# Carbon Capture and Storage (CCS): An appropriate technology for New Zealand?

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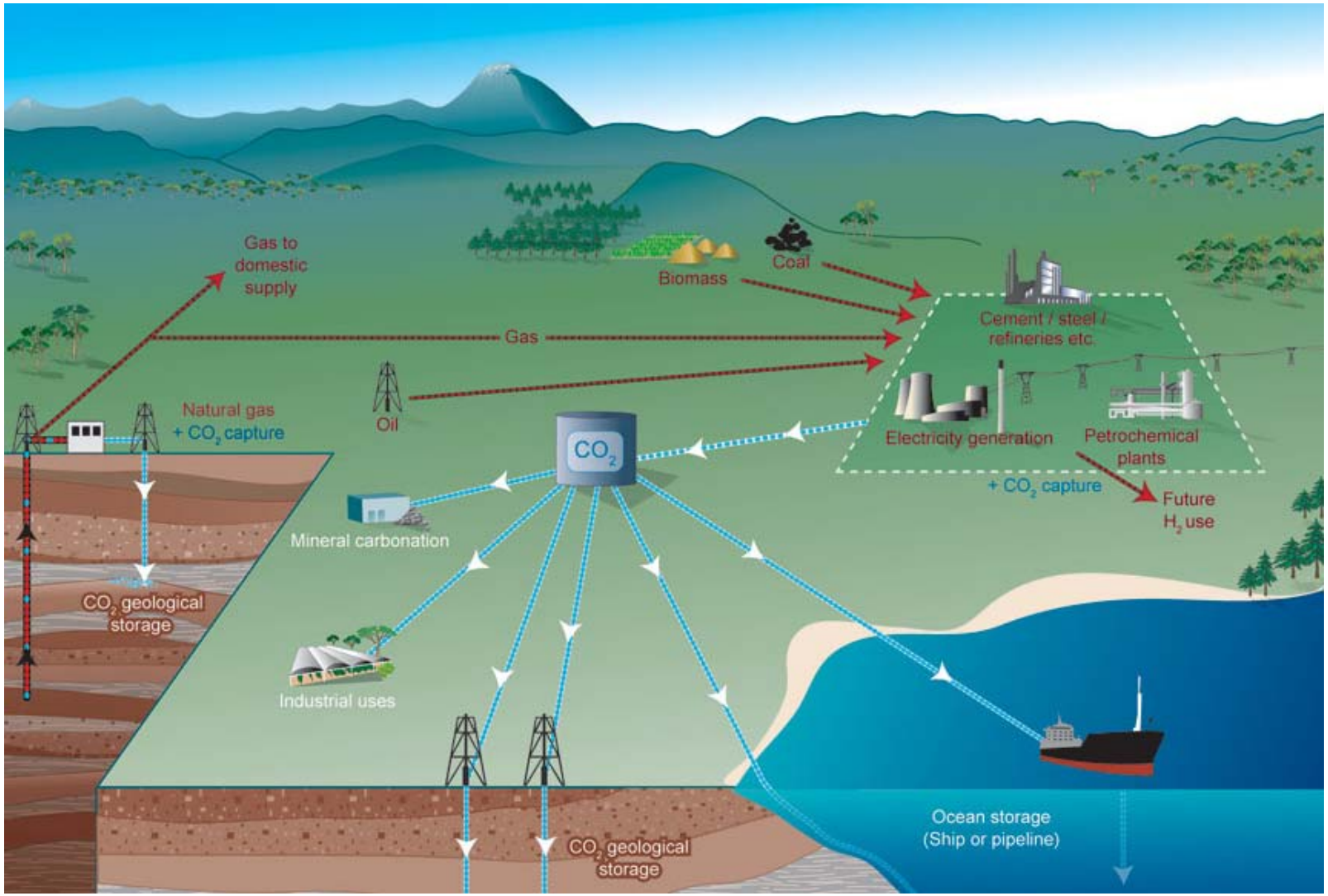
# Carbon Capture and Storage

