Act now for zero emissions: the role of CCUS

Key messages of the 14th CO_2GeoNet Open Forum

San Servolo Island, Venice, Italy
7–9 May 2019

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

ACT NOW FOR ZERO EMISSIONS: the role of CCUS

The title of the 2019 Open Forum underlines the urgency to implement full-scale CO_2 Capture, Utilisation and Storage (CCUS) projects across the world, and emphasises the existing diverse CC(U)S opportunities that will enable tailored solutions for individual regions, local communities and industrial entities.

The following key messages extracted from the CO_2GeoNet Open Forum presentations and panel discussions, were voiced by the forum participants which included researchers, regulators and decision makers, industrial stakeholders and CCS project operators, journalists and researchers.

A *just* transition to a low-emission future

Society demands a just energy transition – a low emission future encompassing the creation of new jobs, economic growth and improved quality of life. This transition to a low carbon future needs careful planning upstream in order to make the right decisions: near-term actions are essential in achieving a long-term vision. **CCS is part of the transition and part of the solution.** The challenge ahead is enormous, but CO_2 Capture and Storage (CCS) technology is ready and working[1]. IEA modelling indicates CCS is 'essential' to a low-emission future, alongside renewables, energy efficiency and other solutions. CCS is needed to decarbonise the cement and steel industries, at least in the short-to-medium term. CCS is not an excuse to continue using fossil fuels, it's an indispensable technology in decarbonising the manufacturing industry, and CO_2 storage is a vital component for emission reduction with Direct Air Capture (DAC) and Bioenergy.

Shared responsibility

Everyone –citizens, politicians, industry- has a **shared responsibility towards climate sustainability**.

Governments and politicians have a leading responsibility in the just transition. Many governments are in the process of defining their climate plans and ambitions. Plans should be challenged to include CCS so that the maths works.

Positive signals are coming from carbon intensive industries, interest is developing in the financial sector, there is increased investment in CCS research & development and companies are seeking decarbonisation solutions, including CCS.

Recently the younger generation has taken on an inspiring role, bringing renewed energy and a fresh outlook to encourage the public to demand changes and to press politicians to make large-scale CCS happen. NGOs also play an important role in advocating CCS; they can influence politicians, leaders and citizens.

Pay the bill or face the consequences

CO_2 that is emitted should be considered as 100% leakage; CO_2 that is captured and stored can dramatically reduce this. One of the main arguments for not deploying CCS is cost. However, the cost for mitigating climate change will be dramatically higher without CCS[2], and extreme if we do nothing or act too late (climate-induced disasters, loss of lives, climate-change refugees, shortage of drinking water supplies, etc.). Implementing large scale CCS is a challenge, but more dramatic changes to large-

[1] Global CCS Institute, 2018. The Global Status of CCS: 2018. Australia.
[2] IPPC AR5 Climate Change Synthesis Report 2014 (Table 3.2)

scale infrastructure have been made in the past. **CCS is ready now and costs will come down significantly with learning-by-doing**, as has happened in the past with other breakthrough technologies, for example personal computers and solar energy. Communicating benefits and costs in terms that can be easily understood helps build shared understanding, for example, comparing the cost of a CCS project with the cost of building kilometres of highway/train line or expressing captured CO2 in terms of the equivalent number of cars taken off the road (the CO2 captured at Boundary Dam is equivalent to taking 250,000 cars off the road annually[3]).

Creating a favourable context

CCS technology is ready, but favourable economic and regulatory conditions are still not mature. One of the current major challenges for the CCS community is to engage with politicians at various levels, to enable them to help create a favourable and sustainable framework for deployment (e.g. international agreements, national climate policy plans, initiatives, incentives, and regulations). Politicians will have to provide tools to help create a business case for industry. **Clear, consistent and long-term policy and regulatory measures are needed to provide a predictable business landscape that will attract investment**. There are multiple pathways to reduce costs; the approach should fit the local context. Sometimes positive incentives work more effectively than penalties (e.g. 45Q in USA has generated significant interest).

