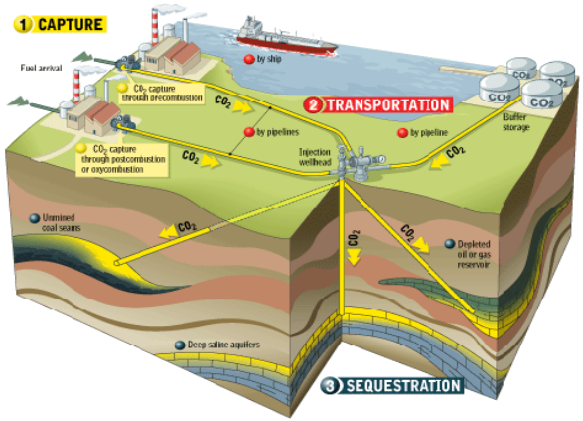

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CCS - VIEWS FROM INDUSTRY, PART II

The Theory & The Practice

J.P.Morgan

Agenda

- "D &D" - Key Disclaimer and Declaration of Biases
- The Theory: Thinking about CCS as a Project
  - The Traditional Project Financing, Key Risk Identification and Mitigation Framework
- The Practice: CCS Project Issues in "Real Life"
- What We Need to Get it Done

"D & D": Key Disclaimer and Declaration of Biases

Some Stipulations

- Disclaimer: The views of the speaker are just that – not the views of J.P. Morgan
- Declarations: Personal "Bias" Math:
  - Geologist + project finance lawyer + developer/environmental professional for power companies + environmental markets proponent =
    - CCS technology exists, is implementable and is not a mystery in its component parts (capture, compression/transport, injection, well management); coordination of independent technologies is not a stumbling block
    - The USA – as "the Saudi Arabia of coal" – is realistically not moving away from coal-fired power generation any time soon
      - Technology stock turnover (to more renewables and generally less carbon-intensive generation) will take decades and billions
      - "Clean coal", in the form of IGCC or other decarbonized technologies, has a key role to play
- Assumption: Big capital projects will require non- or limited recourse financing (given size and capital needs)

The Theory: CCS – The Project Finance Framework

	Highlights	Key considerations
Construction risk	■ Well known and credible EPC contractor ■ Contractual structure/guarantees around budget, schedule and performance	■ Availability of full EPC wrap ■ Cost overrun risks ■ Assumption/insurance of key risks? Geotechnical
Project economics	■ Every project assessed on a stand-alone basis ■ Must generate sufficient cash flow to service debt, repay principal and provide return on equity	■ Is CCS just about disposing of a "waste" product from another project or does it generate value? ■ MARKET PRICE of CARBON and avoided emissions
Contract structure	■ Looking at the entire project, what's the contracted revenue stream? ■ How firm are revenue and cost drivers over term of the project and particularly term of financing?	■ Risk allocation ■ Milestone payment schedules ■ Performance guarantees with liquidated damages from creditworthy entities
Counterparty risk	■ High quality offtakers with good credit ■ Minimum credit standards and "standby" equity provisions in contracts	■ Availability of insurance products? ■ Performance bonds and LCs
Technology risk	■ The technology used in CCS has been employed successfully in chemical plants/E&P for decades ■ Guarantees for component parts and integrated whole	■ Geologic storage on broad commercial scale still getting established – all about "track record"
Ownership structure	■ Strong project sponsorship with well known and credible entities – technology providers with "skin in the game" ■ Sponsors willing to take cost overrun risk	■ Investors will be focused on ability of sponsors to absorb cost overruns – including around technology
Government support	■ National, clear, broadly-based cap-and-trade program ■ True market price of carbon = abatement cost ■ Permitting regimes - clear, streamlined, timely ■ Liability regime	■ Combination of grants, loan (or performance/technology) guarantees, tax incentives required ■ Administration of programs critical to success

The Theory (cont.): Managing Key Credit Considerations

	Risk	Potential mitigation	Agency perception	Market perception
Construction risk	2	■ Secure full EPC wrap ■ Construction completion insurance ■ Strong liquidated damages requirements	■ Agencies will need to be comfortable with downside scenario and that contingent capital payments are available to complete the project	■ Institutional investor appetite for construction risk untested, high risk of negative reaction; no appetite for these risks from traditional PF banks
Project economics	Input 2 Output 2	■ Fuel/input supply via hedges/contracts ■ Off-take price certainty via additional fuel/output hedges/contracts	■ Hedging and debt amortization supports higher ratings, merchant exposure would be subject to rating agencies downside commodity scenarios	■ Institutional investors generally comfortable with certain commodity risks (input and off-take); traditional PF banks much less so
Contract structure	4	■ Strong, coordinated terms and conditions	■ Will conduct detailed legal review of all contracts	■ Contracts should be structured appropriately based on project finance precedents
Counterparty risk	3	■ Higher credit and LC requirements	■ Will reflect perception and diligence on actual counterparties	■ Will reflect perception and diligence on actual counterparties
Technology risk	2	■ Equipment component guarantees from manufacturers ■ Secure guarantees for equipment individually and together ■ Equipment providers in ownership group	■ Agencies likely to focus even more on technology risks relative to investors	■ Overall project technology (e.g., gasification + CCS) will be scrutinized ■ Early projects will require serious government and equity support
Ownership structure	3	■ Clear strategy to address potential cost overruns ■ Provide L/C and/or equity reserve ■ Clear corporate structure and sponsorship	■ Agencies will assume sponsor is willing to walk-away if the project encounters difficulty	■ Related in investors' analysis to construction risk
Government support	2	■ Guarantees (loan and performance) ■ Assumption of liabilities for CO_2 in the ground ■ Insurance for other project components	■ CCS project likely only ratable once there is some track record of successful, scale projects	■ To extent applicable, favorable effect on execution

Legend: 5 Lowest risk 1 Highest risk

The Practice: A Case Study

Theory is fine, but what about reality?

- 2006 RFP for new generation in southern Delaware
- Three initial proposals: IGCC with CCS; offshore wind; natural gas combined cycle
- Three main challenges for the IGCC with CCS:
  - Technology/construction wraps and performance assurances
  - Project economics:
    - High front-end capital cost
    - No market value for avoided carbon emissions
    - Disposal of carbon as a waste product
    - Cost and performance burden on other part of project (i.e., power plant – efficiency losses/parasitic load)
  - Grassroots support
    - War of the sound bites
    - What do we really know about this? Does it work and will the gas stay there?
    - Lake Nyos, Cameroon, 1986

What We Need to Get it Done

The "Top 5"

- Certainty
  - Regulatory: Cap-and-trade regime to put credible market price on a ton of carbon *in the near term*
  - Market: Price signal must be clear and truly reflect (or on a glide path, closely approximate) the abatement cost curve
  - A clear pathway to siting and permitting – not just removal and injection but also the pipeline
- Economic Incentive
  - Technology developers need both a "helping hand" (grants, loan guarantees, performance guarantees) and the right, clear, market signal
  - Project implementers need a recognition of the "venture"-type risk in early projects and loan guarantees/grants to help speed down the natural technology implementation curve
- Address Potential Liabilities
  - CO_2 transportation; CO_2 in geologic formations – "migration" risk – Price-Anderson analog?
- Technology Curve Acceleration
  - Structured and efficient public programs to encourage wide scale commercialization of CCS technology: grants; loan/technology (performance) guarantees
- Education and Public Support
  - Effective communication around: What is it? How does it work?
    - Why it's not some crazy experiment – years of E&P/refining experience