



CO₂GeoNet

Prepared by Ceri J Vincent

Chair of Executive Committee, British Geological Survey, UK

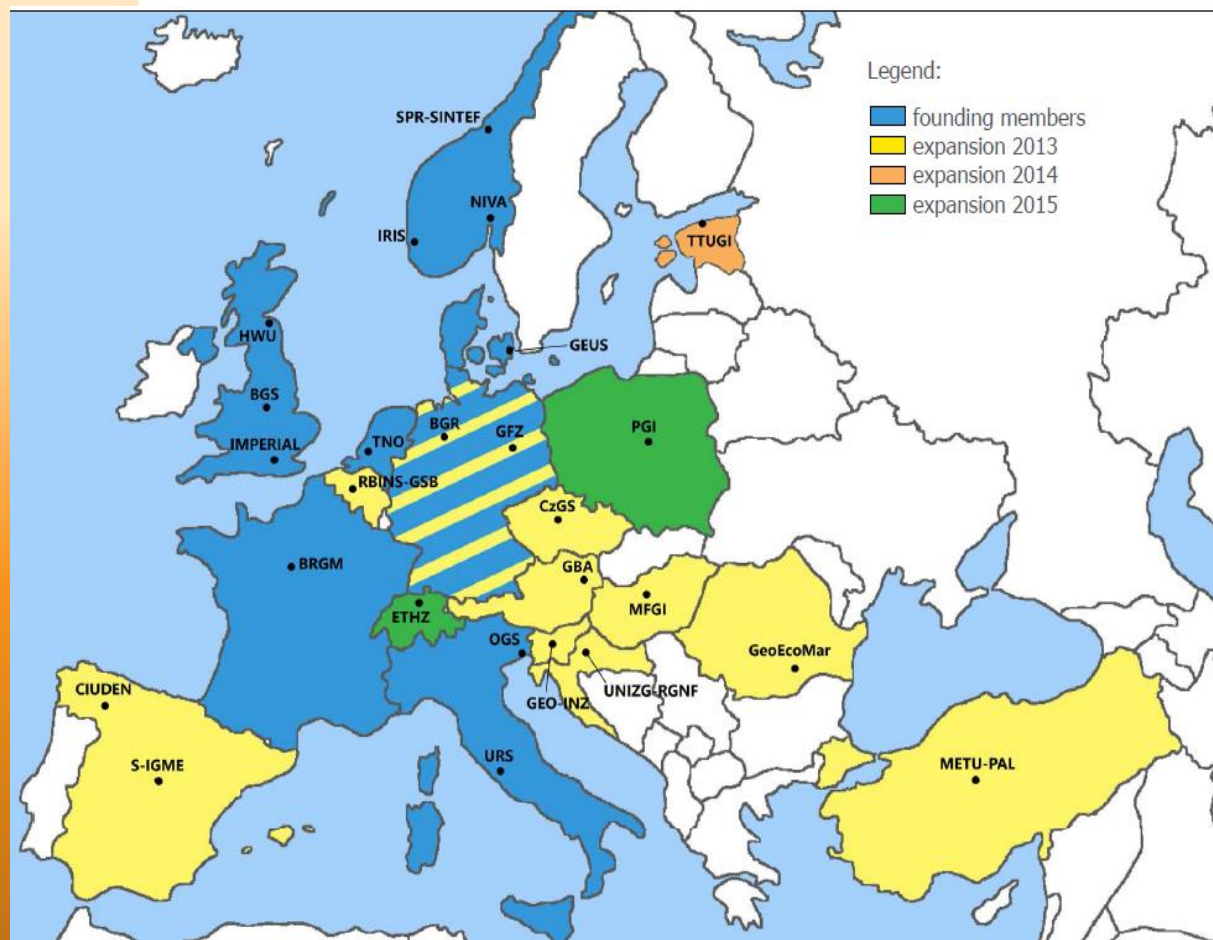
Presented by Alla Shogenova

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A leap forward for CO₂GeoNet