CCS vs. CO_2 utilisation vs. CCUS

CO2 should be considered a commodity, not a waste. CO_2 has been utilised for goods for over a century. Although utilisation will not on its own tackle large-scale emissions, we should identify high-value utilisation opportunities in the market ('push' technologies) to help sway opinion, pay for early projects and get CCS going (market 'pull'). Utilisation can help develop a project business plan. However, CO_2 utilisation is a completely different concept to CCS and we need to consider how long the CO_2 is actually 'stored' (e.g. where will all "bio"plastics end-up?). Not all types of CO_2 utilisation are climate-friendly actions and we should not lose sight of the distinction between the technologies.

Urgency of upscaling and deployment: Act now

Our emissions are still accelerating: how do we change this? In order to deliver the expected emission reductions, massive storage capacities will be required before 2030, meaning that annual CO_2 storage rates need to increase 20 fold (IEA[4] states that by 2060 we should store 6.8 Gt per year for 2DS). **Upscaling is needed now**. The CCUS community has to talk with local and national politicians to explain how CCS can fit into climate plans and what is needed to get CCS projects off the ground.

Large-scale CCS projects will draw on knowledge and experience from the oil & gas industry: not only in terms of investigation, but also for planning, implementation and operation. The development and operation of a research site is distinctly different from that of a large-scale industrial site.

Opportunities: seek low-hanging fruit, locally

CCS is an opportunity for economic growth and job creation. This is a key message to communicate to policy makers, NGOS and the public. CCS can create new jobs and preserve workers' rights to good quality jobs. CCS projects can be tuned to match local needs and opportunities. For example, buffer storage for utilisation can help the business case for storage. The combination of CCS with hydrogen can play a paramount role by producing CO_2-free hydrogen to decarbonise electricity, transport,

