

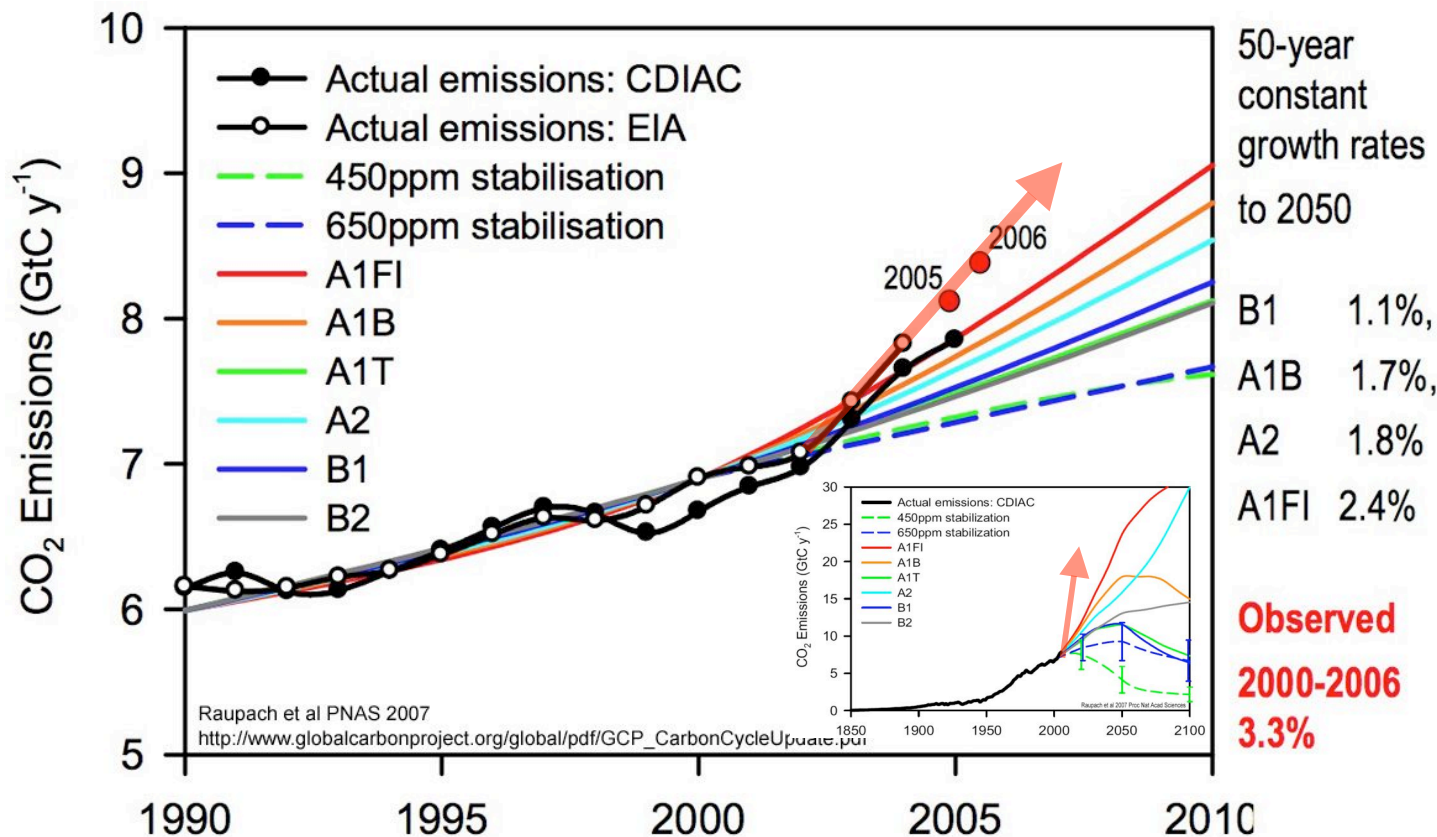


Mitigation and Adaptation

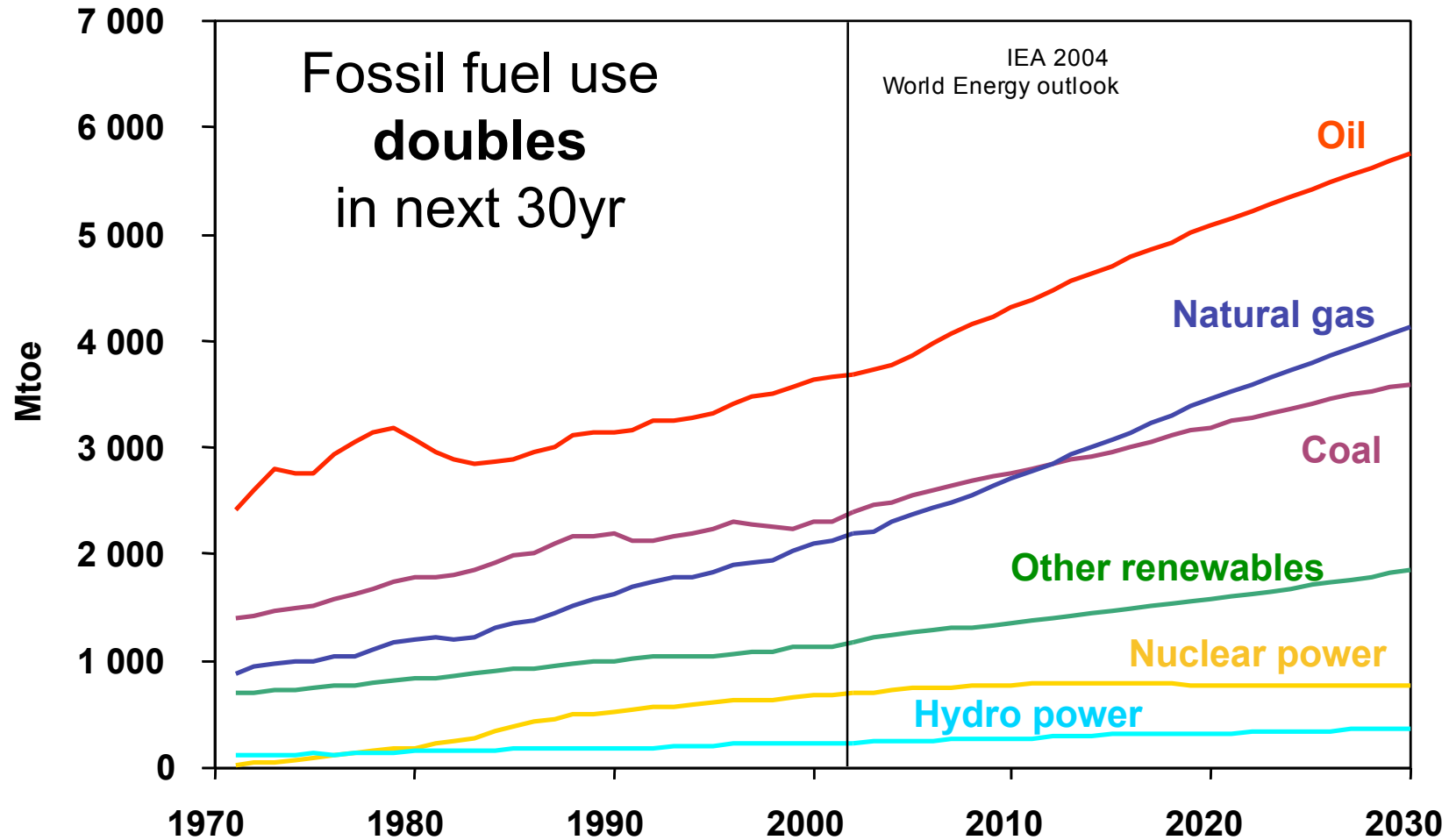
Stuart Haszeldine

