

AGENDA ITEM 10

**REPORT TO THE TEES VALLEY
COMBINED AUTHORITY CABINET**

27TH JULY 2017

**REPORT OF THE INNOVATION &
TECHNOLOGY MANAGER**

PORTFOLIO: INNOVATION

CARBON CAPTURE AND STORAGE

SUMMARY

Carbon capture and storage (CCS) is a process where CO₂ is captured from industrial and power facilities and is then piped offshore and injected into rocks under the North Sea where it is permanently stored. These projects are technically feasible with 22 projects operational across the globe, and the UK has large offshore sites capable of permanently storing large volumes of CO₂.

CCS represents one of the only ways Tees Valley industry will fully decarbonise. CCS infrastructure would attract new inward investment into the region and be seen as a national strategic asset for the UK, supporting the long-term sustainability of industry.

Tees Valley is now home to the UK's leading CCS project, Teesside Collective. This is a consortium of large industrial companies, supported by NEPIC and co-ordinated by the Combined Authority.

The UK needs projects like Teesside Collective to meet its carbon targets cost-effectively. Industry needs the project to provide a solution for their carbon emissions, while making their UK sites more attractive investment options for many of their foreign owners. Teesside Collective's work has shown that the project is technically viable and cost effective.

The government, through the Department of Business, Energy and Industrial Strategy (BEIS), is refocusing its policy approach to CCS, which is expected to be published in the autumn. Teesside Collective has an extensive engagement and communication programme in order to influence this policy, and to secure government agreement to resolve regulatory barriers, provide initial financial support for the build and operation of a major project in this region.

RECOMMENDATIONS

It is recommended that the Combined Authority Cabinet:

- i. Note the report and progress that has been made

- ii. Agree to continue to support Teesside Collective, and its development of proposals for industrial-scale CCS;
- iii. Support proposals to Government for CCS to be supported through the Clean Growth Plan, with Tees Valley at the forefront of its development.

DETAIL

Industrial carbon emissions in Tees Valley

1. Tees Valley has one of the highest carbon emissions in the UK. In 2015 (before the closure of SSI), carbon emissions amounted to 13 million tonnes, 11 million of which were from industrial sources, making per capita carbon emissions in Tees Valley three times higher than the national average. Even accounting for the reduction of carbon emissions from SSI, the level will remain high.
2. Latest carbon statistics show that Tees Valley has seen a 19% drop in carbon emissions over the past ten years; the closure of SSI will show a further drop but clearly for the wrong reasons.
3. Industrial companies have to pay for the carbon they produce. However, in the current EU Emissions Trading Scheme, most companies get free carbon allowances, which effectively means they only have to pay for a small proportion of their emissions. In addition, the price of carbon is currently very low; therefore carbon prices are not currently a significant burden.
4. However, if the UK remains in the EU's Emissions Trading Scheme, the free allowances that companies in Tees Valley currently receive will be reduced, and the price of carbon will rise. This represents a significant business risk for some of our major industrial companies.
5. In addition to the Emissions Trading Scheme, these multi-national companies are coming under pressure from their supply chains to decarbonise their products. For example, Lotte Chemical, which supplies companies such as Coca-Cola directly, is being required to reduce their carbon emissions or risk losing contracts in the future. This means decarbonisation has become a business driver.
6. In addition to the strategic drivers companies face, the UK government has legally binding carbon targets to reduce carbon emissions by 80% in 2050 from 1990 levels. This is a significant challenge, and the government is currently expected to miss its interim carbon targets (termed carbon budgets).
7. Therefore, while there is a strategic driver for companies in the medium-term to decarbonise, there is no immediate financial driver. As lean companies with low margins, industry cannot make this change without Government support.
8. In addition the government needs industry to decarbonise in order to meet carbon targets but increasing carbon costs to push investment in decarbonisation could have the opposite impact by moving investment overseas.
9. Having CCS in place in Tees Valley would also create opportunities for further innovations, including decarbonising heat and transport with hydrogen, which are enabled by CCS infrastructure.

