The Energy Context

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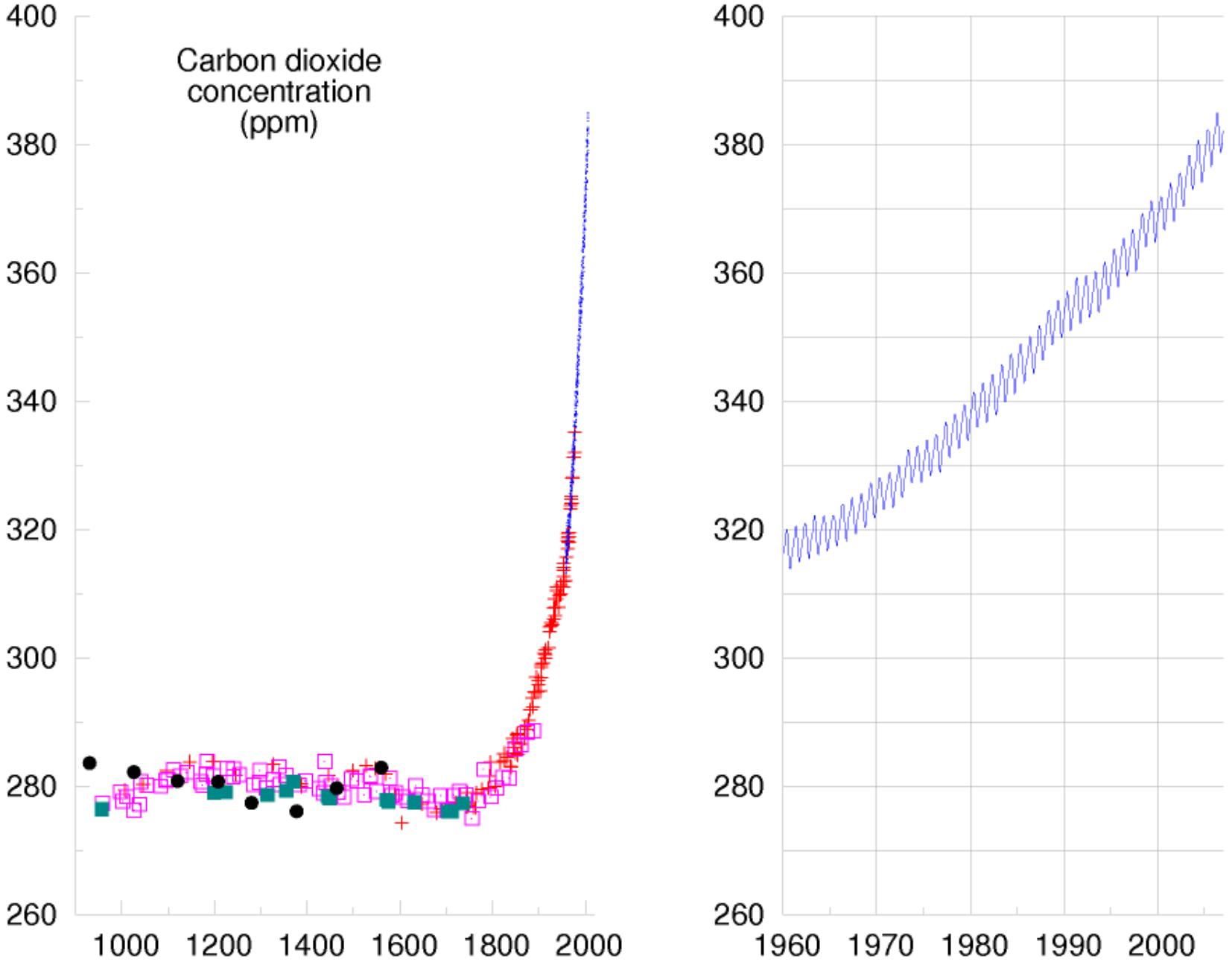
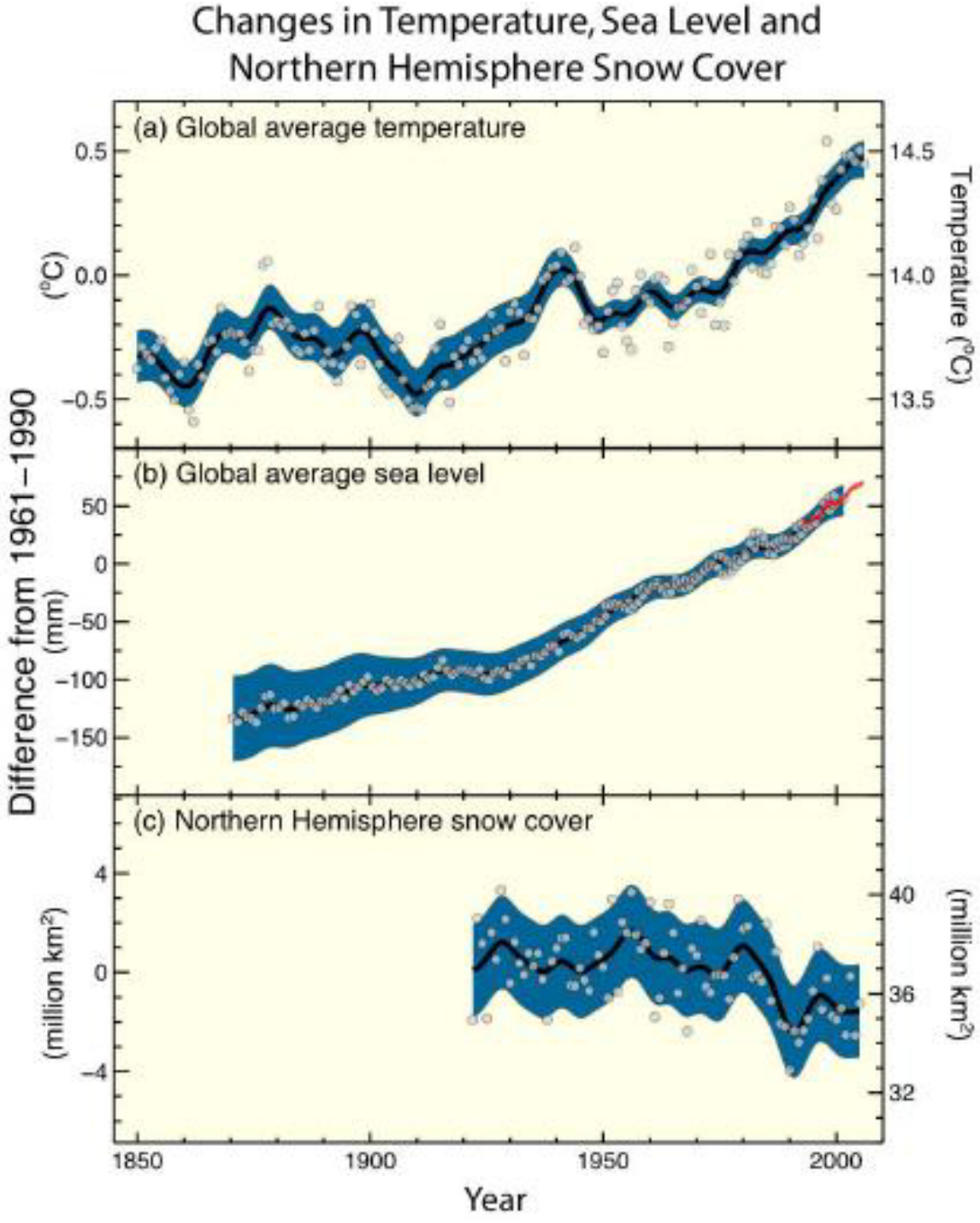
