

Herbert Smith

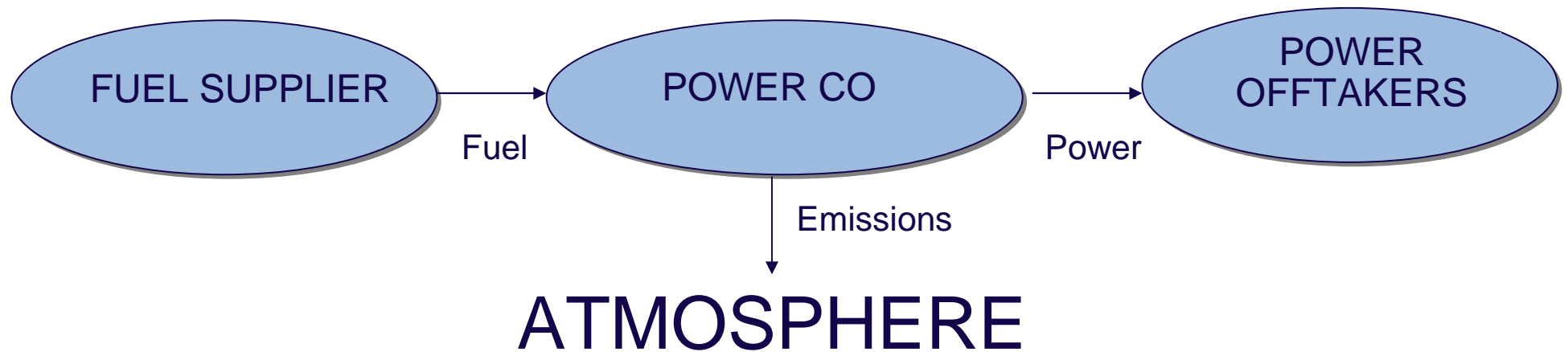
Funding CCS projects – current and future developments in Europe

Simon Tysoe
Geneva, 18 November 2008

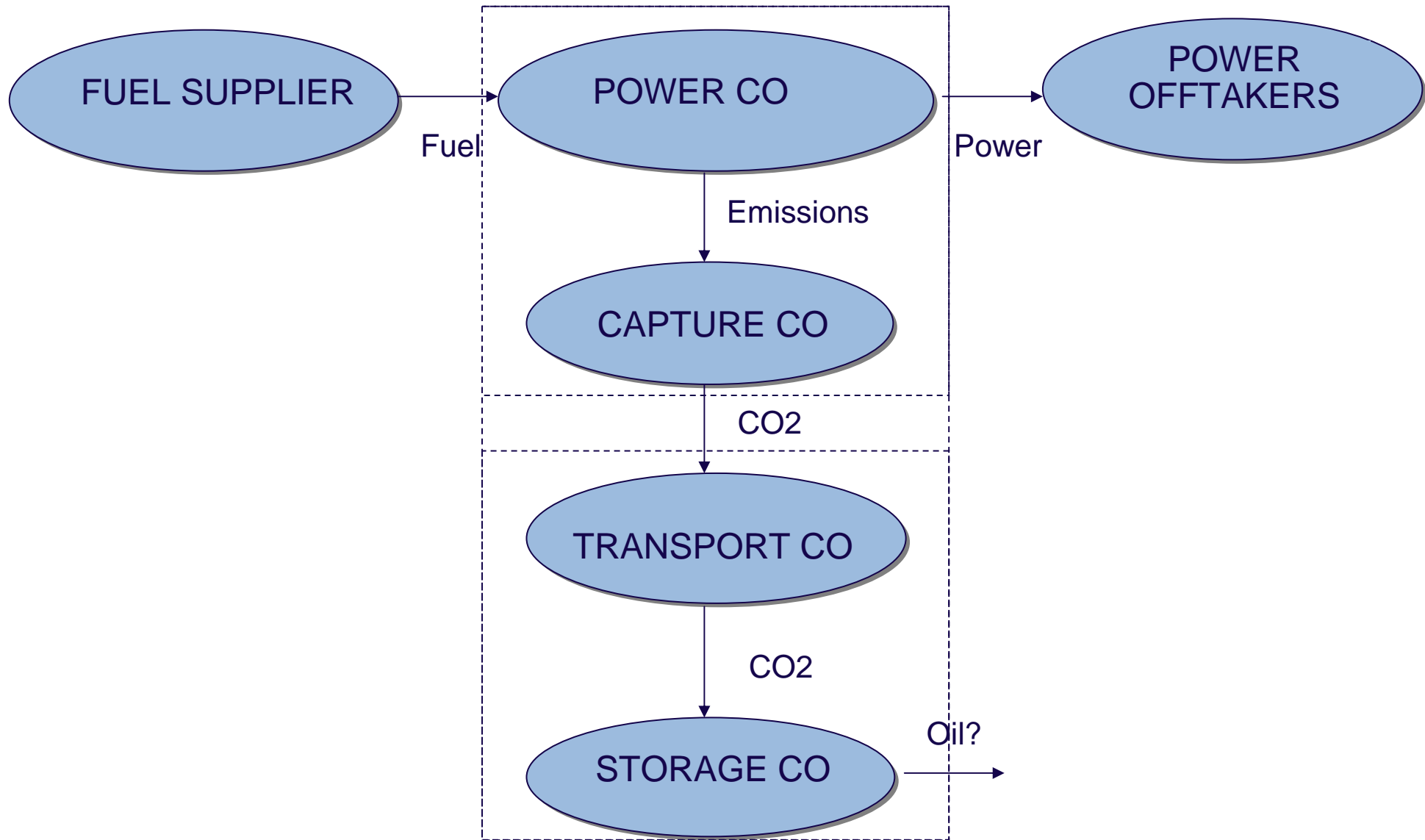


Herbert Smith in association with
Gleiss Lutz and Stibbe

A typical power project – value chain



A CCS power project – value chain



Additional costs of CCS

| Power and Capture | Transport | Storage |
|---------------------------------|--|--|
| Capital costs + 30 – 70% | Capital and operational costs of pipeline | Access rights, well appraisal, monitoring, insurance |
| Operational costs + 25 - 75% | + \$1 – 8 / tCO ₂ per 250km | + \$0.5 – 8 / tCO ₂ |
| Fuel costs + 10 - 40% | | |