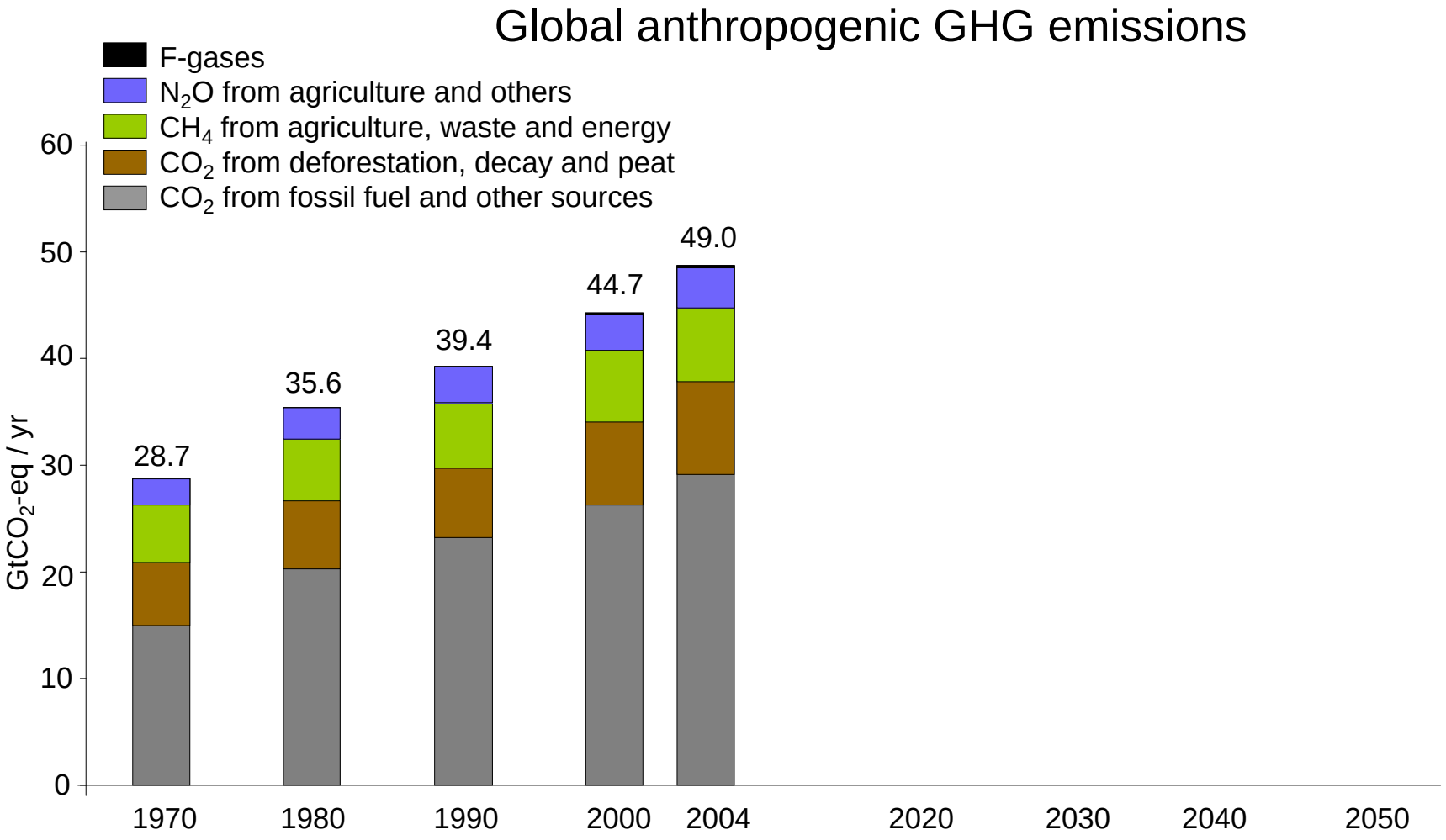



IPCC – Special Report on Carbon dioxide capture and storage (2005)

# Overview

- Timeframe for GHG reductions
  - Globally
  - For New Zealand
- Status of CCS
  - Current implementation
  - Future prospects
- Is CCS applicable for New Zealand?
  - Compare CCS against other options

# Timeframe - Global Context




Data from IPCC – 4th Assessment Report (2007)