- ✓ Created as a EU **FP6 Network of Excellence** in 2004
- ✓ Became an **Association** under French law in 2008
- ✓ Founding Members: **13** research institutes over **7** countries
- ✓ Expansion thanks to CGS Europe FP7 project (2013-14)
- ✓ Now comprises **26** research institutes from **19** countries

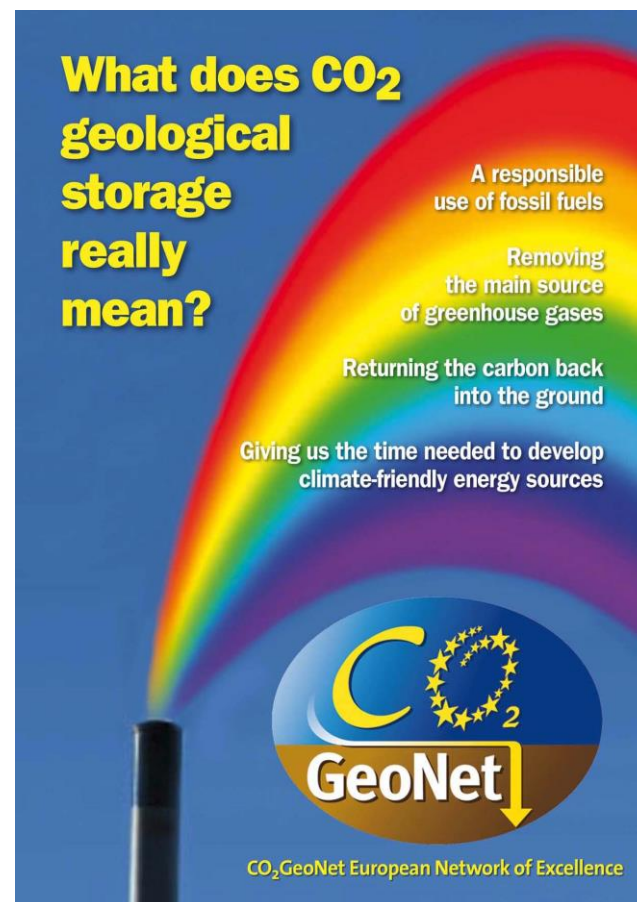


The President, Secretary General and Executive Committee coordinate the running of the Association with guidance from the Advisory Committee and under the authority of the General Meeting