Total additional cost of CCS per tonne of CO2 abated

| Demonstration phase (2015) | Early commercial phase (2020+) | Mature commercial phase (2030+) |
|---------------------------------------|---|--|
| €90 to €60 | €35 to €50 | €30 to €45 |

Thanks to McKinsey & Co "Carbon Capture & Storage: Assessing the Economics" September 2008

Where does the money for CCS come from?

- All extra costs and risks with CCS must be funded by power sales, enhanced oil recovery and government incentives.
- In the absence of any government incentives, enhanced oil recovery is the only additional funding stream for CCS projects.
- Even current oil prices, EOR alone is not likely to be sufficient for CCS projects in Europe as oil price fluctuates and oil fields proximate to CCS projects are not large enough.
- Government initiatives are required.

Addressing the funding gap for demonstration projects

State funding

- State aid rules in EU being relaxed to facilitate, but doesn't produce any extra funds of itself.
- Hypothecation of proceeds of EU ETS Phase III allocation auctions.
- UK running the UK CCS competition. Open to post-capture technology only.

Other possible EU mechanisms

- Inclusion in Renewables Obligations? Multiple ROC's (as per UK).
- Allocation of multiple EU ETS allowances to early project?

EU funding initiatives

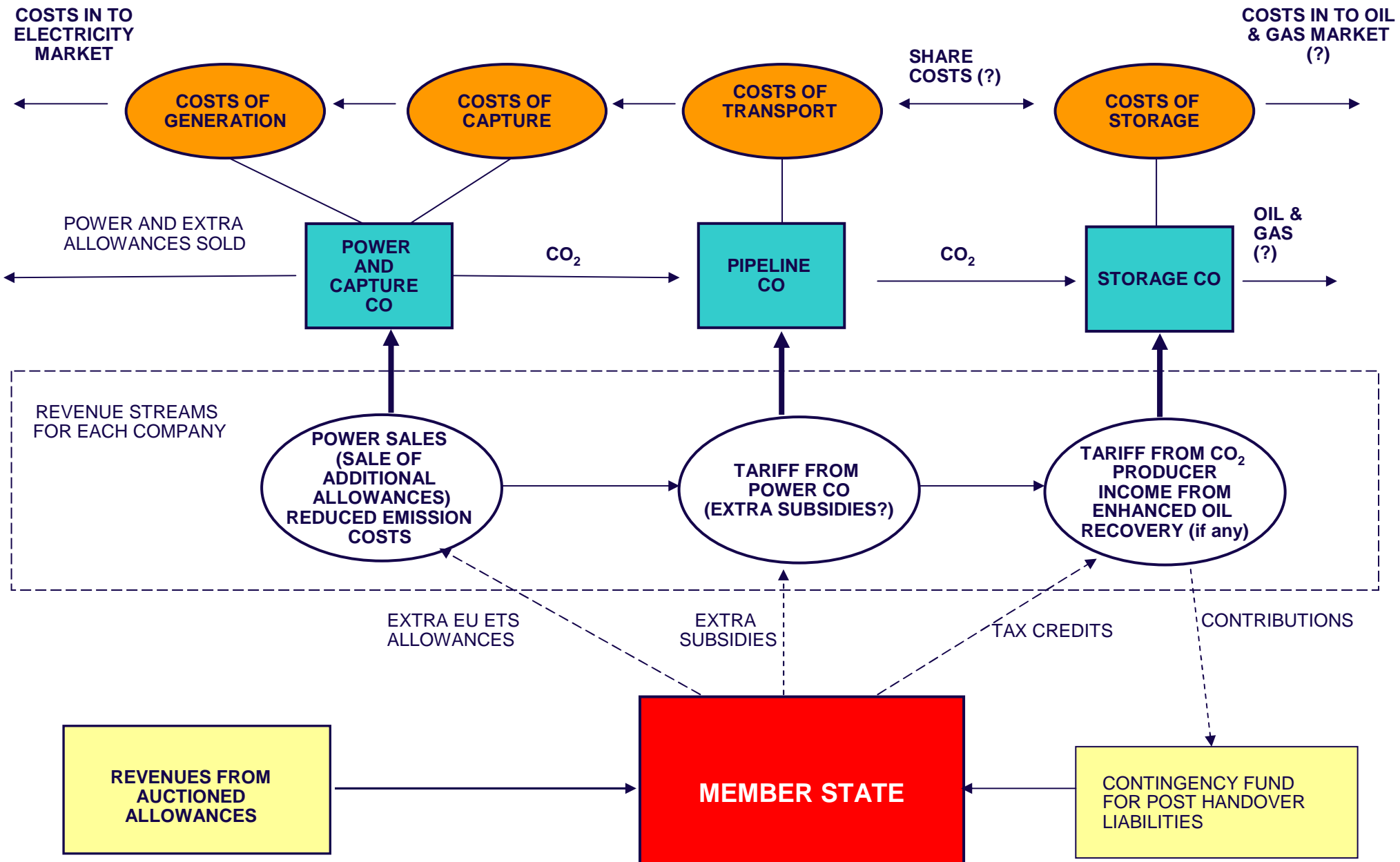
EU proposals to amend the EU ETS and create a CCS Directive