University of Edinburgh

CO₂ rate of emission rising

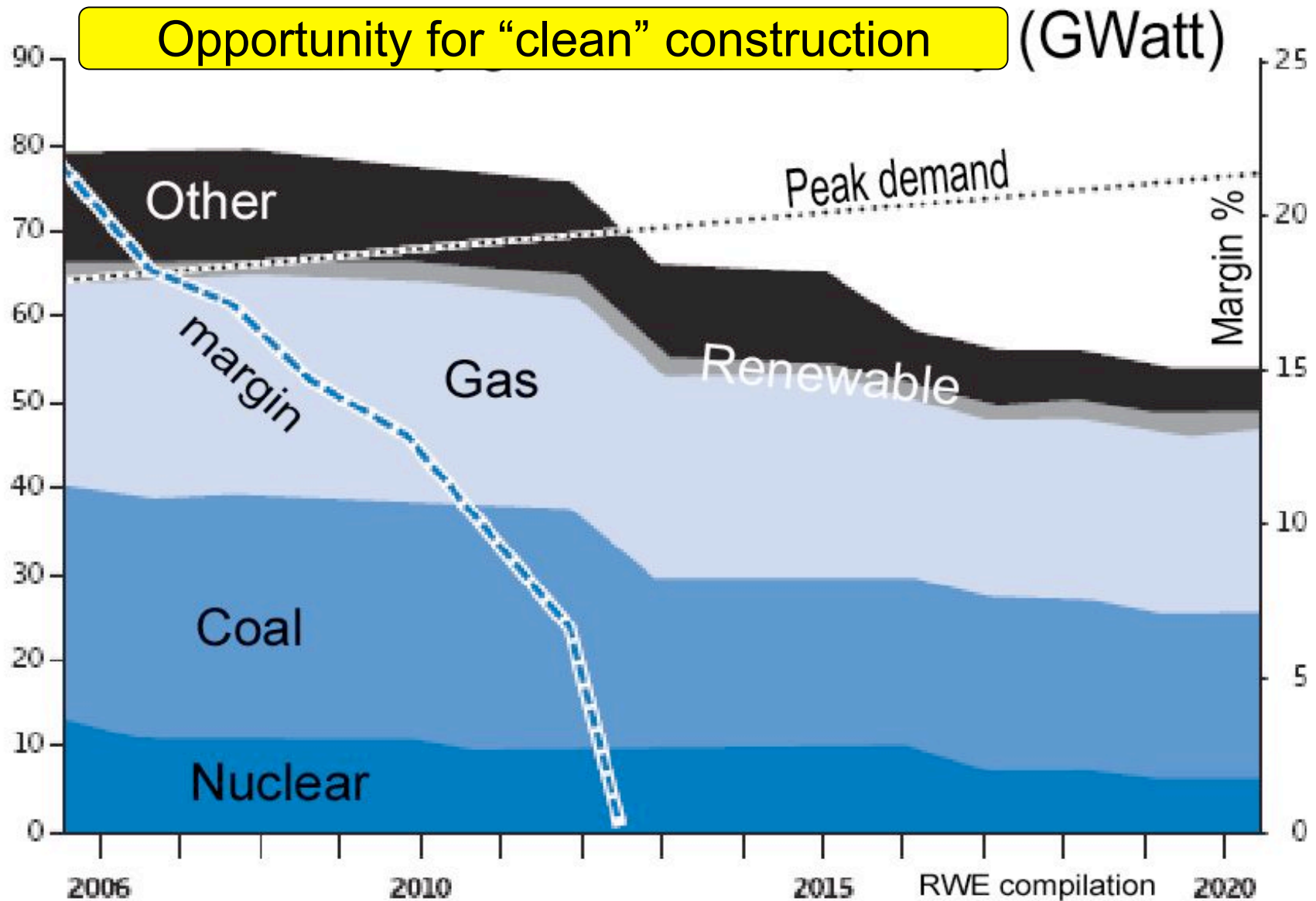


World energy prediction (Business as usual)



