

# The fourth carbon budget: An electric-centric future?

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## Key points

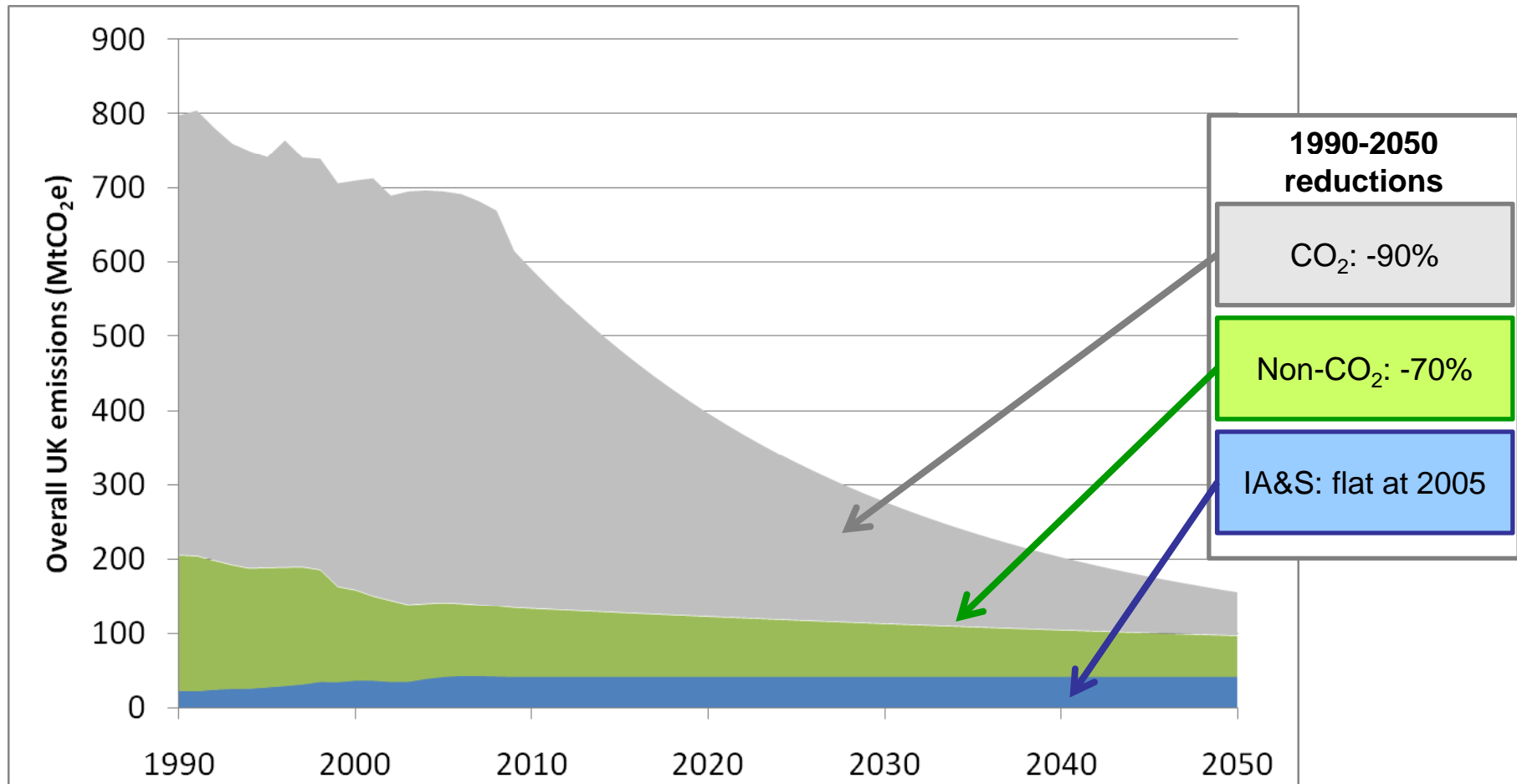


- 2050 emissions target requires **more than 80%** reductions in energy CO<sub>2</sub>
- CCC's **fourth budget** analysis identified significant changes towards this required by 2030, based on decarbonising electricity and extending to other sectors
  - **Renewable heat** likely to be cost-effective in many applications by 2030
  - Majority of new **cars** should be ultra low-carbon (electric) by 2030
  - The **power** sector should be largely decarbonised by 2030
- **Gas** has important but declining role

