A brave new energy world:
striving for a carbon-free buildings sector

EPRA Conference 2024 Berlin

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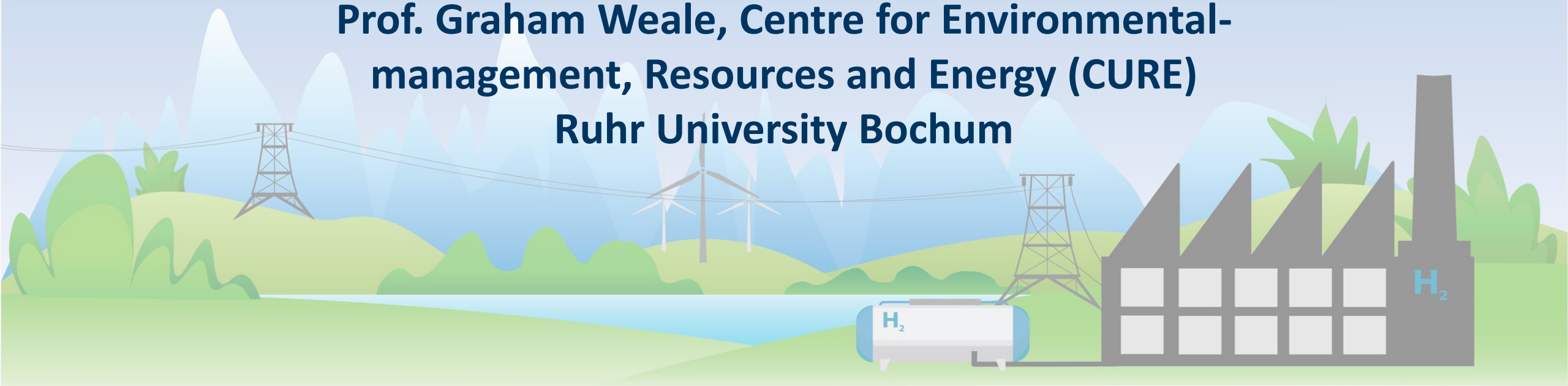
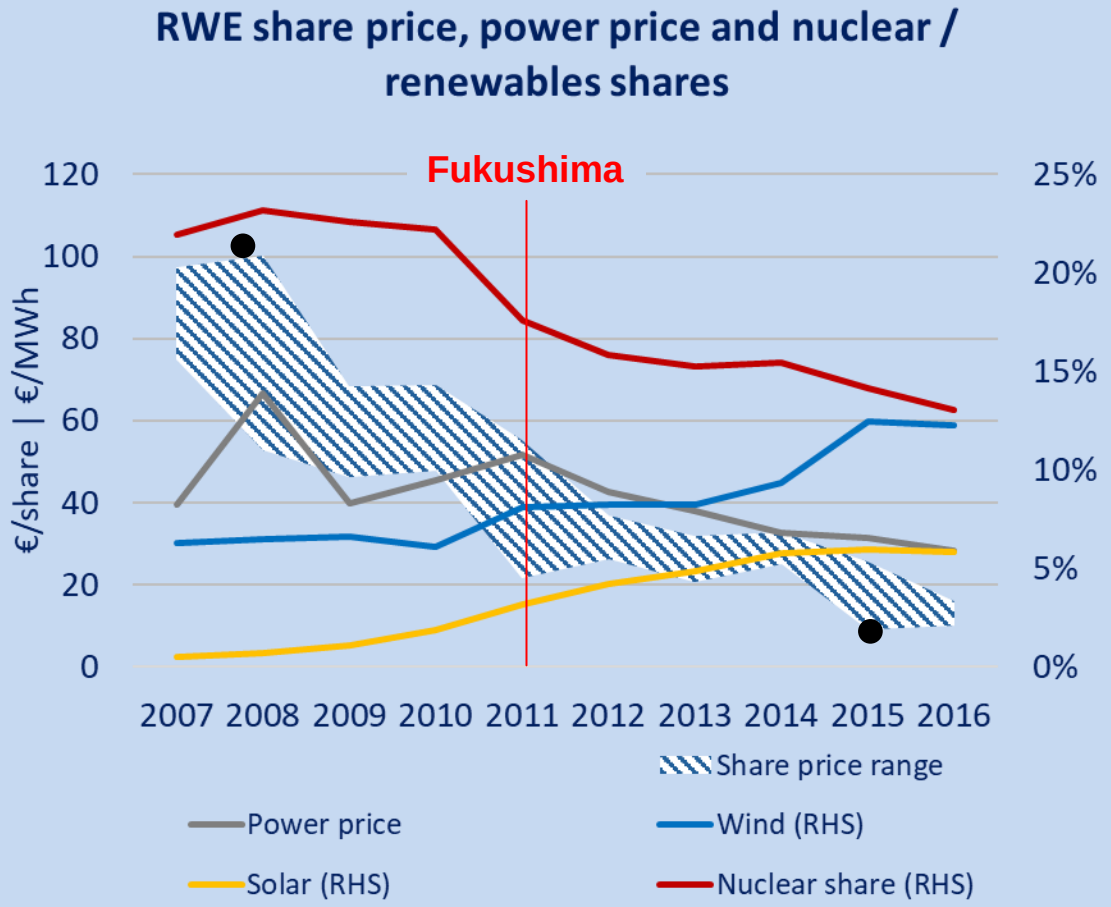


Agenda

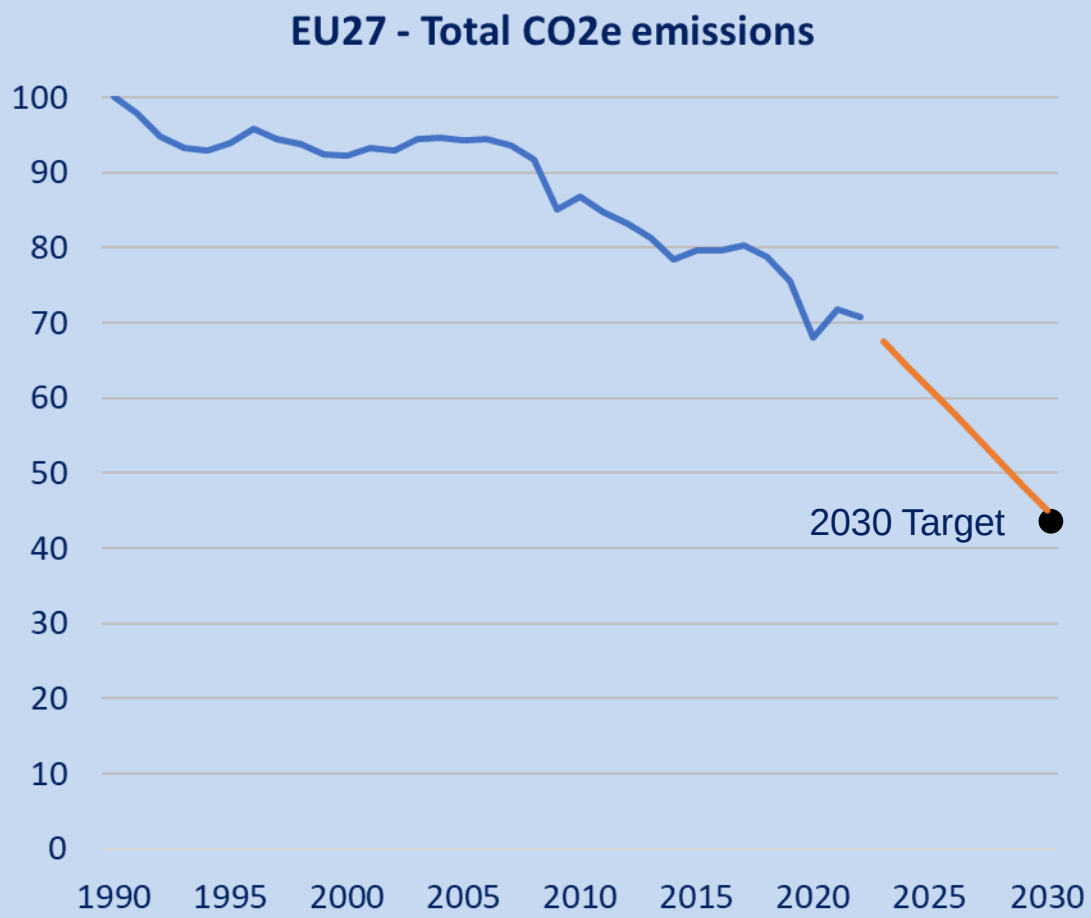
1. Experience of the Energiewende as Chief Economist of RWE AG (2007-2016)
2. Progress in the buildings sector to date in EU27, DE, FR, SE and UK
3. The Green Deal
4. Electrification is the key
5. Sweden’s innovative concept – the ectogrid
6. Realistic outlook to 2030

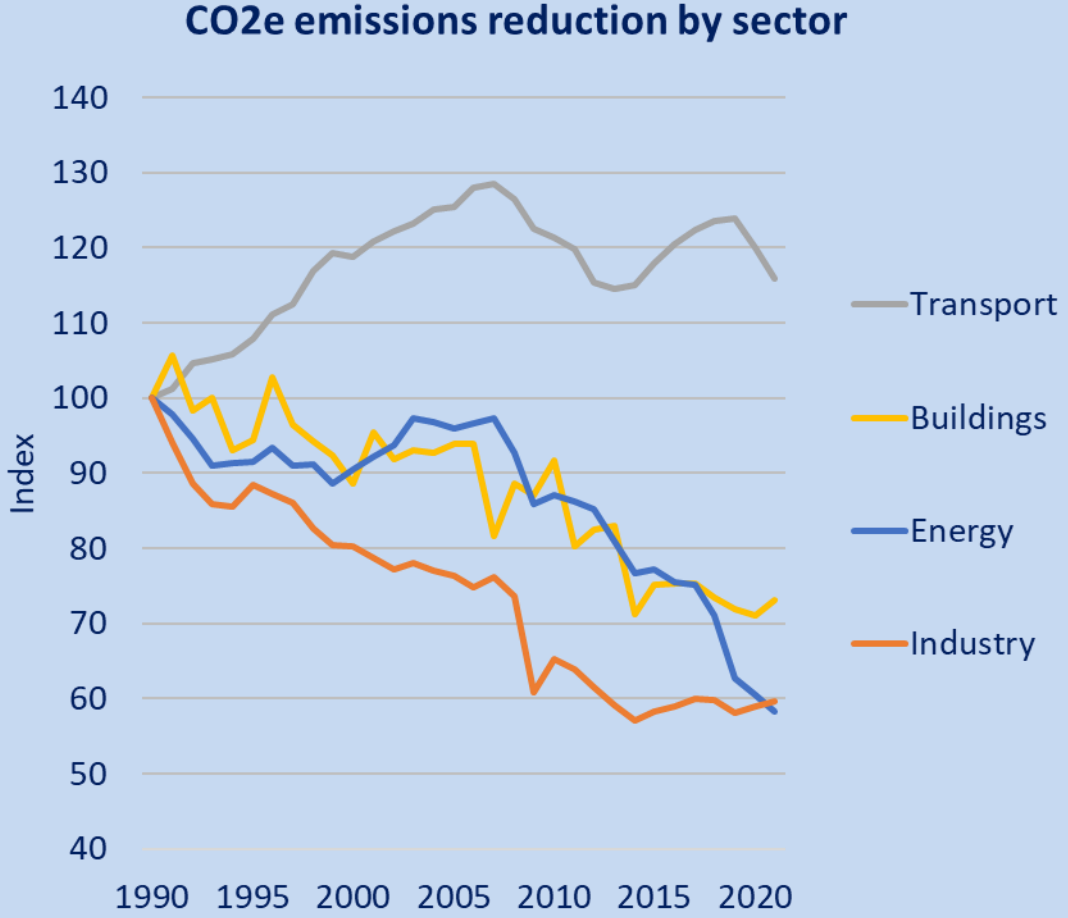
1. Experience of the Energiewende as Chief Economist of RWE (2007-16)

