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Your
Ref:

Debbie McCall
Energy Consents Unit
Scottish Government
2nd Floor, Meridian Court
5, Cadogan Street
Glasgow, G2 6AT

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By e-mail: thermalguidance@scotland.gsi.gov.uk

Dear Debbie,

THE CONSENTING PROCESS FOR THERMAL POWER STATIONS IN SCOTLAND

Thank you for providing the Scottish Environment Protection Agency (SEPA) with the opportunity to comment on the above consultation document.

SEPA's main role is to protect the environment and human health. We do this by regulating activities that can cause harmful pollution and by monitoring the quality of Scotland's air, land and water, working to enable those we regulate to comply with the legislation. SEPA has an important role in considering the environmental impacts of energy decisions, and within its remit, contributing to reducing these impacts.

The questions raised in this Scottish Government consultation are in relation to carbon capture readiness (CCR) and carbon capture and storage (CCS) and reflect those raised in the BERR consultation "Towards Carbon Capture and Storage" which closed in September 2008. SEPA copied our response to the BERR consultation to Scottish Government at that time.

CCS is considered to be one possible technological solution (or mitigation) that has the potential to significantly reduce emissions of CO₂ from fossil fuel power stations. SEPA is supportive of aims to develop CCS technology and of the development of a regulatory regime which whilst enabling CCS will also protect human health and the environment.

There are, however, some elements of concern that should be considered, not least of which is ensuring that Scotland avoids being locked in to high carbon emission electricity generation sources that could put pressure on climate change goals. CCS is viewed as representing a method for improving energy security at the same time as meeting climate change goals. However, there remain challenges in the development of CCS technology and deployment:

- A number of research and development projects relating to CCS are in operation globally and all aspects of the CCS chain have been demonstrated separately. However, there is currently no example of capture and storage at the scale required for a power plant, nor of commercial application of the entire chain of carbon capture, transportation and storage at a large scale;

Chairman
David Sigsworth

Chief Executive
Dr Campbell Gemmell

Corporate Office
Erskine Court, Castle Business Park, Stirling FK9 4TR
tel 01786 457700 fax 01786 446885
www.sepa.org.uk

- A number of reports such as the McKinsey report published in 2008¹ estimate that wide spread deployment of CCS technology will not be undertaken until around 2030. Consideration needs to be given to the impact on CO₂ targets of new build fossil fuel power stations operating unabated until 2030;
- The full assessment of the increased energy demand of the whole chain of CCS has not been fully assessed to quantify the best options for differing geographical areas, consideration should also be given to undertaking Life Cycle Analysis of CCS options to ensure that we continue to aim for energy efficiency in energy production;
- Estimates have been made as to the storage potential available both in Europe and globally. However, until more detailed assessments of sites are undertaken these estimates cannot be used to reliably assess mitigation potential. When considering policy choices, the 2007 ACCSEPT report states that there are significant uncertainties surrounding current estimations of potential storage space. It notes that even when using conservative estimations there is likely to be sufficient storage space to make CCS an option but that policy makers should use caution when considering the higher estimations as the methodologies involved in making such assessments is still controversial;
- The commercial viability of CCS is intrinsically linked to the cost of carbon and it is unlikely to be widely adopted until the price is attractive to operators as a mitigation technology;
- Permanent and secure storage of captured CO₂ in geological formations has yet to be fully evaluated.

More detailed responses including SEPA's response to the specific consultation questions are given in the attached Annex.

As a public body committed to openness and transparency, SEPA feels it is appropriate that this response be placed on the public record. If you require further clarification on any aspect of this correspondence, please contact Carolyn Vannan, Principal Policy Officer, SEPA Corporate Office, at the address shown below.

Yours sincerely



Janice Milne
Head of Environmental Policy

Enc

¹ http://www.mckinsey.com/client-service/ccsi/pdf/CCS_Assessing_the_Economics.pdf

Annex

In addition to responding to the specific questions outlined by Scottish Government SEPA would also like to take the opportunity to comment on the sections related to Appropriate Assessments. Currently this section is not specific to proposals for a power station and thus gives no steer to applicants about the nature of information that Scottish Government, as the competent authority for Section 36, would require in order to assess the potential impacts of the application for Special Areas of Conservation and Special Protection Areas (under the Conservation Regulations 1994) and for Sites of Special Scientific Interest (SSSIs) (under the Nature Conservation (Scotland) Act 2004). SEPA believes that it would be helpful for applicants to be advised that Government is likely to require deposition modelling, with a view to identifying likely impacts as a result of potential critical load exceedences for acidifying and eutrophying substances. Note that the deposition footprint of a large power station will probably require national modelling and may have potential impacts elsewhere in the UK and so will require use of a national model such as the Fine Resolution Atmospheric Multi-pollutant Exchange (FRAME) model used by the Centre for Ecology and Hydrology. There are also likely to be potential local water impacts from cooling water, the assessment of which will require dispersion modelling. Without such information at the time of application, the competent authority may find it is lacking vital information to enable it to discharge its statutory conservation responsibilities.

