

# CCS Roadmap

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**Building networks: transport and storage infrastructure**



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We are:

- Supporting the development of carbon dioxide transport and storage infrastructure through the CCS Commercialisation Programme
- Keeping the economic regulation arrangements for pipelines under review
- Assisting those looking to develop regionally focused CCS activities, including the development of regional clusters of CO<sub>2</sub> emitters
- Exploring sources of finance with potential investors, including new routes such as enhanced hydrocarbon recovery and the Green Investment Bank

- 1.1. The development of the infrastructure necessary to transport and permanently store CO<sub>2</sub> is one of the key challenges to achieving the objectives set out in this Roadmap.
- 1.2. The availability of pipelines and storage sites that enable high emitting industries to contract for the transport and storage of CO<sub>2</sub> on a similar commercial basis to other utility services will be one consequence of the widespread deployment of CCS in the economy. Some proponents of CCS go further, arguing that the development of infrastructure will be a pre-requisite for the widespread deployment of CCS on the scale needed to meet the Government's low carbon electricity objectives.
- 1.3. It is not the role of the Government to plan the generation of electricity or the pace and location of CO<sub>2</sub> transport and storage infrastructure at the level of detail implied by those ambitions, but there are steps the Government can take that will facilitate the development of CCS infrastructure. We will tailor those interventions so they encourage cost effective investment in CCS infrastructure where it helps deliver our CCS Commercialisation Programme objectives and offers value for money, without compromising the overall thrust of Government policy for infrastructure to be privately owned and financed.

## The case for CCS networks

- 2.1. The economic case for investment in shared infrastructure is straightforward and unquestionable. Transportation of CO<sub>2</sub> in particular is dominated by upfront capital investment and that investment does not increase in proportion to the installed capacity. Shared infrastructure therefore reduces the cost of CCS, provided the investment in additional capacity is utilised to the extent necessary to justify the additional investment.

- 2.2. Figure 1 illustrates the point. The figures are based on ‘typical’ circumstances in the UK and compare the cost of a pipeline sized to transport CO<sub>2</sub> captured from a 300MW power station, compared with a pipeline constructed at the largest size typical in the UK.
- 2.3. The larger pipeline would cost about 25% more than a pipeline scaled for 300MW. However, this additional capital investment will increase capacity between 5 and 7 times. Provided this additional capacity is fully utilised it will reduce the cost of transporting CO<sub>2</sub> by a factor of about 5 on a cost per tonne of CO<sub>2</sub> basis. However, if that additional CO<sub>2</sub> does not materialise then increasing the capacity of the pipeline beyond that required for a 300MW power station will have the opposite effect, increasing the cost of transport by about a quarter on an equivalent basis. The cost-benefit is therefore entirely dependent on the likelihood and timing of the additional CO<sub>2</sub> materialising. If that were not the case then the assessment would change markedly.

	Onshore 110km	Offshore 170km	Total pipeline	Incremental costs (e.g. compressors)
<b>300MW 16 : 16</b>	£30m	£190m	£220m	£40m
<b>Larger scale 36 : 42</b>	£50m	£225m	£275m	£200m
<b>Difference</b>	+£20m +70%	+£35m +20%	+£55m +25%	

**Figure 1. Comparison of the cost of pipelines for transporting CO<sub>2</sub> from 300MW and full-scale CCS power stations**

- 2.4. Other organisations have undertaken more sophisticated assessments and come to similar conclusions. In particular excellent work has been carried out in areas of the UK where there are high concentrations of CO<sub>2</sub> emissions to plan the development of regional networks that would enable industries to tap into this service at the point this made business sense. The high level of capital investment required to get these projects off the ground becomes economic even where relatively pessimistic assumptions are made about the amount of additional CO<sub>2</sub> being handled by the network and when that emerges.
- 2.5. In addition to these prospective economic benefits, other less tangible benefits are also likely to emerge from a networked approach. It obviously makes sense in terms of reducing environmental damage and public inconvenience to avoid the construction of multiple pipelines along the same or similar routes within a relatively short period. It is also likely to be the case that businesses would be more likely to capture and permanently store CO<sub>2</sub> if transport infrastructure were readily available than if they were required to develop and install an infrastructure from scratch. A readily available CO<sub>2</sub>

transport and storage network is therefore likely to provide an attractive mitigation option for high emitting industries looking to reduce emissions. This in turn is likely to have implications for the make-up of the economy in those areas of the country with a high concentration of carbon intensive industries.

- 2.6. Recognising the contribution that reduced CO<sub>2</sub> transport and storage costs could make to achieving the objectives of the CCS Commercialisation Programme, the Government will consider supporting the development of CCS infrastructure on a scale that anticipates future demand and enables the development of local infrastructure networks, provided there is clear value for money justification in doing so.

## Government action

- 3.1. The steps in this Roadmap are intended to help build confidence in the scale, location and type of investment in CCS that is likely to take place until 2030 and the steps the Government will take in order to facilitate that. The Roadmap will therefore help inform decisions about investment in CCS that will consequently help provide confidence in the emerging need for CCS infrastructure.
- 3.2. Key to unlocking investment in CCS infrastructure is market confidence that CCS will provide the benefits anticipated, that demand for transport and storage will materialise and that commercial arrangements typical for other utility services will emerge. Government action to facilitate the development and deployment of CCS is designed to help address each of these points and will ultimately create the right conditions for the private sector to invest in pipeline and storage infrastructure without Government intervention.
- 3.3. That confidence is likely to develop over time. Until then we are willing to consider supporting the development of infrastructure through the CCS Commercialisation Programme that anticipates future demand as well as the development of local networks, provided there is clear value for money justification in doing so.
- 3.4. Beyond the CCS Commercialisation Programme the Government's long-term strategy is that CCS infrastructure is funded through private investment and that it develops over-time in line with demand. However, we also want those piecemeal investments to become integrated into a network as demand and geographical distribution of CO<sub>2</sub> capture increase. Regulatory powers have been adopted to ensure that third parties can access infrastructure on a fair and equitable basis and also to enable new pipelines to interconnect with existing capacity in order for a network to develop. We sought views on how to most effectively develop the pipeline and storage capacity needed for CCS deployment as part of a consultation on developing CCS infrastructure in 2010<sup>1</sup>. In particular we were interested in views on whether setting up a single body, whose role was to construct a pipeline and storage network (either nationally or regionally), would help make it easier for the UK to make more effective decisions about the timing, scale and location of investment in CCS infrastructure. The results were inconclusive. Whilst

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<sup>1</sup> Developing Carbon Capture and Storage Infrastructure. DECC. December 2010. URN: 10D989

we remain open to the possibility of different structural arrangements in the future, we have concluded that taking forward the idea of a single national or regional body is not a priority at this stage. It is possible that unified arrangements could nevertheless develop through companies collaborating to collectively transport and /or store CO<sub>2</sub>. The Government would be willing to consider any regulatory obstacles to such an approach.

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