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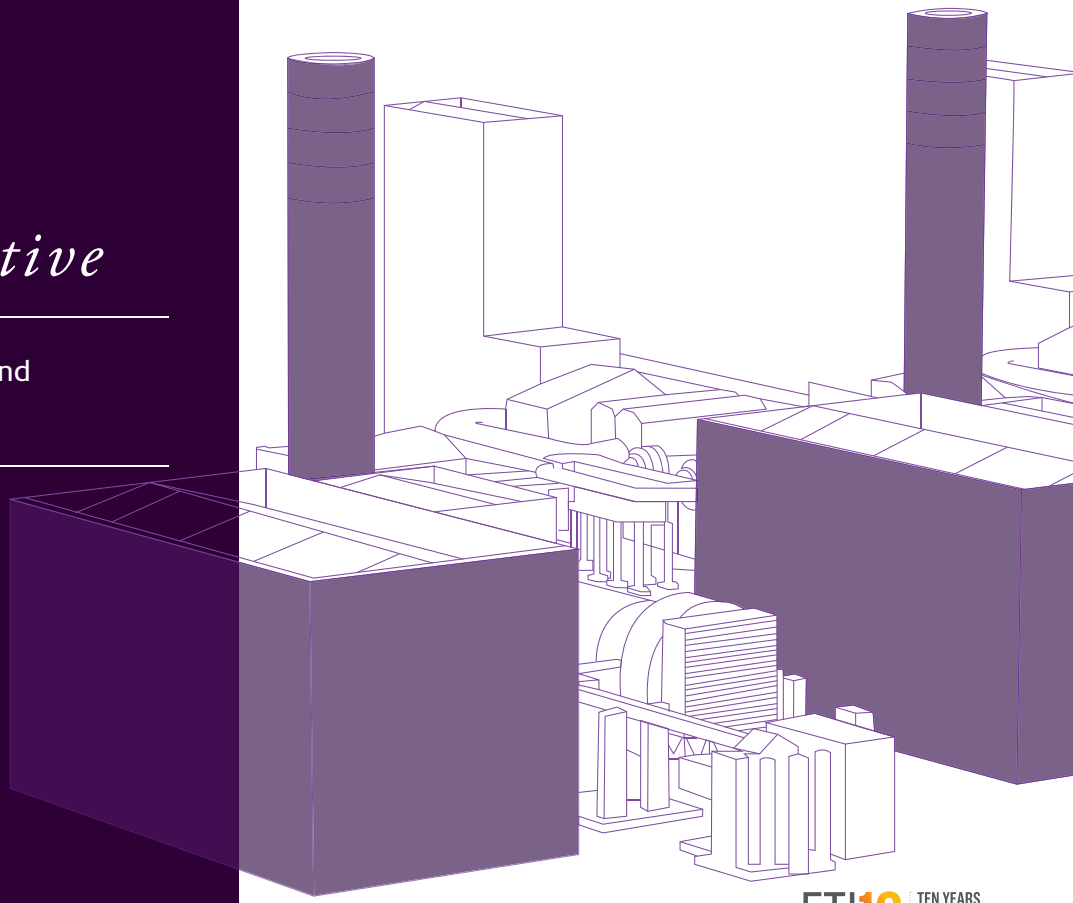
An ETI Perspective

An argument for Carbon Capture and Storage in the UK



ETI10 TEN YEARS OF INNOVATION 2007 — 2017

WHAT MAKES CCS SO VALUABLE?

The answer comes from its potential use across multiple operations. Many people just see one use, capturing emissions from power stations but there are many.

CCS can deliver cost-effective low carbon power generation and, importantly for low carbon energy systems, it can capture industrial emissions. But it can do more. By also using it through a gasification process it can provide low carbon gases such as hydrogen. When deployed in conjunction with Bioenergy it can provide "negative emissions" (the net removal of CO_2 from the atmosphere) allowing for a trade off at a systems level against more difficult challenges to decarbonise (such as transport and heat).

When looking at energy system design and planning, the decision on whether or not to deploy CCS matters. This is because it determines key aspects of the UK's future energy infrastructure. Very different decisions have to be made if there is no provision of CCS in the system. Because of the long lifespan of energy infrastructure assets this means there is a real urgency to make a decision about proving CCS deployment at scale in the UK.

Given this option of multiple operations and its impact on energy infrastructure decisions the economic prize of CCS to the UK is potentially considerable.

Delivering the UK's 2050 carbon targets without deploying CCS is very likely to result in substantially higher costs (present ETI estimates are greater than 2% of GDP by 2050 across the energy system). Indeed it is our conclusion that costs and risks to the UK's decarbonisation pathway could be reduced by bringing forward, rather than delaying the deployment of CCS.
Any delay we estimate adds £1-2bn per year throughout the 2020s to the otherwise best cost for reducing carbon.

By employing CCS the UK has the opportunity to develop a more sustainable UK heavy industry base in chemicals, minerals and materials processing. Economically CCS is critical to decarbonising the heat and transport sectors because of its ability to provide reliable low carbon electricity generation and also, the cost-effective production of hydrogen.

Cost effective, impactful and investable CCS requires reliable, large quantities of CO_2 to be captured and stored over many years. In the UK, power generation best meets these requirements so is best placed to lead on deployment.

Furthermore the UK will need secure, flexible, low carbon electricity generating capacity from the mid-2020s onwards because existing fossil fuel and nuclear stations will be reaching the end of their operational lives and the country's carbon budgets will be tighter. Intermittent renewables will be an important part of the electricity generation system but will not meet these requirements and grid-scale energy storage remains a challenge that needs to be overcome.