CO₂GeoNet Activities

1. Joint research
2. Scientific advice
3. Training
4. Information and communication

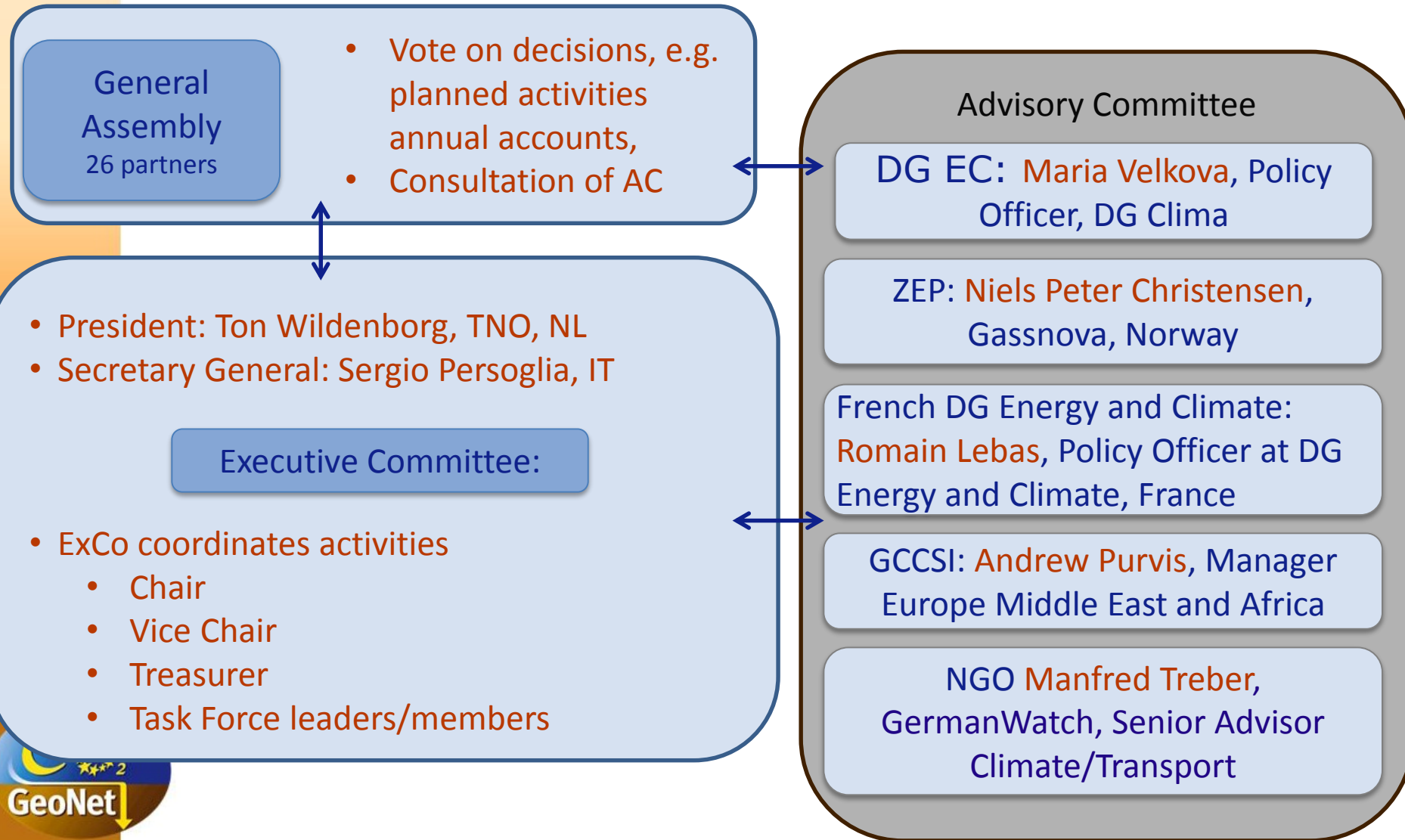
*As an **independent and multidisciplinary scientific body**, CO₂GeoNet has the key role of building trust in CO₂ geological storage and supporting wide-scale CCS implementation*



**Brochure available
in 27 languages**



Management of the CO₂GeoNet Association



Management of the CO₂GeoNet Association

(current status)

- **President** Ton Wildenborg, TNO, The Netherlands
- **Secretary General** Sergio Persoglia, Italy
- **Executive Committee**
 - **Chair** Ceri Vincent, BGS, UK
 - **Vice-Chair** Dominique Durand, IRIS, Norway
 - **Treasurer** Niels Poulsen, GEUS, Denmark
 - Axel Liebscher, GFZ, Germany (Research TF lead)
 - Sabina Bigi, URS, Italy (Scientific advice TF lead)
 - Marjeta Car, Geolnz, Slovenia (Info and Communication TF lead)
 - Niels Poulsen, GEUS, Denmark (Training TF lead)
 - Rowena Stead, BRGM, France (Info and comm. support and website)



Contact us: email: info@co2geonet.com
website: www.co2geonet.eu

Cooperation with European bodies

At national level:

- ✓ Numerous interactions with national authorities/stakeholders
- ✓ Collection of information from each country for making comparisons and summaries at European level

In Europe:

- ✓ **European Commission** – CO₂GeoNet & CGS Europe responded in 2013 to the Consultative Communication on the future of CCS in Europe
- ✓ **European Parliament** – in 2013 multiple inputs to MEP Chris Davies request for advice on CCS (documents, participation to roundtables and workshops at the EP)
- ✓ **EU CCS Demo Project Network** - CO₂GeoNet has been a member of the Advisory Forum since 2011
- ✓ **ZEP Technology Platform** – collaboration on CO₂ storage pilots report
- ✓ **EERA CCS** Joint Research Programme
- ✓ **ECCSEL** – CCS Research Infrastructure



