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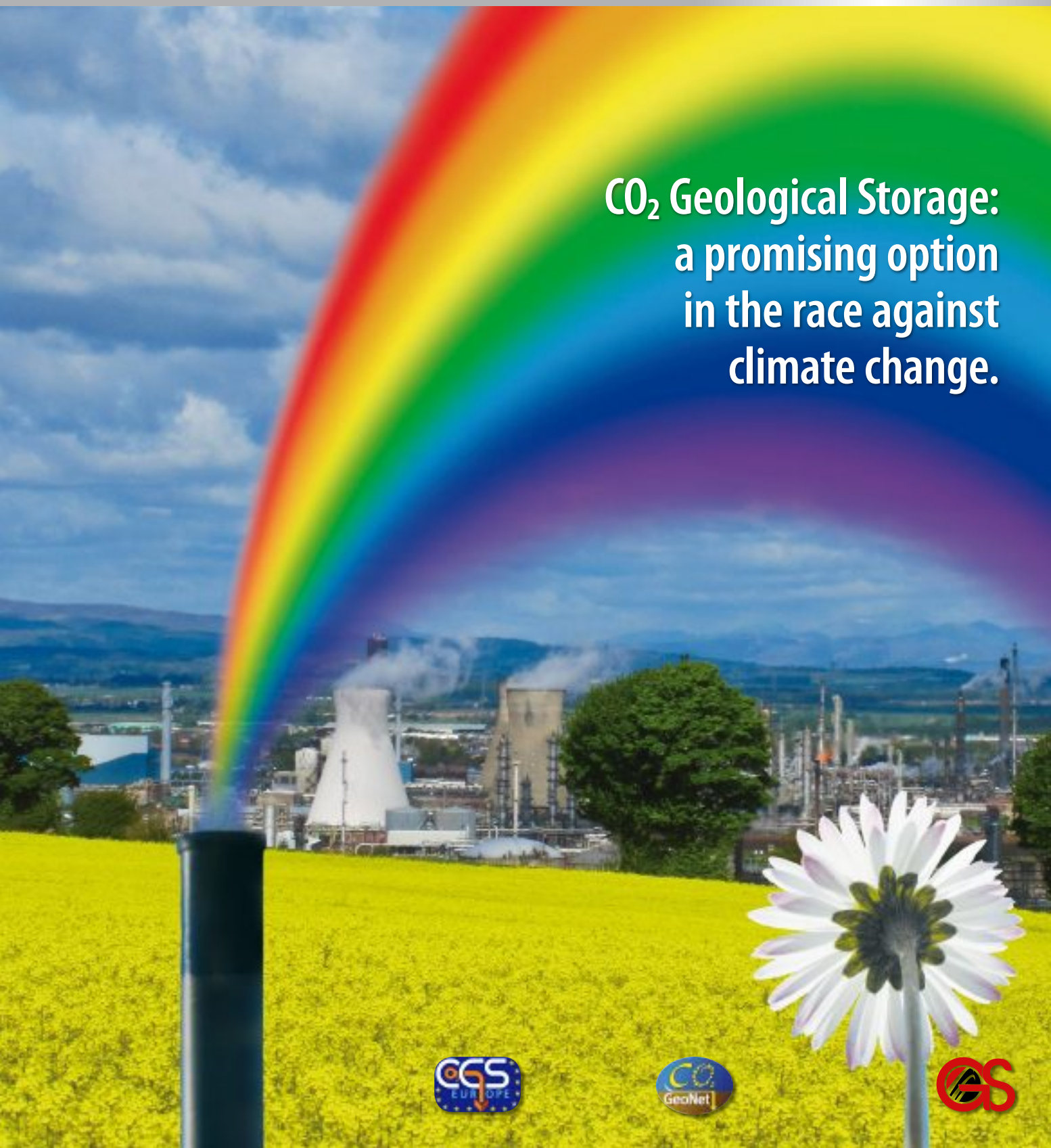
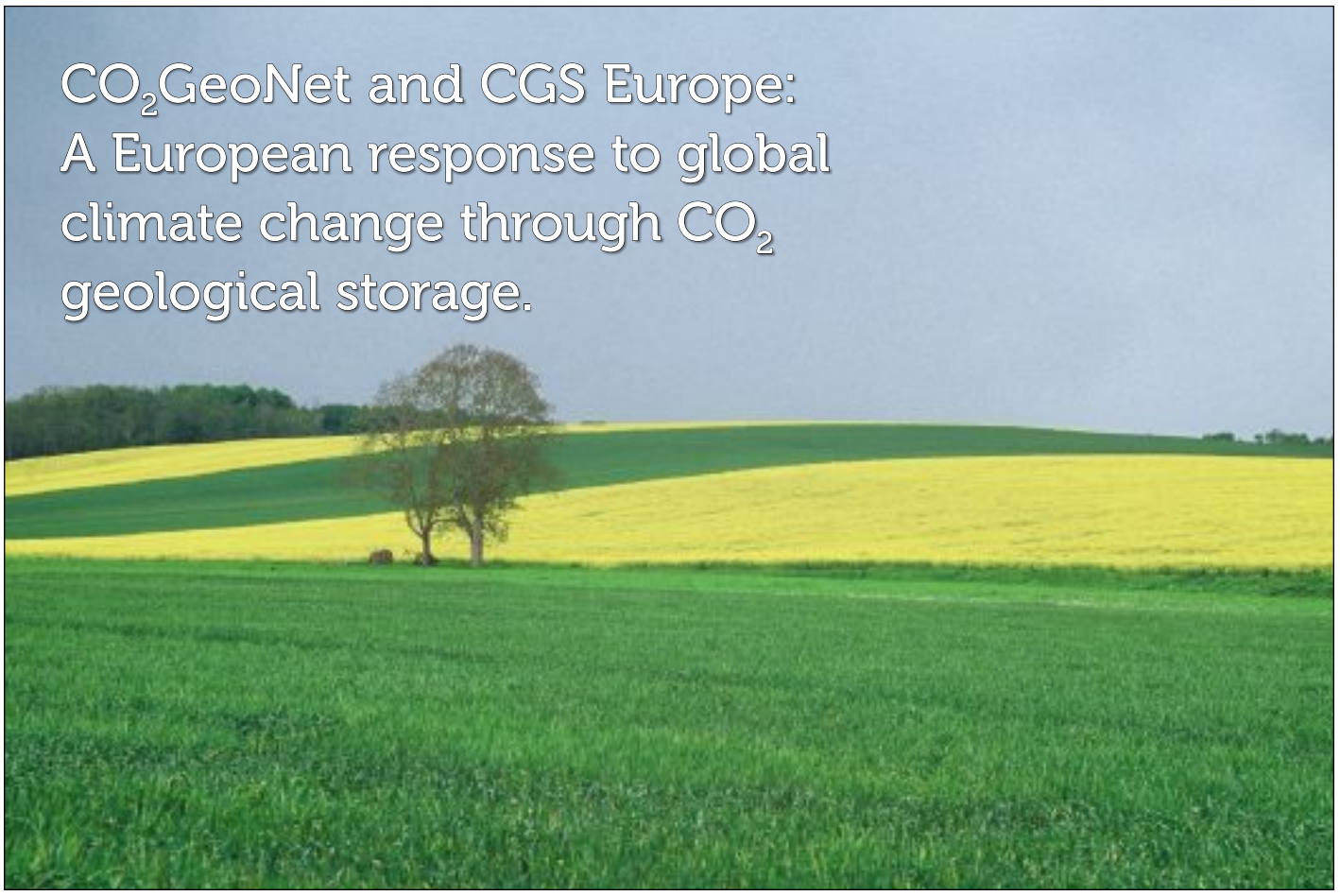