# 80% target will require >80% reductions in some sectors

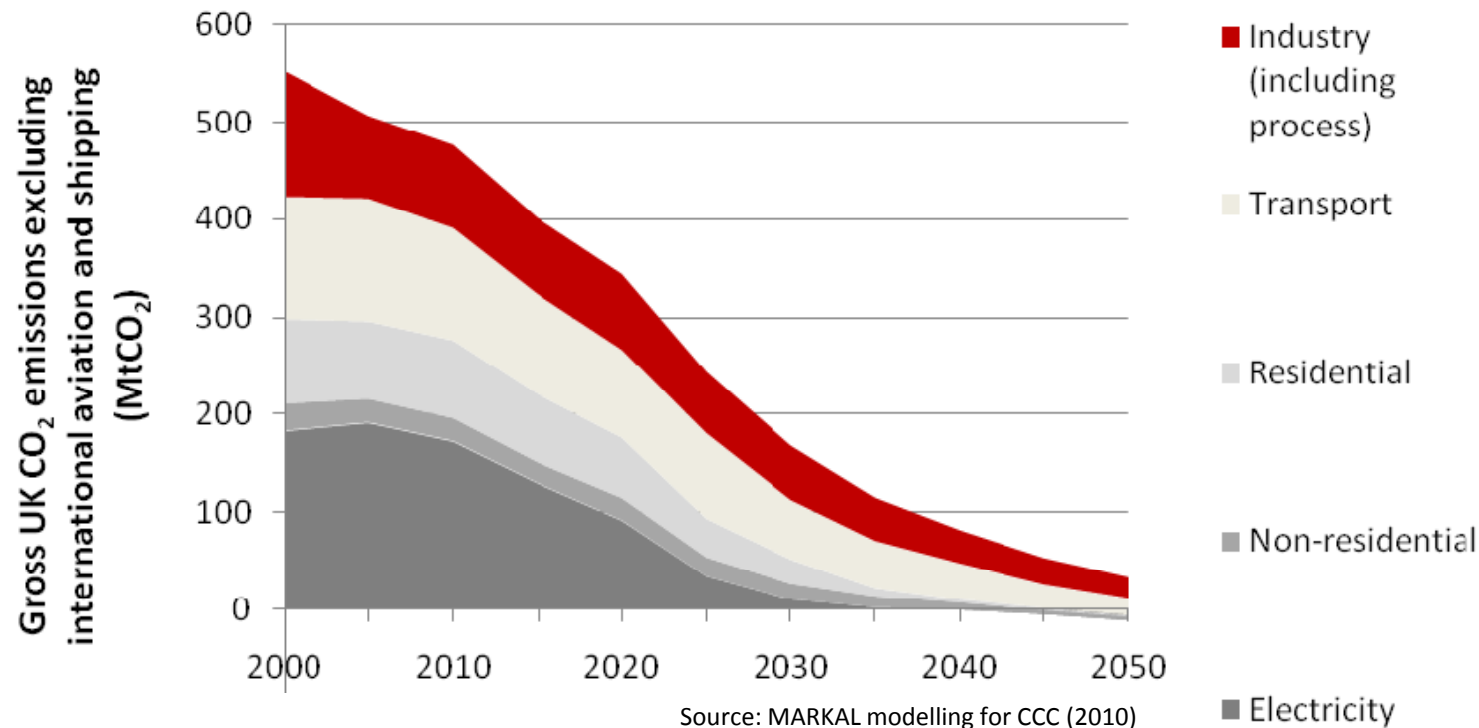


- UK domestic CO<sub>2</sub> emissions
- UK Non-CO<sub>2</sub> GHG emissions
- International aviation & shipping (bunker fuels basis)