- Emission allowance auctioning for power stations under Phase III of the EU ETS (this will increase the costs of non-CCS power).
- 500 million EU ETS allowances ear-marked for demonstration projects.
- Recognise CCS in EU ETS such that stored CO₂ will not be counted as emitted (emission costs for CCS power will be 85-90% lower than conventional coal fired power stations).
- Member States to fund CCS projects through emission allowance revenues – proceeds to be earmarked for climate change.
- State Aid rules for CCS projects to be relaxed to allow funding.
- If Member States and industry do not develop CCS quick enough, EU may consider making it mandatory – 500 grams per kwh?
- But, no money directly provided by Europe before 2014 budget.

Other options in the EU and the rest of the world

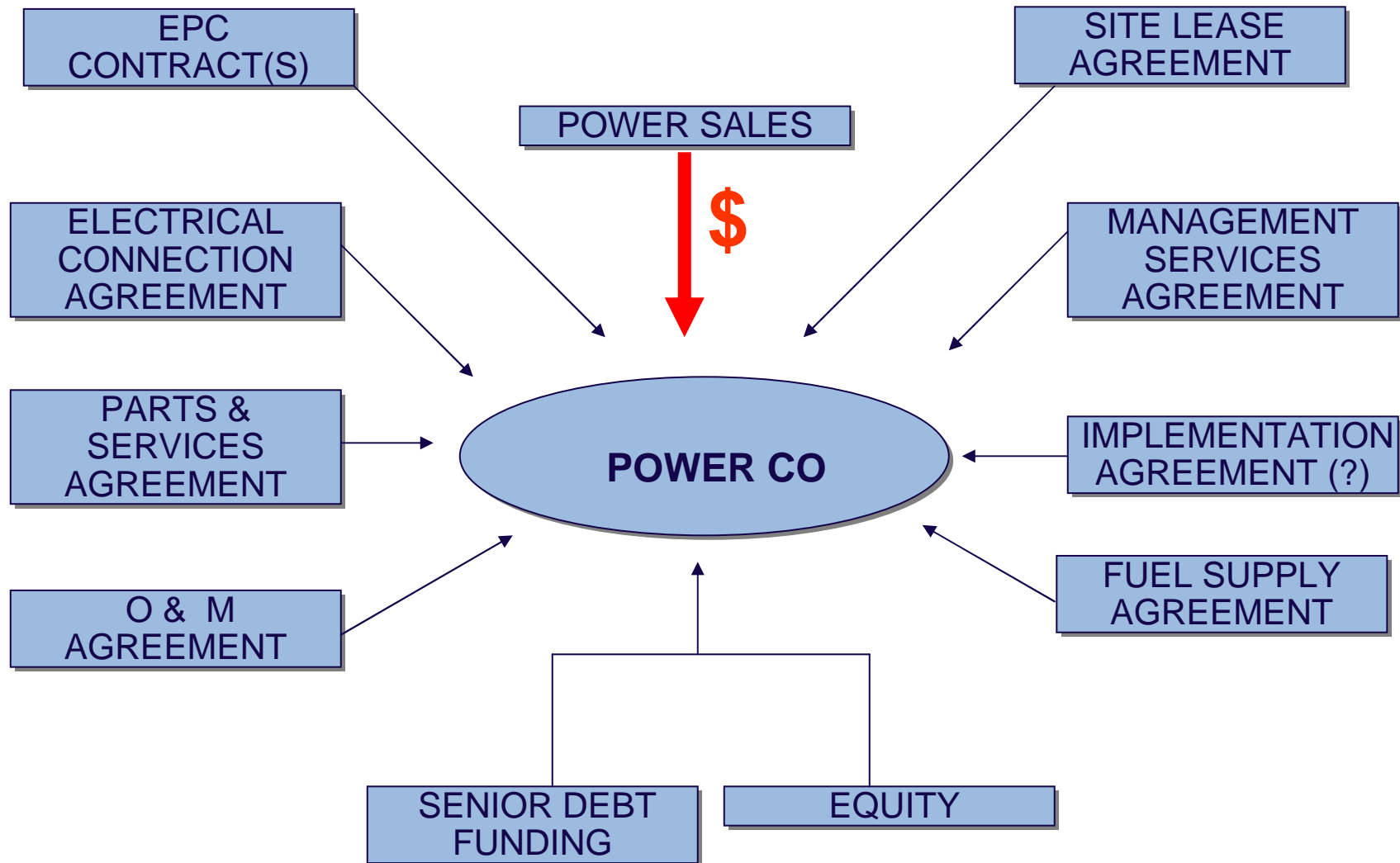
- Enhanced oil recovery
- CDM?
- US tax credits
- Direct subsidies
- Norway draft budget for 2009

What might a CCS value chain
look like in Europe in 2015?