CO_2 Geological Storage: a promising option in the race against climate change.

CO_2GeoNet and CGS Europe: A European response to global climate change through CO_2 geological storage.



The European Union has already made significant progress in advancing CO_2 Capture and Storage (CCS) as a bridging technology for combating climate change. The situation now calls for acceleration, particularly in terms of getting CO_2 geological storage pilots and demonstration projects off the ground. CO_2GeoNet and CGS Europe are the result of a European joining of forces and expertise on all aspects of CO_2 geological storage, in the aim of supporting CCS demonstration and deployment and promoting trans-national cooperation and networking throughout the EU Member States and Associated Countries.

Returning the carbon back to the ground

Our prolific burning of fossil fuels for power production, heating, industry and transportation is responsible for 80% of anthropogenic CO_2 emissions into the atmosphere, of which 60% comes from large fixed emitters where CCS can be applied. CCS is a promising mitigation pathway that, according to the International Energy Agency, should contribute 20% of the CO_2 reduction needed by 2050 in order to achieve stabilisation of greenhouse gas concentrations in the atmosphere in the most cost-effective manner. CCS involves capturing CO_2 at coal- or gas-fired power stations and industrial plants, transporting it by pipeline or ship to a storage location, and injecting it via a well into a suitable deep geological formation for long-term storage. In doing so, the carbon extracted from the ground in the form of coal, oil or gas is returned back again in the form of CO_2, making CCS a smart solution that can help avoid the current situation of large CO_2 emissions disturbing the atmosphere and provoking climate change, sea level rise and ocean acidification.

