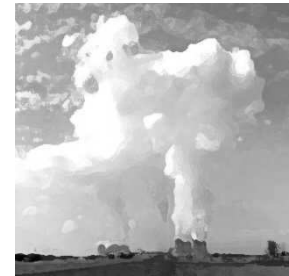


CCS (Carbon Capture and Storage) – Setting the Scene

**And why CCS will be a key contributor to
the Secure and Sustainable Energy Future
which is essential to save the climate**

Alan James
CO₂DeepStore – Managing Director

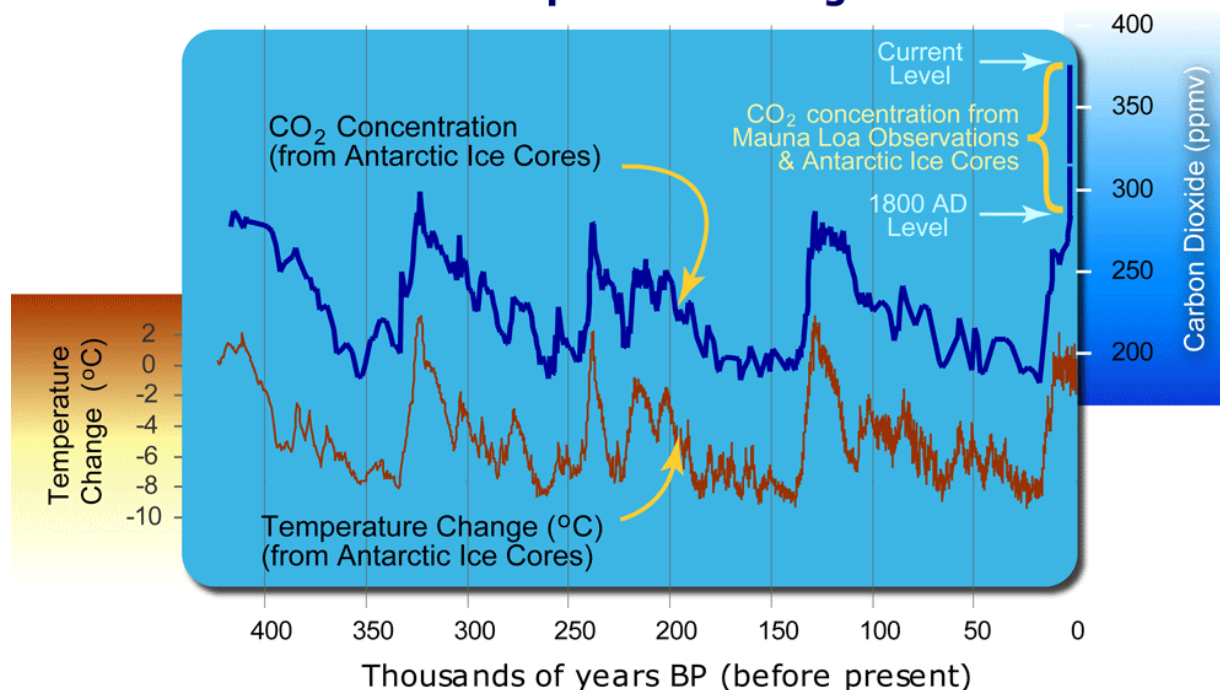


Climate Change Status (IPCC 2007 Synthesis Report)



- Warming of the climate is unequivocal
- Global greenhouse gas (GHG) emissions increased by 70% between 1970 and 2004
- Global increases in GHG are due primarily to fossil fuel use
- Most of the rise in global temperatures since mid 20th century is very likely (>90%) due to the increased GHG levels