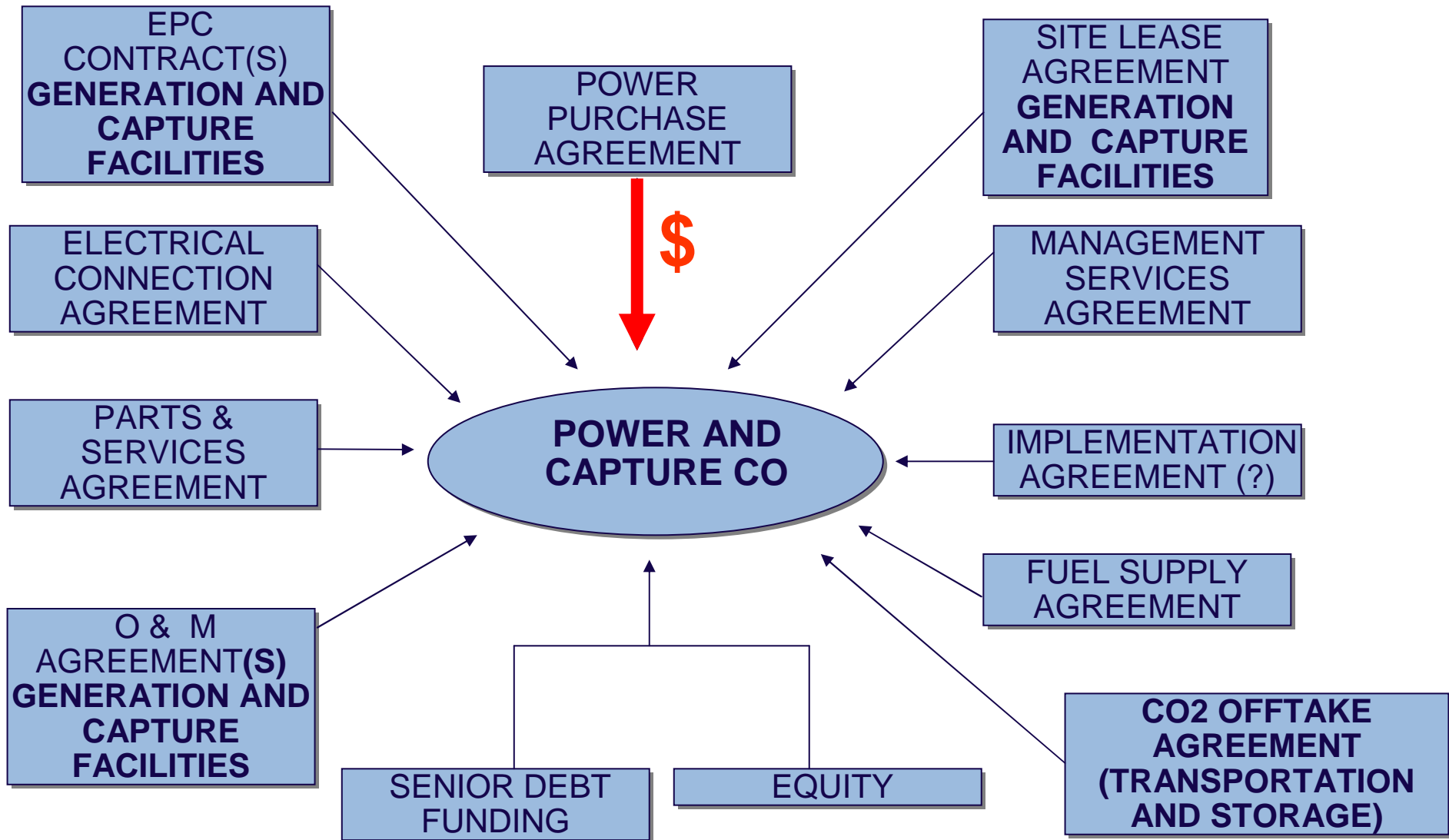


Project realisation - putting a commercial scale demonstration project together

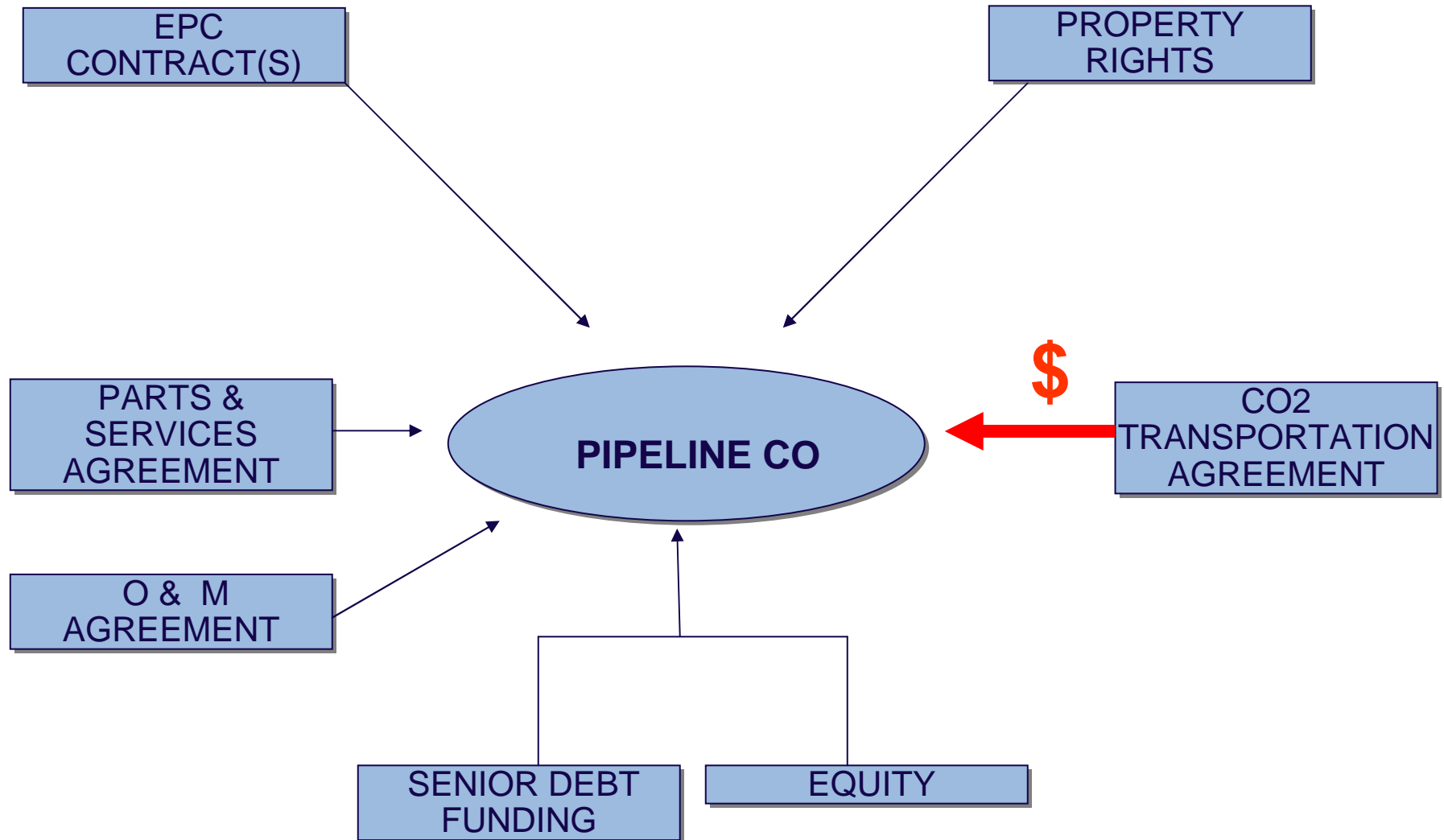