- Turbulent time with expectations continually being wrong-footed
- Stop-go with nuclear power
- EU Emissions prices often single-digit
- Renewable energy started 2000
  - Huge solar boom 2010-12 hammered wholesale power price and share value
  - Power price continually below full costs of gas-fired plants
- Board struggled to develop sound strategy till mid 2020s – then full-speed for renewables



2. Progress with decarbonisation to date:
30% reduction in 32 years – 25% target in the next 8 years!

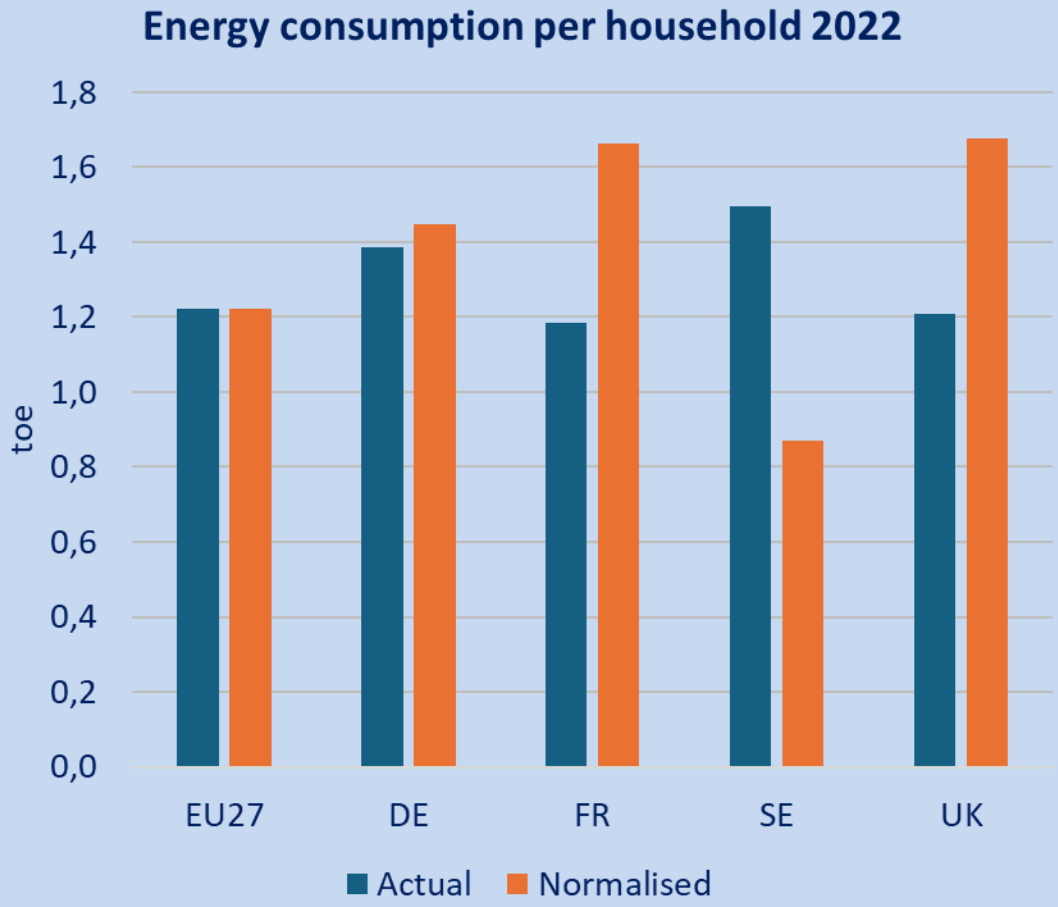


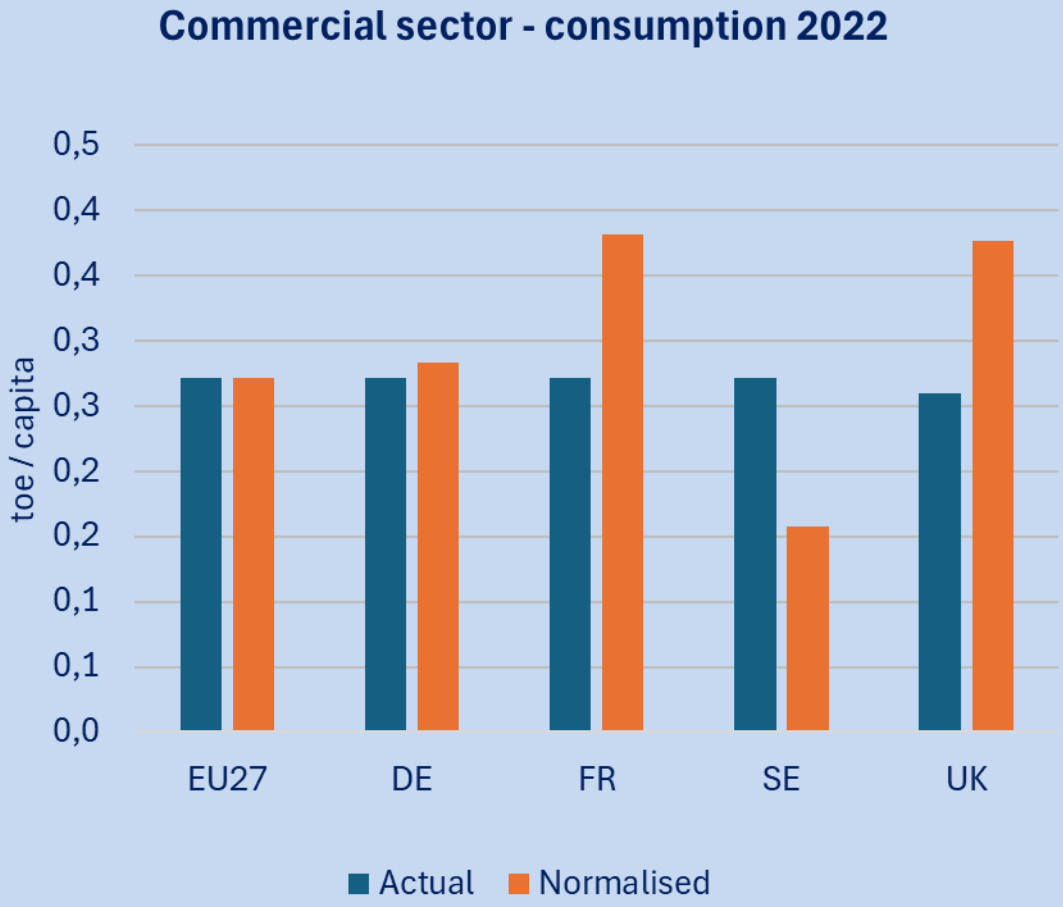


Source: Author based on EU Statistical Country Datasheets

Heating demand per household and per capita in commercial sector

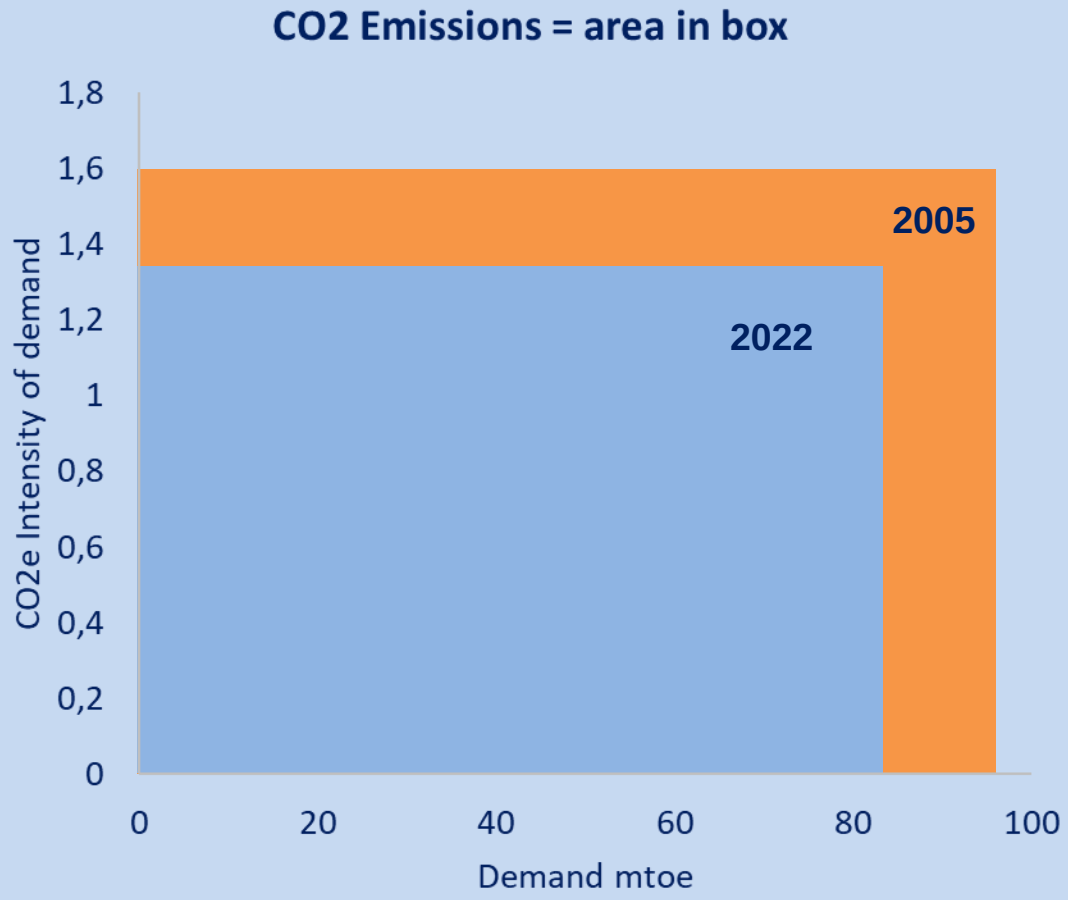
Normalised data refers to average EU27 heating degree days