Cooperation with international bodies

- ✓ **CSLF** – CO₂GeoNet has been a CSLF-recognised project since the original FP6 CO₂GeoNet project
- ✓ **IEAGHG** - CO₂GeoNet and IEAGHG signed a MoU in 2008
- ✓ **GCCSI** - CO₂GeoNet has been a member of GCCSI since 2013 and became an Associate in 2014
- ✓ **UNFCCC** - CO₂GeoNet has been an observer organisation (Research NGO) of UNFCCC since 2013 and participated in COP-19 in Warsaw late 2013
- ✓ **ISO CCS** - CO₂GeoNet is a Category A Liaison to ISO TC265 since early 2014

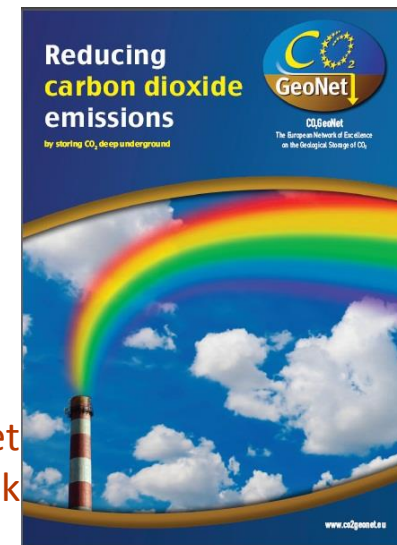
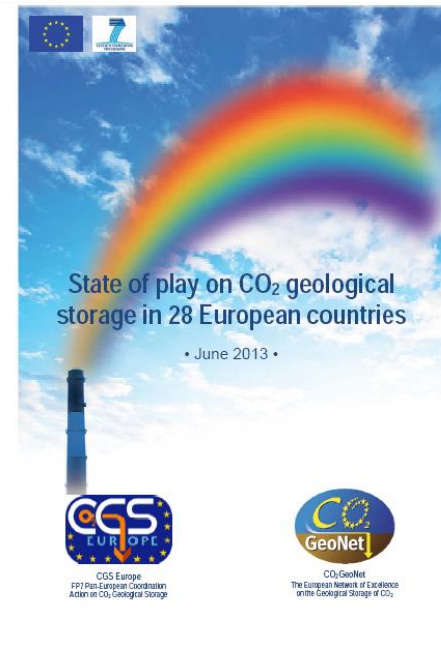


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Key publications

- ➔ State-of-the-Art of **Monitoring Methods** to evaluate CO₂ Storage Site Performance (April 2013)
- ➔ State-of-Play on CO₂ geological storage in 28 European countries (June 2013)
- ➔ State-of-the-Art Review of CO₂ Storage **Site Selection and Characterisation Methods** for granting the CO₂ storage site permit (September 2013)
- ➔ Opportunities for CO₂ storage pilots in Europe in collaboration with ZEP (October 2013)
- ➔ IEA GHG report; Methodologies and technologies for **mitigation** of undesired CO₂ migration in the subsurface (December 2013)
- ➔ State-of-the-Art review of **Directives and Regulatory Regimes** related to Operational and Safety Risks (February 2014)
- ➔ 'What does geological storage really mean' CO₂GeoNet brochure, available in 27 languages



CO₂GeoNet
newsletter



CO₂GeoNet
ebook

Association expertise

- ➔ Multidisciplinary expertise:
 - ➔ geology, geophysics, geochemistry, geomechanics, hydrology, microbiology, reservoir engineering, oceanography, social science, ...
- ➔ Masters every facet of CO₂ storage:
 - ➔ site selection and characterization, modelling and monitoring CO₂ fate and site behaviour, environmental impacts, risk assessment, and safety protocols
- ➔ Provides integrated research results, synthesized knowledge and advices, shared by a large and independent scientific community



EC supported projects

CO2GeoNet initiatives

- CO₂GeoNet project (2004 – 2009, budget 9 M€)
 - initiation of CO2GeoNet network
- CGS Europe (2010 – 2013, 2.9 M€)
 - Build an independent pan-European body of expertise