Typical power project – contract matrix



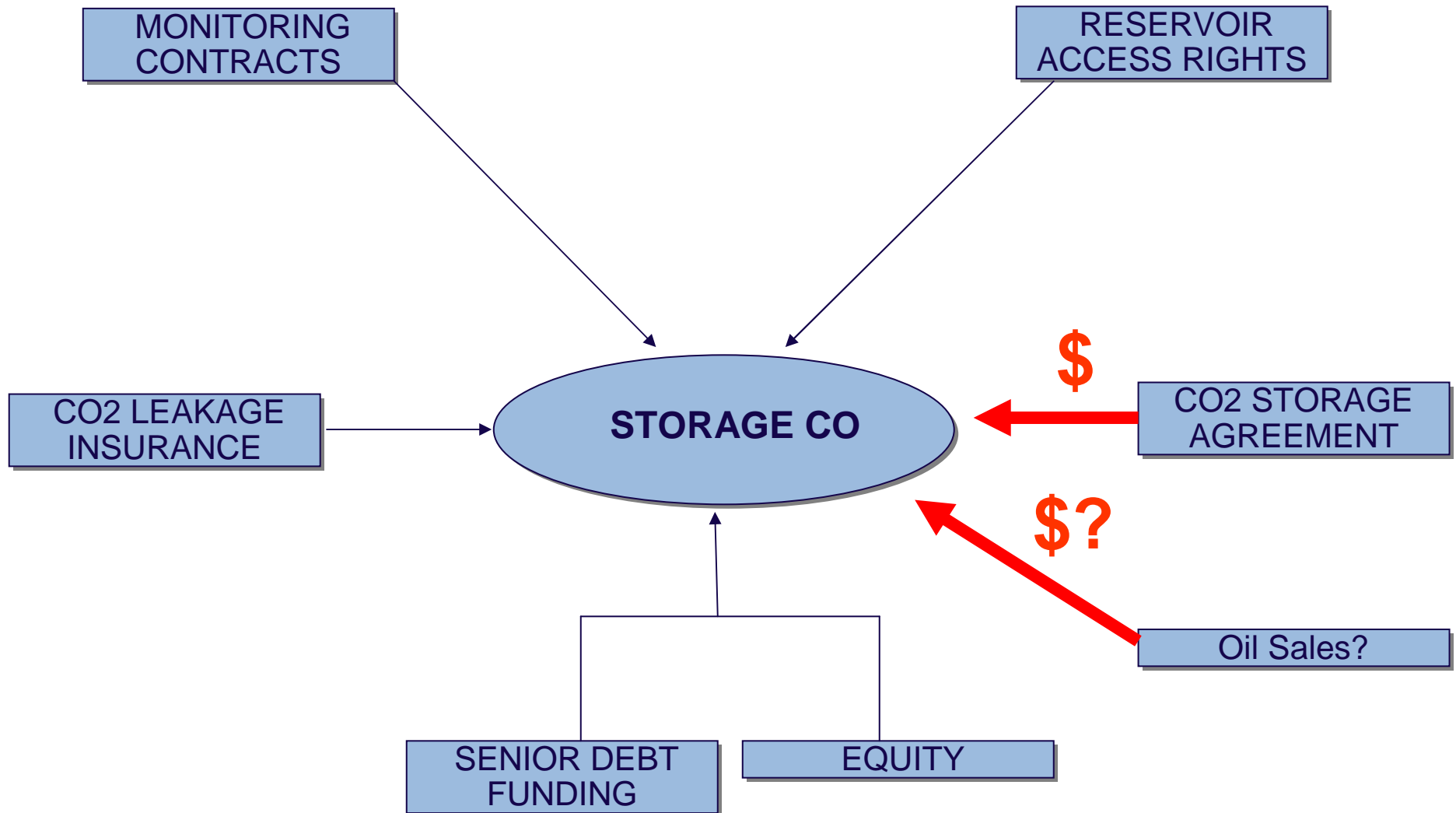
CCS power project – power and capture