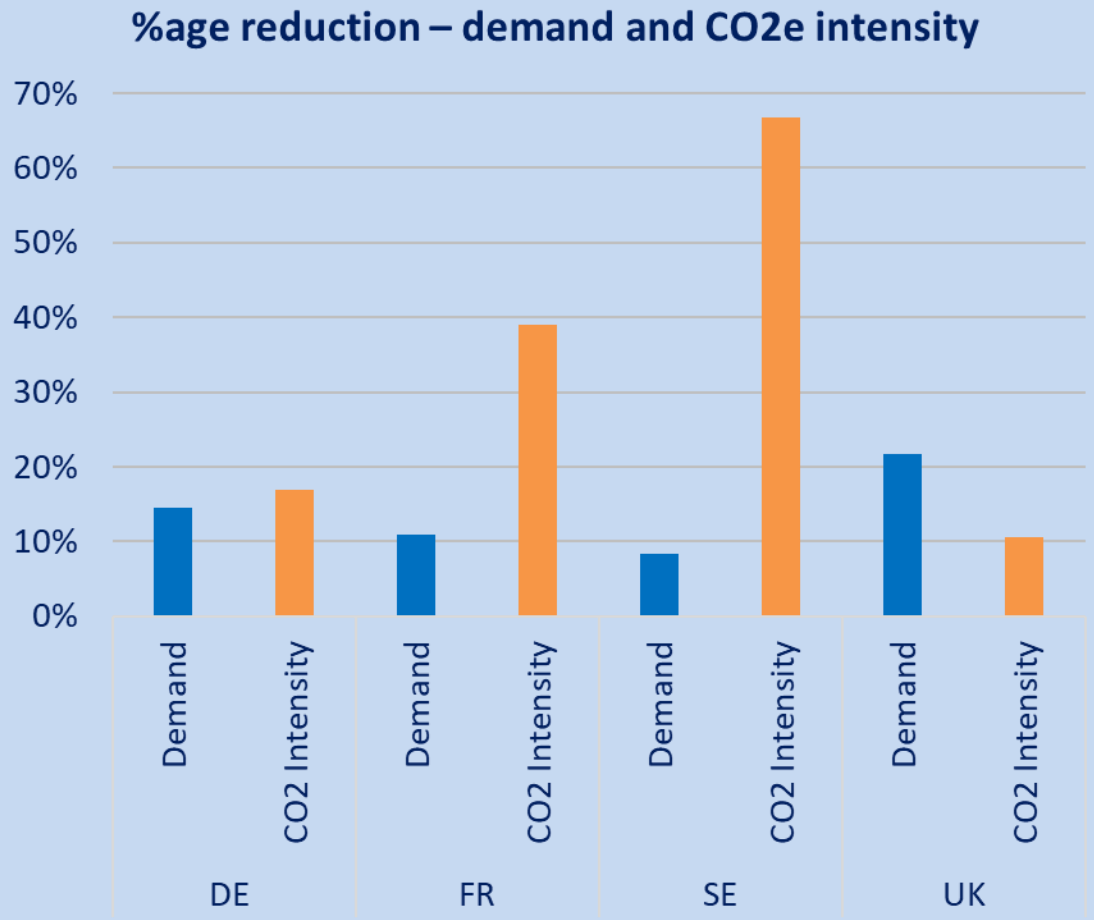




Source: Author based on EU Statistical Country Datasheets

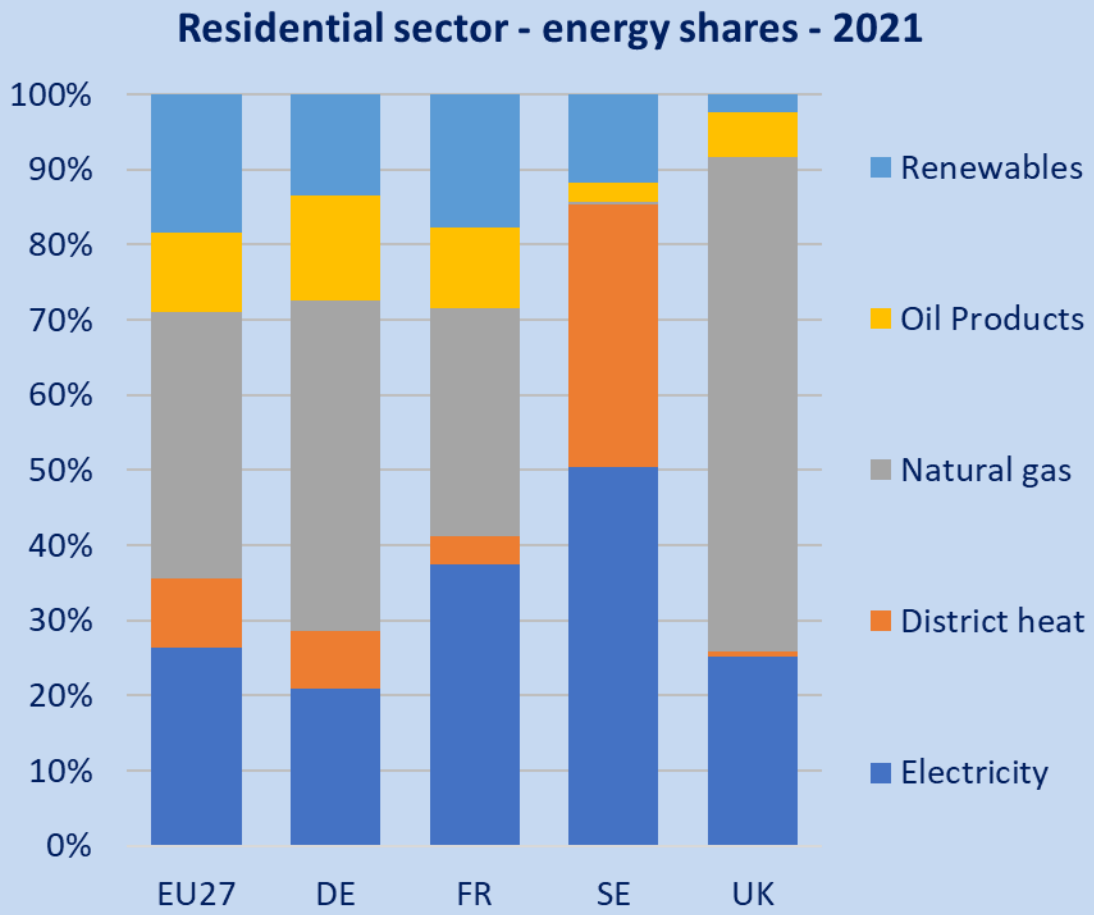
A two-dimensional challenge – energy demand and CO2e intensity reduction required in buildings sector – progress from 2005 to 2022

