IEA GHG Experiences on CO_2 Capture and Storage

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CO_2 Capture and Storage

- Technology is developed
- CO_2 Capture demonstrated at 1 Mt/y scale
  - Sleipner and In-Salah
- For power generation applications need to scale up to 3 to 5 Mt/y scale and replicate several thousand times
  - Scale up not a major technical barrier
- Transmission – 3100 km of CO_2 pipelines in existence
  - Need to expand pipeline infrastructure to be comparable to that of natural gas
    - Not a major technical barrier

CO_2 Capture and Storage

- Geological storage
  - Sufficient capacity available to store all CO_2 needed to stabilise emissions
    - In concert with other mitigation options
  - Will need to rely heavily on deep saline aquifers
    - Aquifer injection demonstrated at Sleipner
  - Need additional effort to quantify the storage capacity and integrity of deep saline aquifers
    - Need to demonstrate effective containment

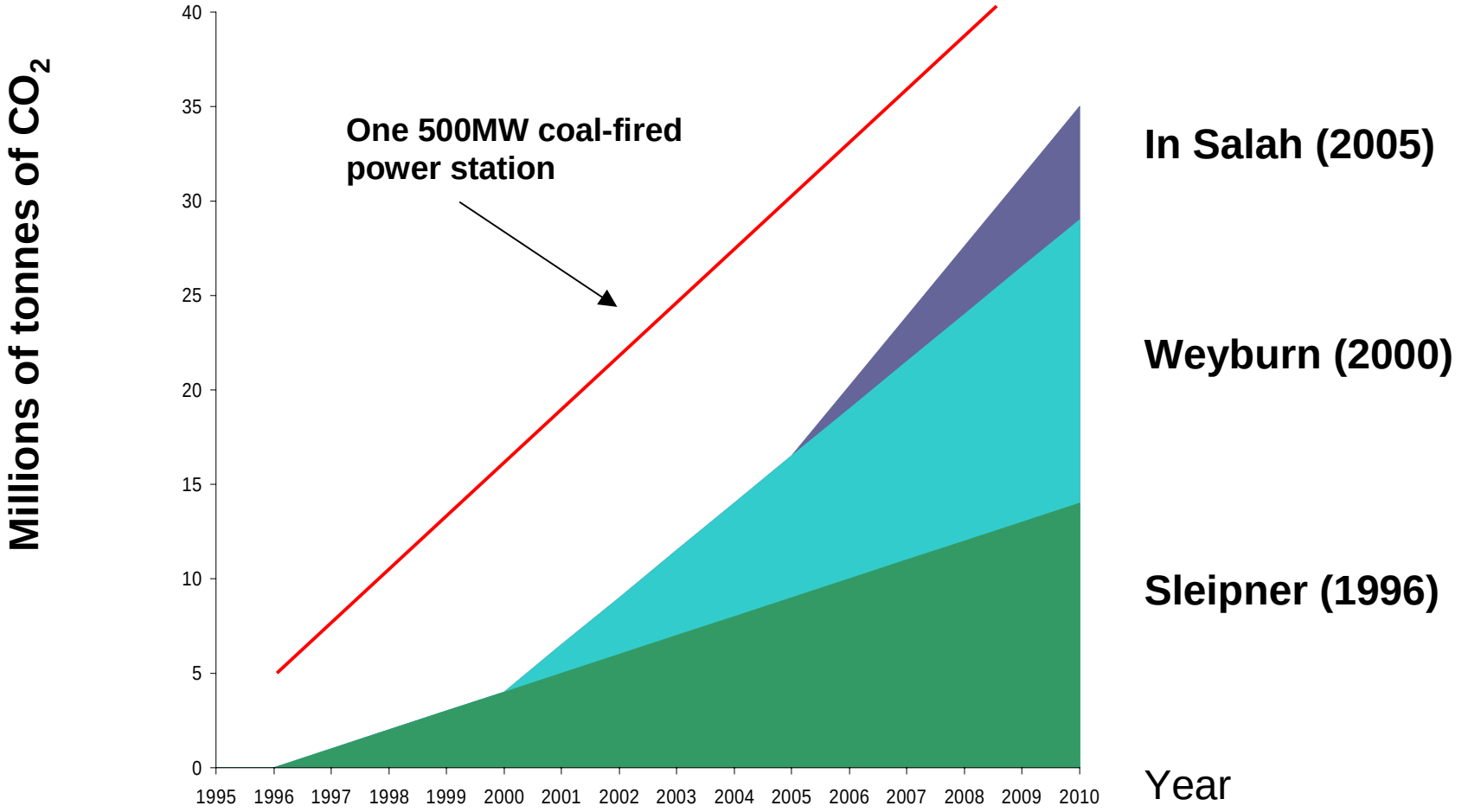
CO_2 Containment

- No firm evidence from any of the large scale projects that seepage is occurring
  - Sleipner, Weyburn and Rangeley
  - Only one project has reported surface seepage and there are doubts about the data
    - Biogenically converted methane
  - Monitoring lifetimes are short 3 to 25 years
- Performance assessment studies suggest negligible seepage
  - Weyburn – simulations suggest 5000 years before surface seepage theoretically could occur
    - Wells could be an issue
  - Sleipner modelling suggests all CO_2 will have dissolved by 3000 years
- No technical basis on which to quote a seepage rate for geological storage