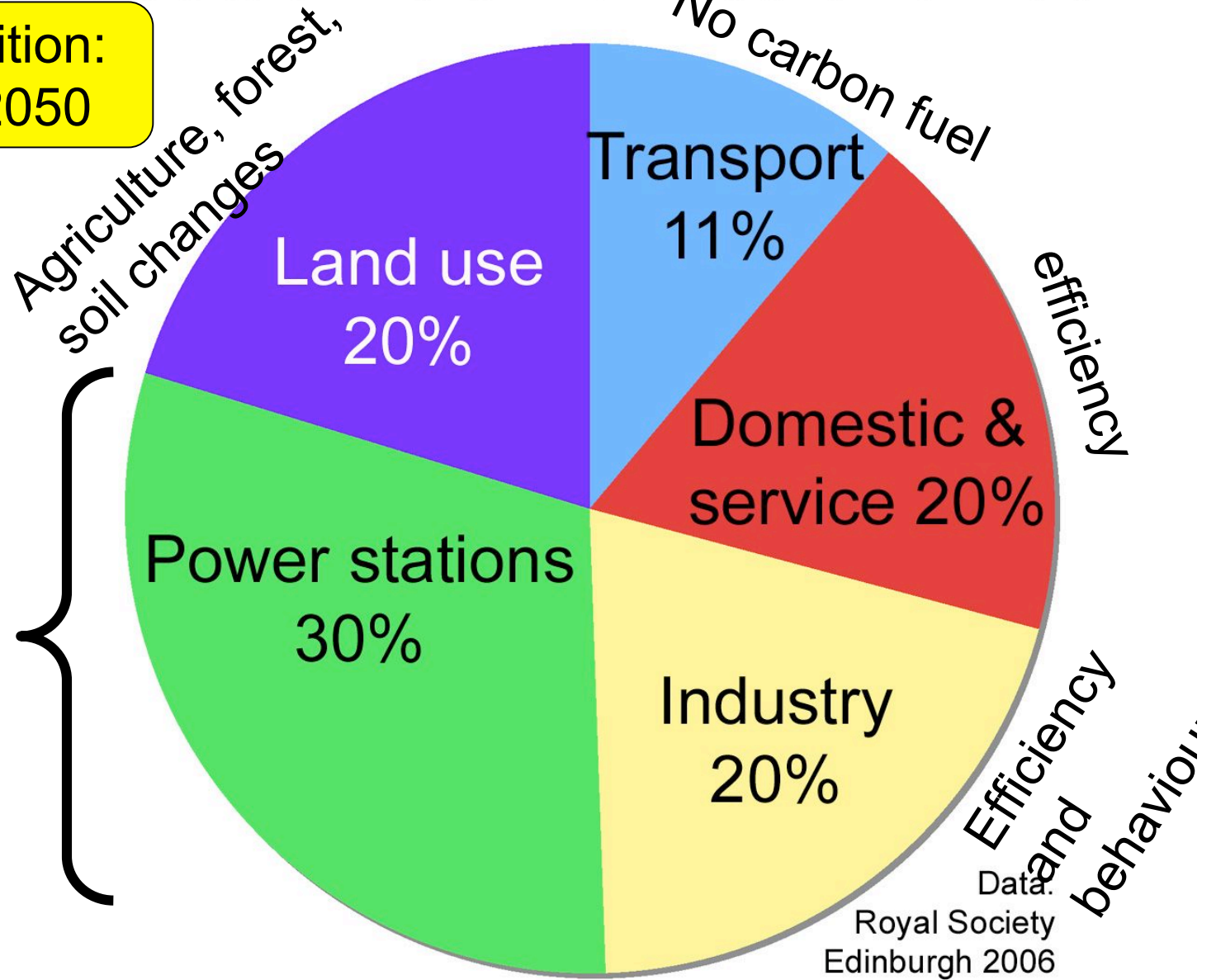
Fossil fuels will still provide most of world energy

UK Electricity gap ?