Tees Valley's decarbonisation opportunities

10. There are a number of opportunities to decarbonise Tees Valley industry, and the Combined Authority will be developing a comprehensive strategy over the coming year. These opportunities include:
 - i. Carbon Capture and Storage (CCS)
 - ii. Carbon utilisation
 - iii. Bio-refining
 - iv. Energy efficiency
 - v. Production of low carbon hydrogen with CCS
 - vi. Energy storage
 - vii. Novel energy generation
 - viii. Industrial integration
11. Of these opportunities, CCS represents the unique ability to reduce carbon emissions by 90% at selected plants, and also to provide an infrastructure capable of attracting new inward investment.
12. With one of the highest concentrations of industry in the country, and located close to North Sea carbon storage sites, a CCS network in Tees Valley is one of the cheapest forms of carbon abatement in the UK economy, and the obvious location to start building this infrastructure in the UK.
13. All industrial clusters across Europe face the same challenges, and all are assessing the possibilities of CCS within the context of other decarbonisation opportunities.

The importance of CCS to industry in Tees Valley

14. CCS is the only technology available to significantly reduce industrial carbon emissions at many industrial plants. Many industrial plants produce CO₂ through their process, as a result of the chemical reactions needed to make the product, and is therefore unaffected by energy efficiency measures. In these situations, taking carbon dioxide from the flue gas before it is released to the atmosphere is the only option to decarbonise.
15. In two instances in Tees Valley, chemical plants produce pure CO₂ as a by-product; some of this is transported for use in industries such as food and drink.
16. CCS is technologically proven at a commercial scale on industrial plants and there are 22 CCS plants operating across the world. CCS is not an innovation challenge, it is a commercial challenge. Implementing a CCS network in Tees Valley would represent the UK's first commercial scale CCS project, and establish Tees Valley as a pioneer of industrial development.
17. A CCS network would provide the Tees Valley with a strategic asset on which to attract new inward investment. In addition it could create 1,200 jobs during the construction phase and help retain 5,900 jobs whilst in operation.

International comparisons

18. There are two main regions which are advancing CCS networks in Europe in addition to Tees Valley, these are Norway and Rotterdam. Rotterdam in particular is a competitor location to Tees Valley for inward investment, and the

Norwegian plans include a Yara's fertiliser plant, a direct competitor to CF Fertilisers.

19. Norway project is to store 1.3million tonnes CO₂ a year by 2022 from three industrial plants; these include a fertiliser plant, a cement works, and Energy from Waste operator. The Norwegian government has agreed to take the storage liabilities for the CO₂, incentivised a private sector company to transport and store CO₂, and have funded front end engineering and design for three industrial plants. They are currently developing the incentive structure for the industrial companies to build and operate the CCS plant.
20. Rotterdam has been developing CCS plans for its industrial sites for many years, however in the focus has been to retrofit a coal power plant with CCS and expand from there. In the past few weeks the focus has now shifted, and instead Rotterdam plans to focus on low cost industrial companies. The plan is now to start with the winter surplus CO₂ from hydrogen plant of Shell's Pernis refinery, and the Alco bioethanol plant and quickly expand to other low-cost sources, such as hydrogen plants at oil refineries and waste incineration units in Rotterdam. It is expected that the Port of Rotterdam will take an active role in developing this infrastructure.

Carbon Utilisation

21. Carbon Utilisation is a process whereby CO₂ is used to produce a product; this creates a value for the CO₂. Companies in Tees Valley already sell CO₂ to the drinks industry, and pipe CO₂ to greenhouses to enhance the growth of tomatoes.
22. Some of the opportunities to use CO₂ actually lead to permanent storage of the CO₂ as would be expected by a traditional CCS scheme; however a lot of the technologies eventually release CO₂ back into the atmosphere. Therefore while it creates an opportunity to sell CO₂ it does not reduce a company's carbon costs.
23. The Combined Authority has assessed the potential for carbon utilisation within Tees Valley which highlighted that there are opportunities to develop aggregate, fuels, chemicals and plastics using CO₂. The Combined Authority is talking to the major companies innovating within this space, presenting the area as an ideal location to locate their operations.
24. However, while technologies are being developed to use CO₂ to produce a product, the volumes of CO₂ used are limited. For example, carbon8, who have three operational plants using CO₂ to produce aggregate, collectively use 30,000 tonnes of CO₂, compared to the millions of tonnes of CO₂ that our industry emit.
25. Therefore both carbon utilisation and carbon capture and storage should be progressed simultaneously, as they currently are by the Combined Authority.