400 Thousand Years of Atmospheric Carbon Dioxide Concentration and Temperature Change

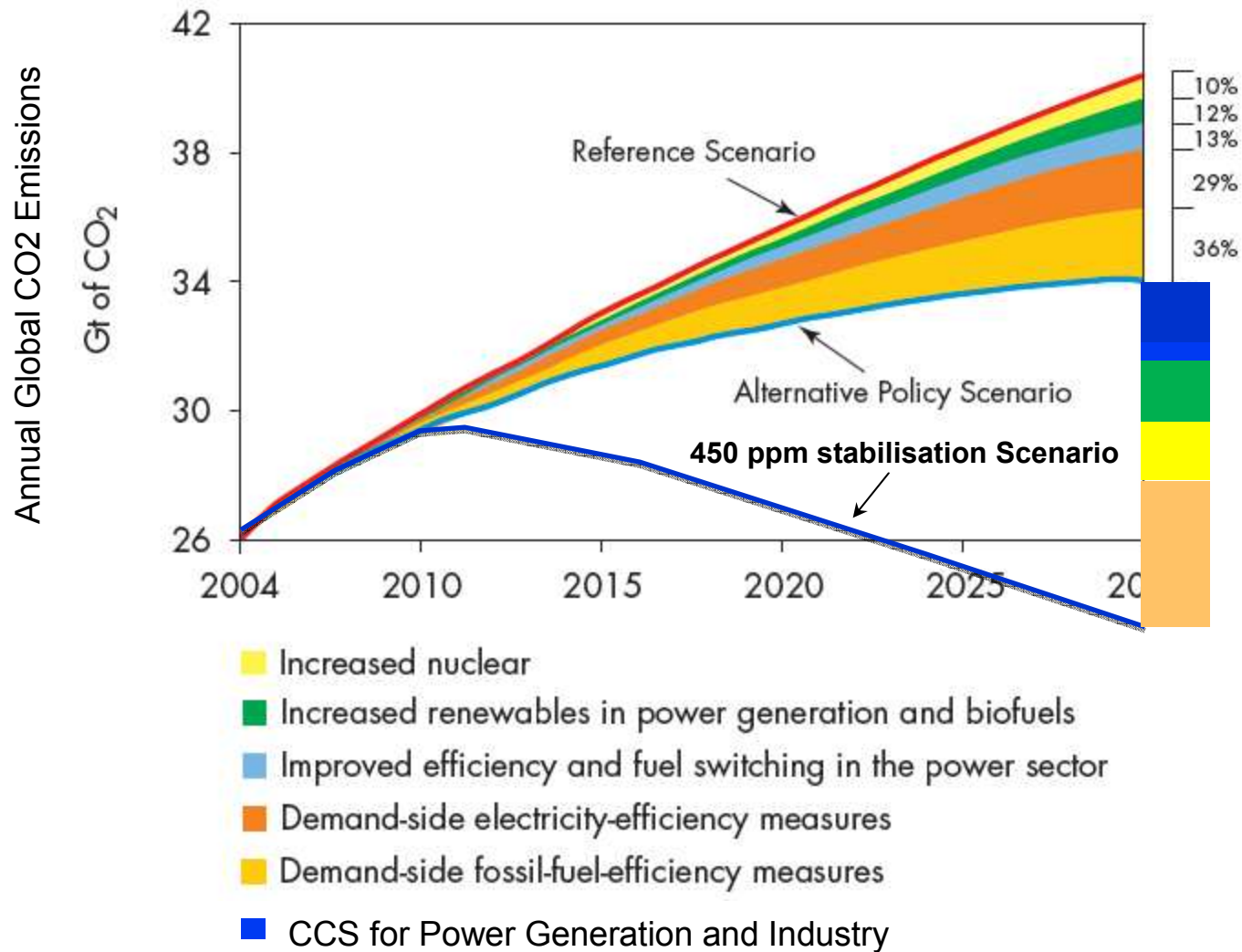


Data Source CO₂: <ftp://cdiac.ornl.gov/pub/trends/co2/vostok.icecore.co2>
