LESSONS LEARNED

LESSONS AND EVIDENCE DERIVED FROM UK CCS PROGRAMMES, 2008 - 2015

Wednesday 14th September 2016

Presentation to ZEP Advisory Council

CONTEXT

CCS Competition: the "business model"

- Private sector development
- Full chain development
- Offshore storage
- Government financial support and risk-sharing
- Create operational, expandable offshore CO_2 T&S capacity
- Create a "world-leading CCS industry rather than just simply projects in isolation"

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CCS Competition: the "process"

- Formal competitive procurement process ("OJEU")
- Invitation to Participate in Discussions (ITPD) set out the objectives and "Outcome" for the Commercialisation Programme's £1 billion Competition (April 2012)
- 17 initial bids – eventually reduced to 2 preferred bidders
- Part-funded FEED projects, potentially leading to full projects

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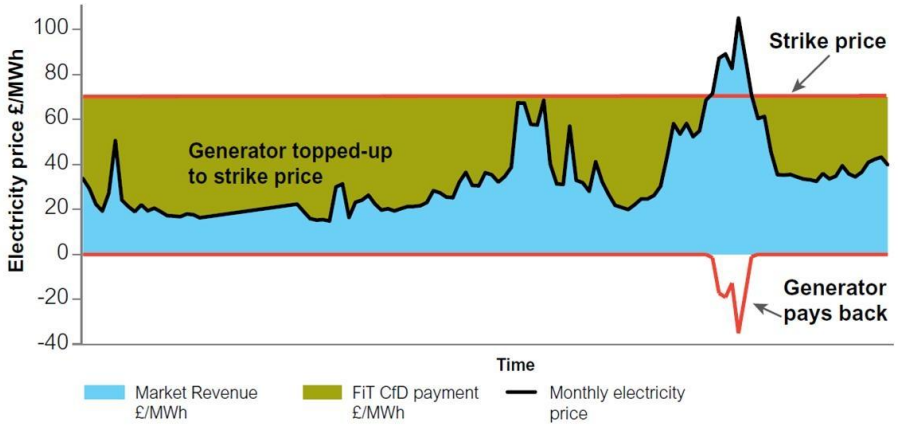
CCS Competition: the "offer"

- Capital grant (up to £1 billion – expected to be split between successful bidders, if more than one)

- Feed-in Tariff with Contract for Difference (CfD) paying for low carbon electricity



- Risk sharing – HMG share cost caused by "CCS risk events"

- Fund 75% of (some of) the "FEED" costs

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CCS Competition: the "Outcome"

"private sector electricity companies can take investment decisions to build CCS equipped fossil fuel power stations, in the early 2020s, without Government capital subsidies, at an agreed Contract for Difference (CfD) Strike Price that is competitive with the strike prices for other low carbon generation technologies"