Scottish CO2 emissions 2002

Scottish Ambition:
80% cut by 2050



EITHER

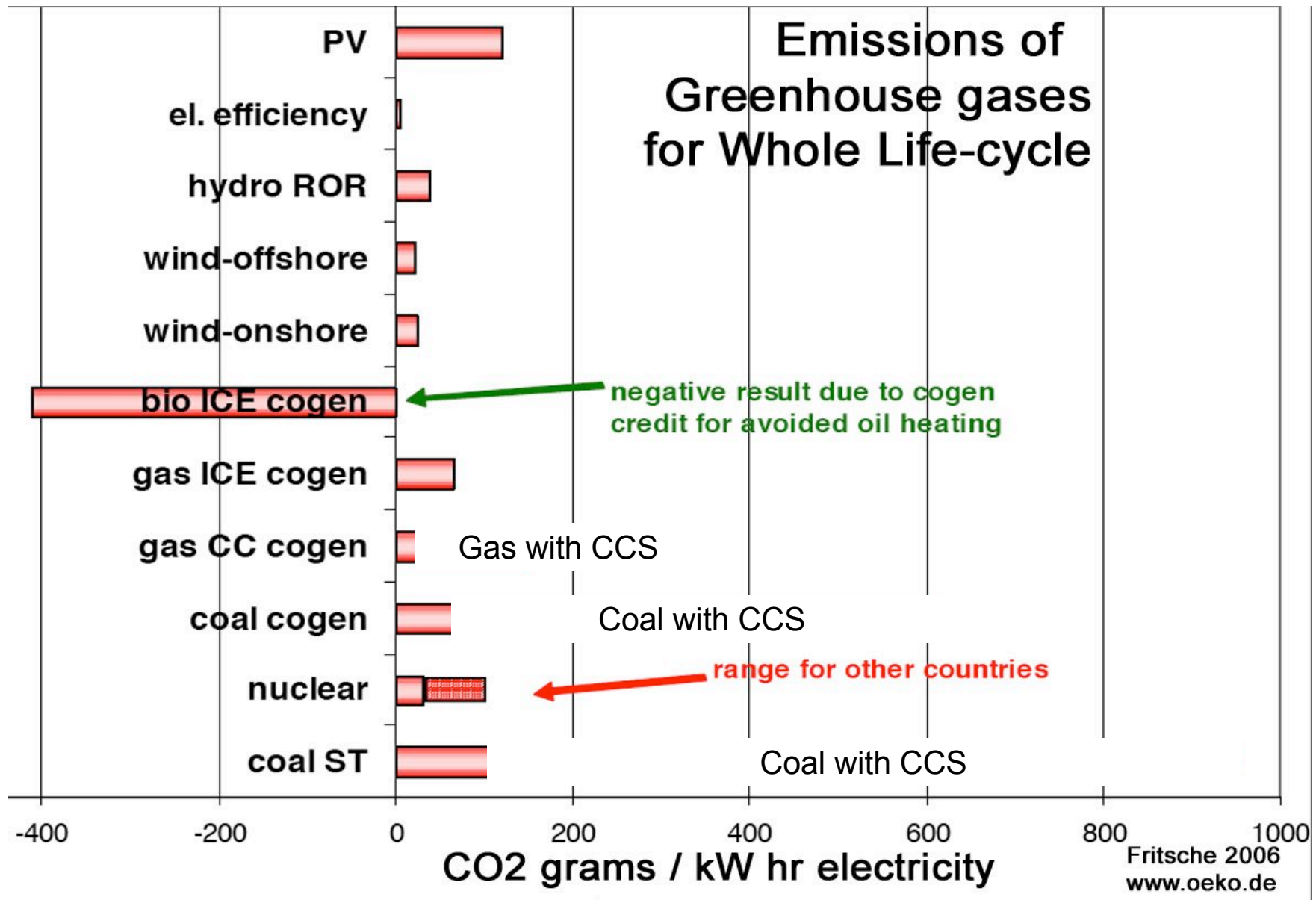
Stop coal and gas use

OR

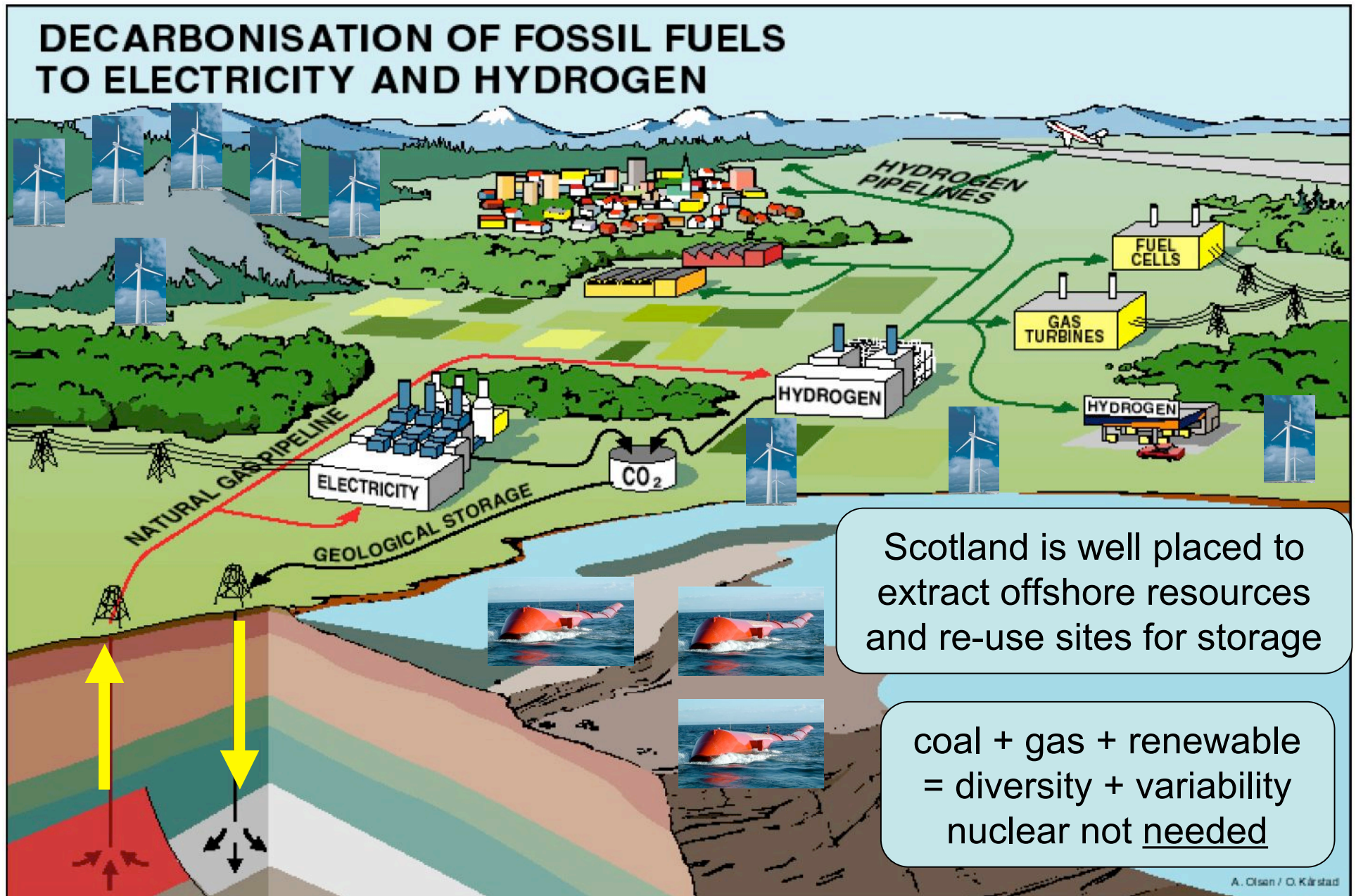
Capture CO2

OR nuclear & renewable

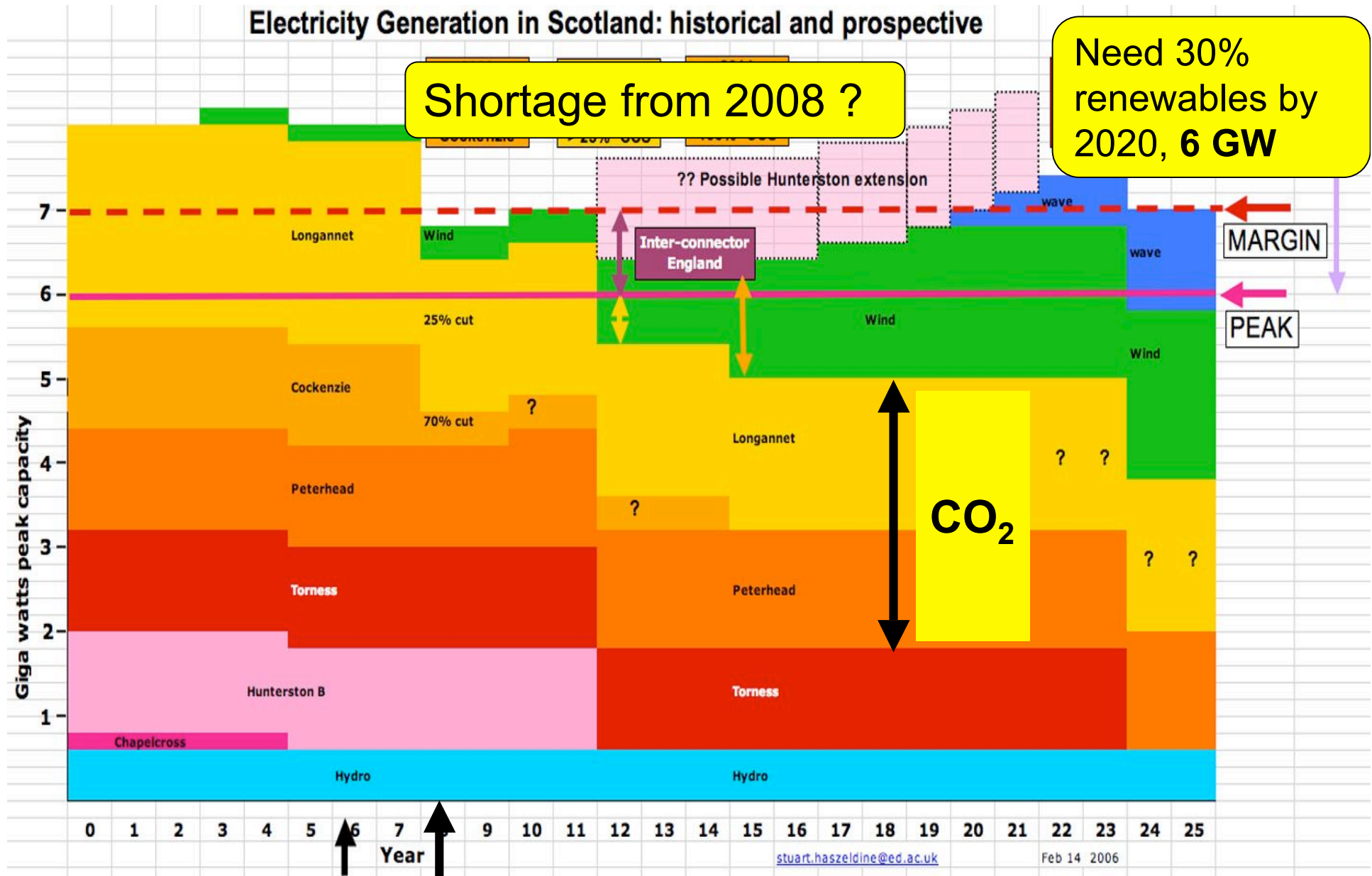