Projects where key roles were undertaken by CO2GeoNet Members

- GeoCapacity (2006 – 2008, budget 3.5 M€)
 - assessment of the storage capacity of Europe and selected CSLF countries
- RISCS (2009 – 2013, budget 5.2 M€)
 - improve our understanding of the possible environmental impacts of geological storage of CO₂



EC supported projects (2)

- ➔ SiteChar (2011 –2013, 5 M€)
 - ➔ set the criteria for characterisation of sites for geological storage of CO₂
- ➔ ECO₂ (May 2011 – April 2015, EC contribution 6 M€)
 - ➔ evaluate the likelihood, ecological impact, economic and legal consequences of leakage from sub-seabed CO₂ storage sites
- ➔ CO₂CARE (2011 – 2013, 5.3 M€)
 - ➔ Support large scale demonstration by delivering technologies and procedures for abandonment and post-closure safety
- ➔ ULTIMATE CO₂ (2011 – 2015, 5.3 M€)
 - ➔ significantly advance our knowledge of specific processes that could influence the long-term fate of geologically stored CO₂
- ➔ CO2STOP (2012 – 2013, 0.2 M€)
 - ➔ Assess European storage capacity and provide data for a database to be held by EC JRC

Framework contracts

Framework contracts in relation to climate change

- Service Requests arrive periodically from the Commission in relation to the CCS Directive and the NER300 programme
 - Led by ICF Consulting Ltd (2012-2015)
 - CO₂GeoNet/CGS Europe was involved in the contract "Implementation of Directive 2009/31/EC on the geological storage of carbon dioxide (CCS Directive) – support to the implementation report"



Studies for other stakeholders

Storage Operator

- ➔ Development of a monitoring plan for the Vedsted storage site for Vattenfall (2009) (coordinated by CO₂GeoNet-TNO)

IEAGHG

- ➔ Potential impacts on groundwater resources of CO₂ storage, 2011 (coordinator: CO₂GeoNet-BRGM)
- ➔ Quantification techniques for CO₂ leakage, 2012 (coordinator: CO₂GeoNet-Imperial)
- ➔ Methodologies and Technologies for Mitigation of Undesired CO₂ Migration in the Subsurface, 2013 (lead CO₂GeoNet-BRGM)



Organisation of events, a few examples



Workshop in Berlin, 2013 - 'Pinning hopes for climate protection on CO₂ storage ? Perspectives of a bridging technology'



Booth at SciTechEurope event in Brussels, 2011



Club CO₂, Le Havre City Council, GCCSI and CO₂GeoNet European CCS day, Le Havre, 2014



2nd GeoSchool, Greece, 2013



Workshop with EUSJA scientific journalists, Venice, 2013



Annual CO₂GeoNet Open Forum

- ➔ Offers a unique opportunity for stakeholders and major players in the CCS arena and wider energy–climate debate to meet and interact directly with Europe's largest group of researchers on CO₂ geological storage.
- ➔ Attracts academic experts, research institute scientists, industry leaders, regulators, representatives of the European Commission and other policy makers...
- ➔ Next (11th) Open Forum to be held week commencing 9 – 11th May 2016



CO₂GeoNet and COP

- July scientific conference 'our common future under climate change'
 - Co-organiser of **Parallel Session**: Negative emissions for climate change stabilization & the role of CO₂ geological storage (9th July)
 - CO₂GeoNet is co-organising **three Side Events**;
 - Two in Italy, one in the UK
 - the objectives of the proposed events are to draw together key stakeholders to foster discussion on opportunities to mitigate climate change with a focus on geological storage of CO₂.
 - Participating in R&Dialogue Side Event, France
- CO₂GeoNet will participate in COP in Paris late 2015