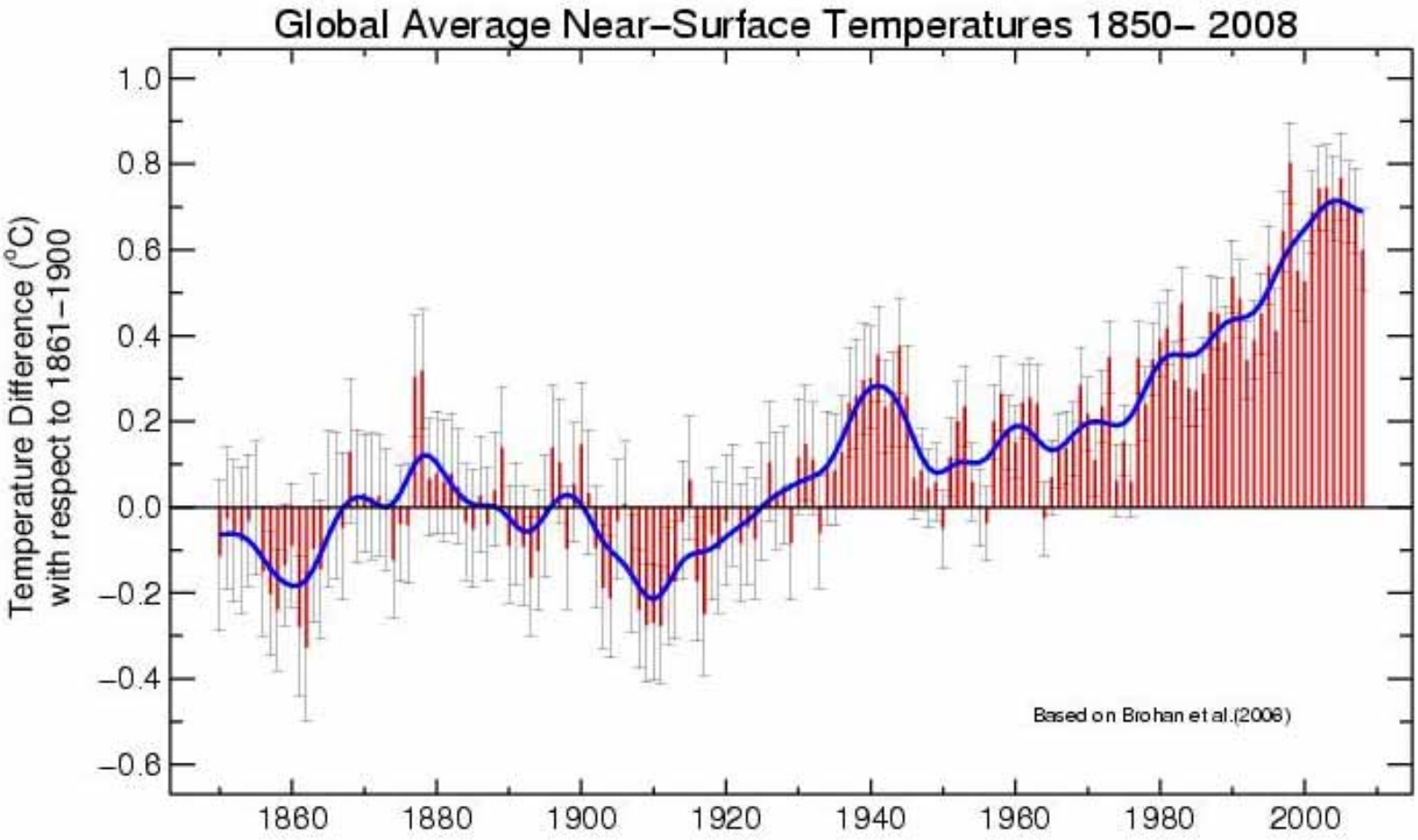
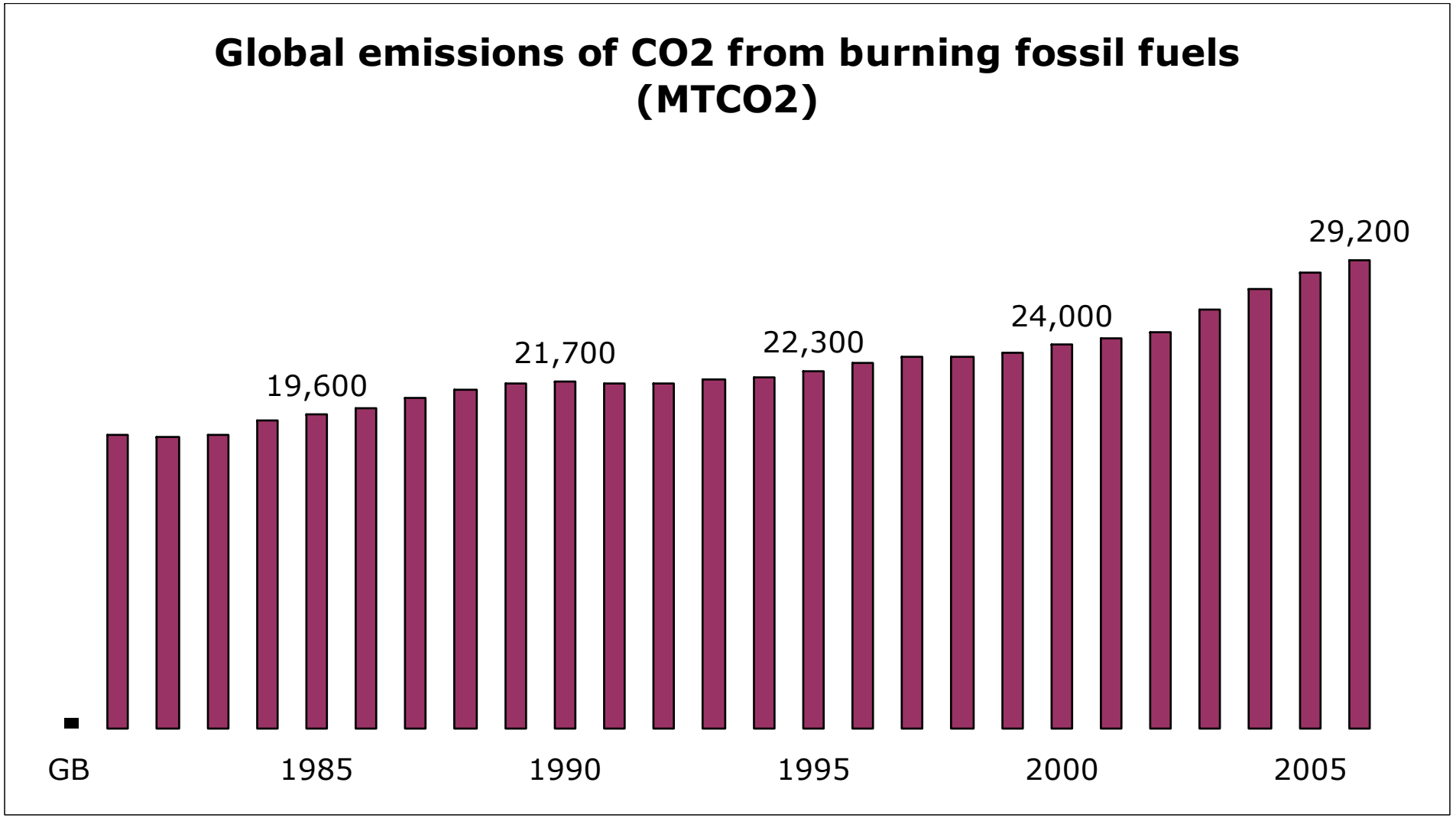