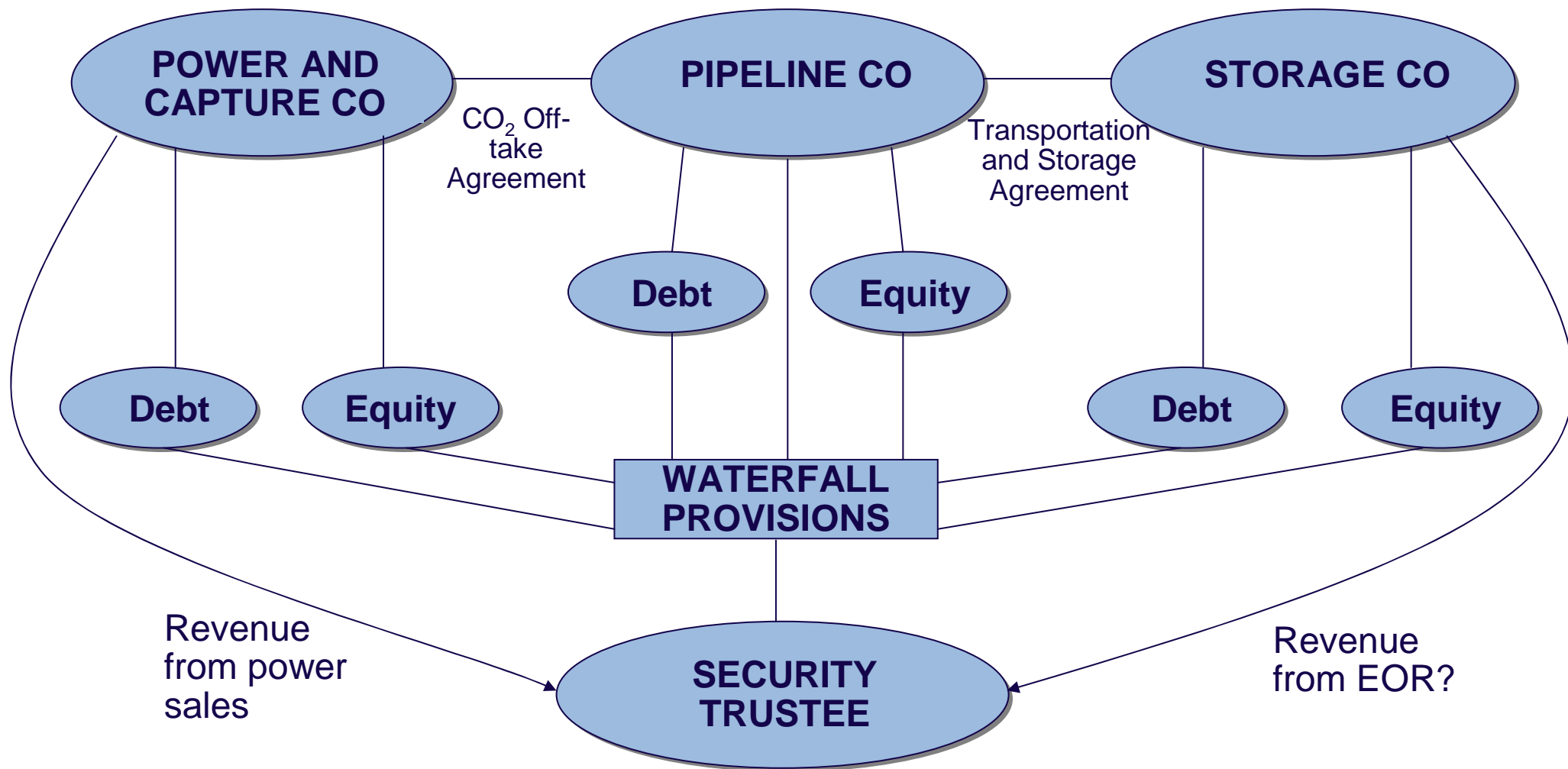
CCS power project – CO2 transport



CCS power project – storage



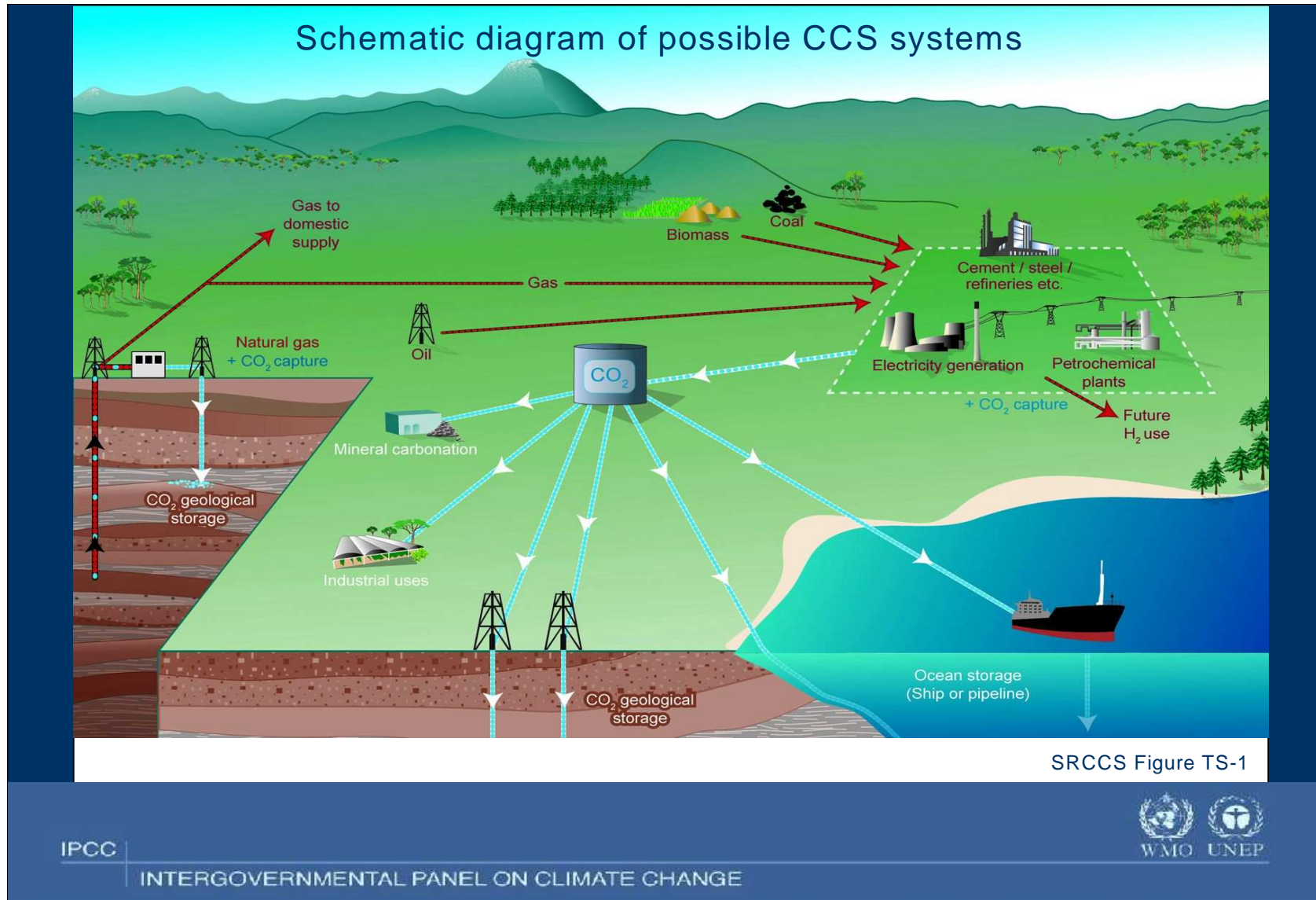