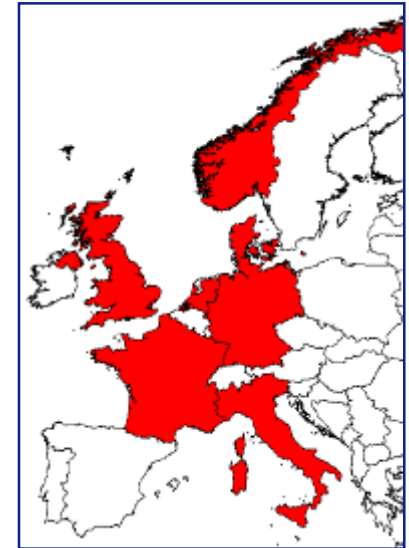


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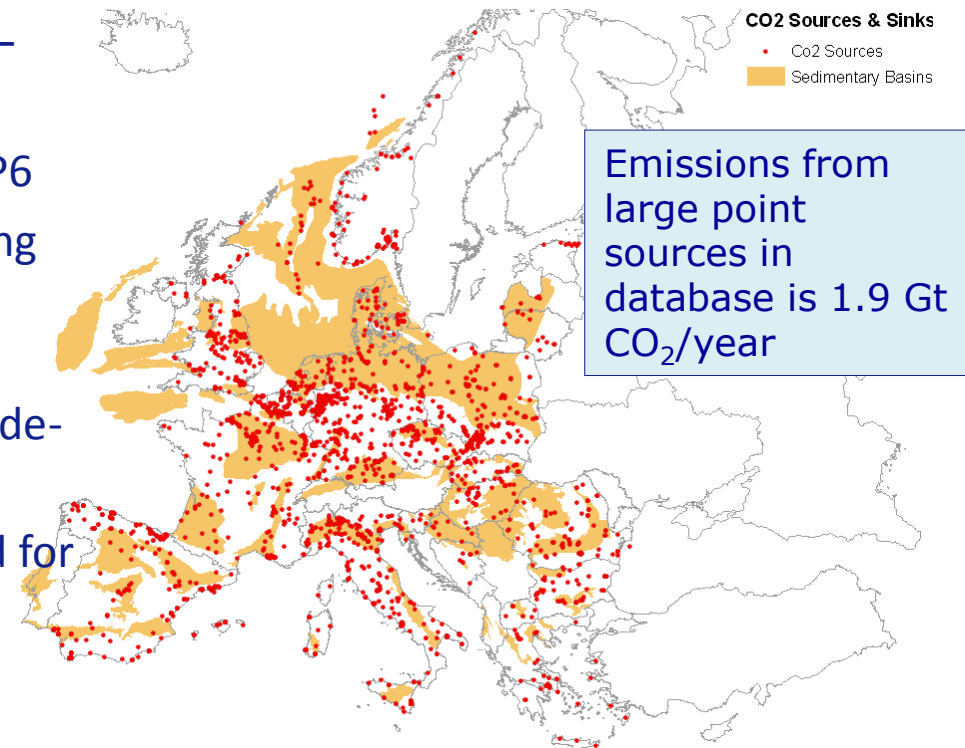
CO₂GeoNet project

- Project duration: 5 years (April 2004 – March 2009)
- Budget: 9 M€ ; EC contribution 6 M€ FP6
- 13 Partners from 7 countries
- Coordinator: CO₂GeoNet-BGS, Nick Riley
- Objectives: Strengthen European Research Area:
 - Align national research programmes
 - Jointly develop and share knowledge and infrastructure
 - Pave the way for the next generation of researchers
 - Provide authoritative geotechnical advice for Europe on CCS R&D
- Joint research activities; predictive numerical tools; rock and fluid behaviour experiments; monitoring techniques; risk and uncertainty.....



GeoCapacity: Assess the European Capacity for Geological Storage of Carbon Dioxide.

- ➔ **Project duration:** 3 years (Jan. 2006 – Dec. 2008)
- ➔ **Budget:** 3.5 M€; 1.9 M€ EC funding FP6
- ➔ **26 Partners from 20 countries** (including 12 current CO₂GeoNet Members)
- ➔ **Coordinator:** CO₂GeoNet-GEUS; Niels Peter Christensen and Thomas Vangkilde-Pedersen
- ➔ **Objectives:** provide the data required for the Europe wide adoption of CCS.
 - ➔ Map potential sources and sinks across Europe
 - ➔ Create GIS and Decision Support System
 - ➔ Create site selection criteria, standards and methodologies



Estimated 117 Gt storage
96 Gt in deep saline aquifers
20 Gt in hydrocarbon fields
1 Gt in unmineable coal beds
Regional scale capacity