Sources: Keeling and Whorf (2005); Neftel et al (1994); Etheridge et al (1998); Siegenthaler et al (2005); Indermuhle et al (1999)

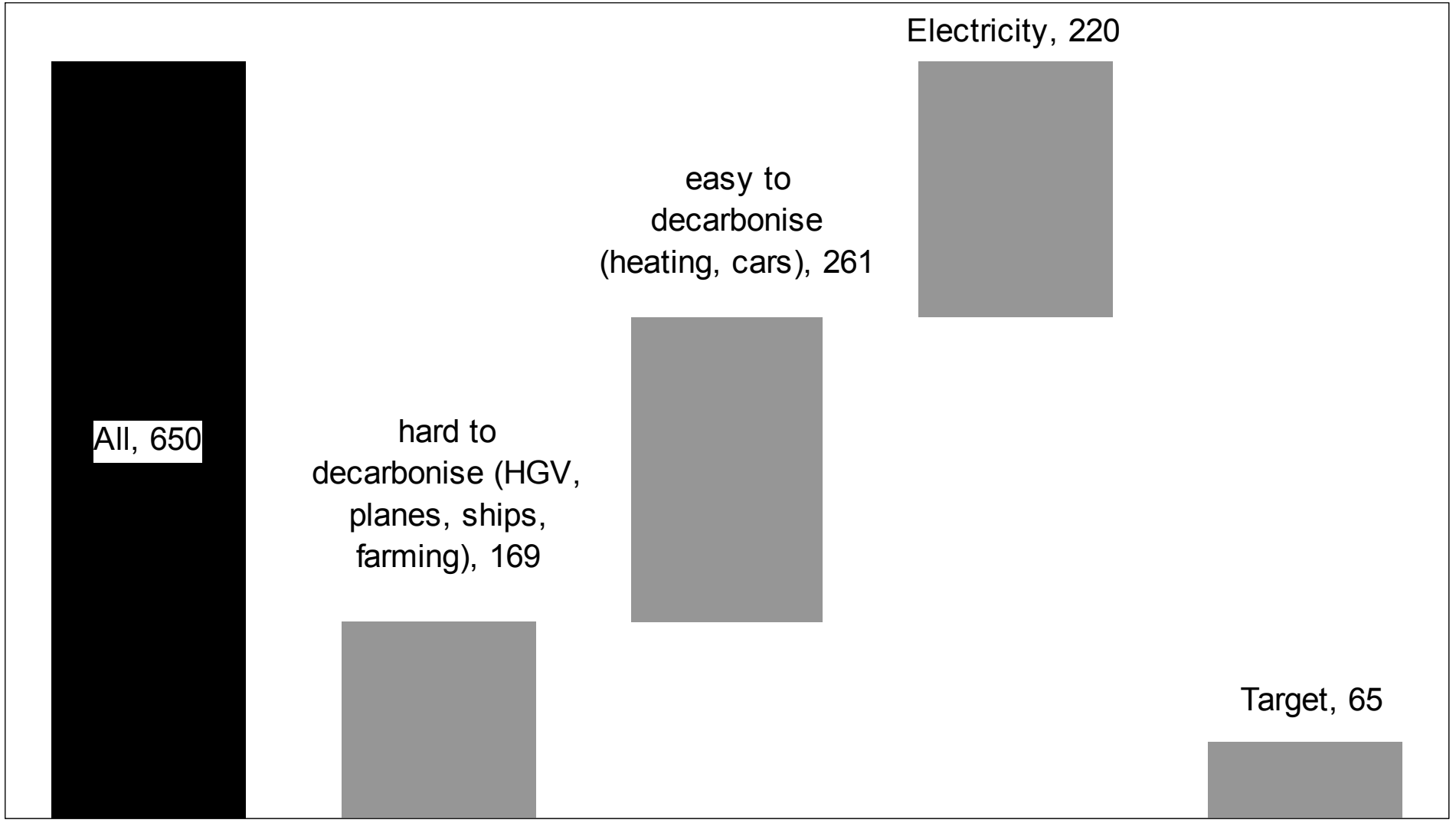

Changes in Temperature, Sea Level and Northern Hemisphere Snow Cover
(a) Global average temperature
(b) Global average sea level
(c) Northern Hemisphere snow cover
Difference from 1961–1990
(°C)
(mm)
(million km²)
Temperature (°C)
(million km²)
0.5
0.0
−0.5
14.5
14.0
13.5
50
0
−50
−100
−150
4
0
−4
40
36
32
1850
1900
1950
2000
Year