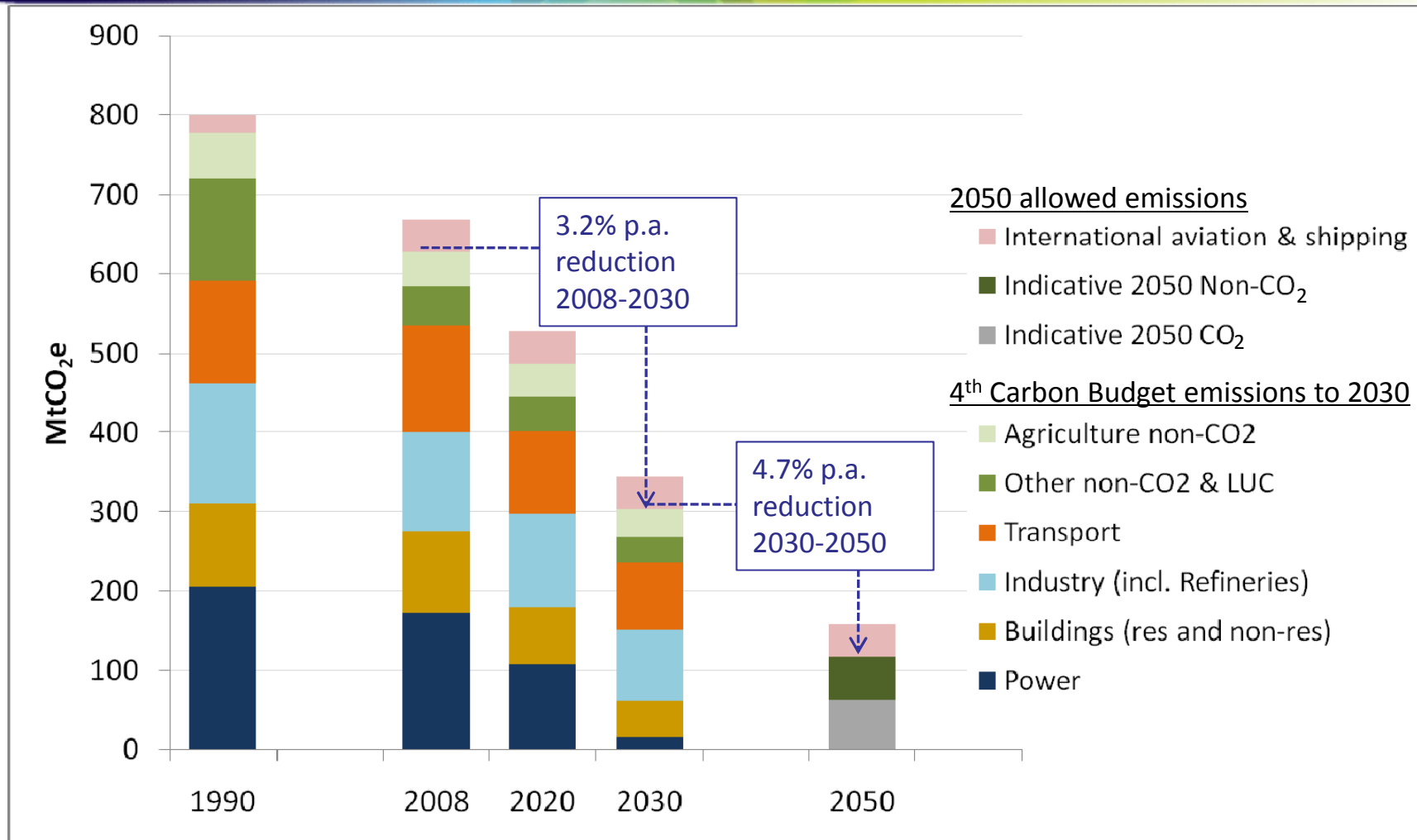
Source: NAEI and illustrative calculations

# Industry likely to be hardest to reduce -> Energy CO<sub>2</sub> may have to be close to zero-carbon by 2050



Full deployment of CCS at suitable sites, together with diversion of biogas and biomass from heating buildings (replaced by electrification) would still leave emissions at over 40 MtCO<sub>2</sub> (from a CO<sub>2</sub> pot of around 60-70 MtCO<sub>2</sub> for 2050)