RISCS: Research into impacts and safety in CO₂ storage

- ➔ Project duration: 4 years (2009 - 2013)
- ➔ Budget: 5.2 M€; 4.2 M€ EC FP7 contribution
 - ➔ 21 Partners (including 5 institutes currently in the CO₂GeoNet Association)
- ➔ Coordinator: CO₂GeoNet-BGS; David G Jones
- ➔ Objectives: improve our understanding of the possible environmental impacts of geological storage of CO₂
 - ➔ RISCS will communicate the research and the outcomes in an accessible way to stakeholders and the public.
 - ➔ Research focused on understanding the potential likelihoods and consequences of impacts scenarios on key receptors such as human populations, ecosystems, and groundwater.
 - ➔ Key output of the project (and other related research) was the 'Guide for Impact Appraisal' (CO₂GeoNet-BGS was lead editor)



CGS Europe: Pan-European coordination action on CO₂ Geological Storage



- **Project duration:** 3 years (Nov. 2010 – Oct. 2013)
- **Budget:** 2.9 M€; EC contribution 2.2 M€
- **24 Partners** representing **34 research institutes** from **28 countries** (including 21 institutes currently in the CO₂GeoNet Association)
- **Coordinator:** CO₂GeoNet-BRGM; Isabelle Czernichowski-Lauriol
- **Objectives:** To build a credible, independent and representative pan-European scientific body of expertise on CO₂ storage that will
 - instigate a durable networking of research capacity on CO₂ storage in Europe
 - help reduce the existing gap between the 'forerunner' countries, and the 'follower' countries
 - contribute to the large-scale demonstration and industrial deployment of CCS
 - support the implementation of the EU Directive on the geological storage of CO₂ and other regulatory regimes



SiteChar: Characterisation of European CO₂ Storage



- ➔ **Project duration:** 3 years (Jan. 2011 – Dec. 2013)
- ➔ **Budget:** 5 M€; EC contribution 3.7 M€ FP7 plus industrial funding
- ➔ **19 Partners** (including 6 institutes currently in the CO₂GeoNet Association)
- ➔ **Objectives:** set the criteria for characterisation of sites for geological storage of CO₂
 - ➔ Examine whole site characterisation process integrating site characterisation, risk assessment and development of monitoring plans.
 - ➔ Advance a portfolio of sites to a (near-) completed feasibility stage, develop a methodology for the preparation of license applications, incorporating all the technical and economic data, as well as societal aspects



ECO₂: Sub-seabed CO₂ Storage: Impact on Marine Ecosystems



- **Project duration:** 4 years (May 2011 – April 2015)
- **Budget:** EC contribution, 6 M€ FP6
- **28 Partners** (including 6 institutes currently in the CO₂GeoNet Association)
- **Objectives:** to evaluate the likelihood, ecological impact, economic and legal consequences of leakage from sub-seabed CO₂ storage sites.
 - To investigate the likelihood of leakage from sub-seabed storage sites
 - To study the potential effects of leakage on benthic organisms and the marine ecosystems
 - To assess the risks of sub-seabed carbon storage
 - To develop a comprehensive monitoring strategy
 - To define guidelines for best environmental practices in
 - implementation and management of sub-seabed storage



CO₂CARE: CO₂ Site Closure Assessment Research



- **Project duration:** 2 years (2011 - 2013)
- **Budget:** 5.3 M€; EC contribution 3.9 M€ FP7 plus industrial funding
- **23 Partners** (including 7 current CO₂GeoNet Members)
- **Coordinator:** CO₂GeoNet-GFZ; Axel Liebscher
- **Objectives:** Support the large scale demonstration of CCS technology by addressing the research requirements of CO₂ storage site abandonment. CO₂CARE will deliver technologies and procedures for abandonment and post-closure safety, satisfying the regulatory requirements for transfer of responsibility