CO2 emissions electricity



The vision



Scotland electricity generation



Renewables: UK

20 %

UK target 20% by 2010
 EU 20% All-energy by 2020
 Scotland 50% elect by 2020, 10.5 GW??

UK Obligation on generators to supply

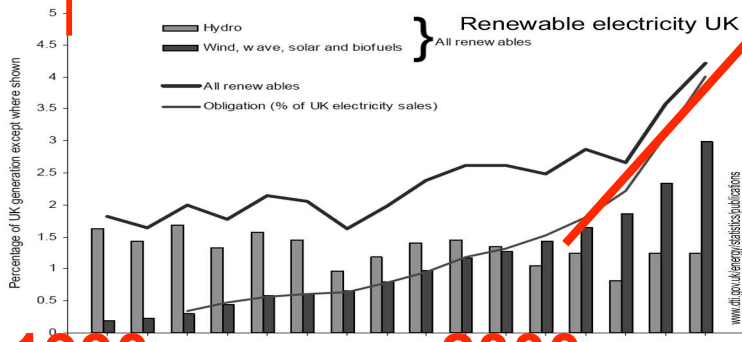


10 %

Scotland currently 2.7GW (hydro+wind), 4GW applied

Power from offshore wind and waves will take time to build

UK commercial 2015 - 2020



1990

2000

2010

2020

CO₂ capture and storage

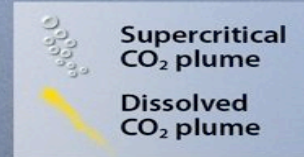
10,000yr remedy: bury CO₂ in aquifers or oilfields