UK CCS policy

26. The UK has legally binding carbon targets, and all the modelled scenarios to achieve these targets require CCS.

27. The UK government has run two competitions in order to build the first CCS project in the UK. Both of these competitions have focused on taking CO₂ from power plants rather than from industrial processes; and both have failed.
28. The most recent CCS competition closed in late 2015 following an Autumn Statement decision to remove the £1 billion that was on offer from Government. This competition included the White Rose CCS project at the Drax site near Selby, and a Shell project at Peterhead in Scotland. If this competition had been completed, and the White Rose project been successful, it would have supported a Tees Valley CCS network coming online in the early 2020s. However, both these projects have now been closed.
29. Following the cancellation of the CCS competition, the government established a Parliamentary Advisory Group to assess how to deliver CCS, in September 2016 this group recommended:
 - i. Establish a CCS Delivery Company
 - ii. Establish a system of economic regulation
 - iii. Incentivise industrial CCS through Industrial Capture Contracts
 - iv. Establish a Heat Transformation Group
 - v. Establish a CCS Certificate System
 - vi. Establish a CCS Obligation System
30. The UK government has yet to formally respond to this report and outline how it proposes to make CCS operational in the UK.
31. In addition, the Energy Technologies Institute (ETI), a public-private partnership between government and major industry, completed an assessment of UK offshore CO₂ storage and concluded that there was enough CO₂ storage for over 50 years of all UK CO₂ even from the limited stores that have been appraised.
32. We are expecting government's CCS policy to be announced as part of the Clean Growth Plan. The Clean Growth Plan is a legal requirement for the government to publish and sets out how it will meet its carbon targets. However this plan has been delayed many times and the latest indications from government are that it will be published in the autumn. There is a window of opportunity to influence this plan to make it as ambitious as possible.

Teesside Collective

33. Teesside Collective, a consortium of five major industrial operators, supported by NEPIC and co-ordinated by the Combined Authority, launched in 2013 and since then has systematically developed the region's CCS proposals, leading the campaign to establish Tees Valley as the go-to location for clean industrial growth.
34. Members of the group are:
 - i. Sembcorp Utilities UK
 - ii. SABIC UK
 - iii. CF Fertilisers UK
 - iv. Lotte Chemicals UK
 - v. BOC
35. Teesside Collective is now seen as the leading CCS project in the UK. Representatives have spoken at more than 60 national and international

conferences, and it has secured meetings with senior officials, political advisors and ministers in BEIS, Number 10 and HM Treasury.

36. In 2015, Teesside Collective published its 'Blueprint for Industrial CCS', which detailed how CCS in Tees Valley would be built and what it would cost. This was funded by a £1 million grant as part of the City Deal. This found that the project would cost £110 million to build three CO₂ capture plants, and £29 million per year to operate.
37. Earlier this year, Teesside Collective published its proposal to fund the CCS network in Tees Valley. This showed that a CCS network in the region would cost £58/t CO₂ to build and operate, representing extremely good value for money for the government compared to low carbon technologies it was currently subsidising.
38. Teesside Collective has proposed a technically feasible and cost-effective solution to decarbonise industry and create a strategic UK asset in one of the UK's most important industrial clusters. What is now required is clear, long-term government policy and financial support to take it to the next stage.
39. This policy should include:
 - i. £15million engineering and design funding for three industrial carbon capture plants in Tees Valley
 - ii. Regulation and budget to fund the build and operation of a CCS network in Tees Valley
 - iii. Agreement that the government owns the CO₂ storage risk, and assists the private sector to develop CO₂ storage sites
40. Teesside Collective, the Tees Valley Mayor, and a cross-party group of local MPs have written to Claire Perry MP, Minister of State for Climate Change and Industry, to demonstrate the opportunity that the CCS project in Tees Valley presents and to ask for a meeting at her earliest convenience.

FINANCIAL IMPLICATIONS

41. There are no financial implications; all work done to date is within existing budgets funded from a BEIS grant.

LEGAL IMPLICATIONS

42. There are no legal implications

RISK ASSESSMENT

43. This Carbon Capture and Storage project is categorised as low to medium risk. Existing management systems and daily routine activities are sufficient to control and reduce risk.

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