1. **Scottish Ministers are minded to insist that developers demonstrate that all new fossil fuel power stations over 300MWe in Scotland demonstrate CCR. Do you agree?**

SEPA agrees that all new power stations over 300MWe should be required to demonstrate carbon capture readiness. 300MWe seems a sufficient threshold to start to plan for implementation of the Directive as this should cover all new fossil fuel generating plant. The level at which the threshold has been set should be revisited on revision of the Directive in 2015. SEPA understands that this threshold has been set as it enables the largest CO₂ emitters to be targeted first, but would prefer to see (either now or in a revision) commitment to a date by which all power stations would need to meet an emissions standard set in terms of kilograms of CO₂ per megawatt hour of electricity generated or an efficiency standard. SEPA understands that the Directive on the Geological storage of Carbon Dioxide currently indicates that its 2015 review "shall examine whether it is needed and practicable to establish a mandatory requirement for emission performance standards for new electricity-generating large combustion installations pursuant to Article 34".

SEPA is aware that fossil fuelled plant built today could not be built with carbon capture technology and that the CCR requirement aims to address this by ensuring that the plant would be able to fit abatement technology when it becomes technologically and economically feasible to do so. With no set date by which the Government envisages this to happen there is no clear signal to developers that plant will not be able to operate unabated for perhaps another 20 years to 2030.

It must also be noted that there is significant difference between "capture readiness" and deployment of capture ready technology. Capture readiness as currently defined does not guarantee that capture technology will ever be deployed.

SEPA believes that additional mechanisms may be required to encourage uptake of CCS and avoid new build fossil fuelled power stations operating unabated in the future. There are two main ways in which low carbon energy choices could be achieved: through mandatory CCS by a set date, or to commit to a date by which all power stations would need to meet an emissions standard set in terms of kilograms of CO₂ per megawatt hour of electricity generated. The UK's House of Commons Environmental Audit Committee suggested that this limit should equate to "capturing at

least 90% of carbon emissions” from a coal station. Mandatory CCS would send a strong signal to industry that if fossil fuelled plant is chosen it cannot operate unabated. An emissions limit would provide a choice that does not prescribe the technology to be implemented, but ensures unabated fossil fuelled plant will not be operating in the future. Such a decision should be implemented at EU level.

2. Do you envisage any difficulties with using the consent regime under section 36 Electricity Act 1989 to implement Article 32 of the draft EU Directive on the Geological Storage of Carbon Dioxide?

No, SEPA does not foresee significant difficulties in implementing Article 32 of the draft EU Directive on the Geological Storage of Carbon Dioxide as it applies to new fossil fuel power stations through S36 of the Electricity Act 1989.

However, clarity is required on the scope of the application of CCR outside of new build plant. As this regulation also has the potential to apply not only to new build but also to extensions to power stations it is important to clarify that CCR can only reasonably be applied to new build plant (or plant built from January 2009 forward) or power stations undergoing a substantial change such as the replacement of existing boilers with supercritical systems. This is because older plant will not have been designed with the ability to retrofit capture technology.

3. In relation to CHP, what impact might a CCR requirement have on the likelihood of new build, whether for 300MWe or more standalone CHP plants or Good Quality CHP plants attached to coal and gas generating stations?

As there is only one CHP plant of this size in the UK, the 300MWe threshold is not expected to have much impact on CHP. Where this was raised by developers as a concern SEPA would be keen to see the ability to make a decision for CHP or for CCR made on a case-by-case basis. However, standalone CHP of over 300MWe is unlikely to be built within urban or suburban areas meaning that the CCR space requirements would not be as onerous. It seems likely that operators of CHP plant that did not wish to be “capture ready” would construct plant below the threshold.

In the case of plant of over 300MWe developers should consider the ability to use some or all of the associated wasted heat. Strictly, this would not be a CHP plant and may well be inappropriate to apply the good quality CHP criteria. However, much could be done through identifying the possibility of utilising reject heat and the submission of a heat plan would be a useful tool to drive forward utilisation of rejected heat.

4. What might be the impact of the potential costs of CCR for 100% biomass power plants and so the implications for their future build?

It seems very unlikely that there would be any 100% biomass facilities of 300MWe. If there were, the space required in order to store fuel would make the purchase of space for CCR minimal in comparison.

SEPA also do not agree that it is illogical to include biomass schemes within CCS. Rather, it is SEPA's view that plant (whether CHP or biomass) of 300MW and above should fall under the scope of the Directive. Such plants constitute large stationary sources of CO₂ and, as such, represent the most efficient and economically viable opportunities for CO₂ capture.

5. Do you agree that developers should have suitable space on site or adjacent to it to accommodate future carbon capture and processing plant?