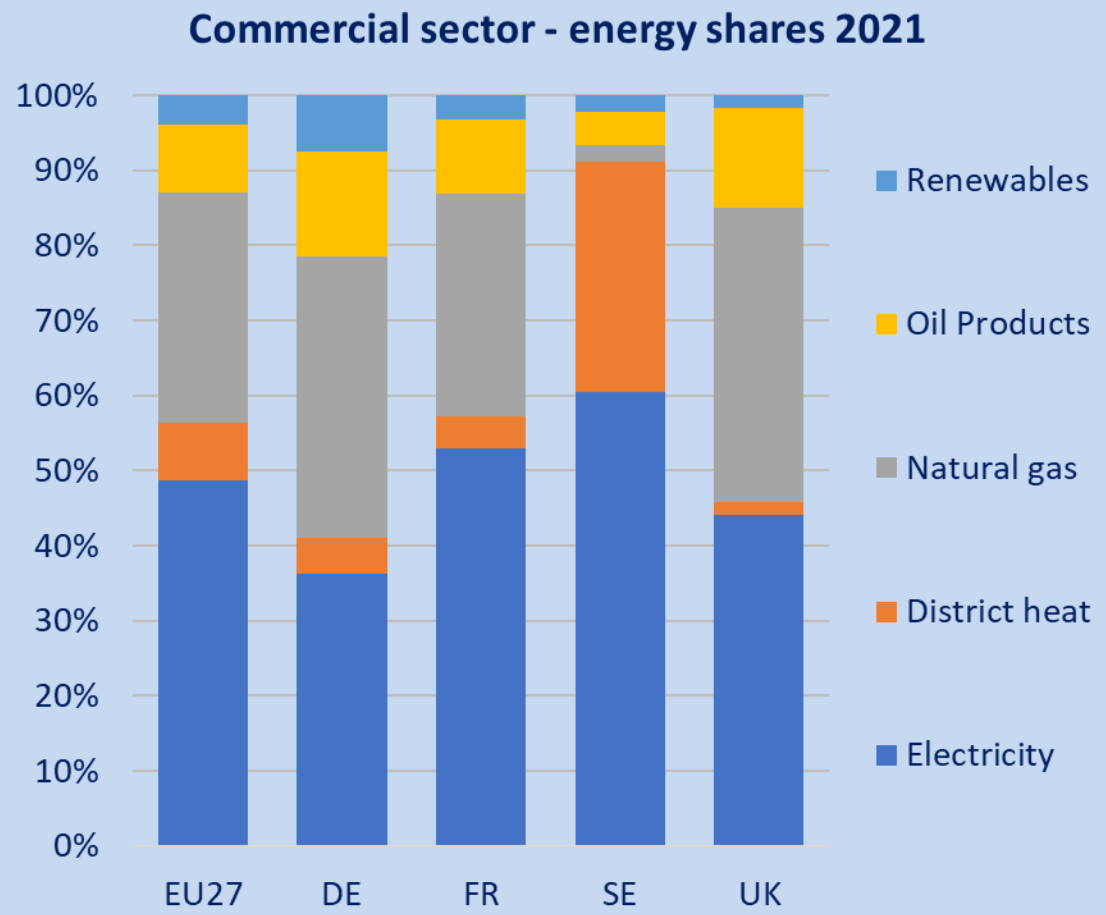




Source: Author based on EU Statistical Country Datasheets

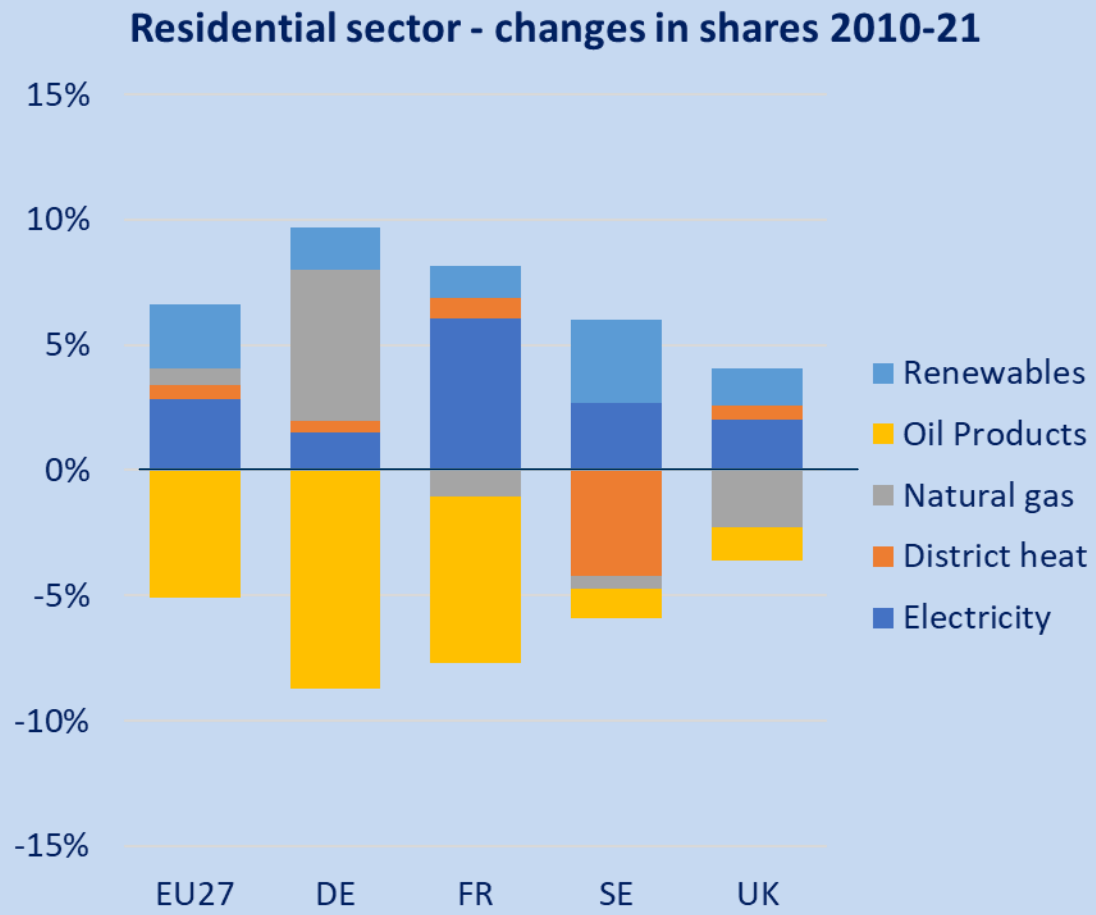
Energy system shares in 2021

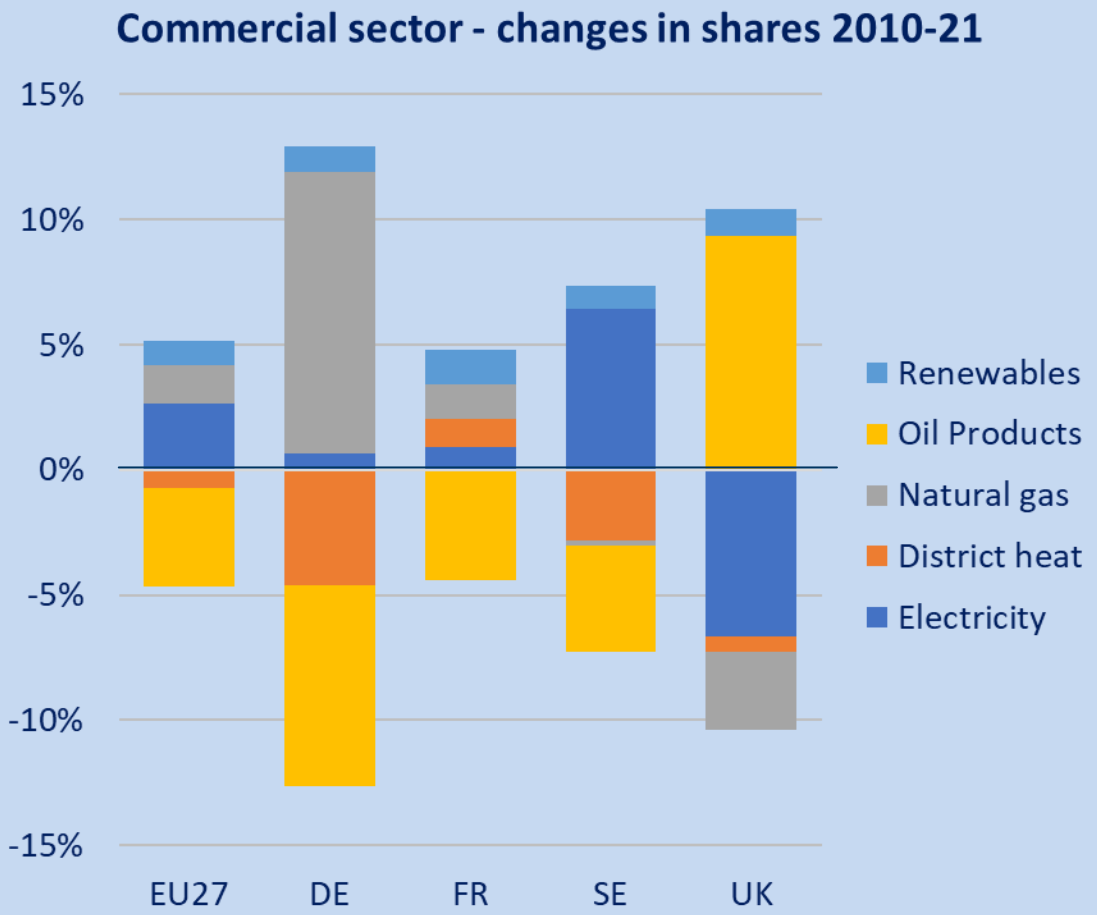




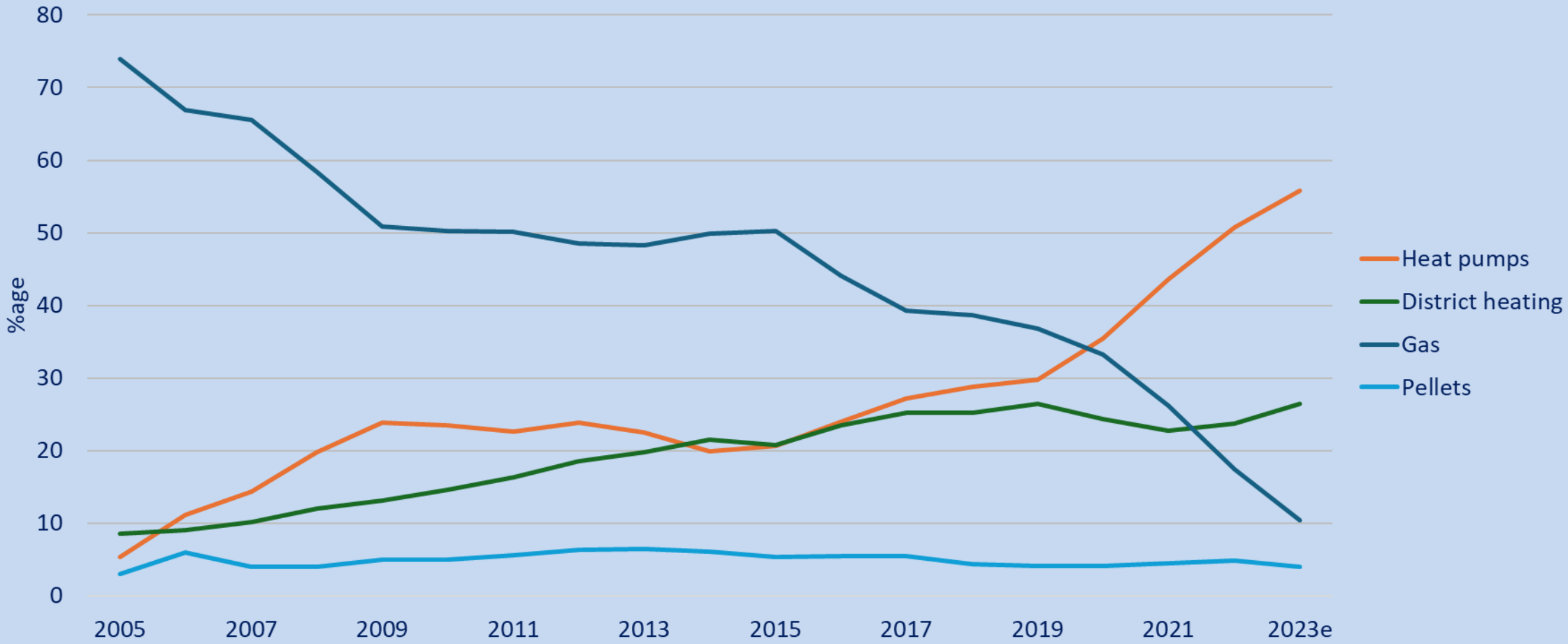
Source: Author based on IEA World Energy Balance 2024

Changes in energy system shares 2010-2021





Germany heating in new households – heat pumps and district heating



https://de.statista.com/statistik/daten/studie/37957/umfrage/beheizungssysteme-in-neubauten-im-jahr-2008/