Data Source Temp: <http://cdiac.esd.ornl.gov/ftp/trends/temp/vostok/vostok.1999.temp.dat>

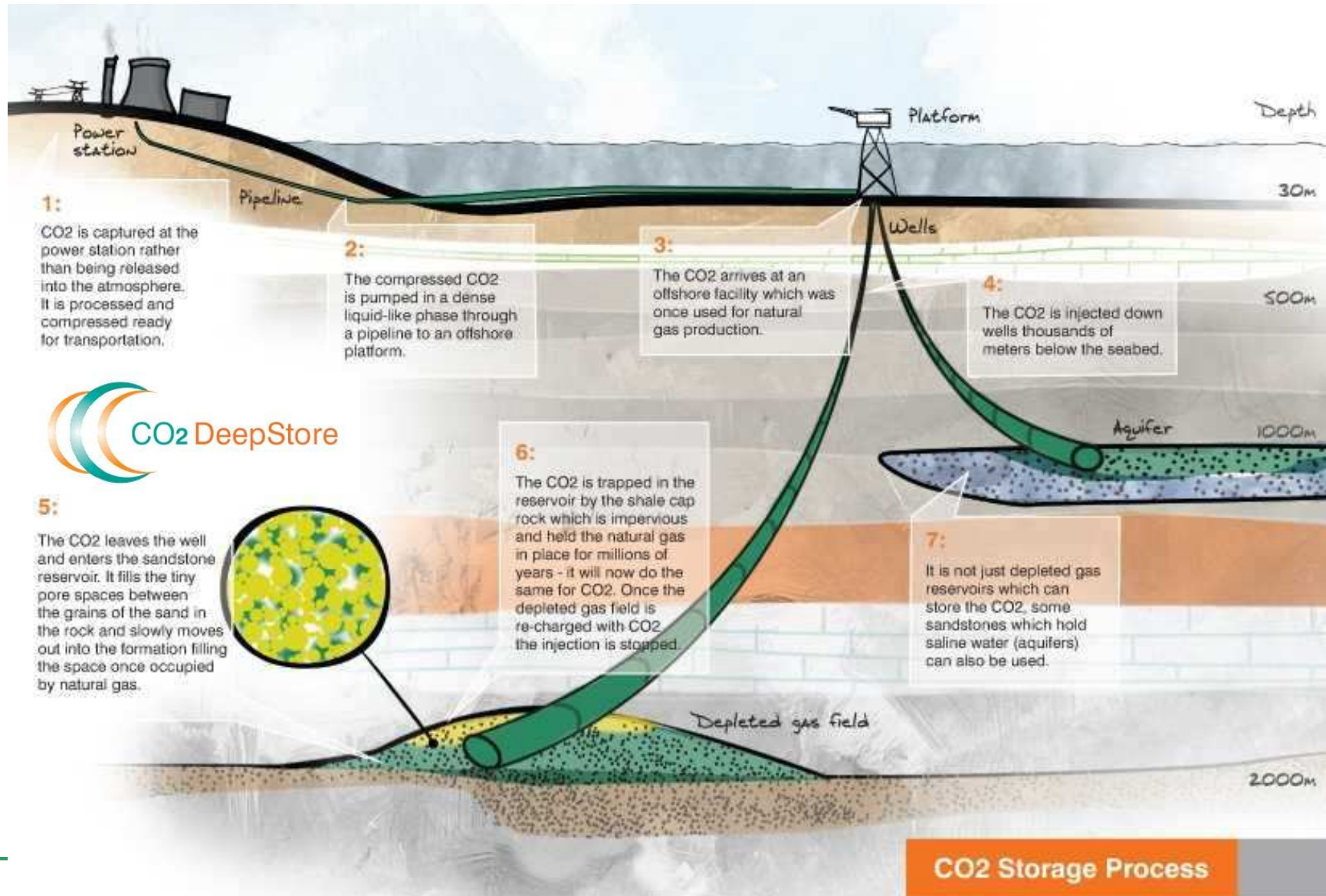
Graphic: Michael Ernst, The Woods Hole Research Center