The last 10 years are all in the top 15 warmest years on record

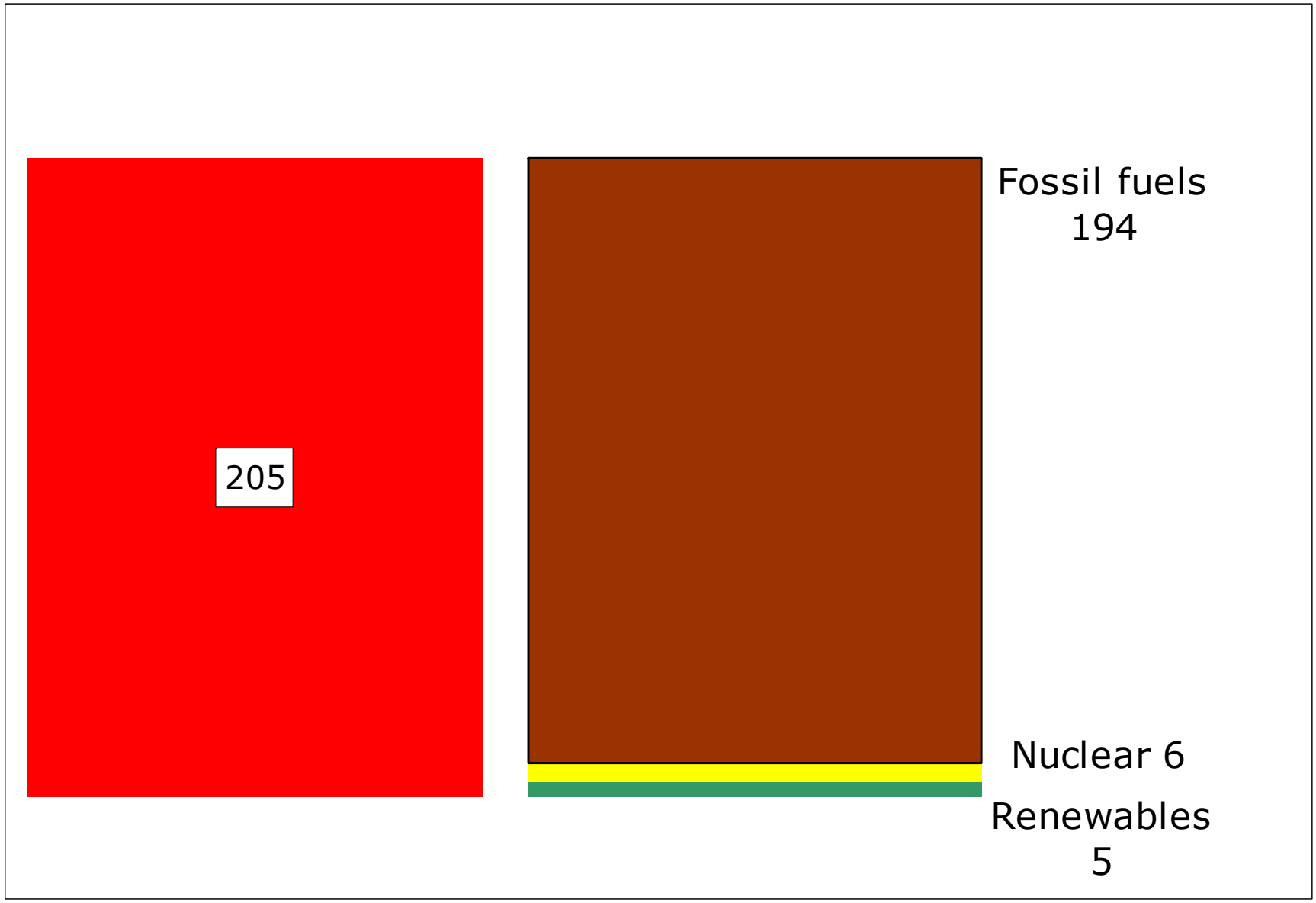



Global emissions of CO2 from burning fossil fuels (MTCO2)
19,600
21,700
22,300
24,000
29,200
GB
1985
1990
1995
2000
2005

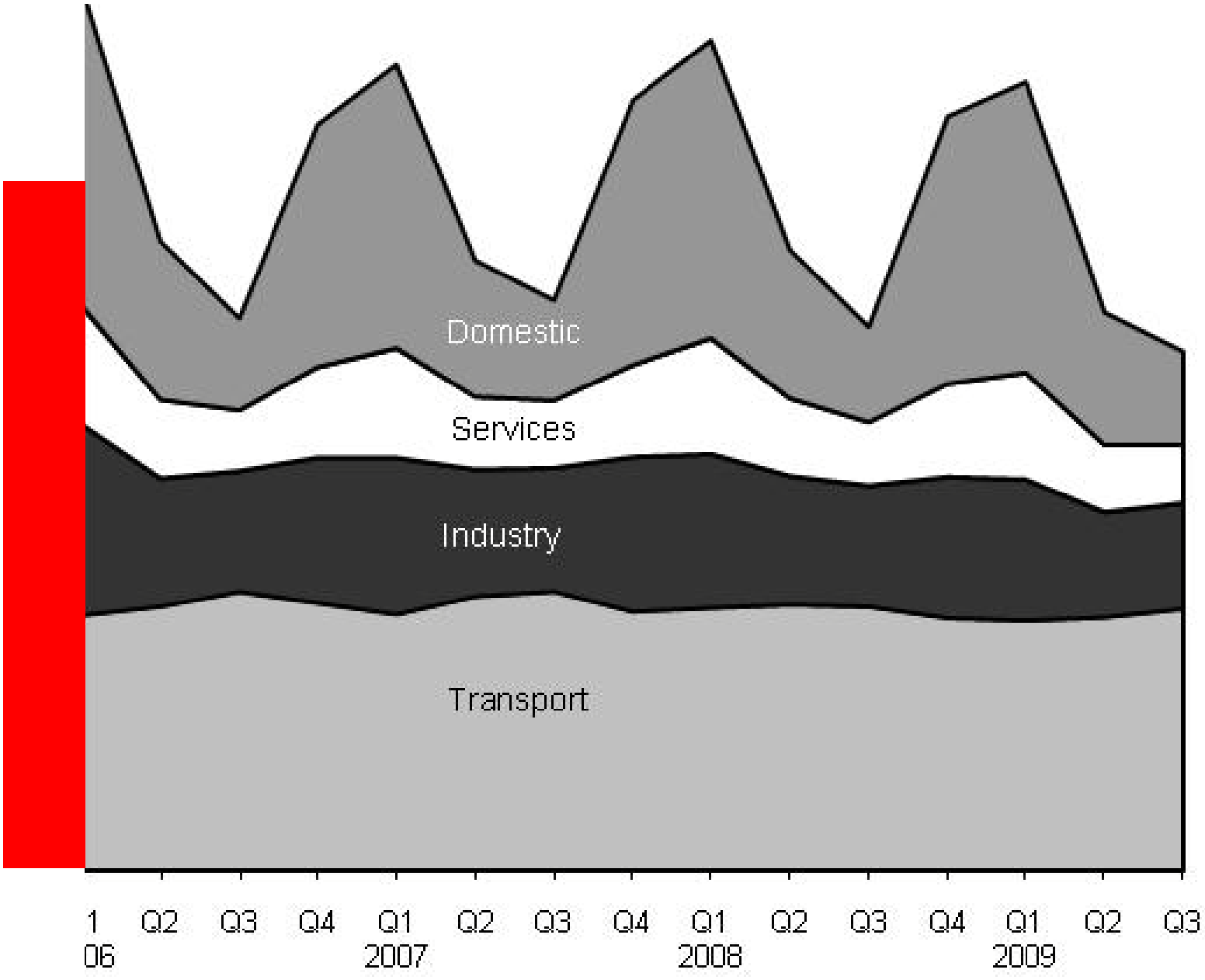
GB carbon emissions (MTCO2e)