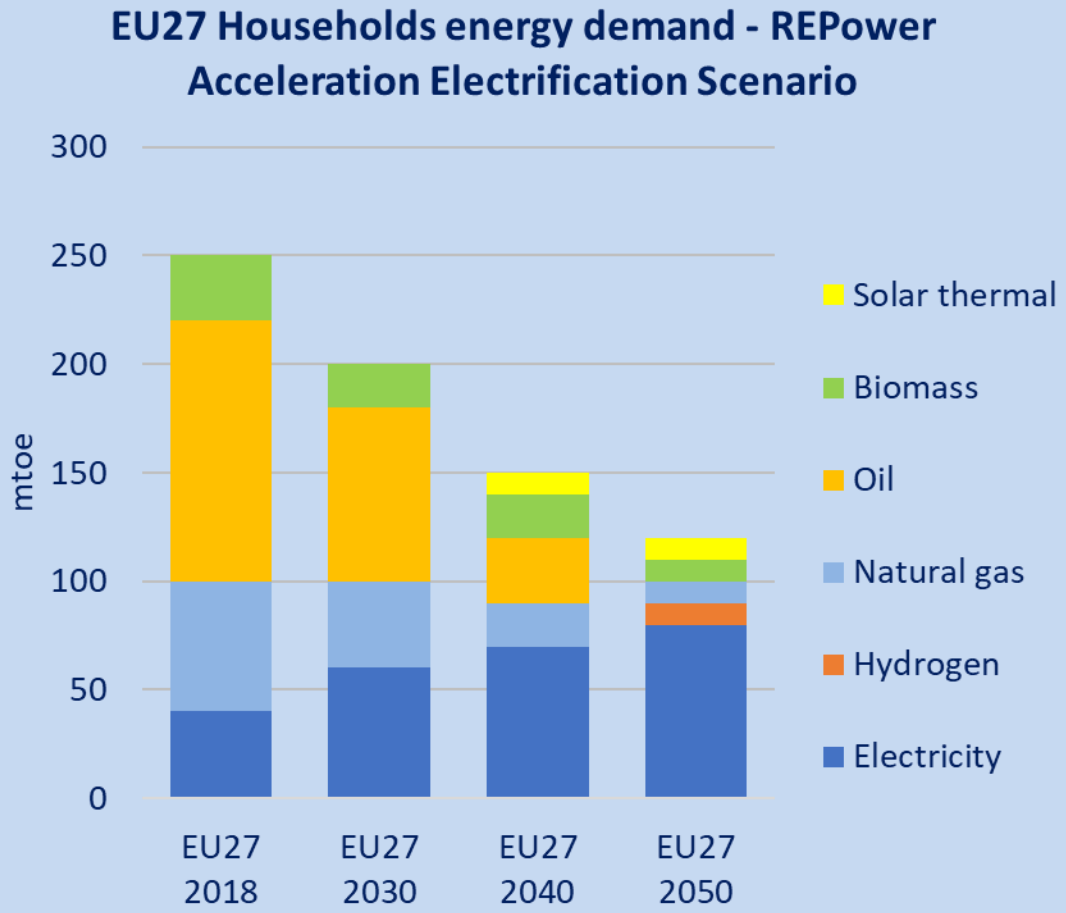
3. The Green Deal and three European Directives driving emissions reduction in buildings

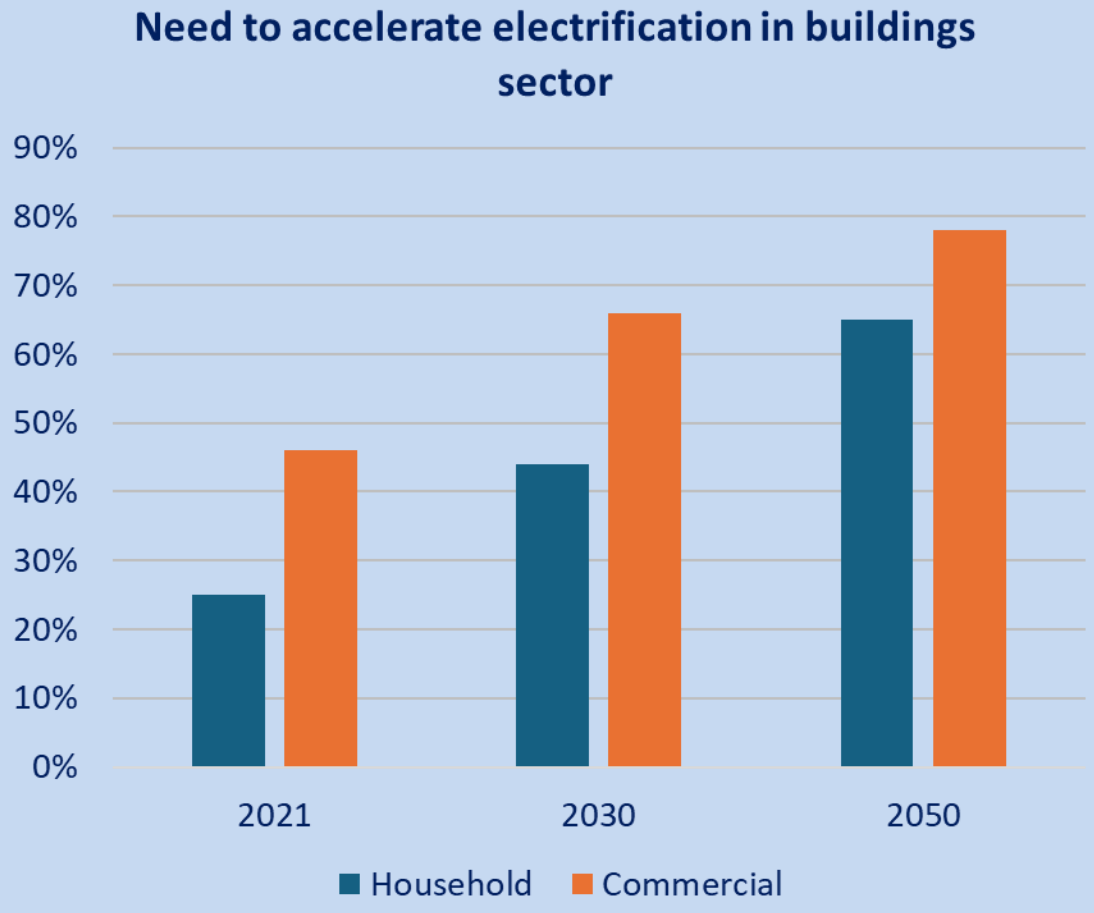
- Green Deal
  - 55% emissions reduction vs. 1990
- Renewables Energy Directive:
  - 42.5% renewable energy in total energy consumption by 2030
  - Promote electrified heating/cooling to reach 49% in buildings by 2030
  - Faster permitting process for heat pumps
- Energy Efficiency Directive:
  - 11.7% reduction in energy consumption by 2030
- Energy Performance of Buildings Directive
  - By 2030 all new buildings should be Zero Emissions and by 2050 all buildings
  - Phase out of fossil fuel boilers by 2040

National policies

- **Germany - Controversial 2023 Buildings Energy Law**
  - From all new buildings must be heated with at least 65% renewable energy
  - Applies in new building zones from 2024; In existing buildings/ new building zones a 2-4 year transitional period
  - Gas-boilers can be installed afterwards if they can use 65% green gas
- **France**
  - RE2020 (Environmental Regulation 2020) aims to improve environmental life-cycle of buildings – maximum consumption of 100 kWh/m²
  - Move to houses producing net energy
  - Éco Énergie Tertiaire rule – 60% in consumption 2010-2050
- **Sweden**
  - Important role of taxes and renovation policy
- **UK after July election**
  - Reform of national building regulations to cut emissions from new and existing buildings
  - Stricter carbon reduction standards in building codes, use of sustainable materials and renewable energy
  - Build 300,000 eco-friendly homes annually