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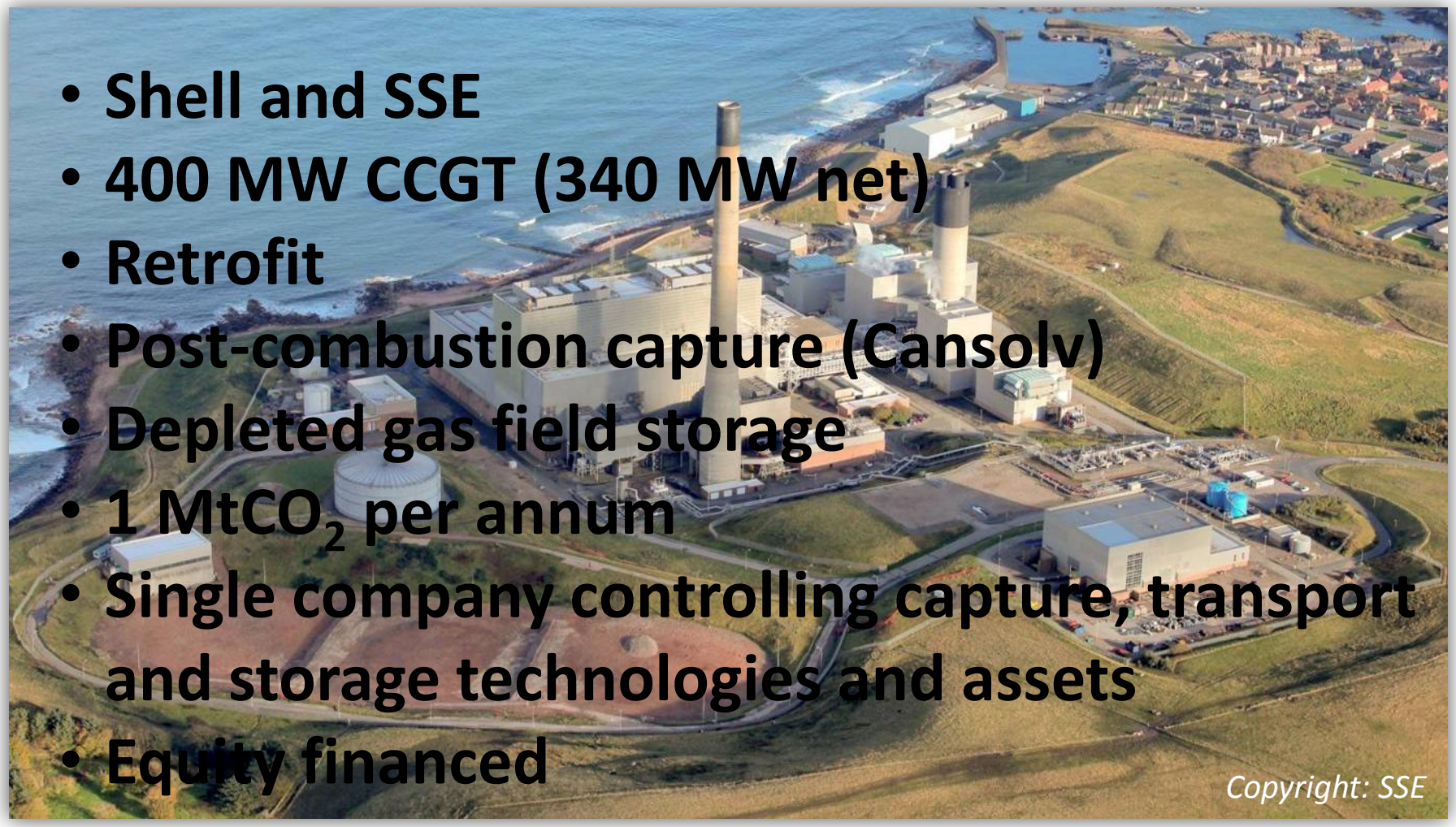
The Peterhead project



- Shell and SSE
- 400 MW CCGT (340 MW net)
- Retrofit
- Post-combustion capture (Cansolv)
- Depleted gas field storage
- 1 $MtCO_2$ per annum
- Single company controlling capture, transport and storage technologies and assets
- Equity financed

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The White Rose project

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The "Outcome" and Costs

Both the Peterhead and White Rose projects would have delivered the "Outcome" in their area

- Operational and expandable T&S capacity - combined pipeline capacity for White Rose and Peterhead projects equivalent to 24 $MtCO_2$ per annum
- White Rose: Unit T&S costs could have been reduced by 60-80% for follow-on projects
- However, costs of the projects were deemed to be too high

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Deliverability under the "business model"

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Deliverability under the "business model"

Peterhead the "exception that proves the rule"

- Circumstances of Peterhead project unlikely to recur
  - single Capture & T&S developer;
  - controls a suitable available offshore store;
  - with necessary capability, financial capacity, strategic interest

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Barriers

Key barriers to delivering projects were commercial, not technical

- Key barriers rooted in the Competition business model
- Private sector financed full chain business model – as defined by the ITPD – unlikely to work in the future. 2 key reasons:
  - Offshore CO_2 storage
  - Cross-chain default