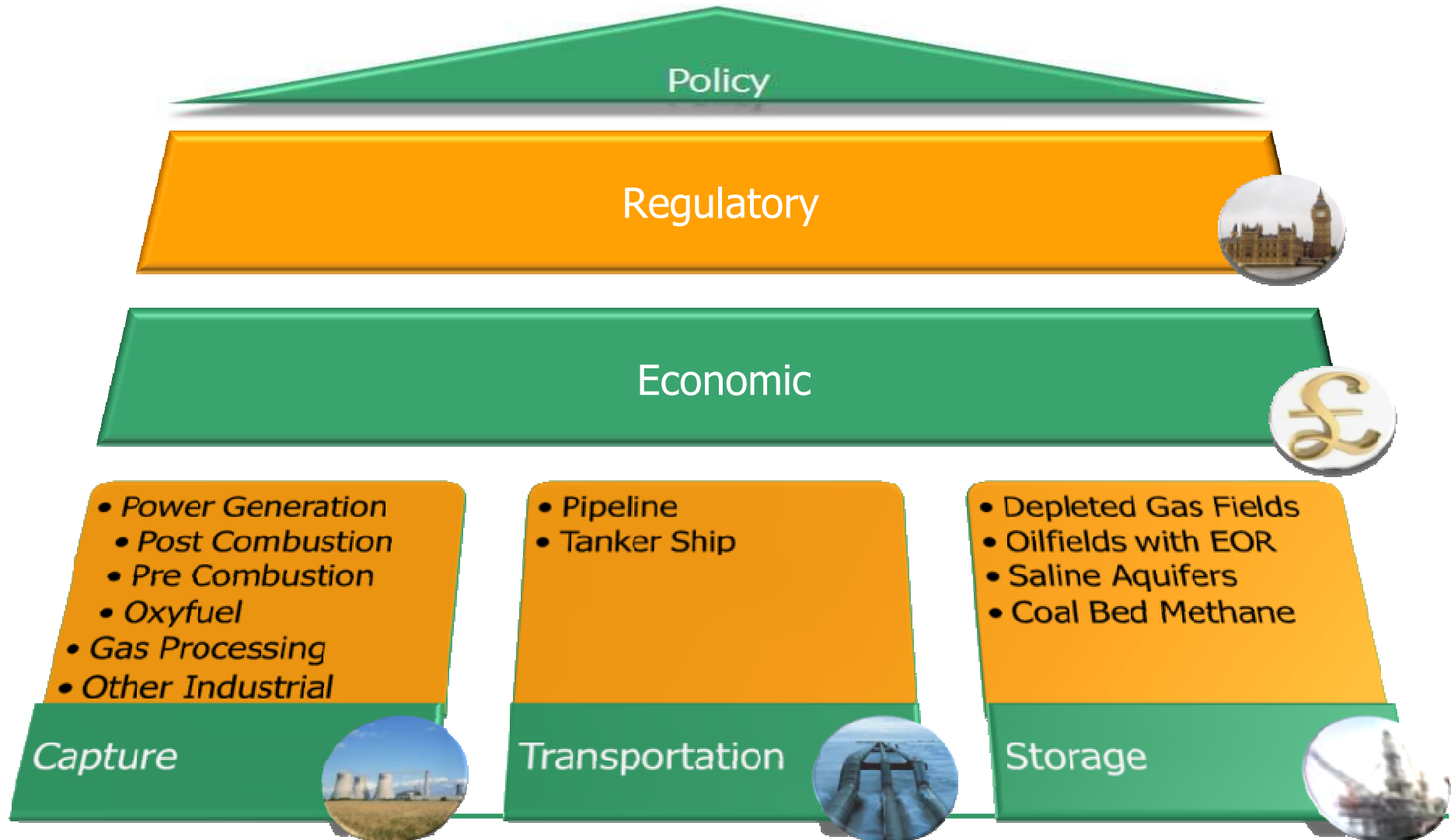
GHG Emissions Scenarios



What is CCS?



CCS Building Blocks



CO2 Capture Facilities

2 – 4 MT/yr CO2 capture
from coal gasification plant



Key

- Gasification synfuels plant
- Major Pilot Plants
- CO₂ Separation from Natural Gas for CCS
- Food-grade CO₂/carbonation of brine/Urea

CO2 Injection and Storage Activities



Storing CO₂ Underground can be done safely and securely

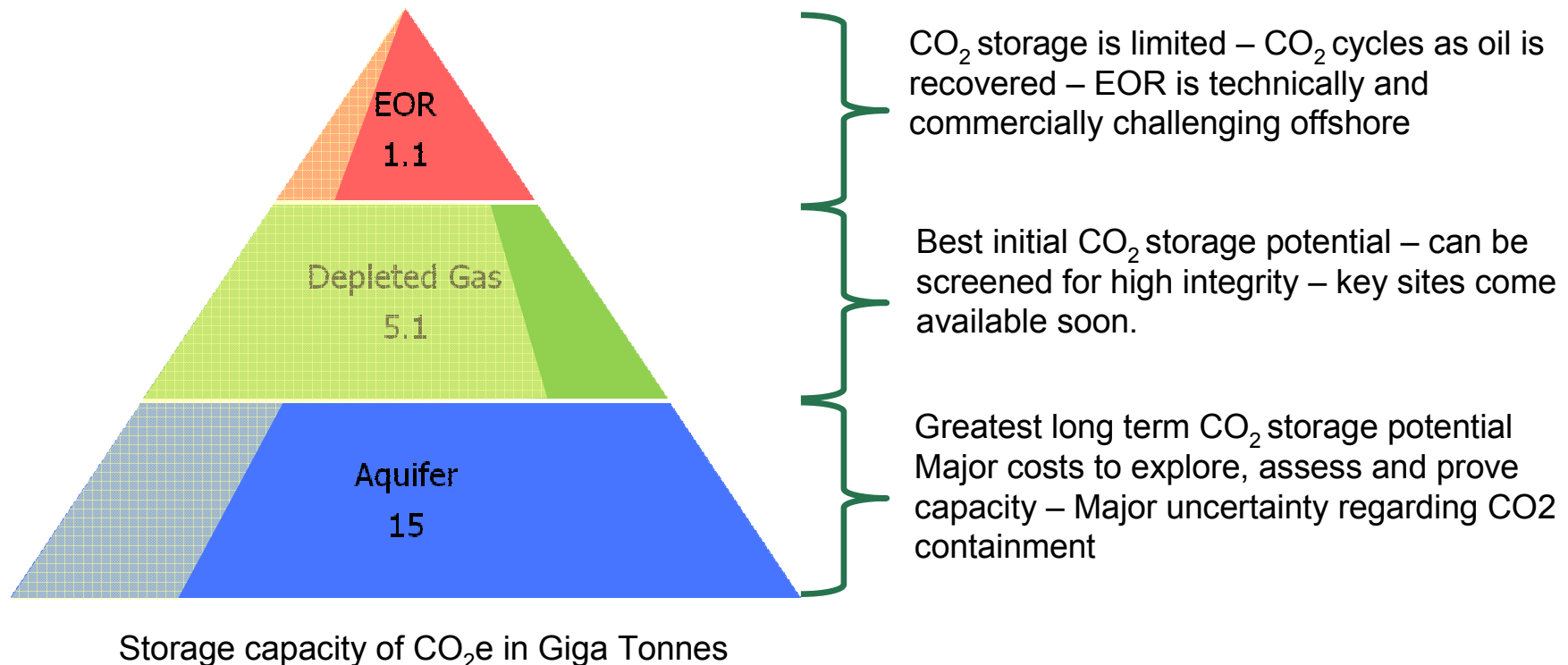
- Injecting and storing gas underground is normal business in the oil and gas industry
 - ◆ Seasonal storage
 - ◆ Peak gas delivery
 - ◆ Offshore gas handling (instead of flaring)