Yes, without adequate space identified for future CCS equipment, a new plant cannot be considered to show any real potential for retrofit in the future. Without making the space available at the design stage and keeping that space free, future developments may hamper or prevent the ability to deploy CCS in the future. The Impact Assessment for the proposed CCS Directive outlined that sufficient space and access requirements to allow capture related equipment to be retrofitted should be considered as de minimis criteria.

6. What do you see as the appropriate space requirements to accommodate different types of capture technologies and why?

The amount of space required for CCS retrofit is likely to be subject to change in the future as different technologies and development in technology will mean significant variance in the space required. The space requirement should be assessed on a case-by-case basis by the competent authority during the application process. This will ensure that not only the right amount of space, but the right type and siting of space, has been identified to meet the requirements of the specific technology proposed.

The International Energy Agency in their report "Capture Ready Plant"¹ reported that the minimum estimated space requirement for post-combustion capture plant, gas reforming and coal gasification with pre-combustion capture are "250x150m, 175x150m and 475x375m (excluding coal store) respectively". This space does not include the space requirements for generation equipment, nor does it include space required for installation, or the space required within the installation for new pipe runs etc.

7. How might these vary in relation to different sizes or types of plant?

The size/power generating capacity of the station and the type of the system used to capture the CO₂ in the first instance will greatly affect the space requirement for accommodating the capture technology. In general pre-combustion capture plants may have an overall smaller "footprint" when compared to post combustion or oxy-fuel systems. This is because the removal of carbon dioxide is inherent in a pre-combustion system rather than being an additional abatement step on a conventional combustion plant.

8. What should be the information parameters that developers would be required to produce in order to demonstrate the feasibility of retro-fitting carbon capture technology to their combustion plant?

In order to demonstrate feasibility of retrofit developers should refer to a suitable reference document such as those produced by the IEA² and should submit a sufficiently detailed plan. This would outline the chosen technology for the site and a reasoned justification for space allocation on the basis of their chosen technology. The technology choice would not be binding but information should be provided regarding why the choice of a specific technology has been made. The submission would include site plans that provide sufficient detail regarding the proposed location of the capture plant, CO₂ condensing equipment and the exit point for CO₂ pipelines offsite, and conceptual diagrams, demonstrating how the space will be used.

¹ International Energy Agency (IEA) 2007 CO₂ Capture Ready Plants

² International Energy Agency (IEA) 2007 CO₂ Capture Ready Plants

- 9. How should a developer demonstrate the identification of a potential storage area or areas when it develops new combustion plant?**

No comment.

- 10. How should identifying a potential area be referenced? What studies should be considered?**
No comment.

- 11. What issues should a feasibility study for each application address in relation to the transport component of CCR?**

There are likely to be planning concerns amongst other issues including safety, environmental and health concerns related to the transportation of CO₂. It may be advisable for a national approach to be taken to assessments for the development of a transport network. The current interim HSE advice (see their web site) is for developers to demonstrate compliance with Health and Safety legislation as if supercritical carbon dioxide were classified as a dangerous fluid or dangerous substance under the Pipelines Safety Regulations 1996 and the Control of Major Accident Hazard Regulations 1999 (as amended) and (for offshore installations) as if all relevant offshore regulations applied.

- 12. Should this transport assessment address the three issues set out above?**

Yes.

- 13. We would welcome any comments on these headline areas and the 'no-barriers' approach being adopted regarding CCR assessment.**

Until further demonstration of full scale CCS has been undertaken, it may be considered reasonable for the operator to demonstrate during application that no known obstacles exist that would prevent CO₂ capture, transport and storage from the site. Such assessment at this stage could include an outline of one or more technically-feasible schemes for transport and storage, including identification of potential storage opportunities. SEPA would support a "no barriers" approach to CCR that requires developers to "make every effort to provide quality information upon which Scottish ministers can make their assessment".

With regards to the headline areas for assessing capture technologies SEPA would agree that it is useful to provide an outline of requirements against which a developers plan is likely to be assessed. The International Energy Agency³ has developed useful guideline documents in respect of post capture amine technology and for oxy-fuel and these outline clearly what may be useful to assess in power station design.

- 14. Do you agree a plant should only be consented if the studies and assessments carried out enable the consenting body to judge it capable of being built CCR.**

Yes.

³ International Energy Agency (IEA) 2007 CO₂ Capture Ready Plants

- 15. Should the final drafting of the EU directive allow should Scottish Ministers be able to consent to new power stations that do not meet all the four factors that underpin the CCR criterion in some circumstances? If yes, what might such circumstances be?**

No. It does not seem equitable for most fossil fuelled power plant to be required to demonstrate capture readiness, whilst some would be exempt from the requirement. It would also not provide a clear and unambiguous signal to industry if it appeared that those plant sites in suitable areas would need to undertake capture readiness assessments, but badly sited plant could be exempt. In order to achieve ambitious climate change goals, it is necessary to use the CCR criterion to drive cuts in carbon dioxide emissions from power plant. Scotland as a nation has better access to storage than most other EU states and it would send the wrong signal if fossil fuelled plant were permitted without demonstrating CCR.