# Fourth Carbon Budget: a feasible and cost-effective scenario for 2030, appropriate on the path to 2050

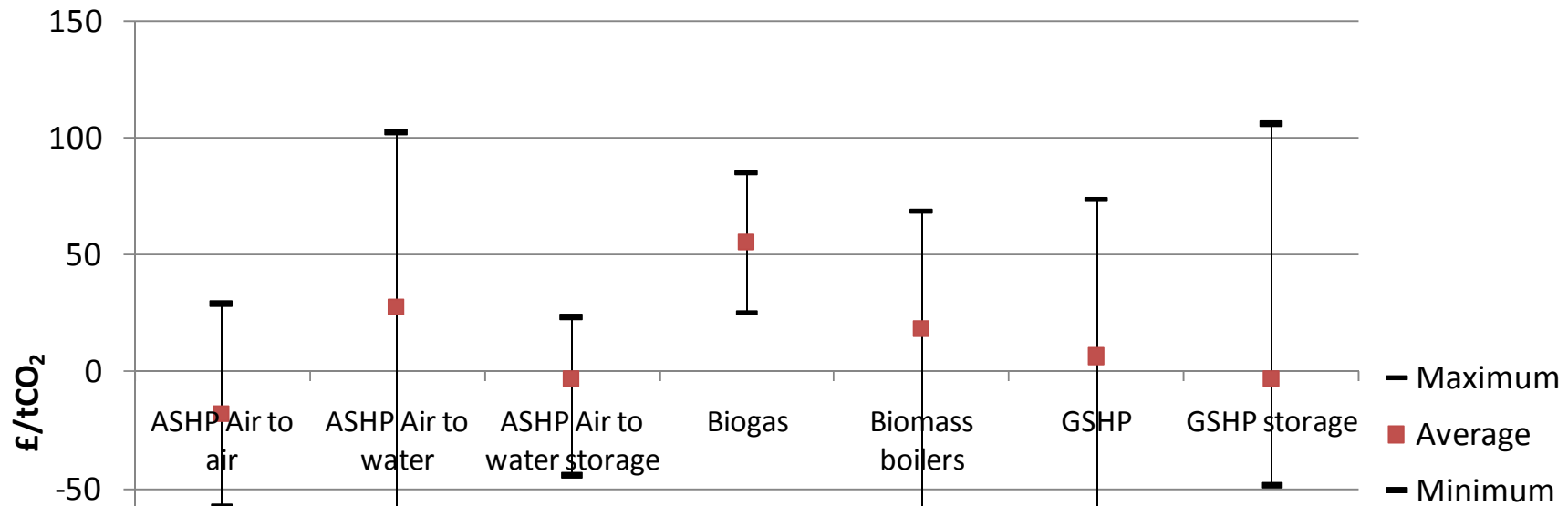


Source: CCC (2010) The Fourth Carbon Budget