CCS power project – possible debt funding structure



Developing business models for the future

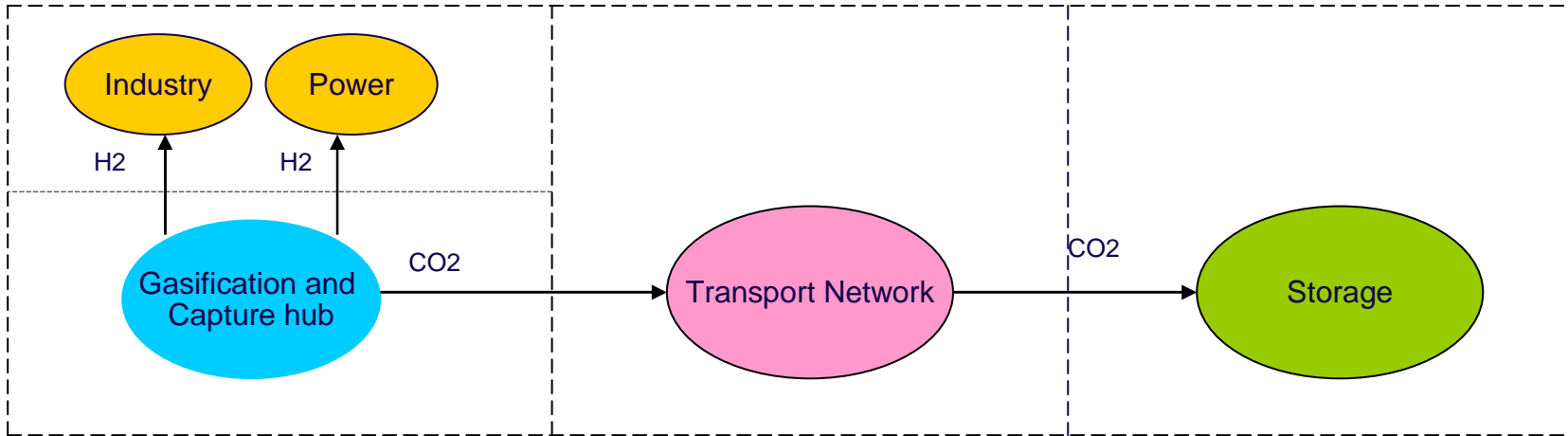


The future?