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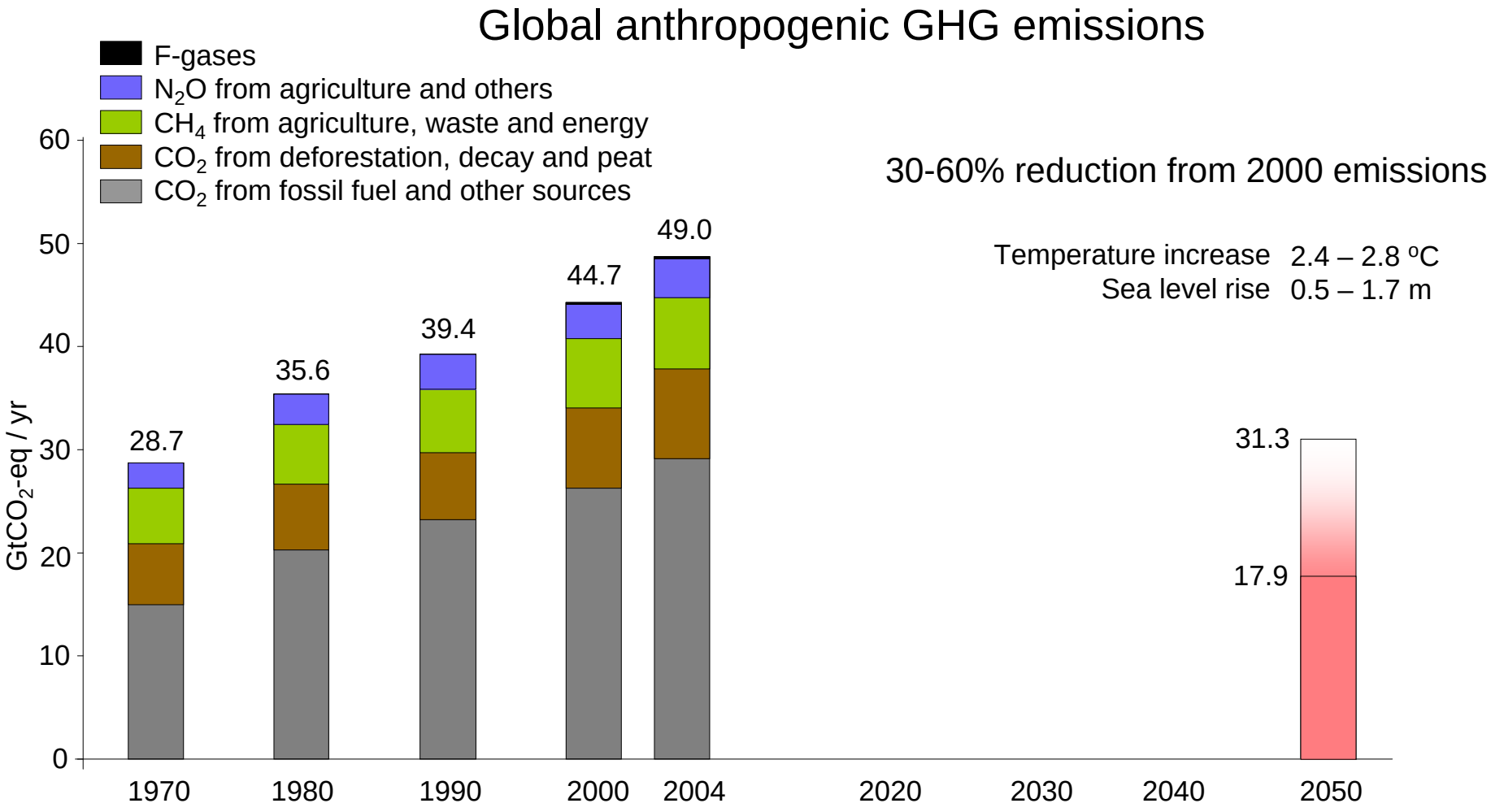