# Heat: By 2030 a range of renewable heat technologies likely to be cost-effective in various applications

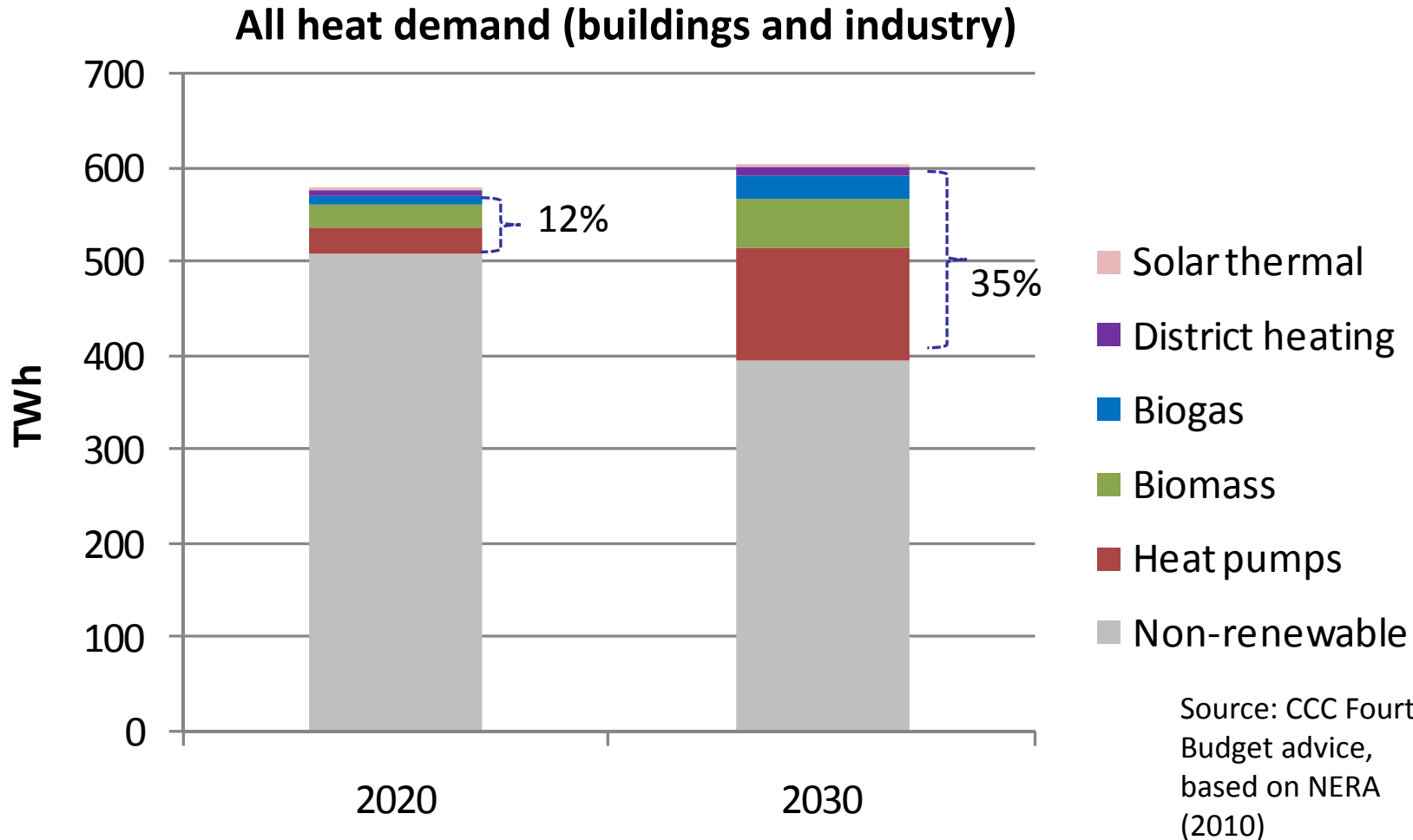


