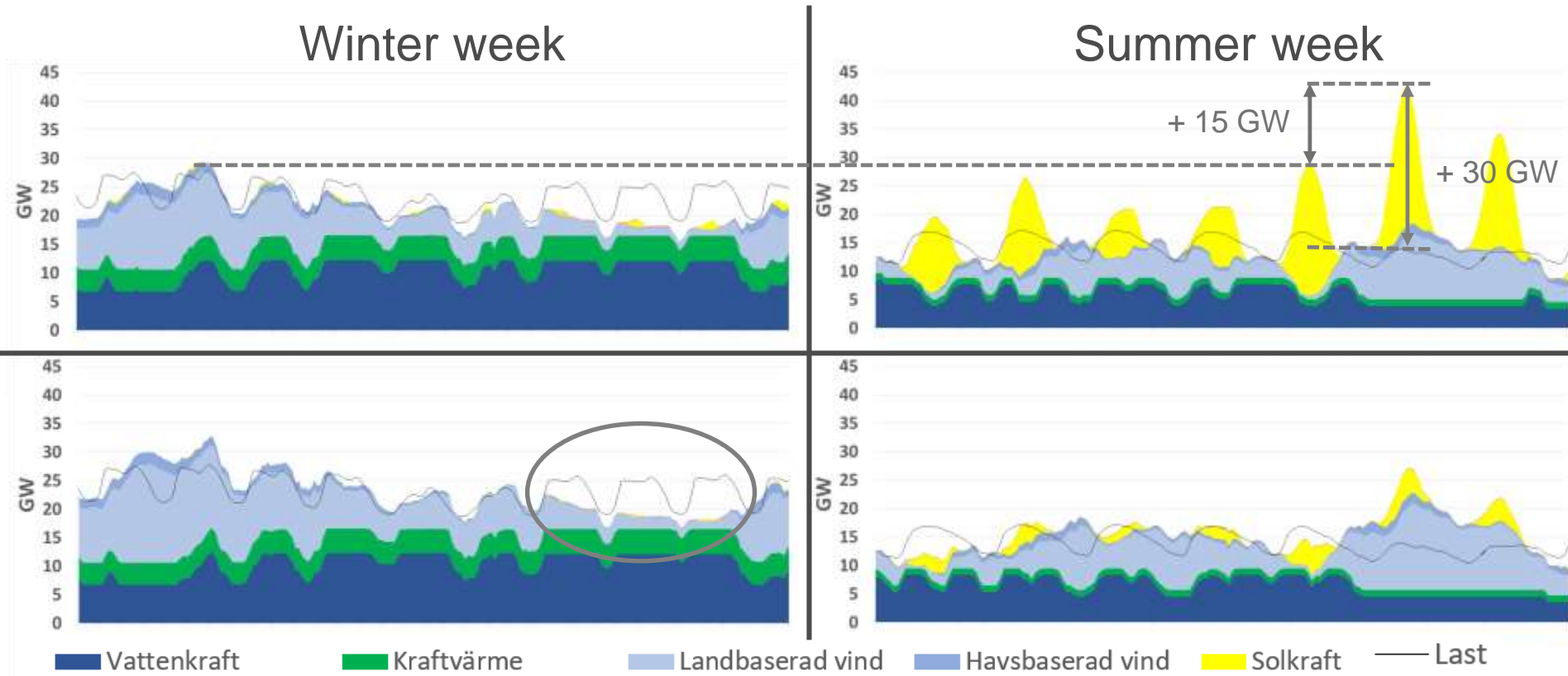
- We need to replace around 100 TWh of electricity
- The new electricity will mostly be variable
- The electricity system is expanding to new sectors with increased electrification and electricity use
- The existing electricity use will change