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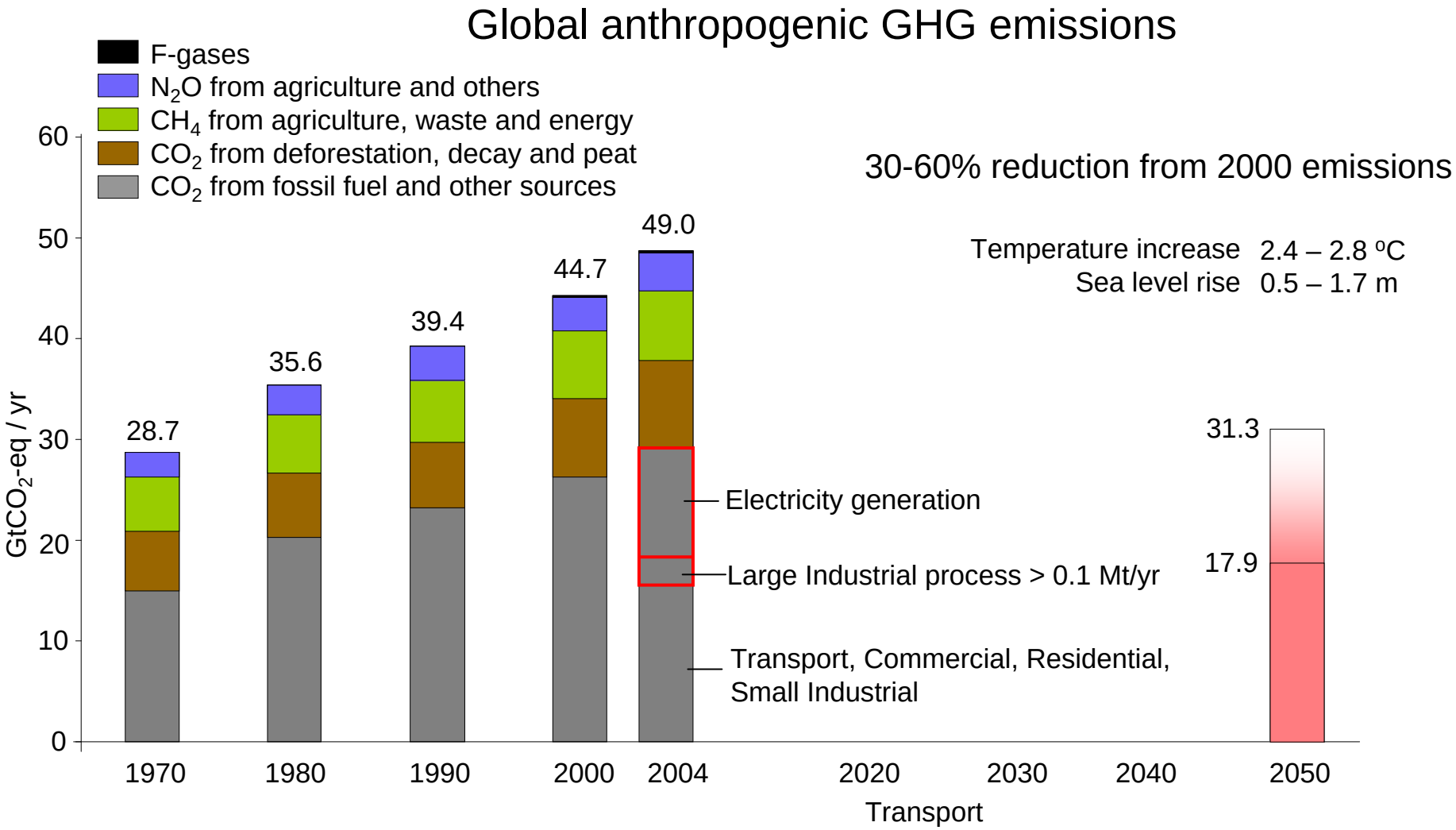
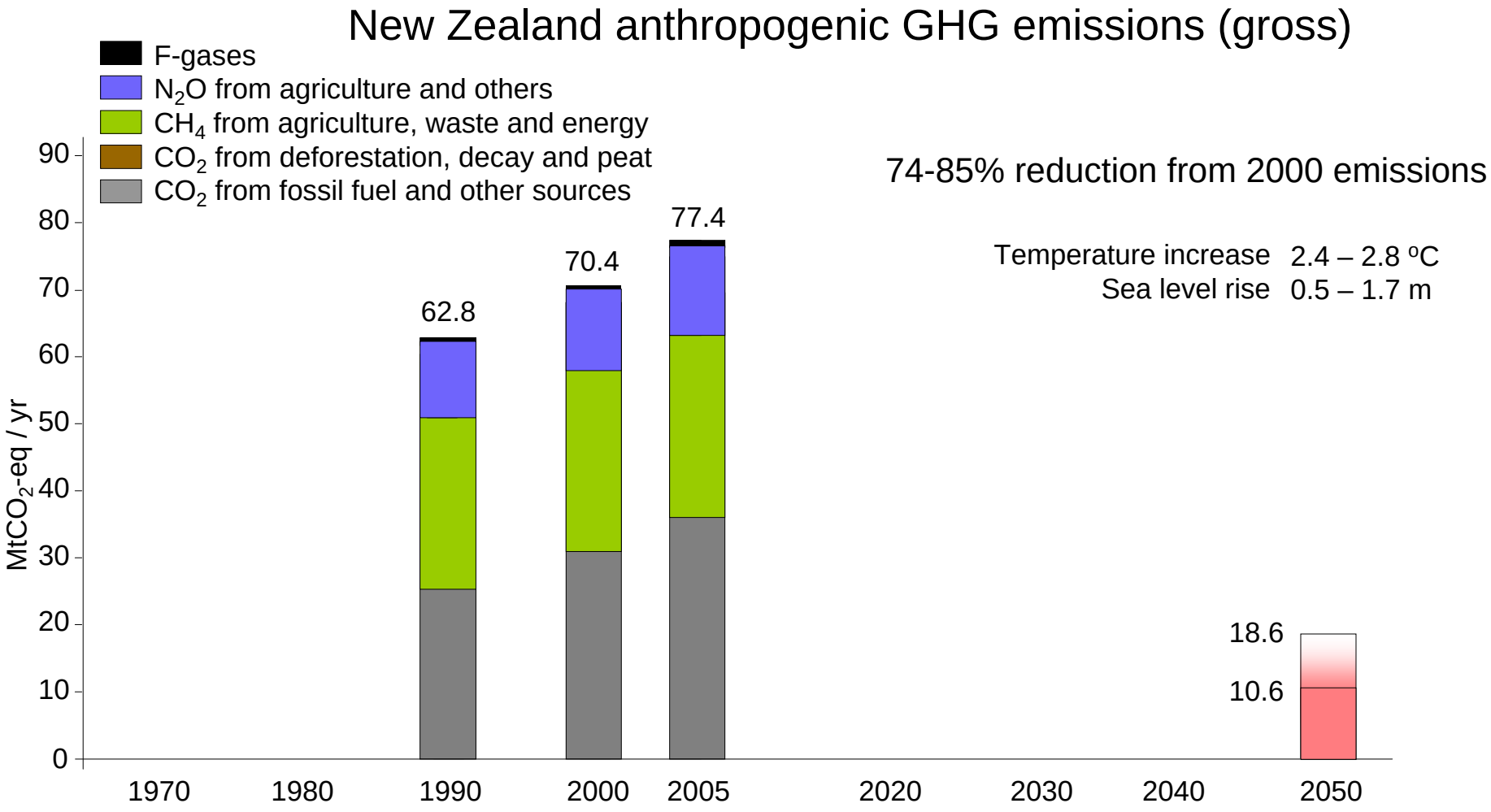



