



TECHNICAL GROUP

Summary Findings from the United Kingdom's CCS Cost Reduction Task Force

Background

At the April 2013 CSLF Technical Group Meeting in Rome, the Technical Group deferred any activity on the “Energy Penalty Reduction” Action in its Action Plan, pending review of the final report from the United Kingdom’s CCS Cost Reduction Task Force. A copy of the final report was provided to Technical Group delegates by the CSLF Secretariat in May 2013. This paper is a summary of conclusions and key next steps proposed by the task force.

Action Requested

The Technical Group is requested to review the findings of the United Kingdom’s CCS Cost Reduction Task Force.

Key Next Steps to Support the Large Scale Development of Power and Industrial Carbon Capture and Storage (CCS): the findings of the UK CCS Cost Reduction Taskforce

In recognition of the importance of cost reduction for the development and widespread deployment of CCS, the UK Government established an industry-led CCS Cost Reduction Task Force (CRTF). The Task Force was created in March 2012 with the objective of publishing a report to advise Government and industry on reducing the cost of CCS so that projects are financeable and competitive with other low carbon technologies in the early 2020s.

While initiated in the UK, membership was drawn from a broad spectrum of UK and international organisations, such that key findings may be applicable elsewhere.

Key conclusion

The Cost Reduction Task Force presented their Final Report in May 2013. The primary conclusion of the Task Force was that UK gas and coal power stations equipped with carbon capture, transport and storage have **clear potential to be cost competitive with other forms of low-carbon power generation, delivering electricity at a levelised cost approaching £100/MWh (\$160/MWh) by the early 2020s**, and at a cost significantly below that soon thereafter.

This conclusion was based on a comprehensive analysis of potential savings across the full chain of CCS, as well as wider cost savings such as from reducing the cost of capital or incorporating new revenue streams such as from CO₂-based Enhanced Oil Recovery (EOR).

Opportunities for cost reduction

Their analysis highlighted five areas where significant cost reductions could be achieved:

1. investment in large CO₂ storage clusters, supplying multiple CO₂ sites;
2. investment in large, shared pipelines, with high use;
3. investment in large power stations with progressive improvements in CO₂ capture capability that should be available in the early 2020s;
4. a reduction in the cost of project capital through a set of measures to reduce risk and improve investor confidence in UK CCS projects; and
5. exploiting potential synergies with CO₂-based EOR.

An indication of the relative significance of each of these factors (for the UK) is given in the graph below. The analysis assumes that early CCS projects will have higher costs because of their smaller size; relatively short lifetime if retrofitted onto existing power plants; single point-to-point full chain configuration; engineering prudence and risk averse commercial and financing arrangements. These early projects are represented by the first column, with costs in the range of £150-200/MWh (\$240-320/MWh). The subsequent columns illustrate potential costs of follow-on projects, taking into account the cost reductions achievable.

The greatest savings have been identified in the areas of transport and storage, improved financeability and improved design and performance. In addition, the Task Force estimated a

potential additional EOR benefit in the range of £5-12/MWh (\$8-20/MWh) for gas CCS, and £10-26/MWh (\$16-24/MWh) for coal CCS, which would be in addition to the reductions identified on the graph.

