AN INFRASTRUCTURE AND VALUE CHAIN FOR CO2 TRANSPORT AND STORAGE IN THE NORTH SEA

JOINT PROGRAMME BY THE UK AND NORWAY

PROGRAMME DEFINITION

Background to the programme

This joint programme has been initiated by Norway's Prime Minister, Jens Stoltenberg and the UK's Chancellor of the Exchequer, Gordon Brown in their statement of the 29th June 2006. A copy of the full statement is attached to this document. This programme has arisen out of a desire for the UK and Norway to work together to advance CO2 capture and storage (CCS) as an option for delivering substantial reductions in CO2 emissions.

CCS is a means by which CO2 emissions from the use of fossil fuels, such as coal and natural gas, in stationary industrial applications can be captured, transported and stored in geological reservoirs deep beneath the ground. The UK and Norway, because of their geographic nature, are both considering storing CO2 in geological formations deep beneath the seabed of the North Sea. Norway has for 10 years been injecting about 1 million tonnes of CO2 a year from its Sleipner gas field into the Utsira formation, while companies including Shell, Statoil and Norsk Hydro are examining further opportunities for CCS, mainly in relation to Enhanced Oil Recovery (EOR), including the Karsto and Mongstad projects. In the UK some ten prospective CCS projects have been announced most involving CO2 separation from power plant and storage involving EOR or through one off injection into depleted gas fields or saline aquifers. All of these projects require some financial incentive, or value chain, to reward the CO2 abated before they will go ahead, and the prospect for expansion of CCS raises questions on how existing and new infra-structure needs to be developed to support this process.

The UK and Norway are already collaborating on the development of a set of regulatory principles for the geological storage of CO2 beneath the North Sea. The joint North Sea Basin Task Force was announced by the UK's then Minister for Energy, Malcolm Wicks and Norway's Minister for Petroleum and Energy, Odd-Roger Ennoksen in November 2005. The Task Force is scheduled to report back to ministers on this work in early in 2007. The two new projects outlined below will extend the work of the Task Force.

Scope of the programme

The new joint programme covers two important areas of common interest to the UK and Norway:

1. Pipeline infrastructure in the North Sea:

    a. To assess how a physical pipeline infrastructure for the transportation of CO2 could help enable CCS in the North Sea. This would include an assessment of the possible re-use of existing pipelines;
    b. To identify and evaluate the benefits and costs of such an infrastructure;
    c. To identify barriers to developing such an infrastructure and what action would be required to overcome these.

2. An examination of a possible value-chain for CO2 in the North Sea:

    a. To examine and compare the value chains for Norwegian and UK CCS projects.
    b. To examine alternative mechanisms for rewarding CO2 abatement and for delivering a positive NPV from CCS projects. This would include the way in which CCS would be included in the EU's Emissions Trading Scheme (ETS);

Infrastructure Study

CO2 Storage sites -. The project will need to identify not just existing oil and gas reservoirs having the potential for CO2 storage but also other potential sinks, such as deep saline aquifers , and which will need to be connected to the pipeline network. This will build on existing studies of potential CO2 sinks. The different infrastructure requirements for CO2 to be either used for EOR or for permanent storage should be considered in the assessment.

Pipe work infrastructure - This study is to assess the potential future need for a physical pipeline infrastructure. It will examine the potential for cost-effective re-use of existing pipelines and the need for new infrastructure. Examination of the reuse of pipelines will need to assess if they would be suitable for CO2 transportation, and would be available when needed.

Economies of scale - The scope for economies of scale arising from the managed and coordinated development of a CO2 pipeline infrastructure, compared to a more random project driven approach, will be examined. Clearly the managed/coordinated approach may involve greater up-front capital expenditure, and it will be necessary to identify the benefits to be gained from such an approach as well as the barriers.

Other Barriers – The study will need to identify any barriers preventing the development of an infrastructure and possible solutions to overcome them. This work will draw on the analysis of regulatory principles already being undertaken by the North Sea Basin Task Force.

In parallel with this work it is important to note that there is already activity within the EU on developing a strategy for CCS. Norway is fully involved in this initiative. The Zero Emissions Fossil Fuel Power Plant (ZEP) Technology Platform was launched in November 2005 and on 12th September 2006 two key documents were published setting out strategies for the Strategic Deployment of CCS as well as the Research Agenda for developing CCS technologies to be commercially viable by 2020. In particular the Strategic Deployment Document proposes 10-12 full-scale demonstrations of CCS across Europe, and it will be important to gather industry views, on how these might facilitate a broader EU pipeline infra-structure.

Value Chain Study

Both Norway and the UK have undertaken detailed assessments of the costs of CCS covering the full chain of technologies (i.e. capture, transportation, injection, closure and monitoring) for both EOR and one off storage. All of these assessments, based on either generic data or project specific costs, have shown that CCS will not deliver a financial return unless a mechanism exists to reward the CO2 abated. This study will draw on these existing assessments to gain additional insights for policy development.

Cost variations – Although all the assessments have shown the needed for financial incentives before CCS will be implemented commercially there are significant variations in the level of support estimated to be needed. A more detailed comparison of Norwegian and UK assessments will be made to understand these differences, and how they are affected by location, technology, fuel costs and national factors affecting transaction costs such as permitting, regulation, etc.

Incentives – Accepting that CCS projects will not go ahead without some form of incentive, what form should this take? This work will involve an exchange on the merits and problems associated with introducing incentives at different points in the value chain, and how these could be designed to deliver a fair, but not excessive, economic rent. It would also be worthwhile to consider how incentives could be designed to mesh with existing measures such as the EU-ETS, and any issues arising from EU State Aid regulations.

Cost benefits – To consider and examine how the costs of further CCS projects could benefit from first of a kind projects either through economies of production, utilisation of established infra-structure and reduced transaction costs.

Timescales and management of the projects

It is envisaged that the UK's DTI will take lead responsibility for the Infrastructure Study, which will be undertaken by consultants. The Value Chain Study involves more detailed sharing of information and experience between Norway and the UK, drawing on

existing analysis and reports, and will be undertaken jointly by Norwegian and UK officials. The results of both studies will be reviewed by the North Sea Basin Task Force before reporting to Norwegian and UK ministers in July 2007.