 - CO₂ has been injected underground for many years
 - ◆ Onshore US as an enhanced oil recovery agent
 - ◆ Offshore Norway in the Sleipner Field for permanent storage
 - ◆ Over 12 MT of CO₂ injected since Mid 1990's from gas processing operations

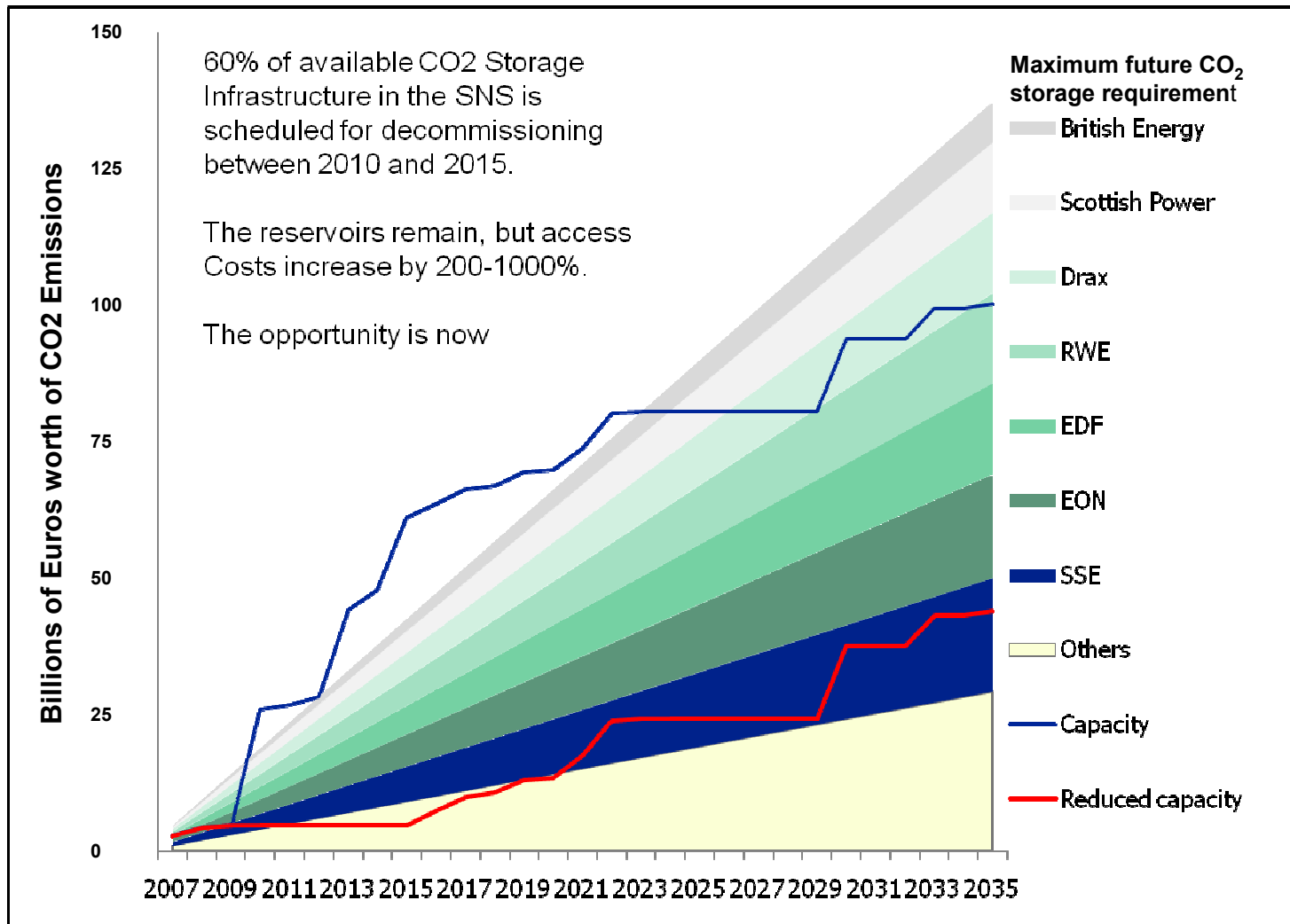
 - A carefully selected site will hold CO₂ successfully without atmospheric release for millions of years
 - ◆ In a similar way that the gas fields of the North Sea trapped their gas
 - ◆ Detailed geological and engineering site assessments are required
 - ◆ Careful monitoring of the CO₂ using a range of technologies to track its movement underground

 - Remember
 - ◆ Underground storage is much safer long term than the reservoir currently in use
-