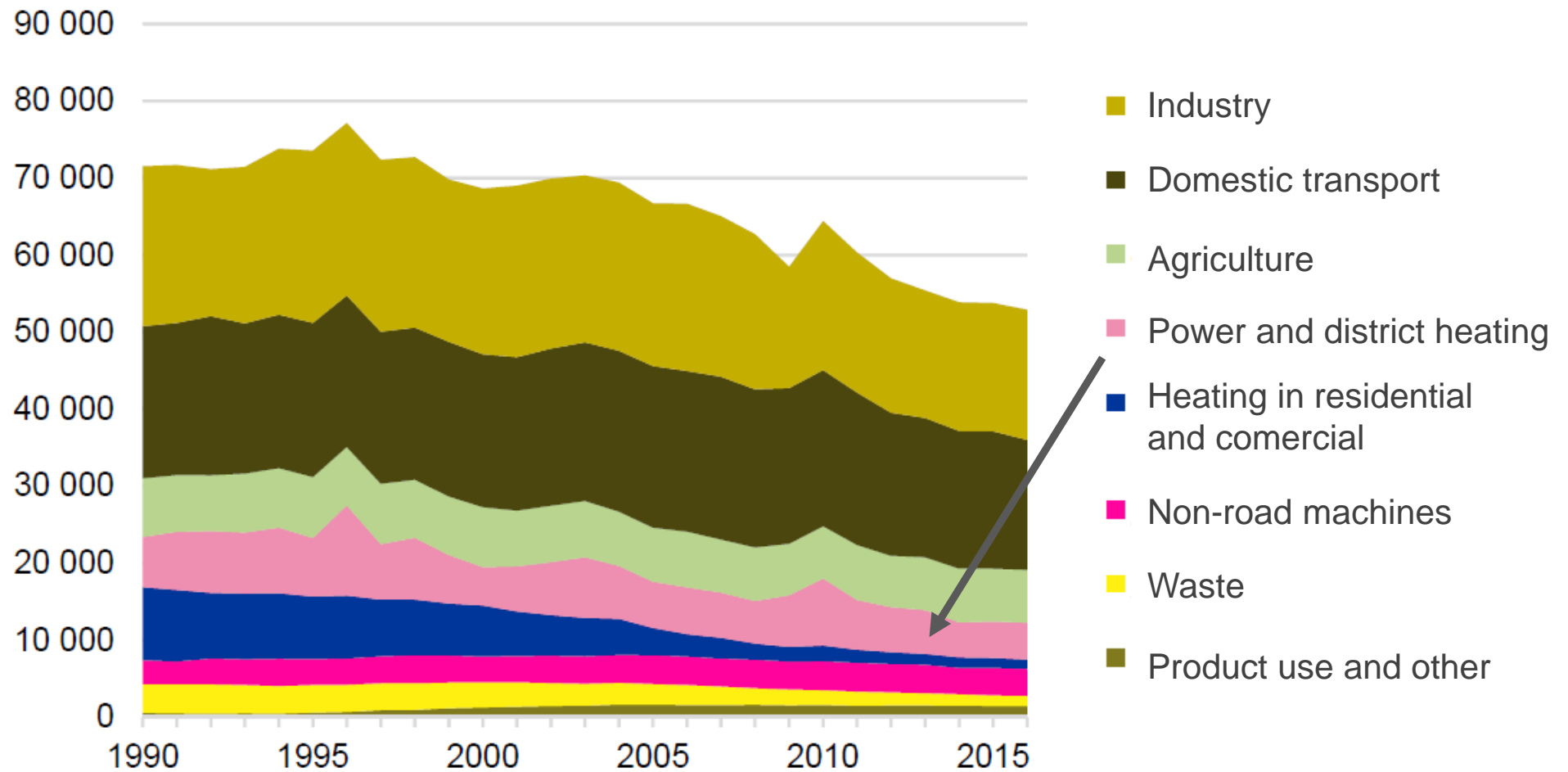
Main scenarios 2040



Increased need for flexibility



Transition of the electricity system and electrification can give synergy effects



100 percent renewable electricity in a well-functioning way is possible...

- To a large extent all modelled systems are functioning, but the long term energy targets are more important! There are often many solutions for the same challenge.
- Large economic potential for renewable electricity resources as well as for flexibility.
- Increased incentives for flexibility and "system friendliness".

...however efforts are still needed to reach the target

- Societal stakeholders need to strive towards a common objective and challenges.
- The market price for electricity should steer towards system friendly behaviour and must reach the correct target group.
- Priority towards system stability and security of supply.
- Continued transmission and grid development.
- It must be possible to realize the large technical potential for renewable electricity and flexibility.

Thank you for your attention!
Terima kasih!

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