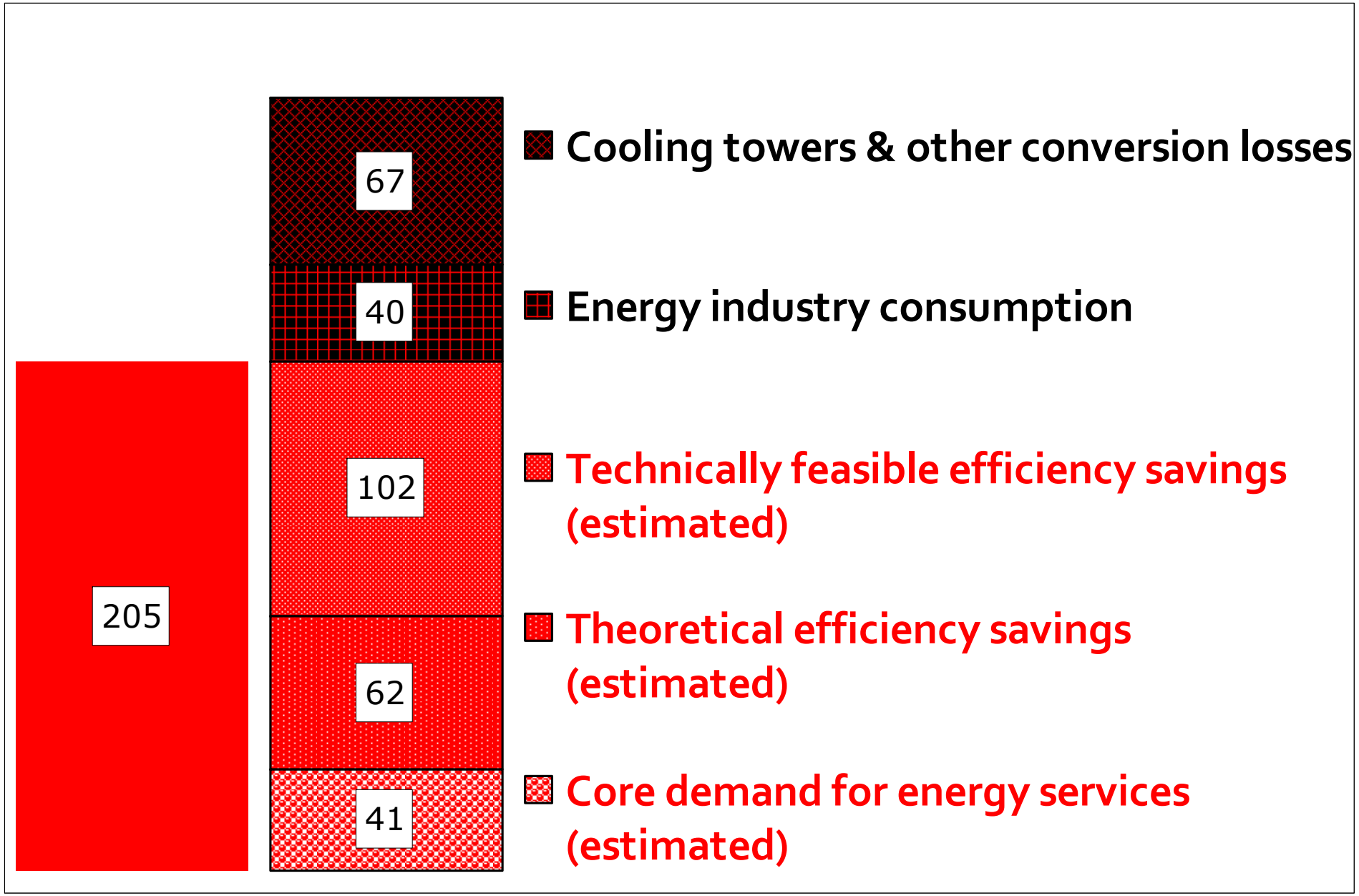
GB Energy Sources in 2008 (GW)