### Abatement costs of low-carbon heat technologies (2030)



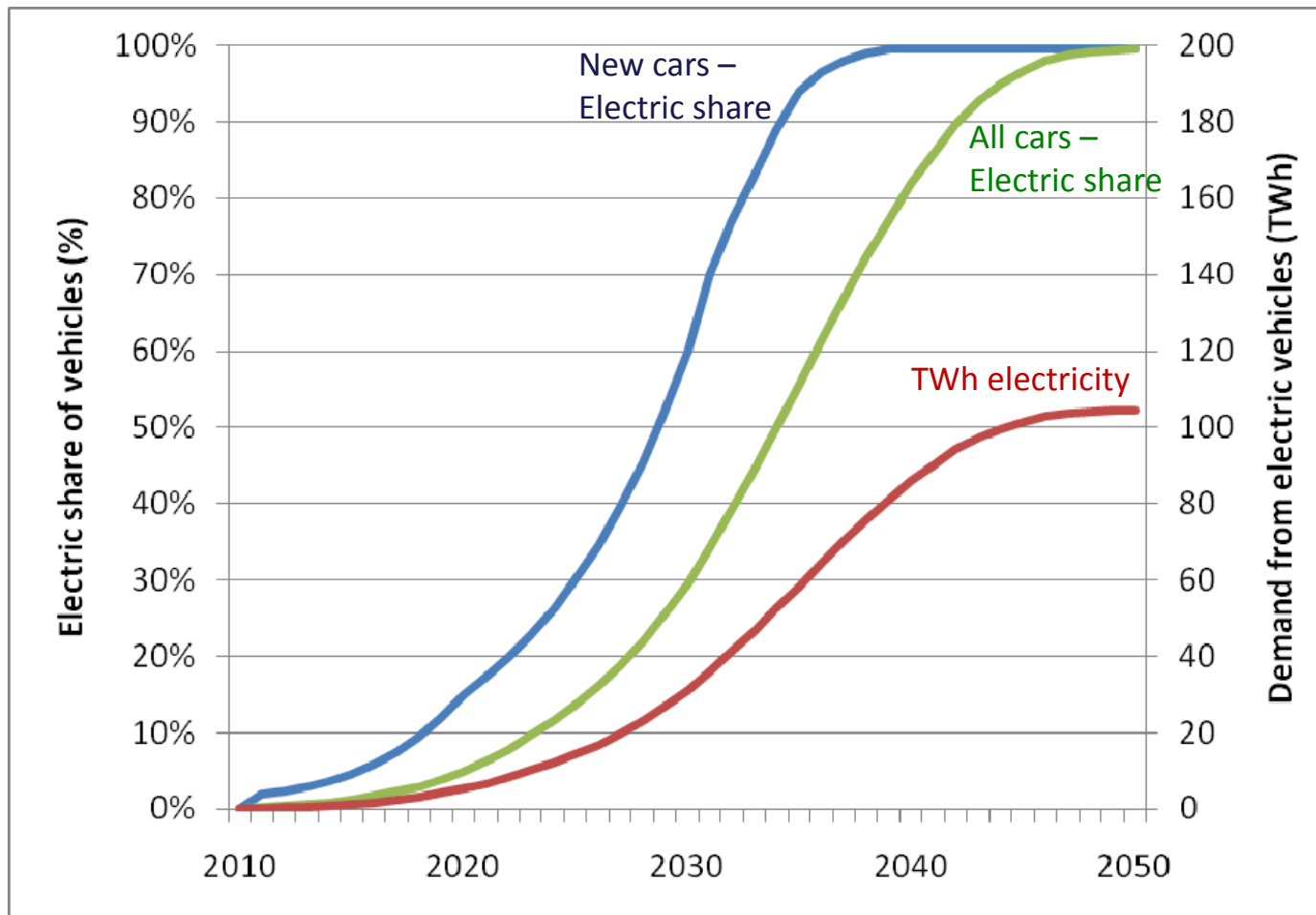
Source: CCC modelling; NERA (2010). Cost ranges reflect different demand segments