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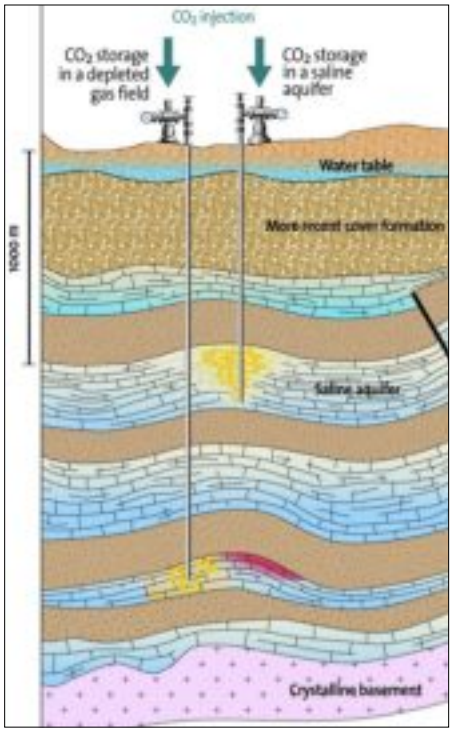

Time is pressing for storage pilots and demonstration projects

According to the EU Energy Roadmap 2050, CCS needs to be applied from around 2030 in the power sector in order to reach emission-reduction targets. Following 20 years of research and a number of pioneering CCS pilots and industrial operations, the world must now move into a large-scale demonstration phase, vital for enabling progressive commercial deployment within the right timeframe. In Europe, the first CCS demonstration projects are emerging under the leadership of major power and industrial companies and with financial support from the European Economic Plan for Recovery (EEPR), the NER300 mechanism for the

co-financing of CCS and innovative renewables in the framework of the European Union Emissions Trading System (EU-ETS), and Member States. The goal is to have 12 large-scale demonstration projects up-and-running by 2015 to harness knowledge and experience from a number of different geological, geographical and industrial contexts, both onshore and offshore. However, the very low price of CO_2 in the EU-ETS (<10€/ton) will not fund as many NER300 demos as anticipated and does not provide a secure environment for long-term investment. Other incentives are necessary.

Furthermore, the procedure for selecting, characterising and obtaining a permit for a storage site takes several years, and time is also needed for its connection to a CO_2-emitting plant by an appropriate transport infrastructure. No investment decisions can be taken for CCS projects without confidence early on regarding the storage site.

The scientific challenges and the expertise within CO_2GeoNet and CGS Europe

More research effort must now be placed on storage compared to capture, which has been attracting much attention to date. This is because each storage site i) is unique due to its specific geology - often complex and unexplored, and ii) must be capable of trapping CO_2 over periods of at least 1000 years. The scientific challenges of CO_2 storage are numerous: site selection and characterisation, modelling and monitoring of CO_2 fate and site behaviour, risk assessment – including possible local impacts on humans and ecosystems – and safety protocols. CO_2 storage is a complex field of research in which many different disciplines interact: geology, geophysics, geochemistry, geomechanics, hydrogeology, microbiology, ecology, reservoir engineering, oceanography, etc. Furthermore, various components of a storage site have to be considered: reservoir, cap rock, overburden, groundwater, soils, surface, vegetation, wells. Similarly with the different phases: planning period (~5 years), injection period (~40 years), closure period (~5 years) and post-closure period (~1000 years). The existence and study of many natural CO_2 fields in the subsurface proves that geological formations are able to store CO_2 efficiently and safely for extremely long periods of time.

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In terms of storage, the abovementioned pilots and demonstration projects are vital for advancing knowledge concerning the storage capacity of a given site, and for testing on-site, in various storage settings, the performance of tools and methodologies developed for site characterisation, modelling, monitoring and risk management. The lessons learned from these field tests will be invaluable in improving the technological blocks so as to guarantee efficient and safe industrial-scale operations, as required by the European Directive on the geological storage of carbon dioxide adopted in 2009. The pool of expertise and research experience available within CO_2GeoNet* and CGS Europe* is a true resource for Europe, providing scientific support for the geological storage of CO_2 and facilitating the large-scale demonstration and deployment of CCS. Activities include research, scientific advice, training and information and communication on CO_2 storage matters. Durability will be ensured by expansion of CO_2GeoNet membership to include other CGS Europe partners, thus broadening the critical mass, extending geographical coverage to truly European, and offering privileged CO_2 geological storage contact points in the EU Member States and Associated Countries.