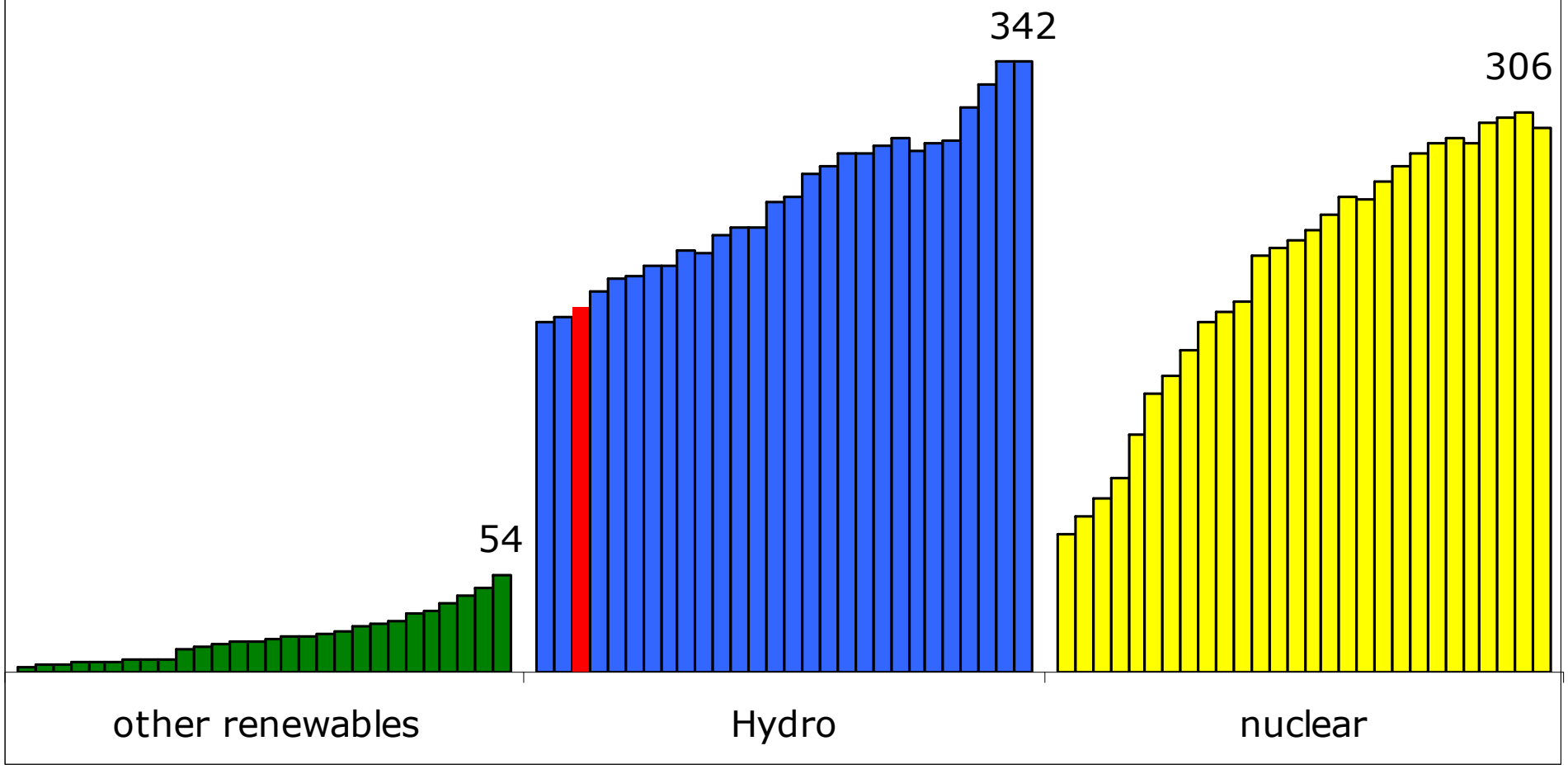
GB Energy demand, by end user and by season



GB Energy Demand (GW, 2008)