For capture technology we advocate that existing proven technologies should be used in early commercial CCS plants. Our analysis shows that the key to early cost reduction for CCS is through the deployment of investable projects rather than through the development of new capture technology platforms, where increased risks to investors more than outweigh any cost benefits. The challenge facing the CCS industry is really one of commerciality rather than technical issues.

Today's commercially available capture technologies are from a mature technology base and they can be expected to deliver further improvements in cost and performance over time. Their use today would help move the industry forward. This move to deployment will help to reduce costs because it is about making CCS work, and at a scale which enables the significant cost reductions.

We predict that amines and pre-combustion technologies will continue to be the technology of choice in power production for years to come.

WHERE IN THE UK SHOULD CCS BE DEPLOYED?

When considering optimal locations it is our belief that the UK should exploit shared infrastructure to reduce costs and therefore increase its future options. To do so, we believe no more than six shoreline hubs and 20 offshore stores are needed to deploy CCS effectively in the UK, building up across the 2020s and 2030s to store around a million tonnes per annum from the 2040s onwards.

For the UK there is a good alignment between the location of potential stores and most of the UK's major emitters now and into the future along the East Coast of the country and in the North West. By undertaking early investment in transport and storage infrastructure the strategic location of early projects can help to unlock further unit cost reductions and build out options.

The UK is extremely well placed to benefit from CCS thanks to its significant offshore CO_2 storage capacity which has no technical barriers to its immediate use. Over the last decade the ETI has painted a detailed storage picture for the UK – identifying exactly what there is, where it is and how much capacity is actually available. The country benefits from decades of work from the UK oil and gas industry which has provided a comprehensive understanding of the rock formations deep below the sea bed which can be used for reliable and secure storage, and has the skills and supply chain to deliver on it. To date a portfolio of priority stores has been brought to an advanced stage of development which could meet the UK needs for the next 50 years. And this represents only 2% of the UK's national storage resource potential.

SUMMARY

So in summary CCS can bring a long term benefit to the UK and potential investors. But to succeed it needs long term commitments from both the public and private sectors. Each side needs to take on the risks that it can safely manage.

Despite the challenges in deployment to date our view is clear that the option of CCS in a future UK energy system needs to be kept open. As we stand, it is about piecing together proven technologies and applying them to CCS deployment. Energy system planners should ensure that any new unabated gas plants are both sited and financed in line with any new UK CCS strategy, even if they are not fitted with CCS from day one.

But vital for the industry to progress is that it has to develop a first commercial CCS plant in the UK. Despite a number of false starts we remain convinced that the key to reducing the cost of CCS lies in delivering a small number of large plants sequentially, not at this point through further innovation into technology-focused research and development activity. So to move forward, the UK has to build its first full scale commercial plant.

This is why the ETI is supporting a project to develop an option to build a gas fired electricity generation power station (potentially as big as 3GW) with full CCS operation – capture, transport and offshore storage - to demonstrate business models that are attractive to industry, government and investors.

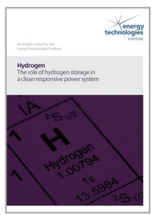
Looking into the longer term, the combination of bioenergy with CCS should be a component of future UK CCS strategy and its deployment advanced. Its ability to deliver negative emissions whilst also producing energy in the form of electricity, heat and liquid & gaseous fuels make it economically attractive from a systems wide perspective. But like CCS itself, the next steps are to demonstrate its components in actual deployment.

So we believe this shows us a compelling argument for CCS in the UK, and reaffirms our analysis that CCS is the biggest single lever available to the UK to deliver on its carbon abatement targets.

FURTHER READING

Reducing the cost of CCS - developments in capture plant technology

http://www.eti.co.uk/insights/reducing-the-cost-of-ccs-developments-in-capture-plant-technology

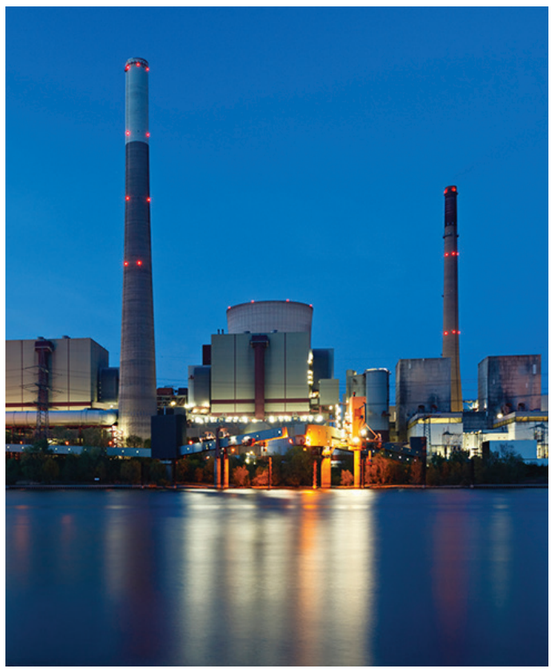


The role of hydrogen storage in a clean responsive power system

http://www.eti.co.uk/insights/carbon-capture-and-storage-the-role-of-hydrogen-storage-in-a-clean-responsive-power-system

Building UK carbon capture and storage by 2030

http://www.eti.co.uk/insights/carbon-capture-and-storage-building-the-uk-carbon-capture-and-storage-sector-by-2030



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