4. Electrification is the key and can reduce demand in buildings sector

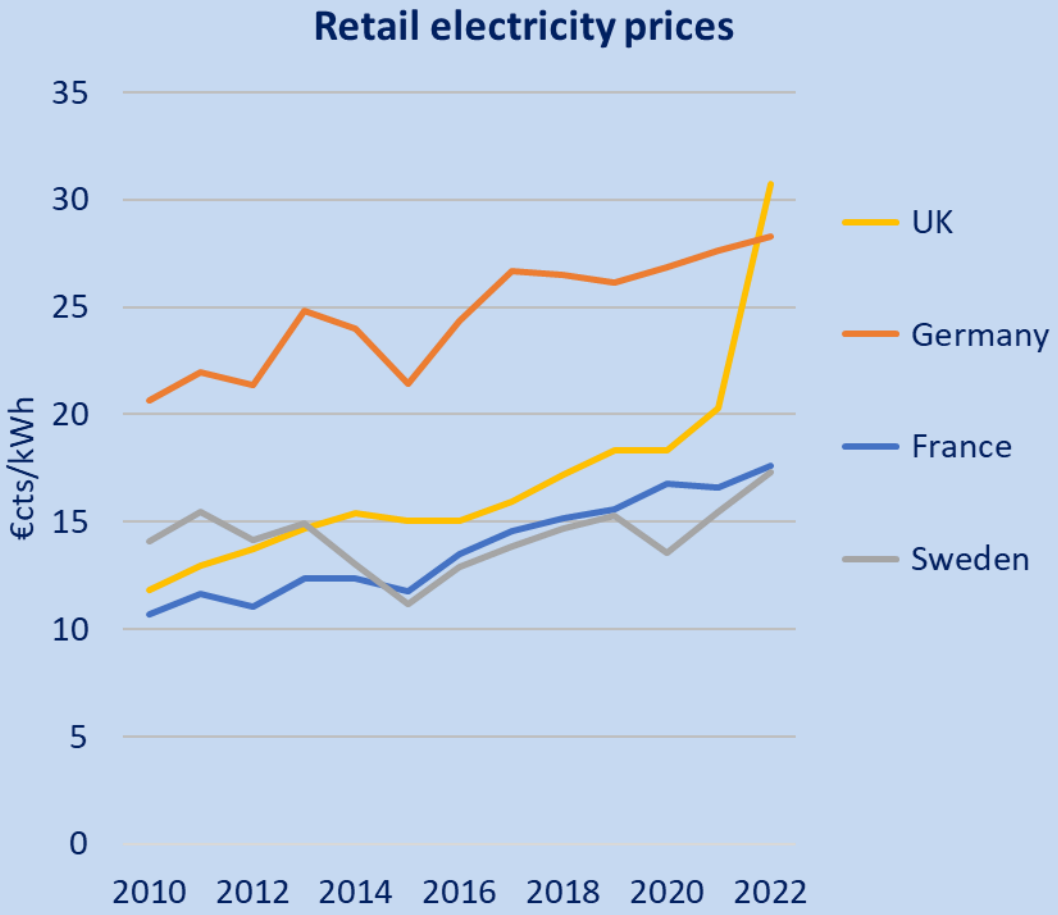




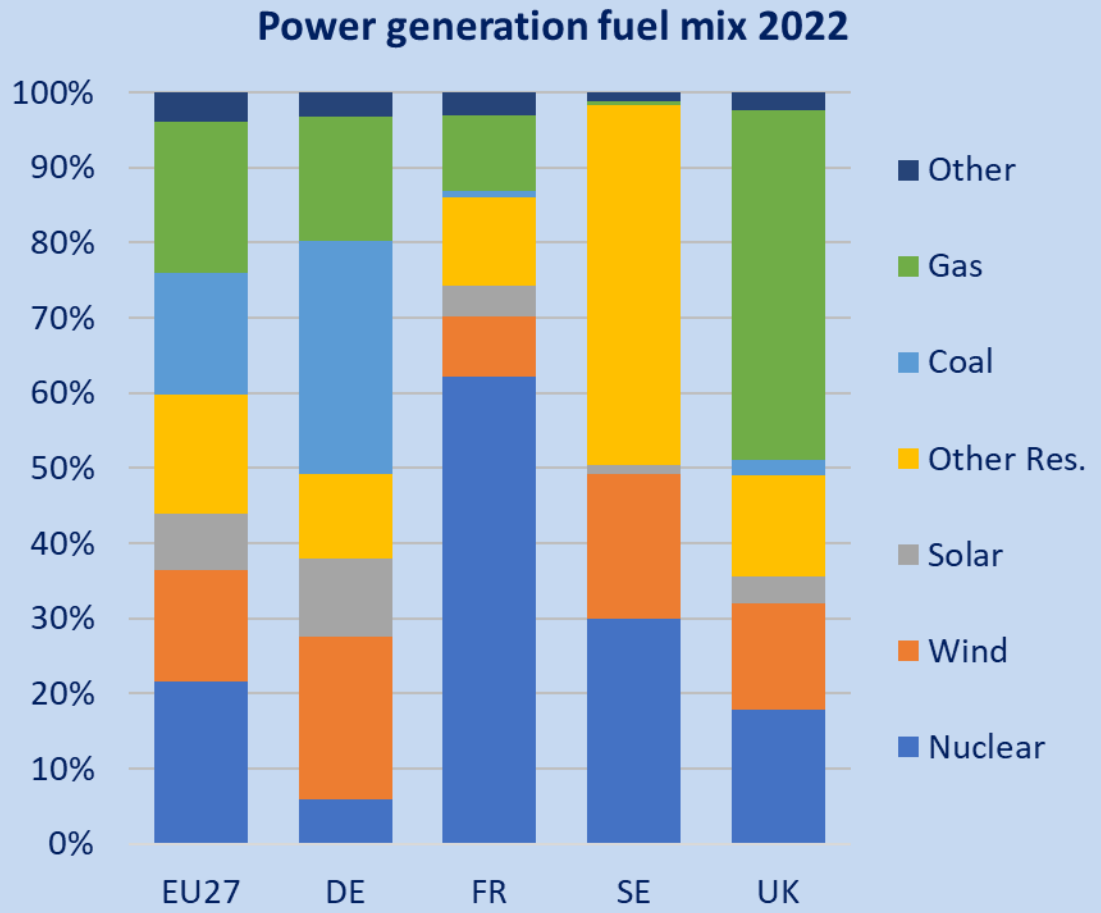
Source: Eurelectric based on EU REPower Scenario

Electricity price development – not helping electrification

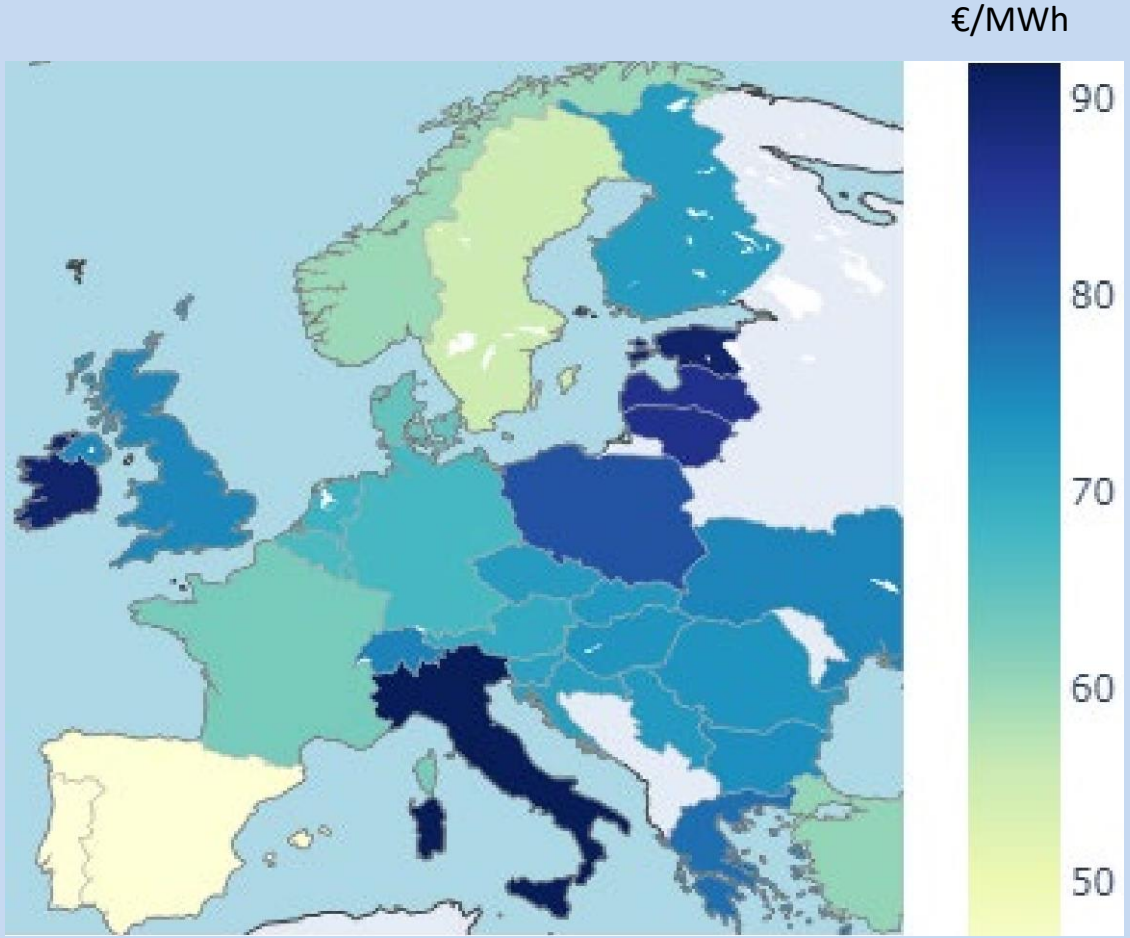
- Renewables growth not leading to lower prices
- Sun and wind do not deliver invoices, but…
  - Wholesale price is set by marginal power plants (usually gas – in future hydrogen)
  - Huge investment is required in transmission and distribution networks
- Paradox:
  - Cheap power needed for energy transition
  - Carbon pricing adds to costs
  - System requirements also add to costs



Power generation fuel mix (2022) and average wholesale prices (2024)

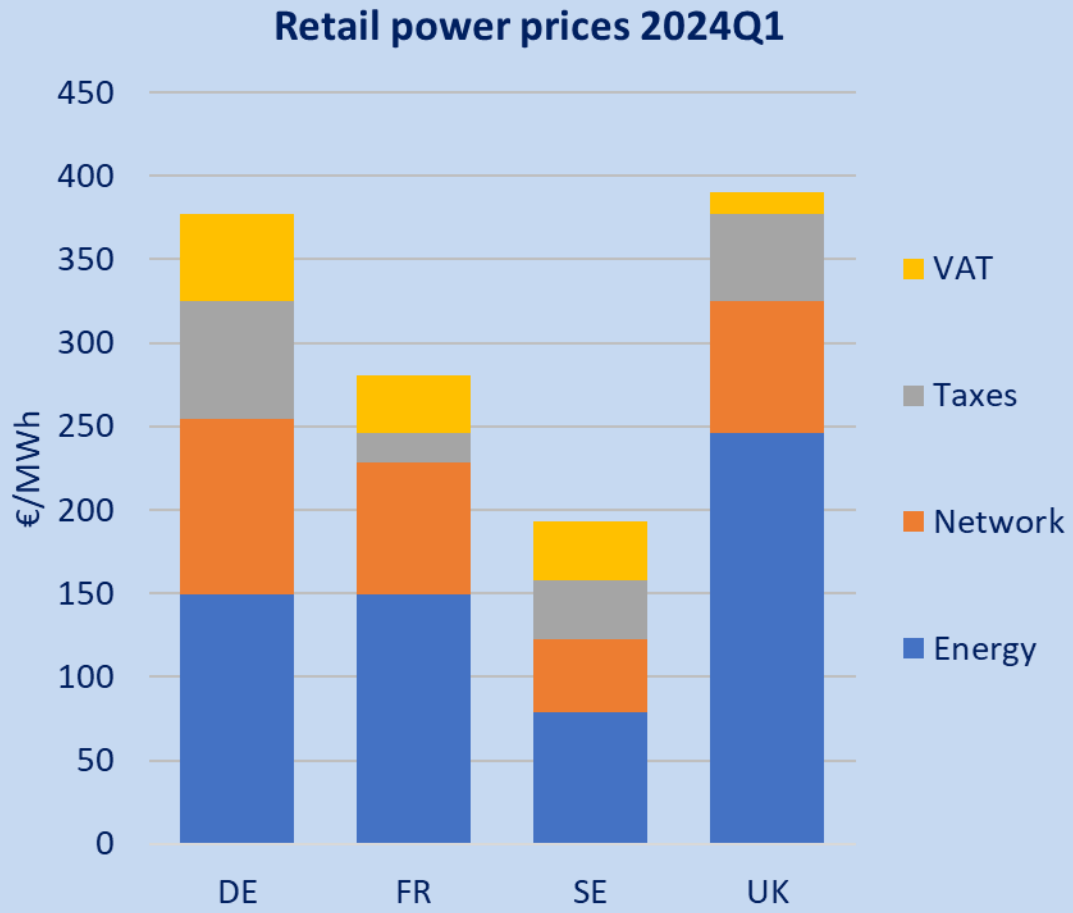


Source: Energy Statistical Country Datasheets (EU27), DUKES (UK)