Data from IPCC – 4th Assessment Report (2007)
IEA – World Energy Outlook (2007)

# Timeframe - NZ Target

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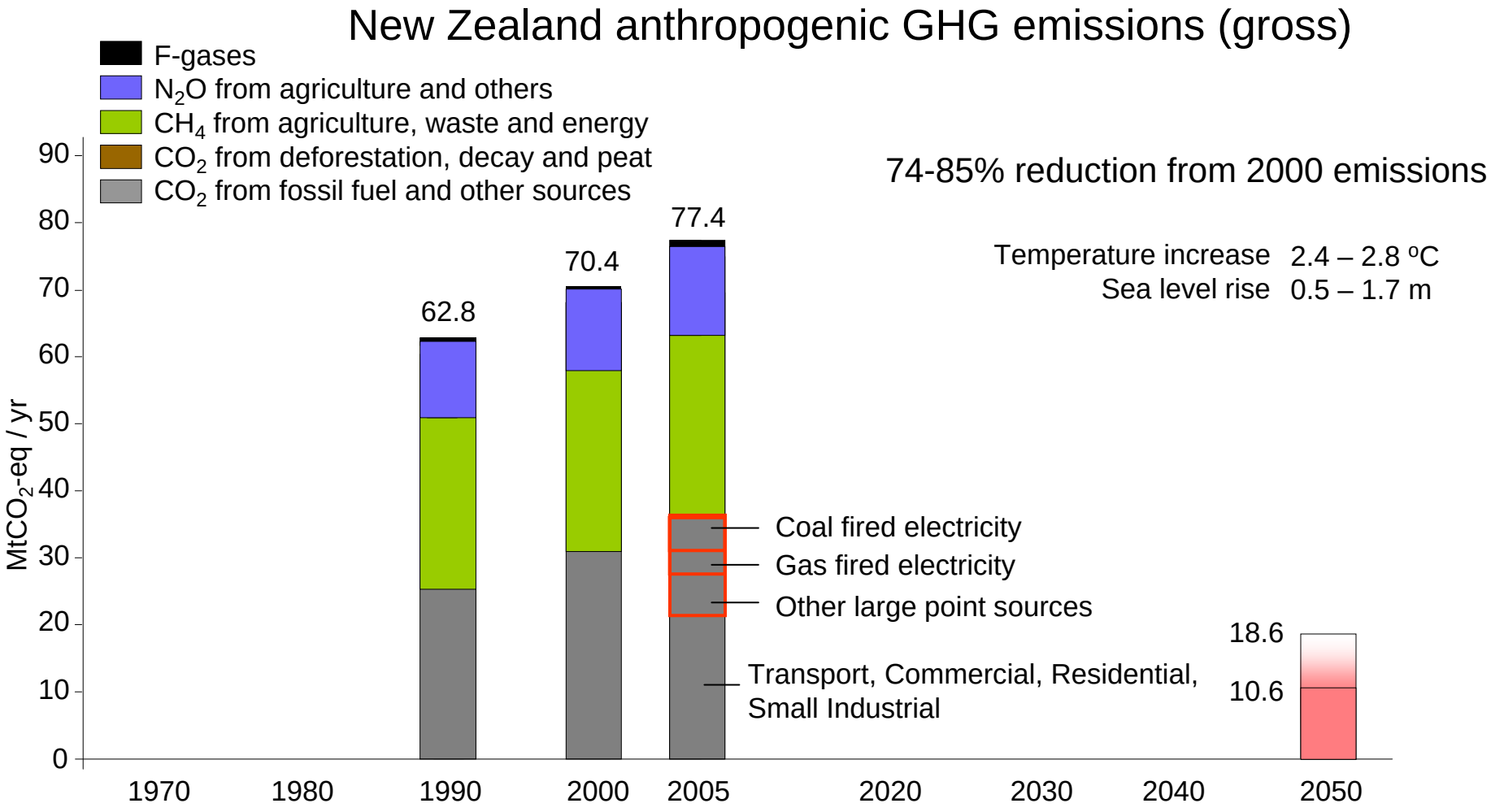