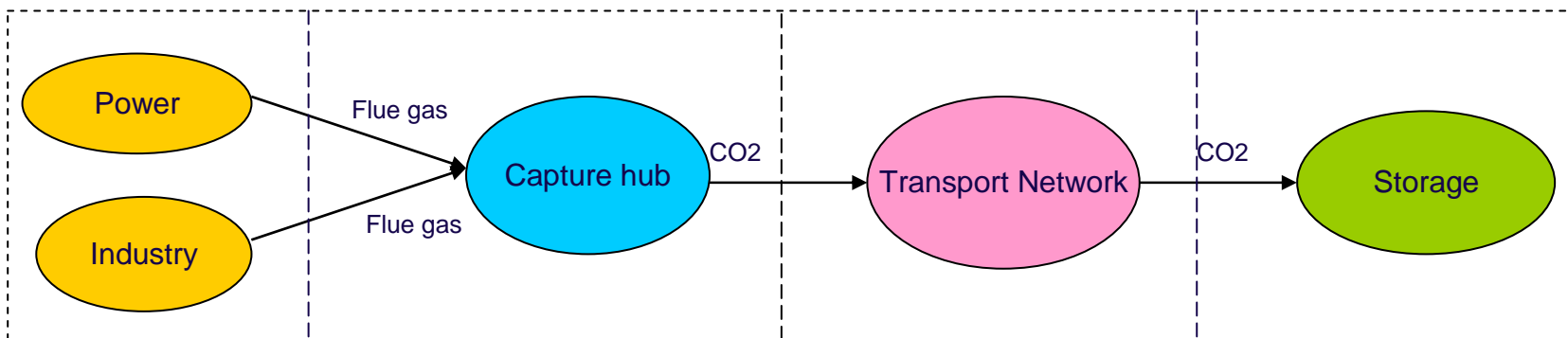


Some currently being attempted and some work in progress

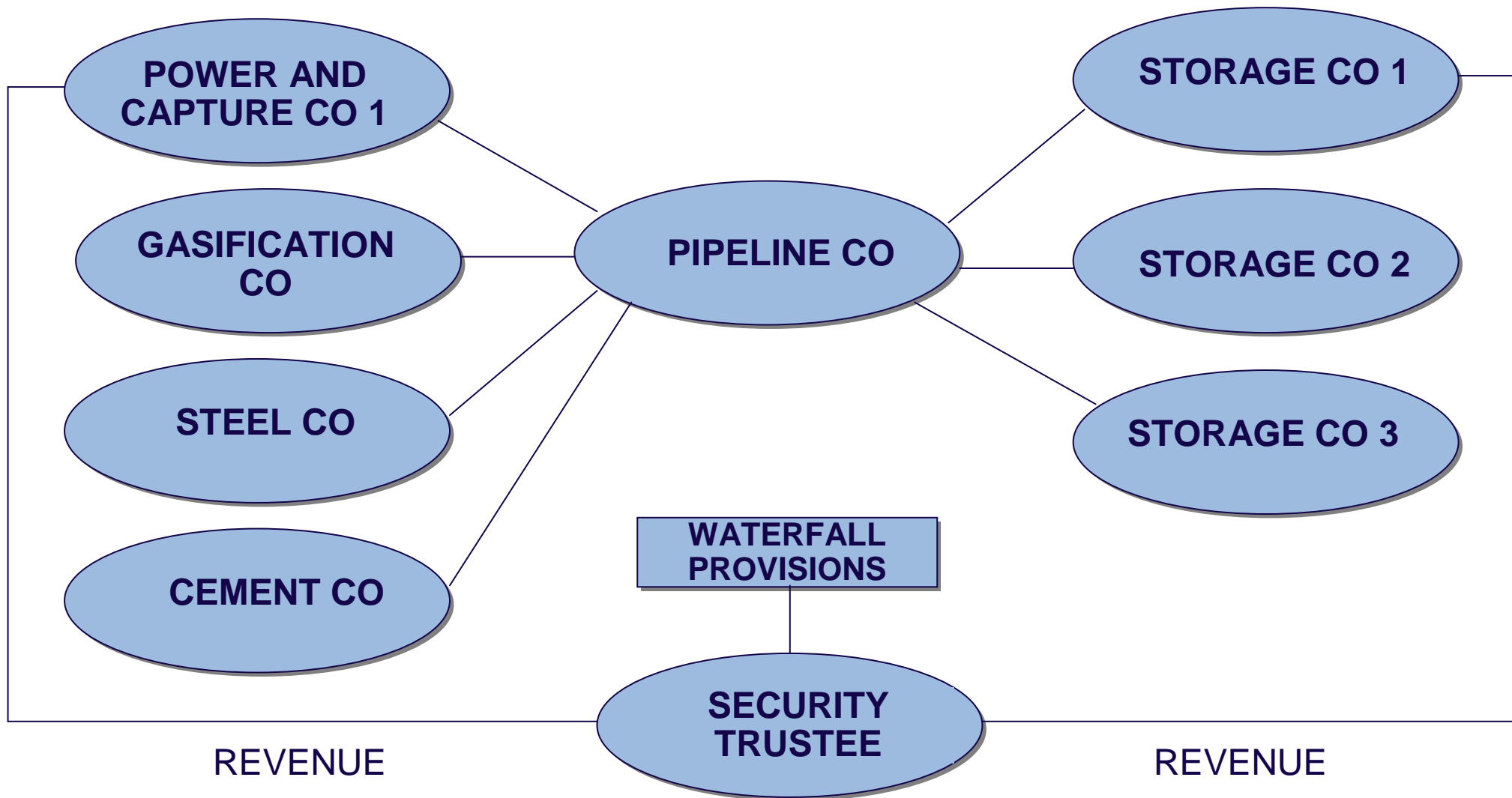
Pre – combustion capture



Post – combustion capture



The New Hydrogen economy – funding structure



THANK YOU FOR YOUR TIME

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Herbert Smith's CCS credentials

- **Centrica** on its proposed 800MW CCS project in the UK
- **BP** on its entry into a global joint venture with Rio Tinto to create the CCS company "Hydrogen Energy"
- **Hydrogen Energy** in relation to a hydrogen-fired CCS project in Abu Dhabi and other projects
- **BG** on the development of its CCS interests
- **Bidders** on the UK CCS Competition
- **Carbon Capture and Storage Association** on amendments to EU and UK legislation
- **London Accord** on legal and regulatory issues surrounding CCS
- **Centrica, Wingas, EON and GDF** on various gas storage projects in the UK