# Major expansion of renewable heat therefore appropriate to 2030, with progress required by 2020



-> Electricity in heating: +20 TWh by 2030, + 50 TWh by 2050

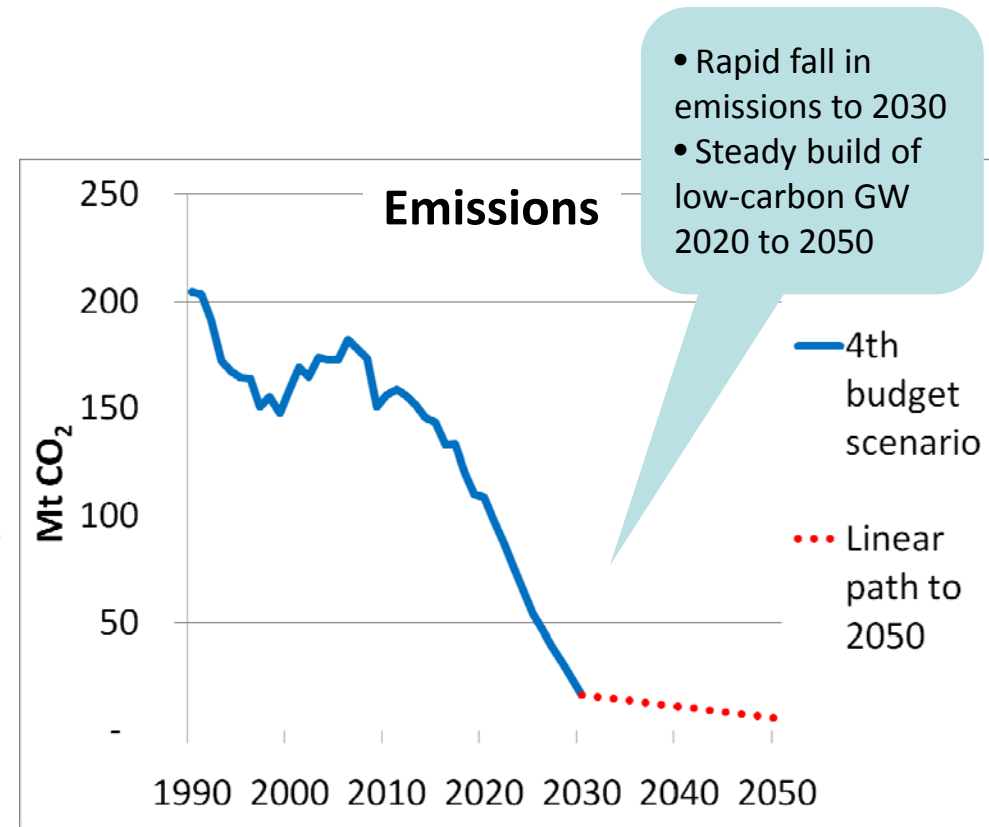
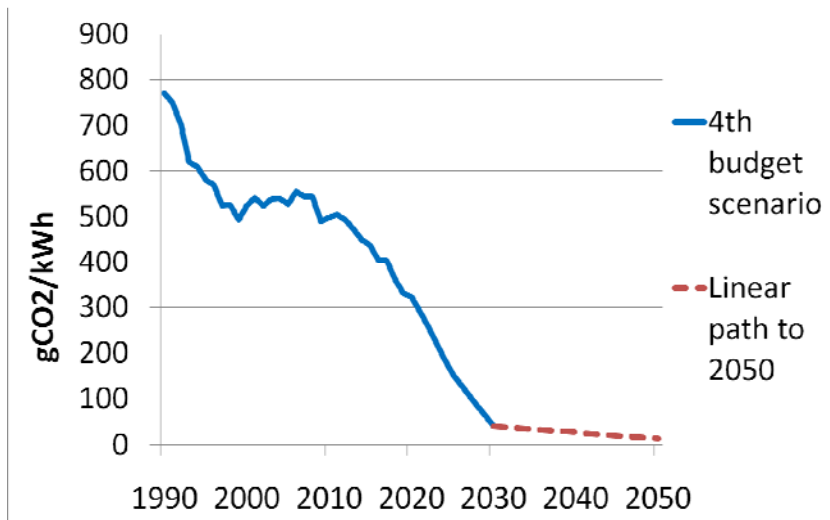
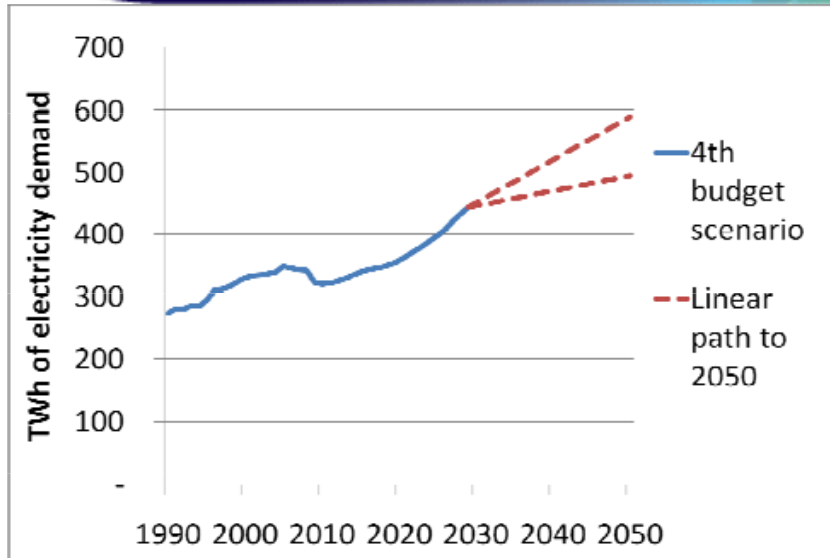
# Cars: Low-carbon vehicles to be 60% of new sales in 2030, with sharpest electricity increases after 2030