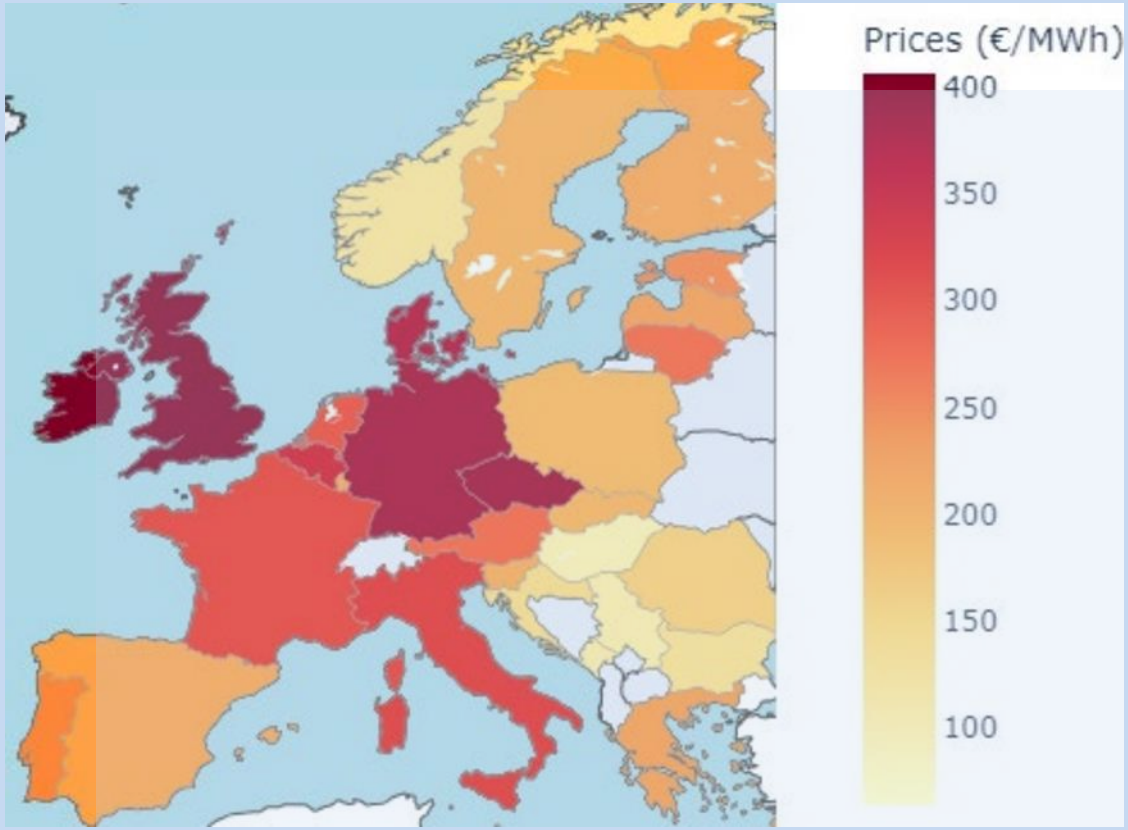


Source: Quarterly report on European electricity markets 2024Q1 / Vaasaett

Retail prices and the role of taxes/levies 2024Q1



Source: EU Quarterly Electricity Reports Vol 17 /Vaasaett



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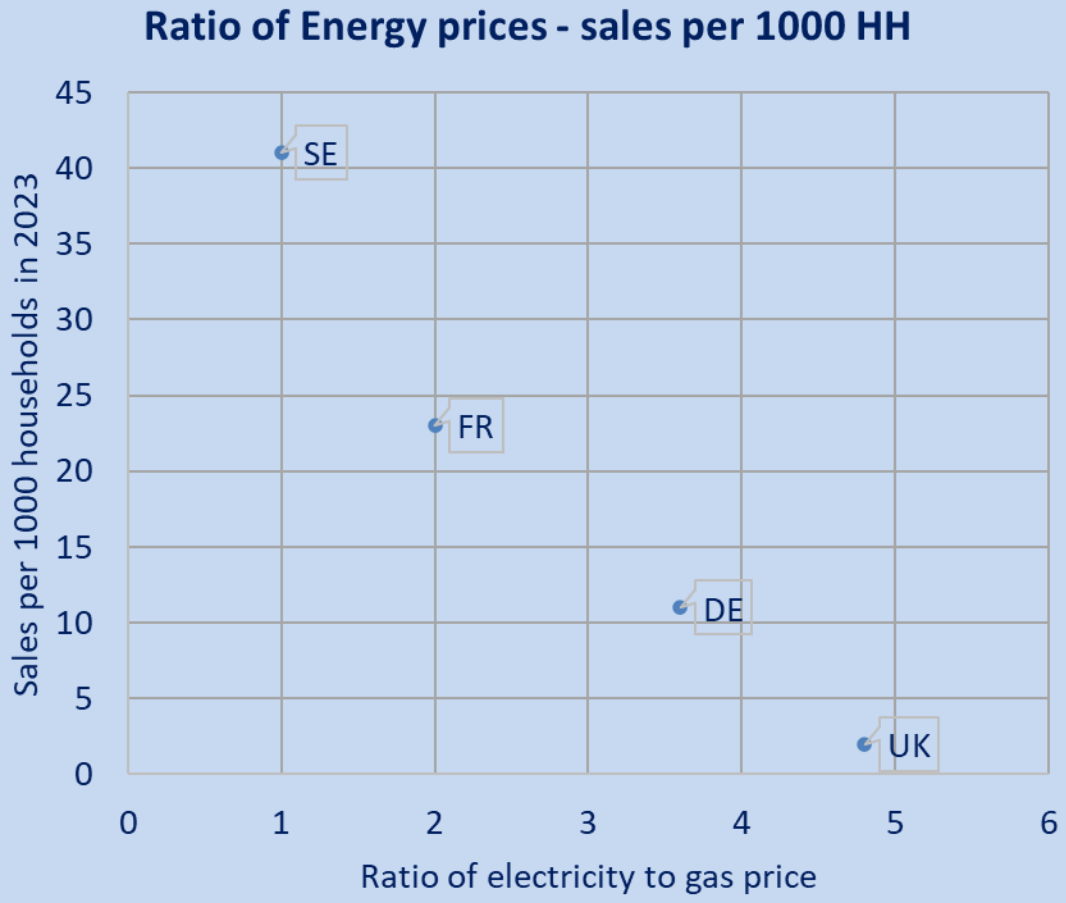
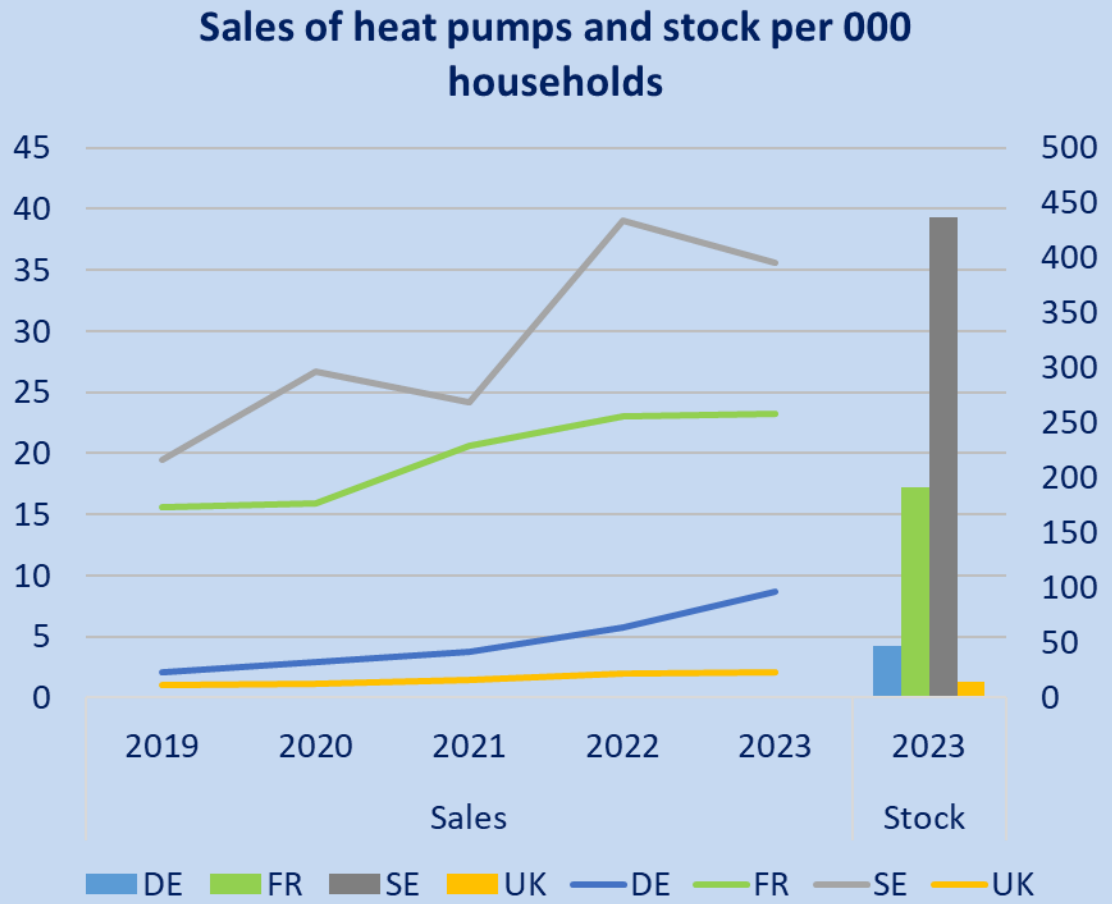
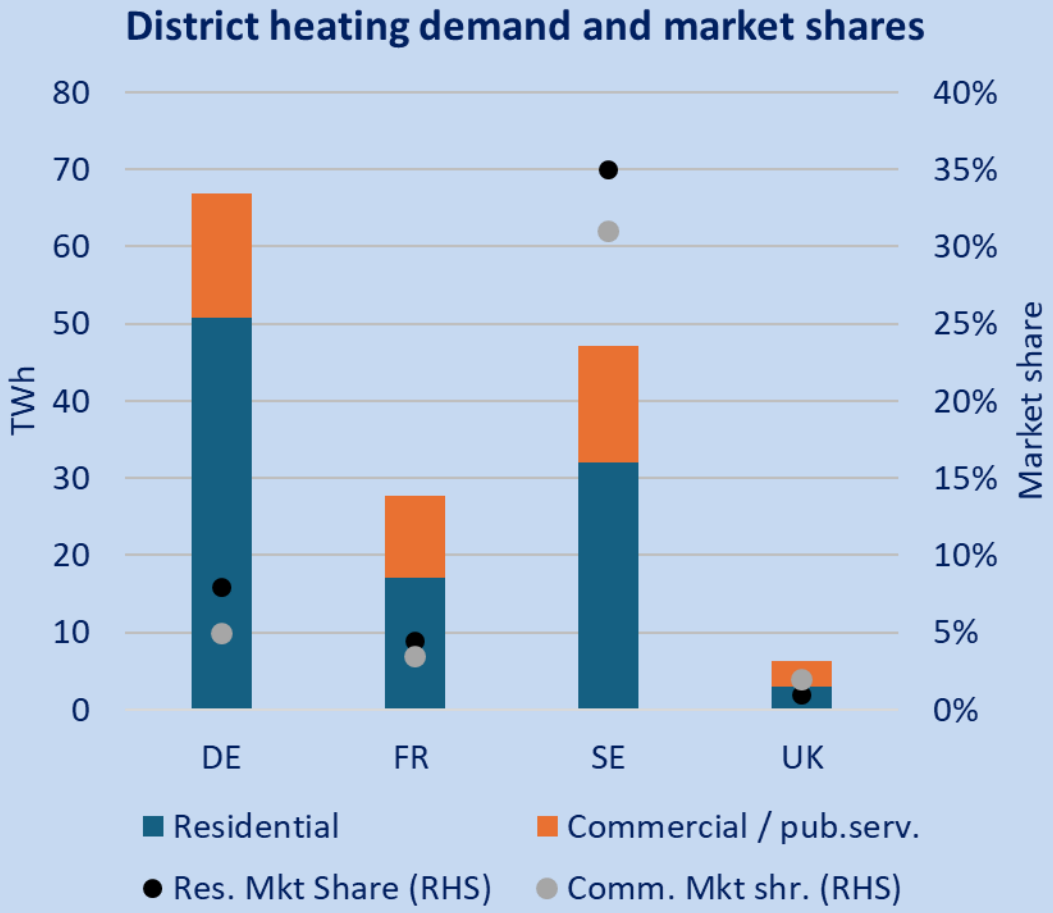
Heat-pump sales trends and stocks and targets