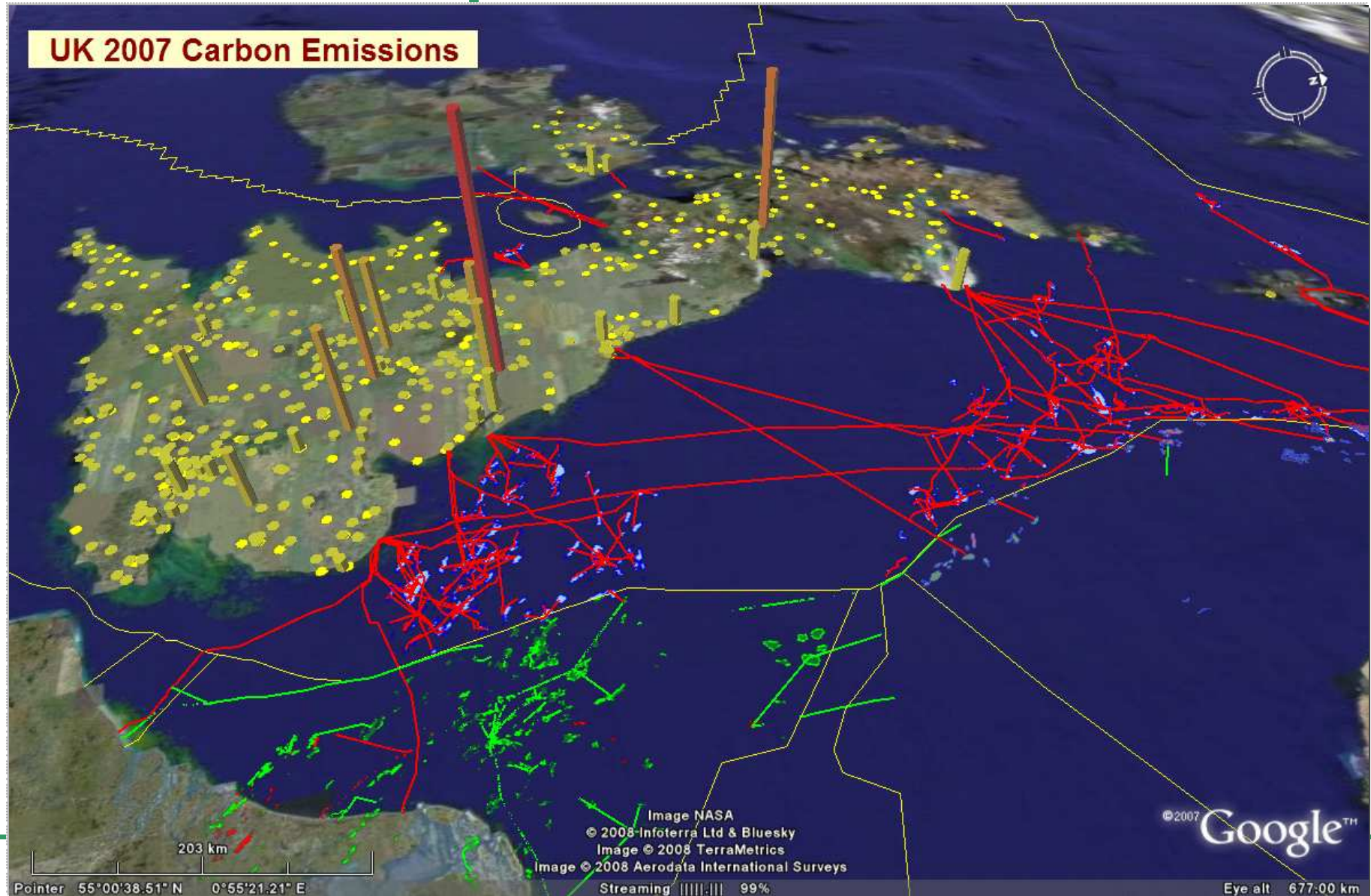
UK CO₂ Storage Options



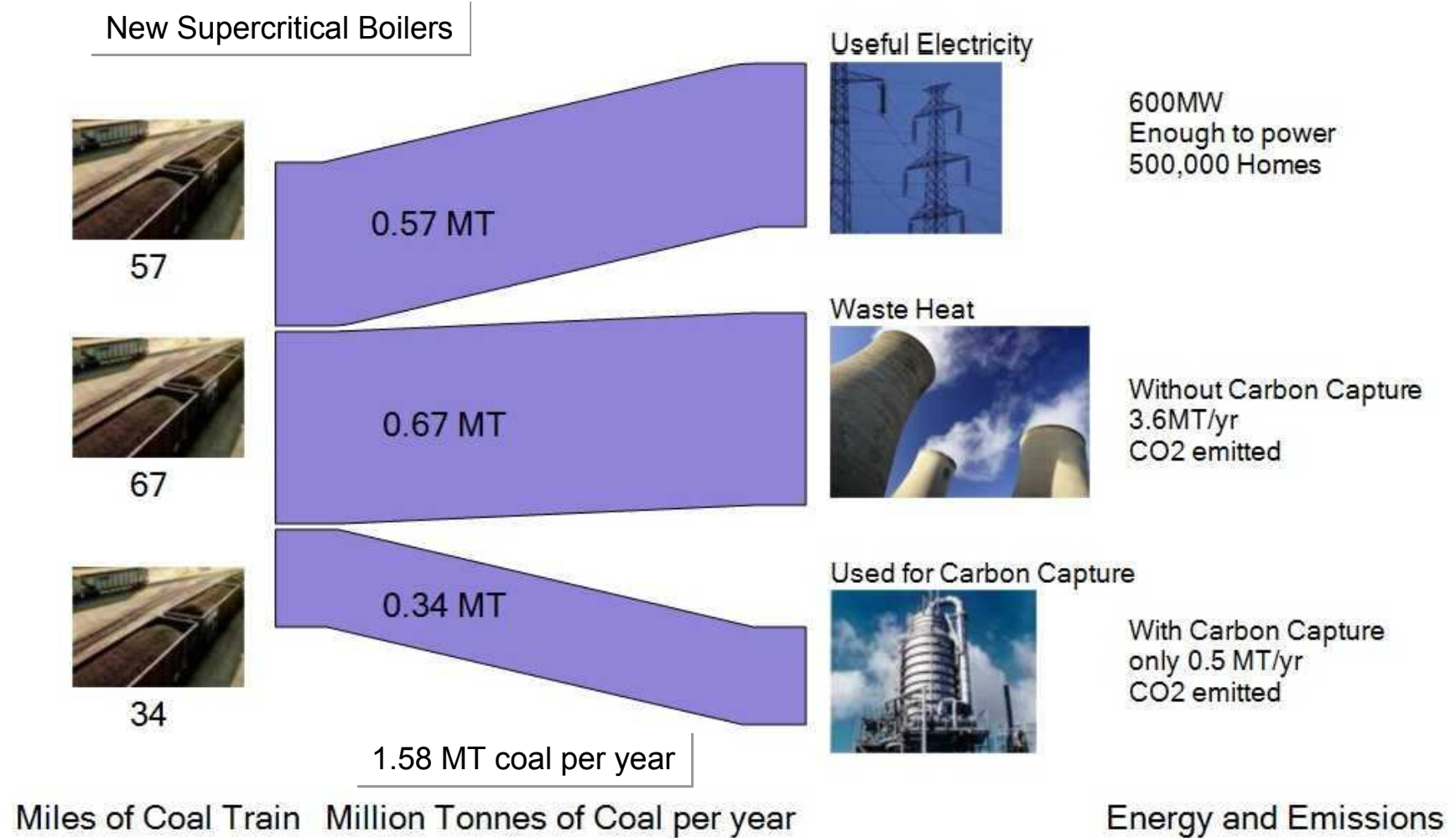
CO₂ Storage Infrastructure Availability



UK CCS Landscape

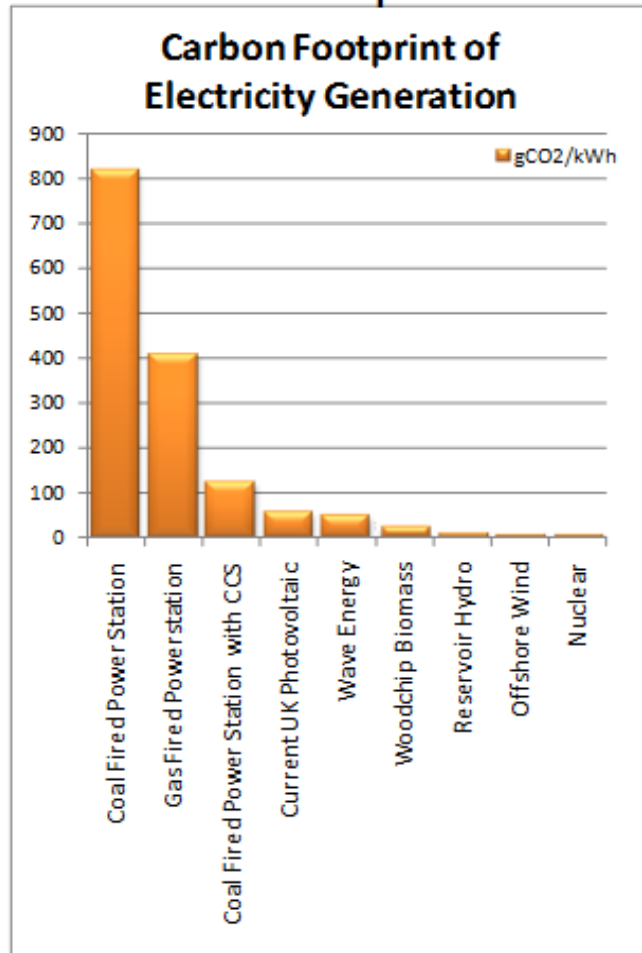


CCS Energy Use

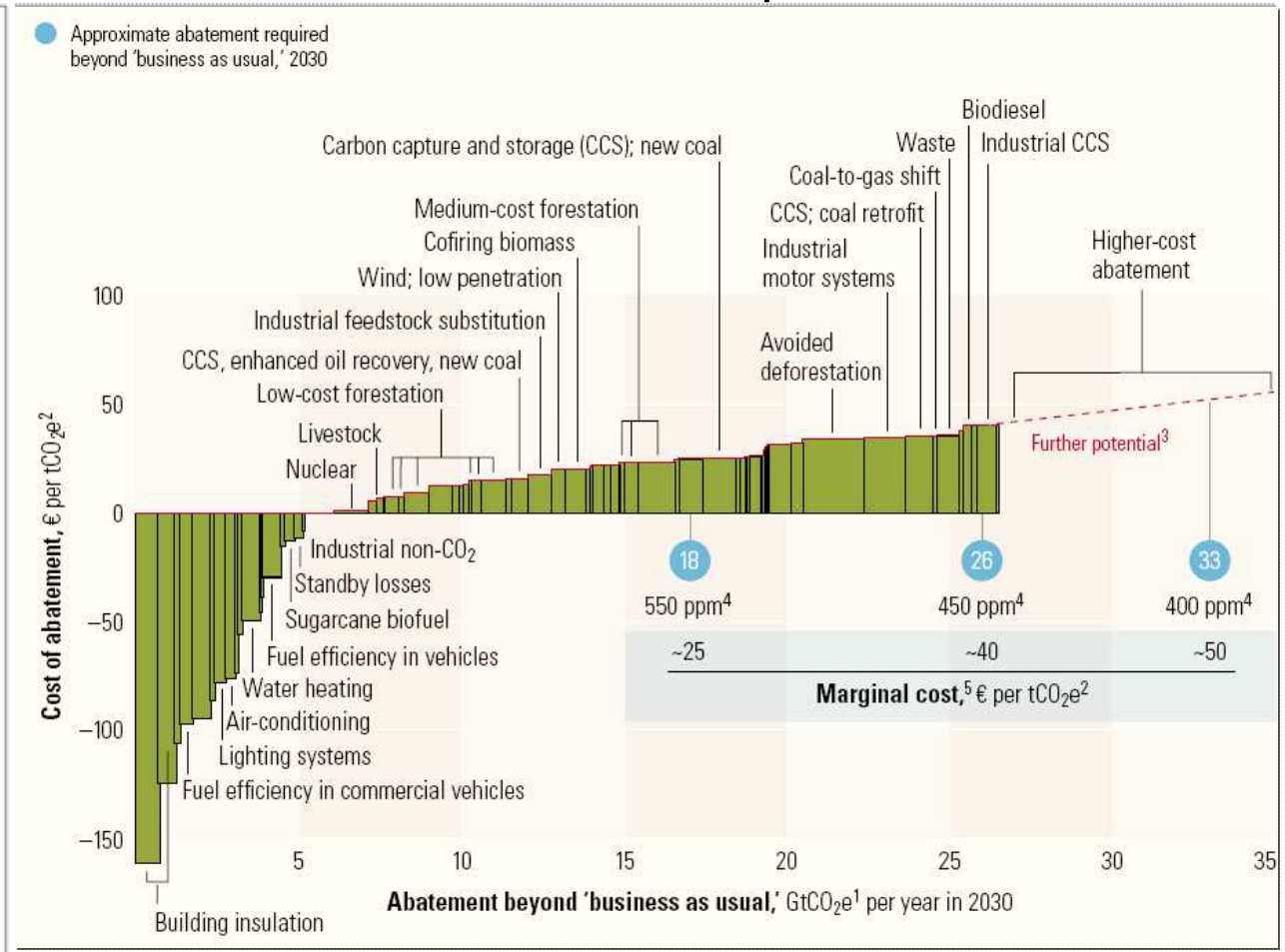


The Cost of CCS

Emissions per kWh



Cost of Abatement in € per TCO₂e



NGO Opinions of CCS – Broadly +ve



- Carbon Capture and Storage (CCS) demonstration schemes should receive incentives and preferably be located on large industrial sites with potential for heat usage
- CCS equipped centralised power stations
- NO new coal stations without CCS fitted as standard



- Carbon capture and storage (CCS), if properly regulated, could be an important weapon in the battle against climate change. CCS could help to keep global warming below 2°C and help cut global CO₂ emissions by more than 50% by mid-century.



- Carbon capture and storage (CCS) could play an important role. There is an urgent need to demonstrate the viability of this technology in large scale electricity generation, and to develop a clear framework for regulation and treatment of liabilities. Certainly we cannot afford to build and run new unabated coal-fired power stations without some form of guarantee that CCS works effectively.



- Concerns about the feasibility, costs, safety, and liability of CCS make it a dangerous gamble.
 - CCS technology is largely unproven and will not be ready in time to save the climate.
-

CCS – Summary

- CCS is an essential bridge to a sustainable and secure energy future
- CCS and renewables must both be a part of future policy
- All the components of CCS are proven and in use across industrial sectors
- CCS uptake requires Political will to drive commercial frameworks
- CO2 can be stored securely and safely in carefully selected sites

CO2DeepStore “CCS Readiness Index”