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Sleipner – Natural gas field
1 Mt/yr

In Salah – Natural gas field
1 -1.5 Mt/yr

Weyburn – Oil field, $CO_2$ from a synfuels plant
1-1.8Mt/y

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NG sweetening = 50 Mt-$CO_2$/yr

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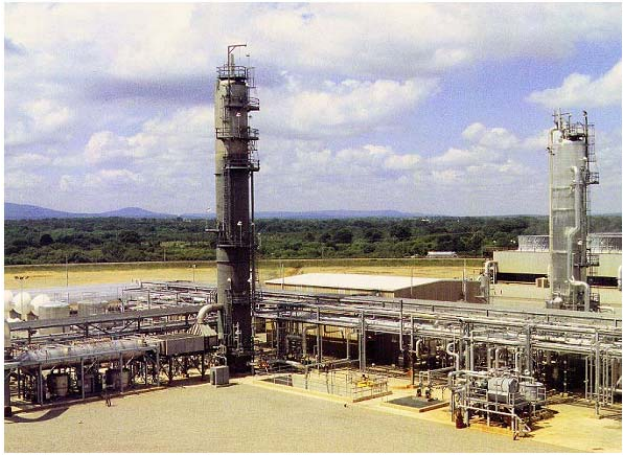

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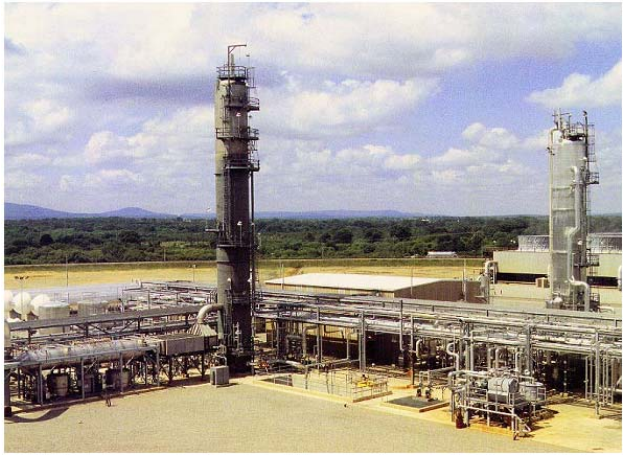

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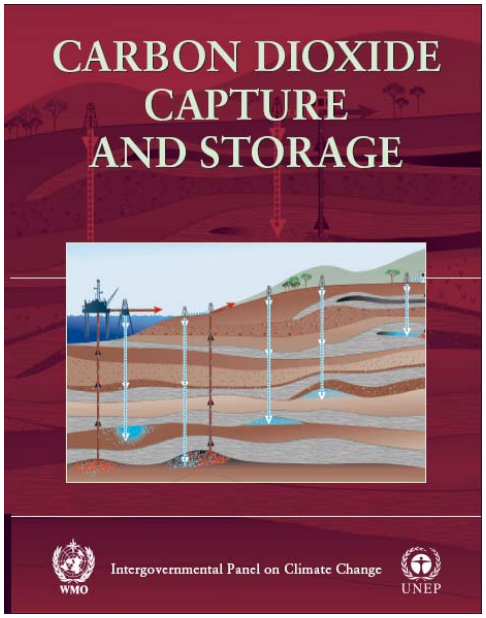
- Energy penalty issues

Page S.C., Williamson, I.G., Mason, I.G., Carbon capture and storage: Fundamental thermodynamics and current technology, Energy Policy, (2008) In Press

# Status of CCS – Future prospects

- “FutureGen” - as cited by the IPCC
- Funded in by the US Department of Energy and consortium of energy companies
- Details of plant
  - 275 $MW_e$ IGCC,
  - US $1.5 billion,
  - hydrogen co-production



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- July 2008
  - DOE announces “Restructured FutureGen”
    - goal to “establish the technical feasibility…of producing electricity from coal with very low…emissions”
    - Commissioning of the plant is not required until 2015
    - Expected to run for 3 – 5 years
    - Only 80% capture

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- Achieve 7% of required reductions from 2024

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**CCS - inappropriate for New Zealand**