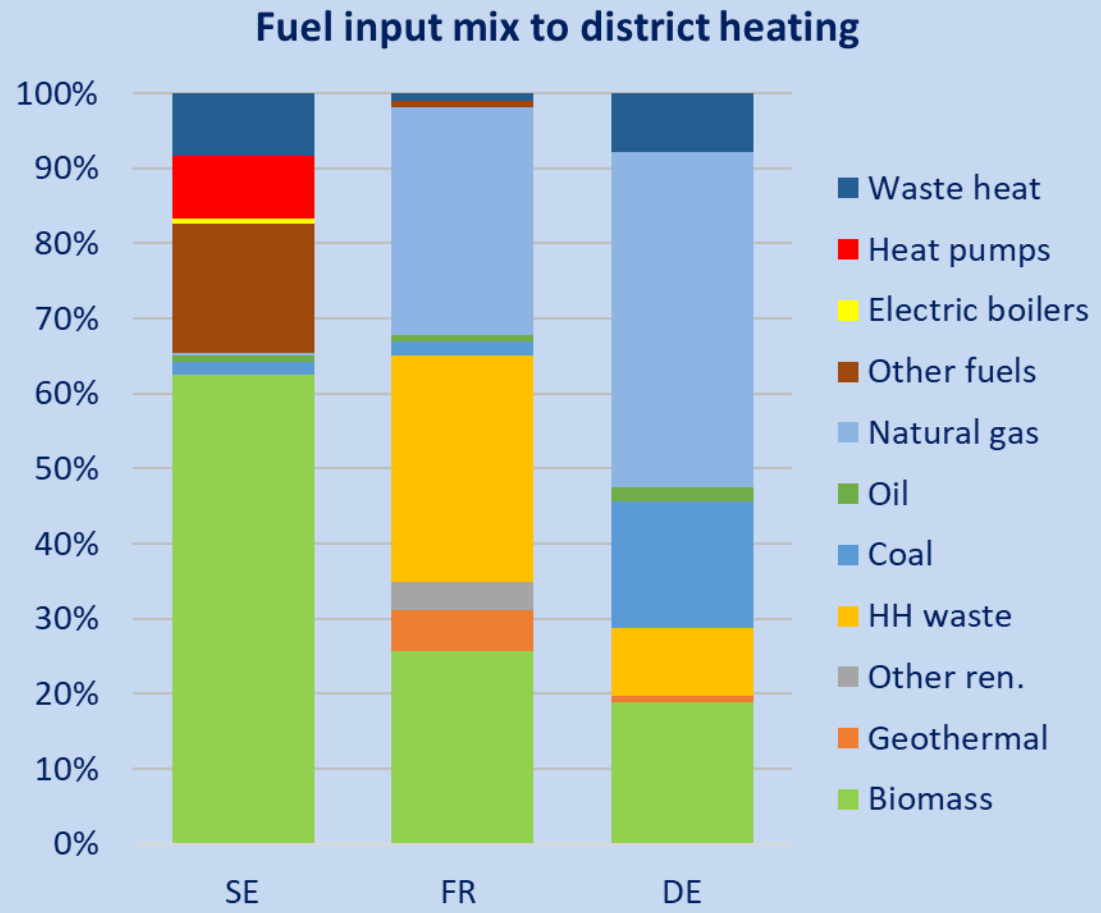




Source: National Heat Pump Associations

District-heating – role of supply and fuel mix





5. Sweden’s innovative concept – the ectogrid

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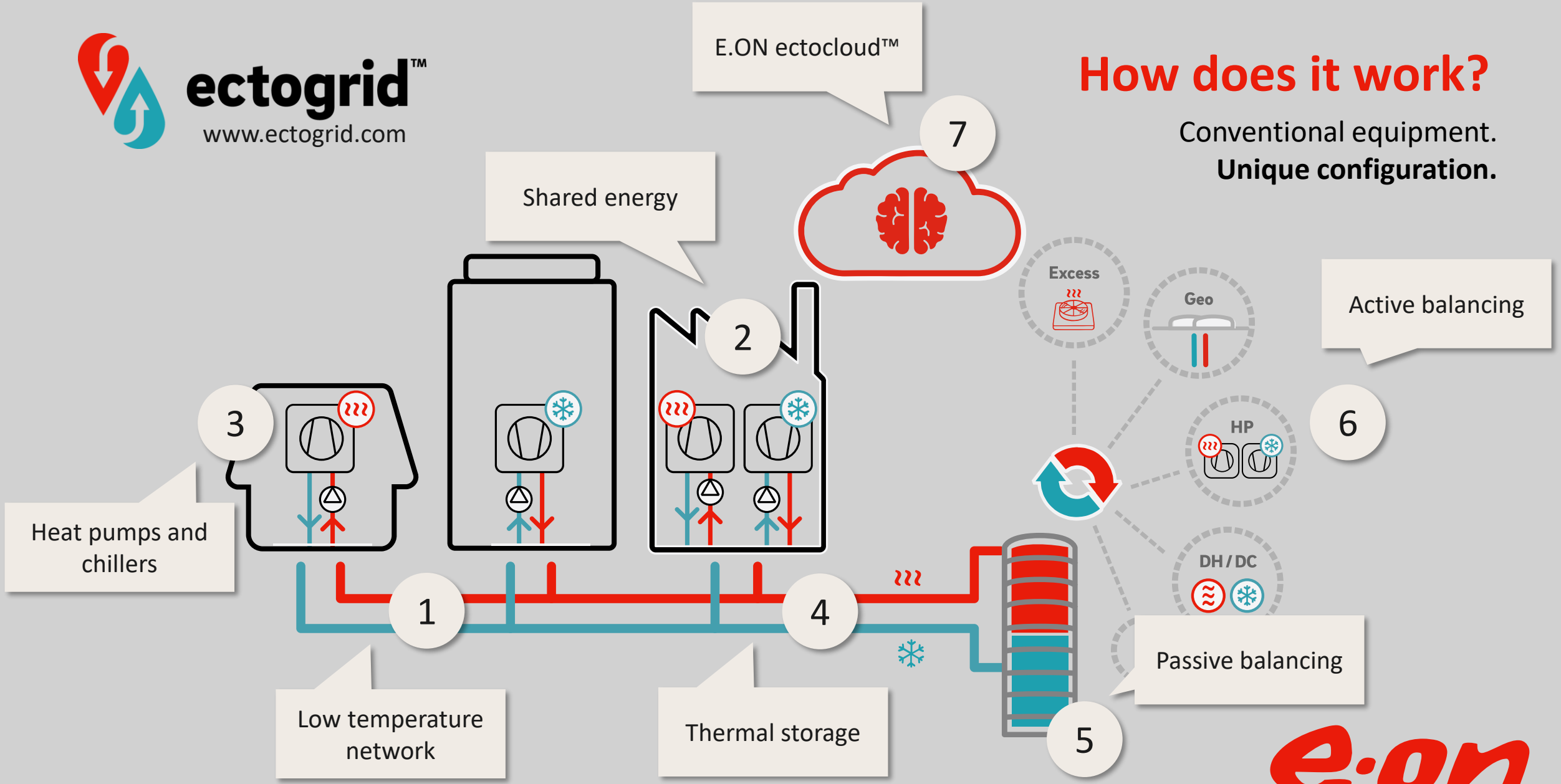

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heating and cooling

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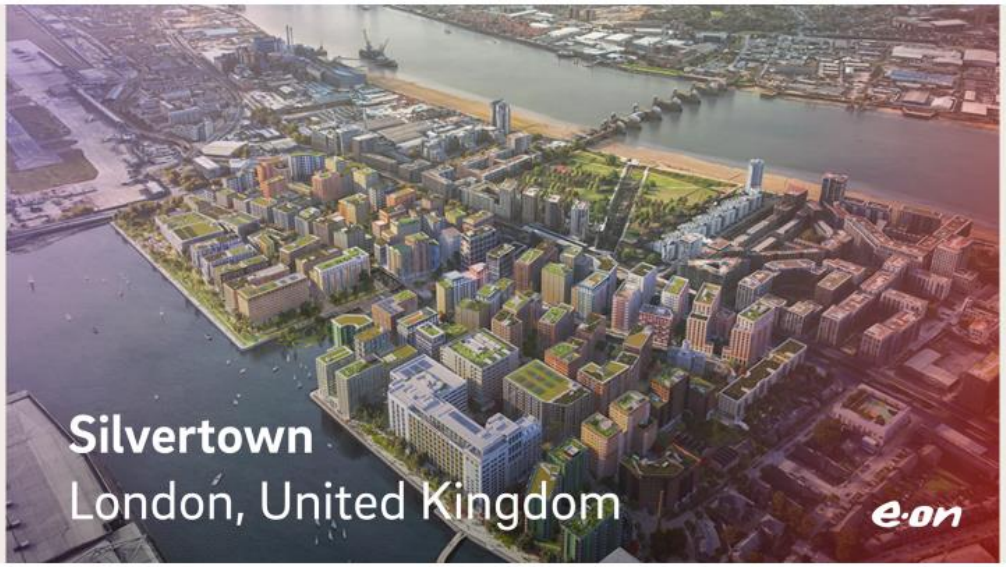
decreased external supplied energy



50 000 m^2
residential housing, offices, hotels, research facilities and data centres

40 GWh
heating and cooling

6 000
inhabitants, close to old Royal Docks and a sugar factory

88 %
reduced carbon emissions from heating and cooling

6. Realistic outlook to 2030

- A rocky road with progress too slow for target
- Electrification is the essential key, but is not straightforward
- Renewable power from wind and sun is not reducing the wholesale prices as wished, and network costs are increasing sharply
- Progress with heat pumps is the most important instrument
  - Requires subsidies, sufficient trained workers and some householder tolerance
- Push hard with pragmatic approach!

Thank you for your kind attention

Prof. Graham Weale

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Consultant, Expert Witness & Guest Speaker

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