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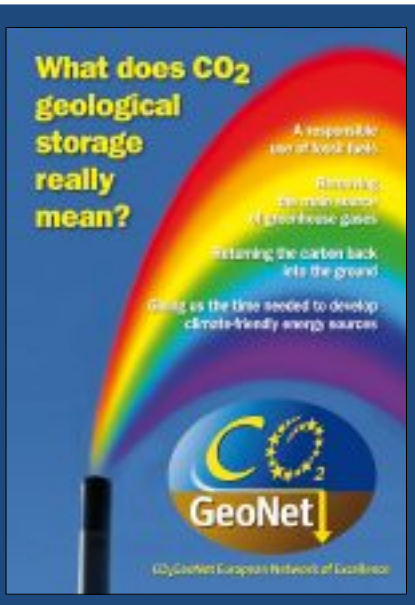

Find out more in 24 languages

The CO_2GeoNet brochure "What does CO_2 geological storage really mean?" tackles pertinent questions on this vitally important technology and explains the basics, such as how geological storage of CO_2 can be carried out, under what circumstances it is possible, and what criteria are needed for its safe and efficient deployment. You can learn more about site selection and characterisation and the monitoring techniques employed for CO_2 geological storage.

The brochure is the fruit of CO_2GeoNet's research activities and results, which were presented during CO_2GeoNet's Training and Dialogue Workshop on this same subject. It currently exists in 24 languages, thanks to the efforts initiated by CO_2GeoNet and that are now continuing under CGS Europe: www.co2geonet.com/brochure

CO_2GeoNet
The European Network of Excellence on the Geological Storage of CO_2

CO_2GeoNet (www.co2geonet.com), the European scientific body on CO_2 geological storage, brings together over 300 researchers with the multidisciplinary expertise needed to address all aspects of CO_2 storage. With activities encompassing joint research, training, scientific advice, information and communication, CO_2GeoNet has a valuable and independent role to play in enabling the efficient and safe geological storage of CO_2. CO_2GeoNet was created in 2004 as a Network of Excellence under the EC 6th Framework Programme for 5 years. In 2008, the Network became a non-profit Association under French law. It currently comprises 13 public research institutes from 7 European countries, but expansion of membership is underway to include other partners of the CGS Europe project.

The lighthouse event is the annual CO_2GeoNet Open Forum in Venice enabling dialogue between the scientific community and all CCS stakeholders (www.co2geonet.com/openforum2012_presentations).

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Members of CO_2GeoNet:

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- **BRGM** (France)
- **IFPEN** (France)
- **BGR** (Germany)
- **OGS** (Italy)
- **URS** (Italy)
- **TNO** (Netherlands)
- **IRIS** (Norway)
- **NIVA** (Norway)
- **SPR SINTEF** (Norway)
- **BGS** (UK)
- **HWU** (UK)
- **IMPERIAL** (UK)

CGS Europe
The Pan-European Coordination Action on the Geological Storage of CO_2

CGS Europe (www.cgseurope.net), a three-year Coordination Action (11/2011 to 10/2013) funded by the EC 7th Framework Programme, has been created to complement existing CCS initiatives and, more specifically, to tackle the part of the CCS chain dealing with CO_2 Geological Storage (CGS) on a true European scale. CGS Europe is a networking project that pools together the expertise of 34 key research institutes in the area of CO_2 geological storage across 28 countries (24 European Member States and 4 Associated Countries). It builds upon the networking and integration experience of CO_2GeoNet with the ultimate goal of providing an independent, scientific, pan-European platform and reference source where national, European and international experts, institutes and regulators can access the most up-to-date results of CO_2 storage-related studies, share experiences and good practices, discuss the implementation of regulations, identify research needs to face upcoming challenges, and build new projects.

SEVENTH FRAMEWORK PROGRAMME

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CGS Europe partners:

- **CO_2GeoNet** Association
- **GBA** (Austria)
- **RBINS-GSB** (Belgium)
- **SU** (Bulgaria)
- **UNIZG-RGNF** (Croatia)
- **CzGS** (Czech Republic)
- **TTUGI** (Estonia)
- **GTK** (Finland)
- **G-IGME** (Greece)
- **MFGI** (Hungary)
- **GSI** (Ireland)
- **LEGMC** (Latvia)
- **GTC** (Lithuania)
- **PGI-NRI** (Poland)
- **LNEG** (Portugal)
- **GEOECOMAR** (Romania)
- **UB** (Serbia)
- **SGUDS** (Slovakia)
- **GEO-INZ** (Slovenia)
- **S-IGME** (Spain)
- **SGU** (Sweden)
- **METU-PAL** (Turkey)