1. Power station with CO₂ capture plant

2. CO₂ transport by pipeline

3. CO₂ injection

4. CO₂ storage sites



Peter Fleet, 2007



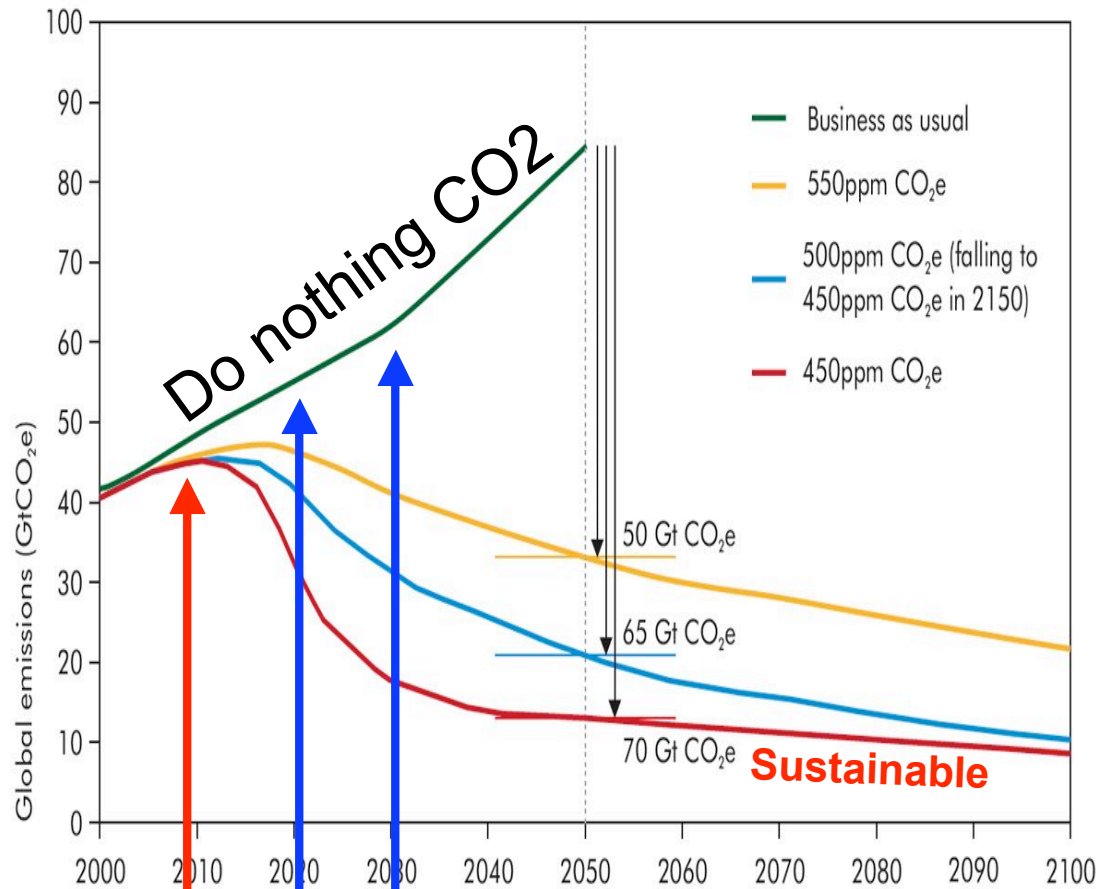
British Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL



The journey starts?

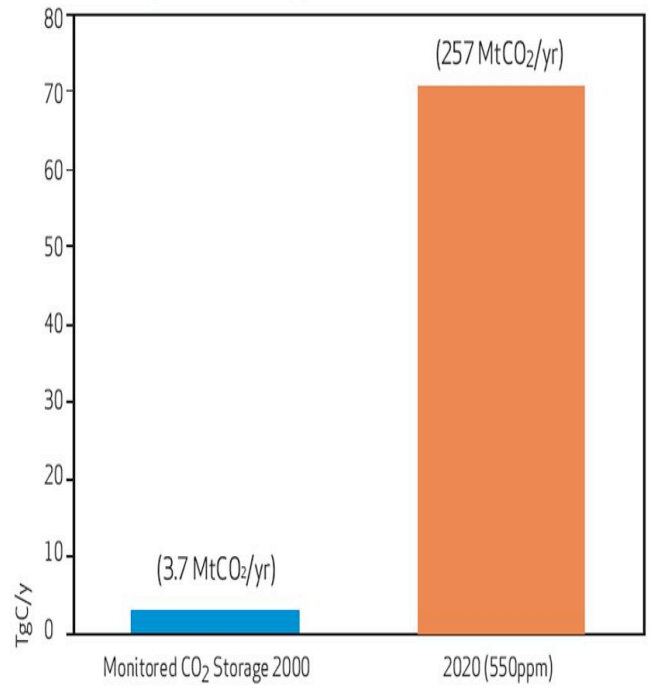
IF by 2020, Scotland has 45% (average) electricity from “renewables”, for 45% of the time. How is the other 80% made?



Source: Stern, 2007.

Here NOW (red arrow pointing to 2010)
No (blue arrow pointing to 2020)
Not here (blue arrow pointing to 2030)

CO₂ Storage Rate 550ppm



Stabilisation requires a significant scaling-up of CCS deployment.