ULTIMATE CO₂: Understanding the long-term fate of geologically stored CO₂



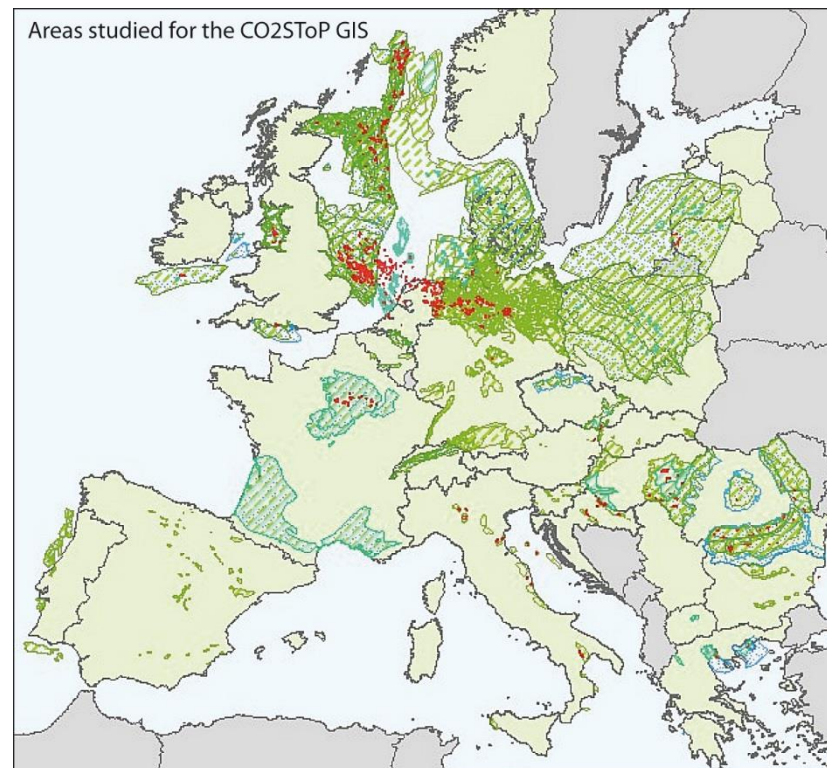
- ➔ Project duration: 4 years (2011 - 2015)
- ➔ Budget: 5.3 M€; EC contribution 4 M€ FP7
- ➔ 12 Partners from 6 countries (including 5 institutes currently in the CO₂GeoNet Association)
- ➔ Coordinator: CO₂GeoNet-BRGM; Pascal Audigane
- ➔ Objectives:
 - ➔ significantly advance our knowledge of specific processes that could influence the long-term fate of geologically stored CO₂
 - ➔ yield validated tools for predicting long-term storage site performance











CO₂Stop: Assessment of the CO₂ storage potential in Europe

- **Project duration:** 15 months (Jan. 2012 – Mar. 2013)
- **Budget:** 0.2 M€ EC FP7
- **29 participants from 28 countries** (including 15 institutes currently in the CO₂GeoNet Association)
- **Coordinator:** CO₂GeoNet-GEUS; Niels Poulsen
- **Objectives:** Assess European storage capacity and provide data for a database to be held by EC JRC



-  = Countries studied
-  = Countries not participating in CO2StoP project
-  = Aquifer daughter units
-  = Hydrocarbon daughter units
-  = Storage units
-  = Formations



CO₂GeoNet and COP

- July scientific conference 'our common future under climate change'
 - Co-organiser of **Parallel Session**: Negative emissions for climate change stabilization & the role of CO₂ geological storage (9th July)
 - CO₂GeoNet is co-organising **three Side Events**; the objectives of the proposed events are to draw together key stakeholders to foster discussion on opportunities to mitigate climate change with a focus on geological storage of CO₂.
 - A dialogue for developing synergies for sustainable energy production: how can biomass, hydrogen and CCS work together to mitigate climate change? (Italy, 20th June)
 - What geological CO₂ storage can bring to mitigating climate change - UK research perspective (UK, 1st July)
 - The potential contribution of CO₂ geological storage to climate change mitigation, both globally and in Italy (Italy, 13th July)
 - Attending Side Event, France: Sharing visions of a low carbon society (5th July)
- Participate in COP in Paris (possibilities under consideration; side events, booth....)