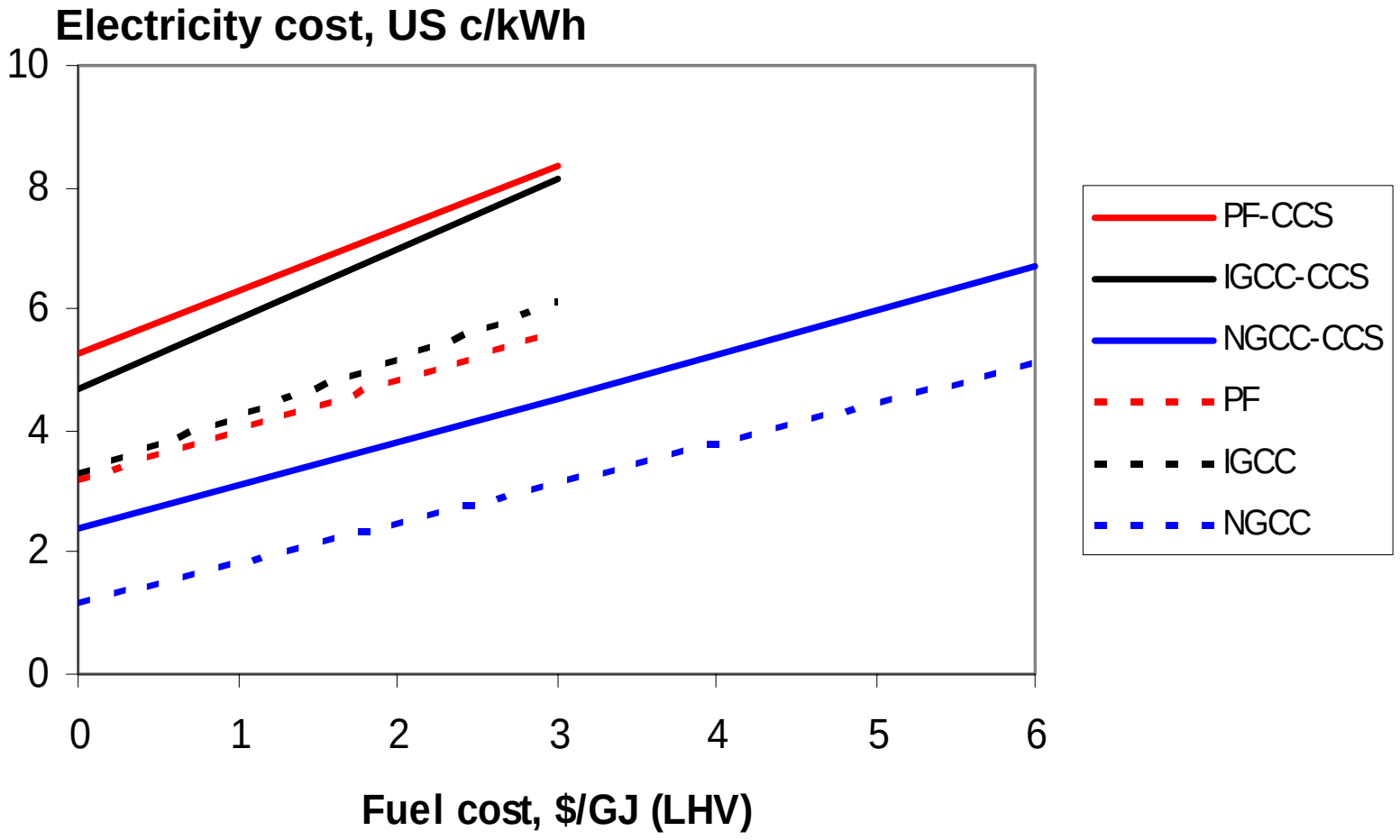
CO_2 Containment

- Industry statistics show there will be fugitive emissions from pipelines and surface facilities
  - Low level and intermittent
  - Can quantify such emissions/
  - Reported through national inventories
- For storage formation should design for zero seepage but cannot say there will be no seepage
- Ensure storage formation does not seep/account for seepage should it occur
  - Effective site characterisation
    - Geology, hydrogeology, faults and wells
  - Risk assessment
  - Monitoring programme – pre and post injection
  - Remediation planning

Monitored CO_2 Stored Underground



Cost of Capture and Storage



Basis: 10% DCF, 25 year life, 85% load factor, $8/t CO_2 stored

Costs

- Costs are high but comparable with other mitigation technologies
  - Costs will reduce by 20-40% with replication

Value Chain Needed

- CCS investment in oil and gas sector stimulated by economic conditions
- Need to create a market for power sector
  - Biggest source of CO_2 emissions
- Emissions Trading may not provide enough support
  - Volatile market conditions may preclude investment

Technology Transfer

- Large numbers of sources in developing countries
  - Number of sources projected to rise
- Need technology implementation in developing countries
- Need CCS to be allowed under CDM to stimulate market take up
  - Need to address issues outstanding and remove barriers

Thank You