Storage capacity and integrity


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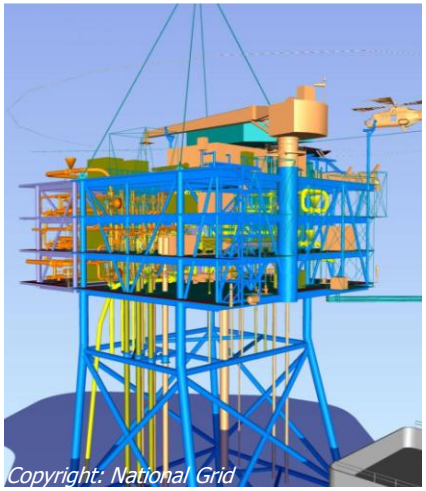
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Two great stores

- Large, well-characterised, ready for development
- Large expansion capacity available
- High expectation that both stores will work
- Most development risks insurable, except:
  - costs/ consequences of CO_2 leakage;
  - delayed transfer to competent authority.

UK offshore storage business model

CO_2 storage is currently not an attractive private sector investment proposition

- White Rose: National Grid was unable to attract storage partners in Endurance under the ITPD terms.
- UK Government would have had to accept majority of un-insurable risks associated with CO_2 storage

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EU CCS Directive

Guidance Document 4

- risks imposing unduly onerous obligations on private sector storage developers
- EU member state interpretation critical to encouraging offshore CO_2 storage development

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Cross chain risk

Solving cross-chain risk is essential to making CCS an investable proposition

- White Rose: no party willing to accept the full costs and consequences of cross-chain default
- G&C need secure income even if T&S is not working

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A level playing field?

CCS value under-stated

- CCS can provide flexible power generation
  - White Rose would have demonstrated; Peterhead capable
- CCS infrastructure would provide economy-wide benefit:
  - industrial CO_2 emissions abatement
  - decarbonised heat
  - transport
- These benefits are not valued in DECC modelling

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Importance of stable policy

Government policy is crucial to CCS development

- Many policy changes over last 10 years
- Investors now awaiting future UK Government policy on CCS

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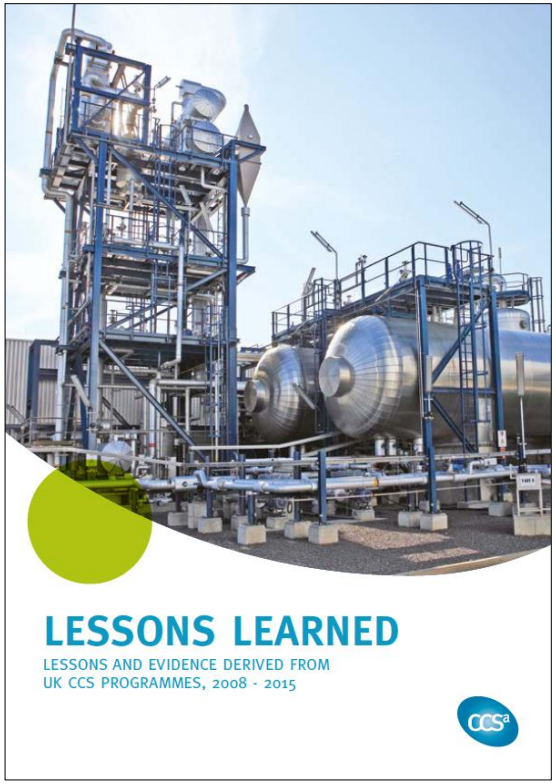
Conclusion



- 36 lessons
- 76 evidence points
- Complements KKDs
- Not advocacy but hope it informs future CCS policies

http://www.ccsassociation.org/press-centre/reports-and-publications/lessons-learned/

Any questions? Please contact theo.mitchell@ccsassociation.org