

GESTCO

Understanding whether it will be practical to store CO₂ underground

by Sam Holloway, *Keyworth*

At the Sleipner West gasfield in the middle of the North Sea, the natural gas doesn't consist only of methane as it does in most North Sea gasfields — there is a small amount of carbon dioxide (CO₂) mixed in with it. When the gas is brought to the surface, this CO₂ has to be removed — to get the gas to a quality where it can be mixed with other gas in a major transmission pipeline which carries it ashore at Zeebrugge. Instead of venting the separated CO₂ to the atmosphere where it acts as a greenhouse gas, Statoil and partners, who operate the field, decided to sequester (store) it underground in a porous and permeable reservoir rock beneath an impermeable cap rock. This method of CO₂ storage is closely analogous to the way natural gas and oil are stored in our oil- and gasfields. The idea is that the CO₂ will stay underground for thousands, or even millions of years; certainly long enough for any man-made greenhouse crisis to have passed, just as the natural gas and oil in our North Sea fields has.

The Gestco project is investigating whether the major industrial plants, which emit vast quantities of CO₂ to the atmosphere in their flue gases, can store these emissions underground in this way instead. An inventory of the major point sources of CO₂ in Europe has been made. The biggest are fossil-fuel-fired power plants (especially large coal-fired plants), integrated steel plants, oil refineries and petrochemical plants, and cement works. If underground sequestration of CO₂ is to make an impact on our emissions to the atmosphere and thus on the greenhouse effect, it will have to be applied to these major sources.

Studies of some of the major potential CO₂ storage sites (often known as carbon sinks) are also under way. When these, and potential pipeline routes, have been identified, they will be fed into a Decision Support System, essentially a highly sophisticated economic model. This will estimate the costs of separating the CO₂ from the flue gases of these plants, the compression and transport of the CO₂ to the sink, the cost of injecting it underground, and any subsequent monitoring that may be required to check that it has stayed where it was put.

These economic studies will enable us to establish the likely costs of any such schemes. This will be important because, if it is to become widespread, the process must be the most cost-

effective means of greenhouse gas abatement for the industries themselves. And, if fiscal instruments such as carbon taxes have to be applied to achieve a reduction in greenhouse gas emissions it is essential to know how they would affect various means of greenhouse gas abatement.

Other issues, such as the safety and long-term security of CO₂ storage underground and public attitudes to the concept, will also be considered during the project. These are just as important as the cost if the concept is to become a major industrial reality.

The Gestco Project — an EU acronym for Geological Storage of Carbon Dioxide from Fossil Fuel Combustion — is a multinational project 50% funded by the Fifth Framework Energie programme. The research organisations involved are the Geological Surveys of Belgium (GSB), Britain (BGS), Denmark (GEUS), France (BRGM), Germany (BGR), Greece (IGME), Netherlands (NITG-TNO) and Norway (NGU). Industrial partners are the Danish National Oil Company, Compagnie Francaise de Geothermale, Public Power Company of Greece, Norsk Hydro, Shell Global Solutions, BP, Vattenfall, TotalFinaELF and Statoil. Two small- to medium-sized enterprises are also involved: Ecofys (Netherlands) and Vito (Belgium).



Ratcliffe-on-Soar power station. Power stations are a major point source of carbon dioxide emission.