# Additional Information
# NZ application – current research

- Fast follower of capture technology
- Require storage research
- Australian CO2CRC Otway Project –
  - FRST and Solid Energy contributing funding
  - $CO_2$ separated from natural gas re-injected into field
  - Total stored to be = 0.1 Mt (4.9 Mt from Huntly in 2006)
- Storage Investigations by GNS
  - 14 Mt-$CO_2$ in Huntly, 300 Mt-$CO_2$ in Maui
  - Large coal resources are in Southland

# Additional Information

## OxyFuel combustion capture

**World's first carbon capture pilot fires up clean-coal advocates**

“The world's first complete demonstration of carbon capture and storage (CCS) technology will begin next week at a coal-fired power station in Germany.”
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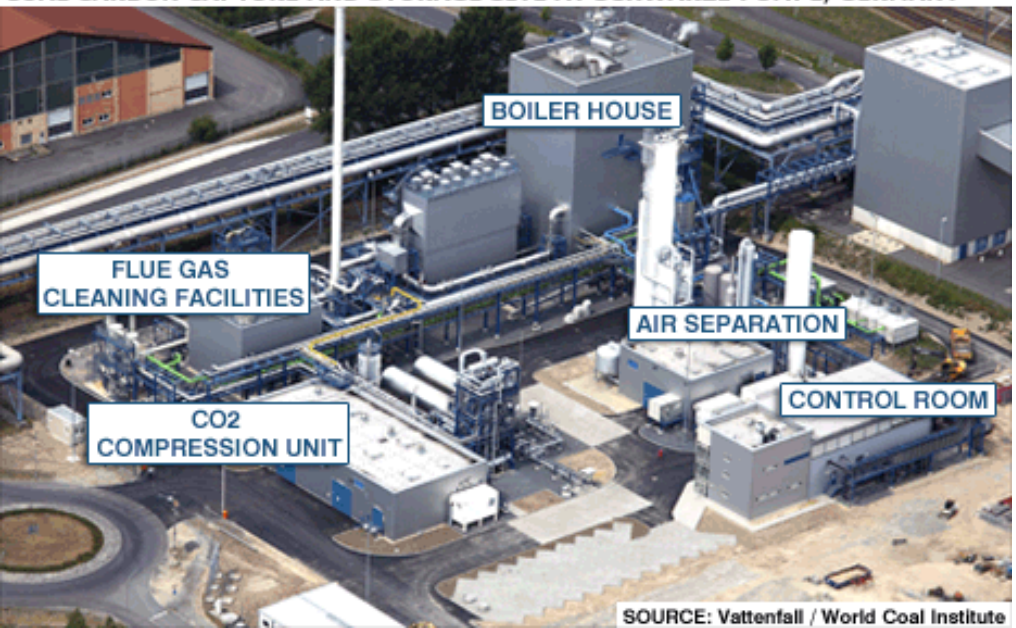
9 September 2008, CarbonNews

COAL CARBON CAPTURE AND STORAGE SITE AT SCHWARZE PUMPE, GERMANY




SOURCE: Vattenfall / World Coal Institute

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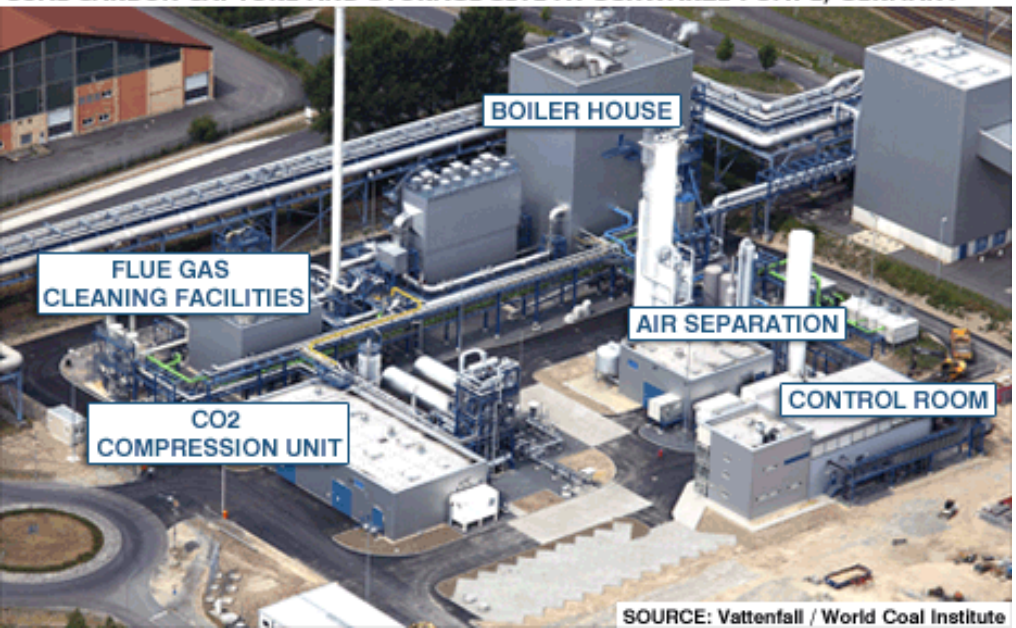