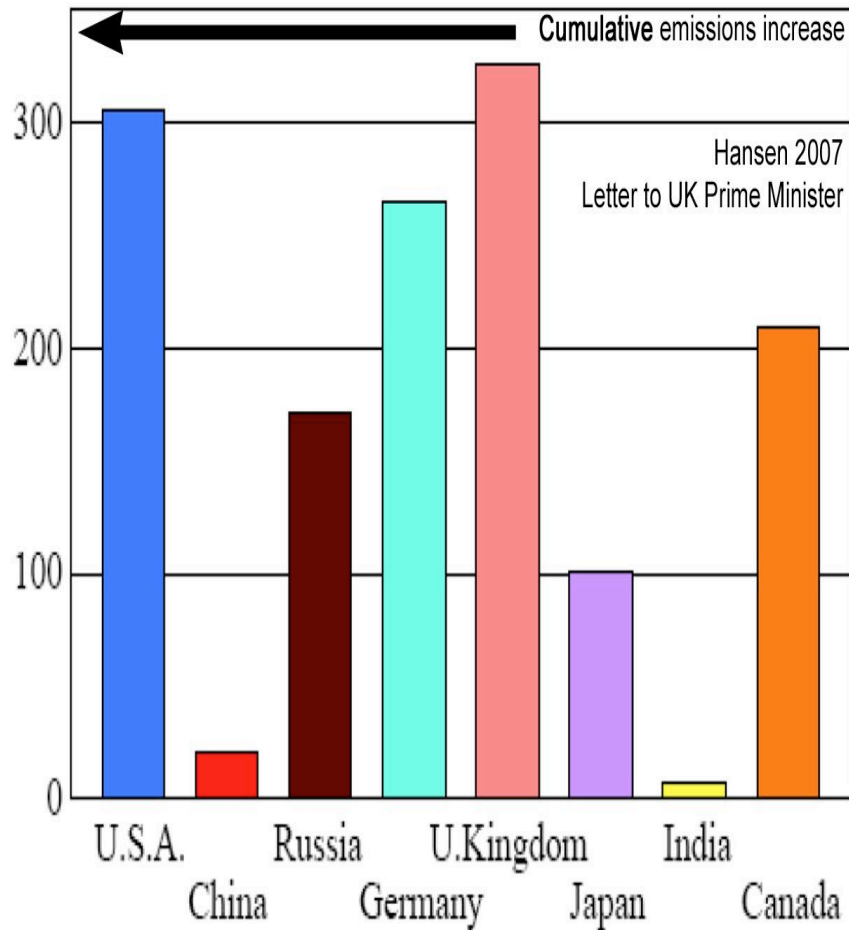
Source: Battelle 2007

World storage by 2020

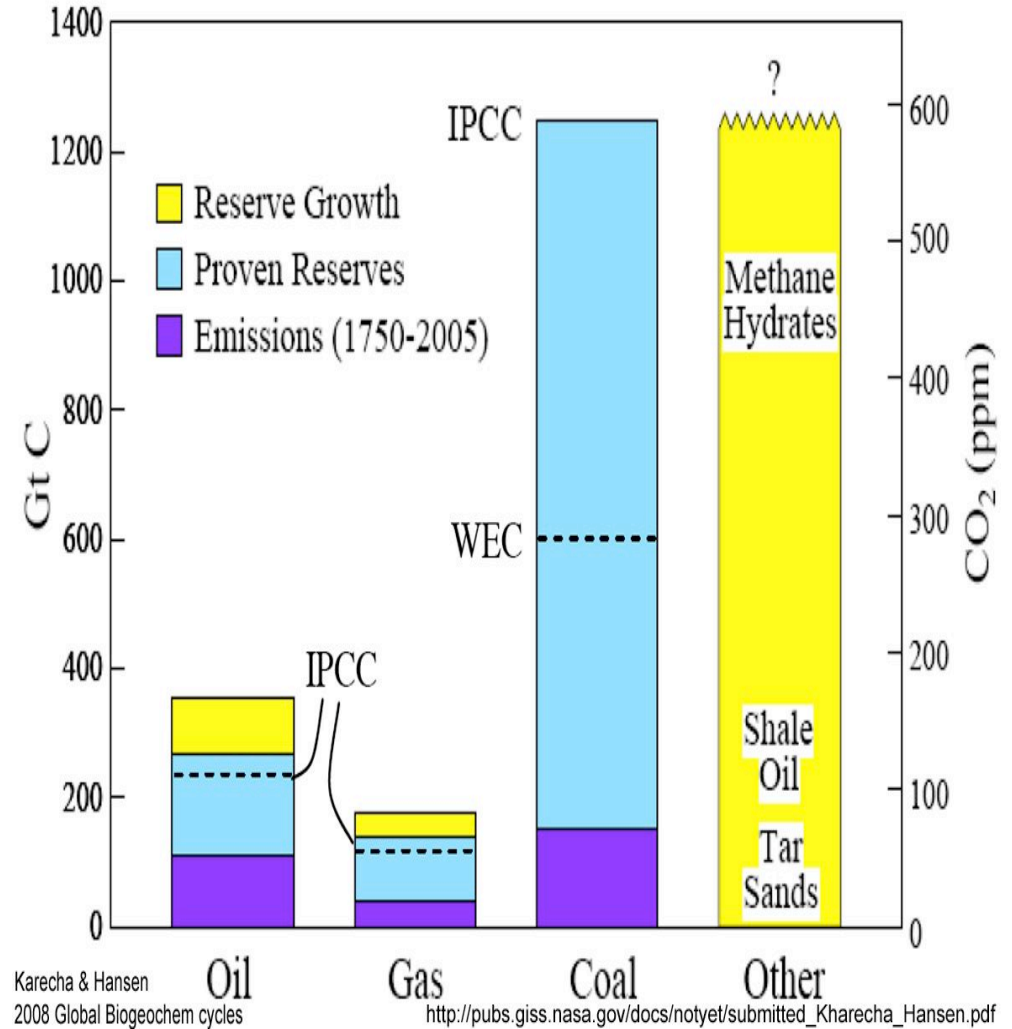
at 550ppm = 17x Longannet
 at 450ppm = 539x Longannet

Why us?

1751-2006 Cumulative Emissions
(Tons Carbon/Person)



Fossil Fuel Reservoirs



Can humans choose to avoid 900% more emissions?

Summary

- CO2 increasing. World will continue to use fossil fuel
- UK opportunity: need to renew electricity generation
- If no nuclear in Scotland,
 need 6 -10.5 GW renewables by 2020
- Scotland can cut 30% CO2 from electricity by CCS
- Scotland has world class opportunities
 for Renewables and Carbon Storage
- Must start NOW, **climate change already committed**