Source: illustrative calculation only, based on CCC Fourth Budget scenarios

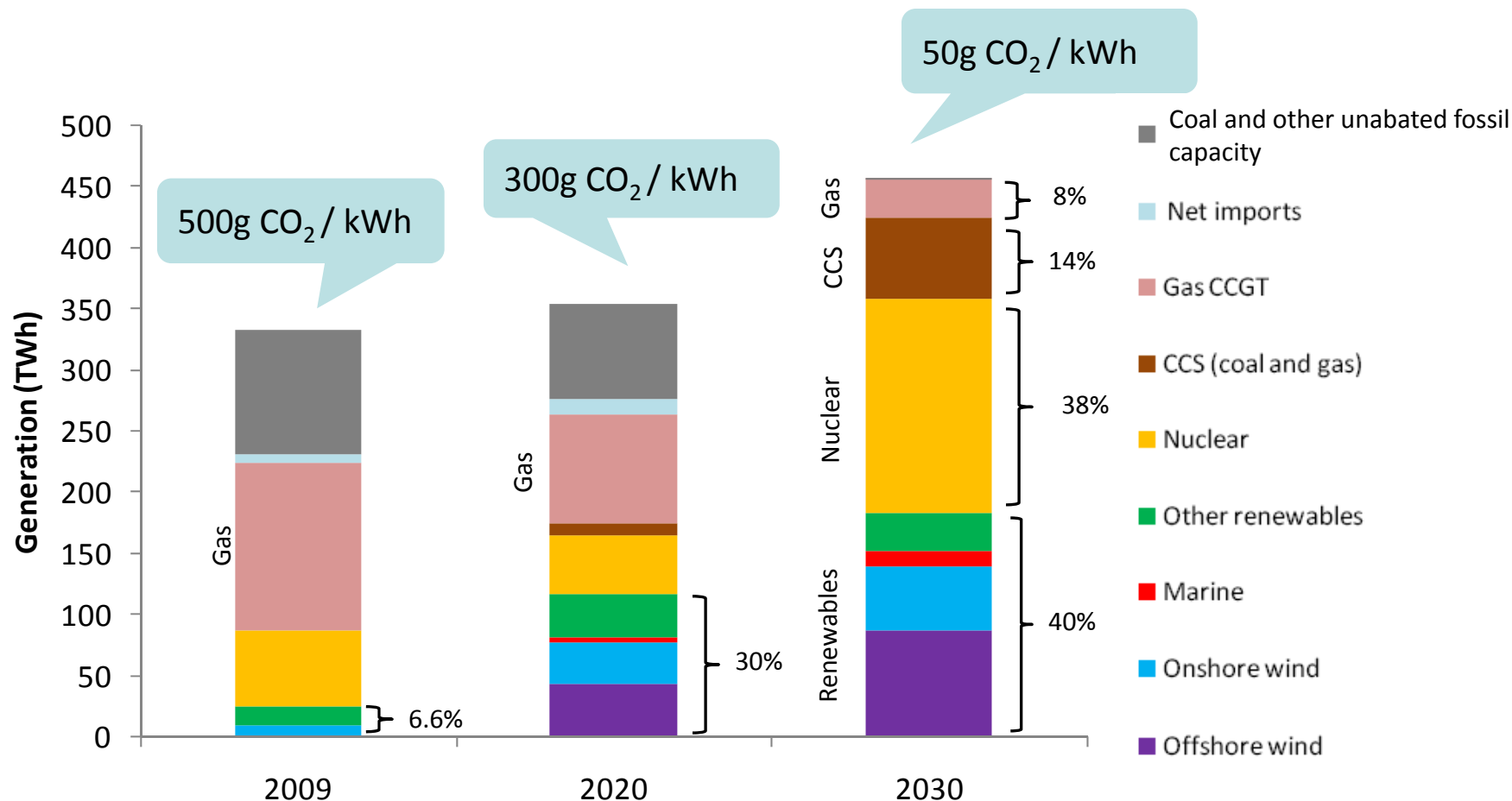
Electric load for transport potentially flexible and off-peak

# Power: Emissions intensity will have to decrease, whilst demand is likely to increase



Source: Medium scenario and range of MARKAL model runs for CCC (2010)  
The Fourth Carbon Budget

# An illustrative scenario for power sector decarbonisation to 2030 – 40% renewable, 40% nuclear



Source: DUKES (2010), CCC Calculations, based on modelling by Pöyry Management Consulting. Includes losses, excludes generator own-use and autogeneration.

## Gas use without CCS phased out by 2050, with declining but important role during transition



### Gas in the power sector

- Important back-up role in 2030 – TWh down, GW up (network challenges)
- Some new build to 2020, very limited after 2020
- With CCS, depending on technology development

Major expansion in CCGT to 2030 raises risks over CCS viability, cost and acceptability, and may fail to develop alternatives.

### Gas in the heat sector

- More efficient use:
  - Boiler replacement to 2030 remains low-cost option
  - Some CHP (micro and large)
- Fuel switching in industry
- Biogas?
  - Availability uncertain, but likely to be limited compared to current gas demand
  - Industrial use particularly attractive (clean, high-grade)