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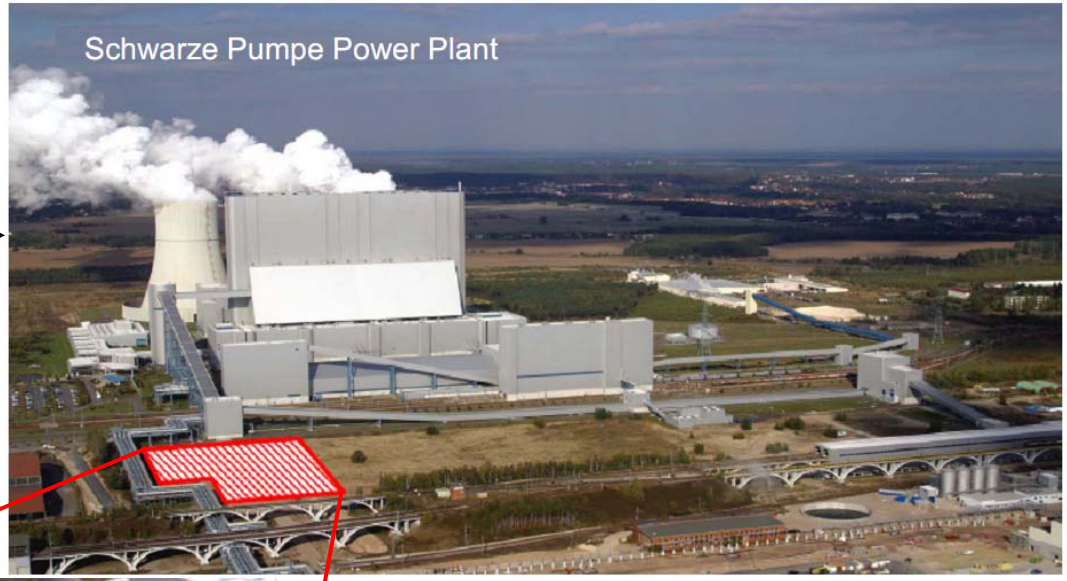
Shouldn't there be a generator?

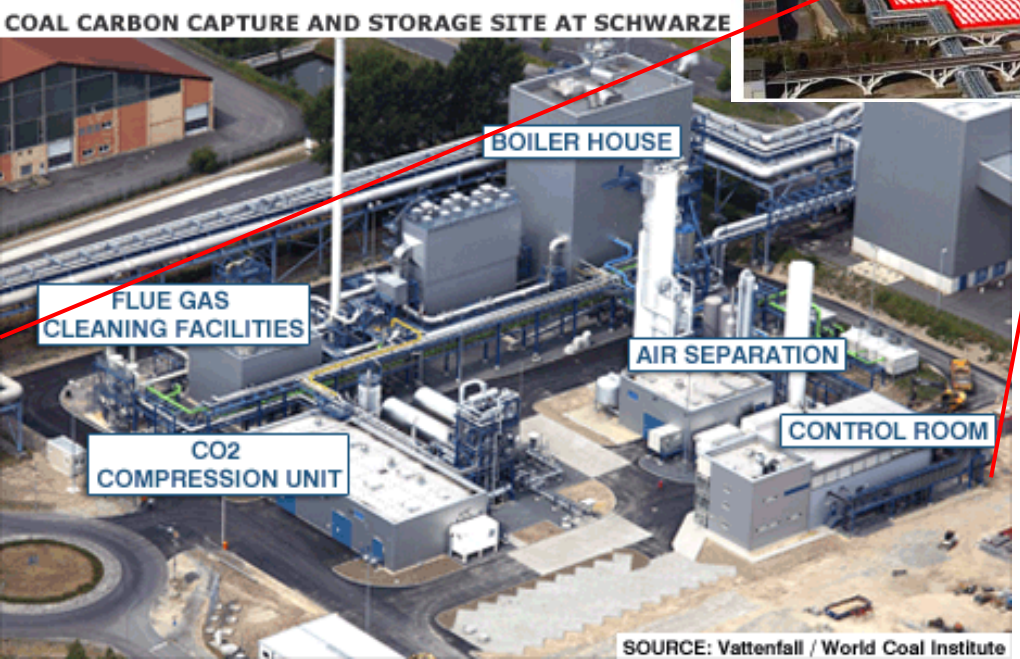
Where does the electricity come from to drive the processes shown?

# Additional Information

## OxyFuel combustion capture

A standard 1600MW$_e$ coal fired power station




30MW$_{th}$ coal plant