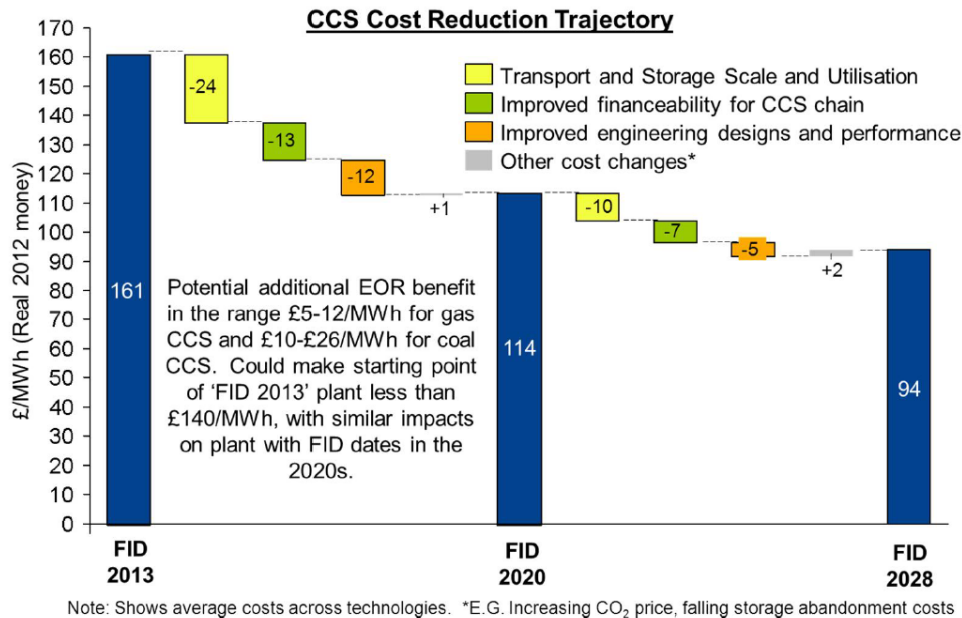


Figure 1: Waterfall Graph - key components of potential cost reduction across the CCS chain

To note, cost savings for a range of different technology configurations were analysed by the Task Force but average cost levels across technologies are used here to simplify messages. Full details of the analysis undertaken are available in the Task Force's report.

In addition to identifying the opportunities for cost reduction, the Task Force also looked at how these cost savings could be achieved.

CCS landscape

The Task Force highlighted the importance of a wider 'landscape' that is favourable to the development of CCS projects. They propose that cost reductions can only take place if a conducive landscape engenders the transition from the early projects to one where CCS is viewed as conventional. The key characteristics of such a landscape include:

1. Credible long term Government policy commitment to CCS - including a suitable regulatory structure and financial and policy framework to foster development of CCS.
2. Successful demonstration of full chain CCS projects at scale - including a commitment to knowledge sharing from projects in the UK and globally.
3. Continued engagement with the financial community - so that they understand the technology and can appropriately assess risk, as well as to ensure their needs are factored into policy development.

The landscape alone will not, by itself, guarantee that costs of CCS projects can be reduced. However, the Task Force believe it will enable a wide range of cost reducing actions to be pursued. Their analysis then examined what are the most important of these actions for encouraging deployment and securing cost reductions.

Key next steps to support large scale development of CCS

While the UK Government is taking forward a comprehensive Commercialisation Programme to build the first full-chain CCS plants in the UK, the Task Force examined the key next steps needed to support *subsequent* large scale development of CCS. As with the cost savings identified, these are UK specific but are likely to be applicable elsewhere too.

Seven key steps were identified to allow the follow-on and future CCS projects to be developed in a way that delivers the identified cost reductions. These were:

1. Ensure optimal CCS transport and storage network configuration – identifying options for transport and storage system configurations that take into account likely future developments and minimise long run costs.
2. Incentivise CO₂ EOR to limit emissions and maximise hydrocarbon production
3. Ensure funding mechanisms are fit-for-purpose – funding instruments should be suitable for widespread use in coal and gas CCS projects.
4. Create bankable contracts - focus on how to construct contracts that will be needed to make follow-on projects bankable.
5. Create a vision for development of CCS Projects from follow-on projects through to widespread adoption with the aim of encouraging prospective developers of CCS projects.
6. Promote characterisation of CO₂ storage locations to maximise benefit from storage resource - the aim is to reduce the ‘exploration risk’ premium, thereby making storage sites bankable both commercially and technically.
7. Create policy and financing regimes for CCS from industrial CO₂ sources.

In addition to these Key Next Steps, the Task Force identified a further 26 supporting steps which should be taken in order to mitigate investor and operational risks and underpin successful development of future CCS projects. Details of these, and the full analysis undertaken by the Task Force, is set out in the **CCS Cost Reduction Task Force Final Report** available from the UK Government Website:

<https://www.gov.uk/government/policy-advisory-groups/ccs-cost-reduction-task-force>