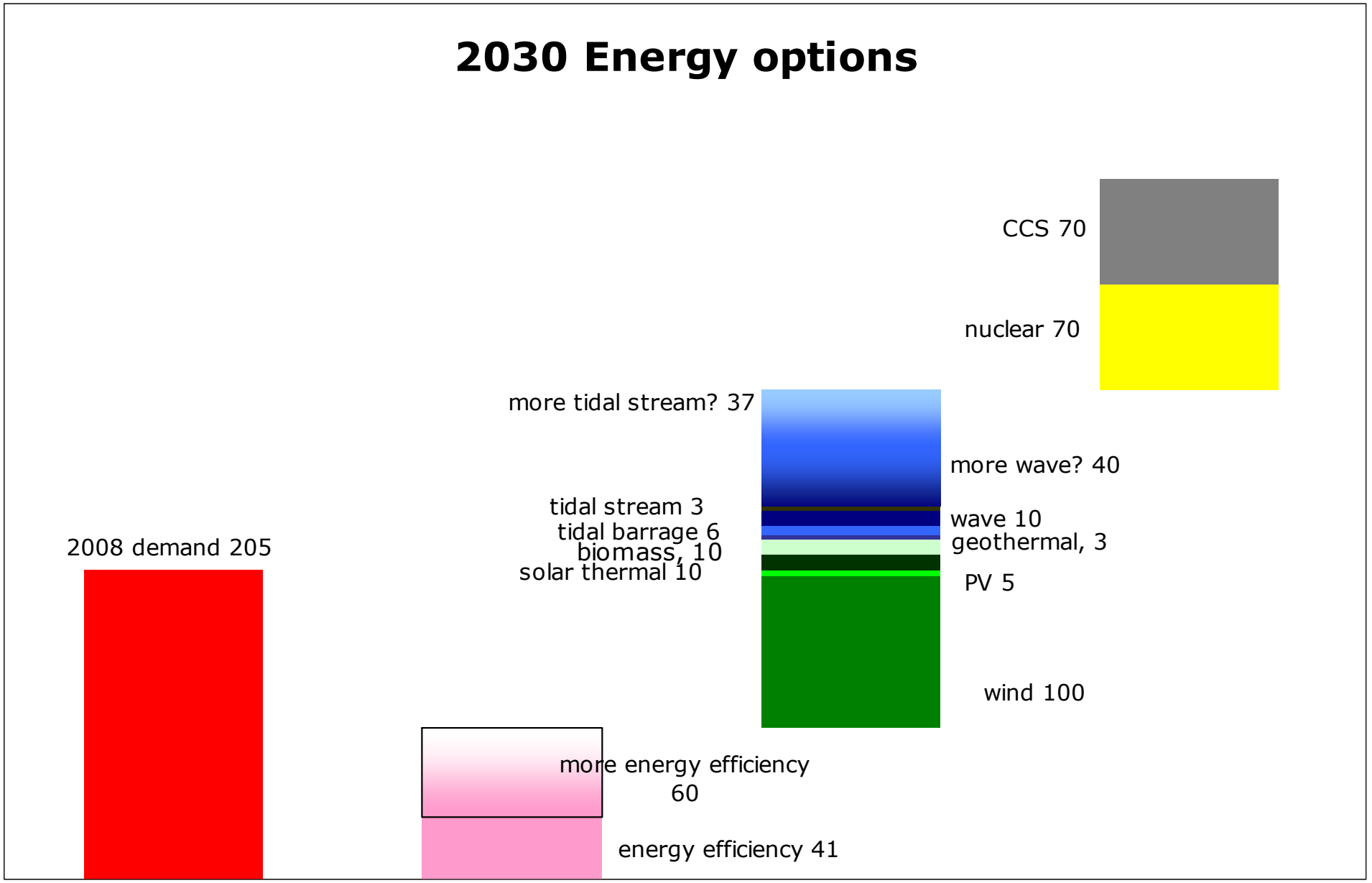


Global low-carbon electricity production, 1980-2007 (GW)



The map to 2020

- Large amounts of coal, nuclear and old gas plant is obsolete and will be closed over the next 6 years, meaning we need to build lots of new generation before 2016
- Legal obligation: 20% energy efficiency, lowering demand to 164GW
- Legal obligation: 15% of our energy from renewables - 24GW
- Wind: capacity trending upwards and accelerating, forecast is for 12-14GW
- Some tidal barrage: up to 3GW
- Biomass, sewage plants, landfill: 3GW
- Photovoltaics (solar electricity): capacity low, globally accelerating, but expensive in Britain, and highly seasonal - unlikely to be over 1GW by 2020
- Tidal stream and wave ready for commercial deployment by 2015: 1GW expected by 2020
- Solar thermal, biomass for heating?
- CCS ready for commercial deployment by 2020, with question marks over cost, viability, fuel supplies and net CO2 emissions
- Nuclear in decline, with most stations closing, none likely to open before 2020


2030 Energy options
CCS 70
nuclear 70
more tidal stream? 37
more wave? 40
tidal stream 3
wave 10
tidal barrage 6
geothermal, 3
biomass, 10
solar thermal 10
PV 5
2008 demand 205
wind 100
more energy efficiency 60
energy efficiency 41

Closing thoughts

- All of our low-carbon options generate far more power than it takes to build them, by a factor of 5-30. Except biodiesel.

- We can balance demand and supply with pretty much any combination of supply-side technologies: that is to say, we have affordable technical solutions for *all* the issues of generator inflexibility, variability and intermittency.

- Britain's current decarbonisation path is nowhere near fast enough to meet our international responsibilities, to make up for our historic liabilities, or to maintain world leadership in 21st century technologies: we *must* accelerate the deployment of energy efficiency and low-carbon power.