CO_2GEONET – AN EC-FUNDED "NETWORK OF EXCELLENCE" TO STUDY THE GEOLOGICAL STORAGE OF CO_2

N. Riley
British Geological Survey, Keyworth, Nottingham NG12 5GG, UK

Abstract: The Sixth Framework Programme (FP6)- 2002-2006 - is the European Unions' main instrument for research funding in Europe. FP6 serves two main strategic objectives: to strengthen the scientific and technological bases of industry and to improve competitiveness and innovation in Europe through the promotion of increased co-operation and improved coordination between relevant actors at all levels. Within FP6, the Network of Excellence (NoE) instrument was developed to strengthen excellence on a particular research topic by tackling the fragmentation of European research. One such NoE, formed in 2004, is CO_2GeoNet, which is made up of 13 research organizations from across Europe who have extensive experience and expertise in the study of the geological storage of CO_2. The principle goal of this consortium is to contribute to and form a durable integration of research into CO_2 geological storage, in the European Research Area, as a means of mitigating anthropogenic mass loading of this greenhouse gas to the atmosphere and ocean, while there is continued use of fossil fuels.

Key words: European Network of Excellence, geological storage of CO_2, research consortium, CO_2GeoNet

The EC Framework 6 Network of Excellence, "CO_2GeoNet", a 13 partner research network, contains a critical mass of research activity in the area of underground carbon dioxide (CO_2) storage. World projections of energy use show that fossil fuel dependency will continue to 2030 and beyond; but sustainability will need CO_2 global emissions reductions by at least 60% by 2050. This will be difficult, especially with the rise of the emerging economies such as China, India, Russia and Brazil, and the huge growth in surface transport. By 2020 China and the USA are likely to be

S. Lombardi et al. (eds.),
Advances in the Geological Storage of Carbon Dioxide, 359–362.

responsible for 50% of global emissions. It will require various strategies by Europe, both with its internal energy systems and in international negotiations/policy implementation to set the world on the 60% reduction path within the next decade. The associated rise in global CO_2 emissions, without abatement, will be at an average rate of 1.8% per annum (from the current value of 25Gt p.a., to 38Gt by 2030) - a rise of over 50%. This would be catastrophic for the planet's sustainability, leading to dangerous levels of global warming (+2°C above pre-industrial), sea level rise and ocean acidification (+0.7°C has already been achieved and ocean pH has fallen by 0.1). Urgent action is needed. Europe's CO_2 emissions will rise by an average of 0.6% p.a. up to 2020, from a 2000 level of 3.1Gt to 3.5Gt by 2020.

The rocks under the N. Sea have a theoretical capacity for storing over 800Gt of CO_2. Capturing CO_2 from industrial point sources and storing it underground (a process that mimics nature) is a very attractive route to make cuts in CO_2 emissions. CO_2 capture and storage allows diverse fuel inputs/outputs, enhances security of energy supply and is well aligned with hydrogen production from fossil fuels. About 33% of CO_2 emissions arise from power generation. If hydrogen or electricity based motive power takes over surface transport, then a major proportion of the 60% emission cut could be achieved using CCS. Through the European Commission's Joule 2, FP4 & 5 projects Europe has led the world in R&D in this area, with rapid growth this decade. National programmes are also emerging. This success has a downside, by creating fragmentation through diversification. N. America despite its rejection of Kyoto (except Canada), has recently embraced CO_2 capture and geological storage and is allocating huge resources (over $4bn) over the next 10 years, and similar developments are happening in Australian research programmes. Europe, as a result, risks losing its head start. We therefore must work more effectively and restructure accordingly. The main aim of CO_2GeoNet will be to integrate, strengthen, and build upon the momentum of previous and existing European R&D. In addition it will project European excellence internationally, so as to ensure that Europe remains at the forefront of CO_2 underground storage research and that research leading to implementing large scale and quick deployment of underground CO_2 storage in Europe is delivered as effectively as possible.

The Network focus is on the geological storage of CO_2 as a greenhouse gas mitigation option (not capture). It has several objectives over the 5-year period of EC funding for integration;

- To form a durable and complimentary partnership comprising of a critical mass of key European research centres whose expertise and capability becomes increasingly mutually interdependent. The initial

partnership will be between 13 institutes, most of whom have a long and established history of research in geological sequestration. Some new players are also included, either because they are expected to have significant national strategic profile in future CO_2 storage projects, or have capabilities which can be realigned to strengthen the network, or even bring uniqueness. For the first time in an EC FP project marine biologists will be drawn into this research topic.

- To maintain and build upon the momentum and world lead that Europe has on geological CO_2 sequestration and project that lead into the international arena.
- To improve efficiency through realignment of national research programmes, prevention of duplication of research effort, sharing of existing and newly acquired infrastructure and IPR.
- To identify knowledge gaps and formulate new research projects and tools to fill these gaps.
- Seek external funding from national and industrial programmes in order to diversify, build and strengthen the portfolio of shared research activities.
- To provide the authoritative body for technical, impartial, high quality information on geological storage of CO_2, and in so doing enable public confidence in the technology, participate in policy, regulatory formulation and common standards.
- Provide training to strengthen the partners, bring in new network members and sustain a replacement supply of researchers for the future.
- To exploit network IPR, both as a revenue earner to sustain the network and to equip European industry to be competitive in the emerging global low carbon energy markets.

In order to achieve these goals the following five areas of research have been defined, with each partner participating in the areas where they have the most expertise:

- Predictive numerical tools, including geochemical, geophysical, fluid flow and geomechanical tools
- Rock and fluid dynamic experimental facilities, including geochemical, geophysical, fluid flow and geomechanical facilities, data and information.
- Enhanced hydrocarbon recovery methods and tools, including enhanced oil, gas, coal bed methane. Monitoring techniques, including geochemical, geophysical, hydrological, biological and remote sensing techniques

- Risk and uncertainty methods and tools, including ecosystem, health and safety and long term impacts, as well as data and risk scenario uncertainty and mitigation strategy

A total of 7 European nations are represented within the Network, with participation by the following institutions:

1. Denmark
   Geological Survey of Denmark and Greenland - GEUS
2. France
   Bureau de Recherches Geologiques et Minieres- BRGM
   Institute Francais du Petrole - IFP
3. Germany
   Federal Institute for Geosciences and Natural Resources - BGR
4. Italy
   Istituto Nazionale di Oceanografia e di Geofisica Sperimentale- OGS
   Università di Roma "La Sapienza" - URS
5. Netherlands
   Netherlands Organisation for Applied Scientific Research - TNO
6. Norway
   Norwegian Institute for Water Research - NIVA
   Stiftelsen Rogalandsforskning- RF
   SINTEF Petroleumsforskning AS - SPR
7. UK
   British Geological Survey (BGS- NERC)
   Heriot-Watt University - HWU
   Imperial College of Science, Technology and Medicine- IMPERIAL

Further information can be obtained at www.CO_2geonet.com, or by contacting the co-ordinator, Dr. Nick Riley at njr@bgs.ac.uk, tel +44 115 9363312