[3] Sask Power (Boundary Dam) website

[4] International Energy Agency (IEA) ETP2017

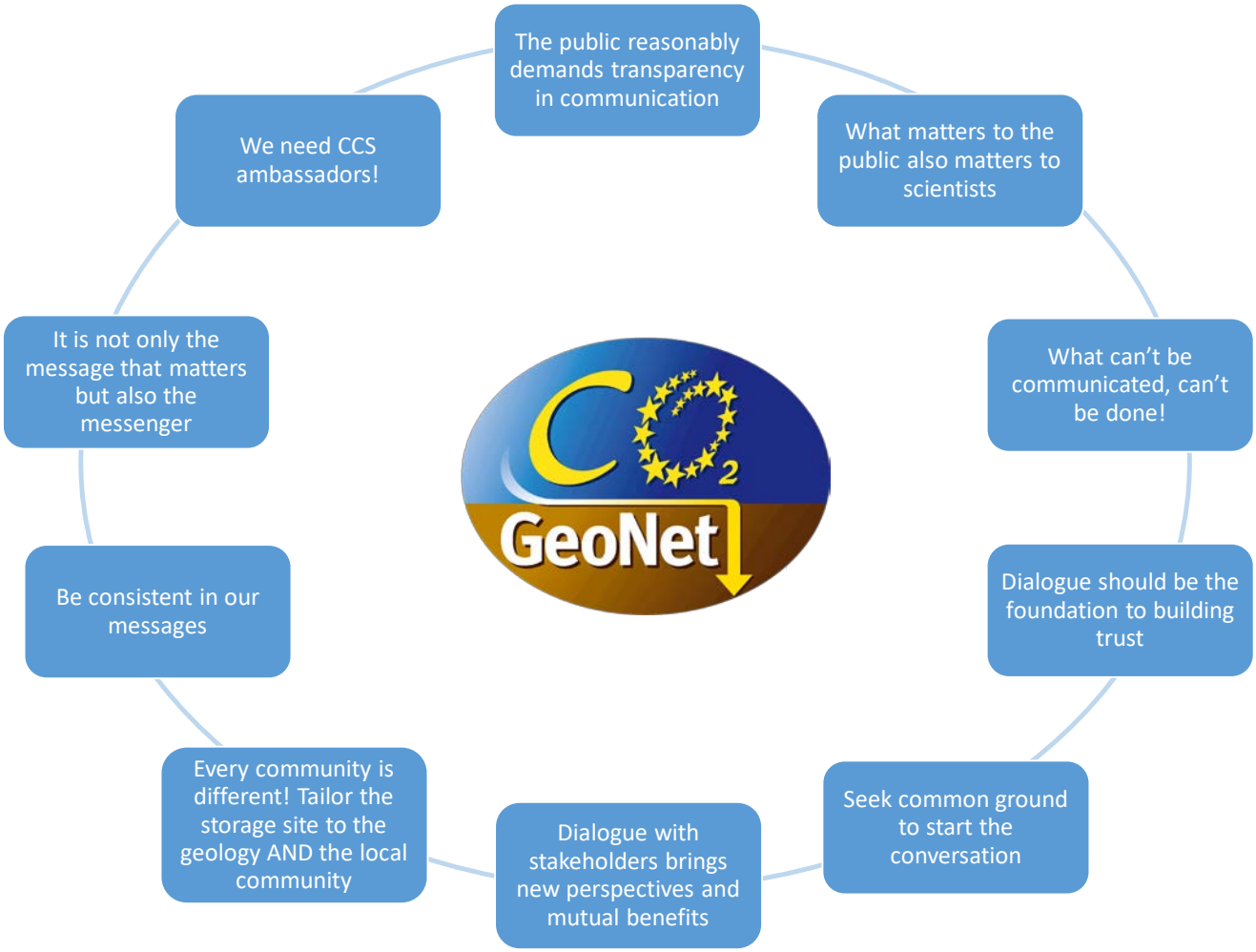
heating, etc. Hydrogen from natural gas reforming with CCS is competitive in terms of economy. In addition, CCS can enable renewables acting as a working fluid or helping to balance supply and demand in the electricity grid.

Onshore storage gives the opportunity to handle CO_2 storage locally, reducing costs and managing emissions. **Such smaller, onshore projects can contribute to building public trust in CCUS technology**.

Hubs and clusters: create a one-stop-shop for access to a CO_2 transport and storage network (e.g. Porthos, H21, etc.) linking different industries together. Plug-and-play storage solutions are attractive to industry.

Communication

Establishing and maintaining a dialogue on CCS is essential, both in terms of international actions to drive CCUS forward, but also on a local level, particularly in communities that are hosting CCUS projects:



Full details of the 14th CO_2GeoNet Open Forum are available at
http://conference2019.co2geonet.com/

This report should be cited in literature as follows: CO_2GeoNet (2019) Act now for zero emissions: the role of CCUS. Key messages of the 14th CO_2GeoNet Open Forum, San Servolo Island, Venice, Italy, 7–9 May 2019.

About CO_2GeoNet

CO_2GeoNet is the European scientific body on CO_2 geological storage. The Association currently comprises 30 research institutes from 21 European countries, and 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 supported by the EC FP6 programme for 5 years. In 2008, CO_2GeoNet became a non-profit association under French law, active on both the EU and global scene. From 2013, the membership of CO_2GeoNet expanded thanks to the support of the now completed FP7 CGS Europe project. New Members continue to join CO_2GeoNet to further enhance the pan-European coverage and expertise of the Association.

More about CO_2GeoNet at www.co2geonet.com

Austria: ***GBA*** - Geologische Bundesanstalt; Belgium: ***RBINS-GSB*** - Royal Belgian Institute of Natural Sciences; Croatia: ***UNIZG-RGNF*** - University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering; Czech Republic: ***CGS*** - Czech Geological Survey; Denmark: ***GEUS*** - Geological Survey of Denmark and Greenland; Estonia: ***TalTech*** - Tallinn University of Technology; France: ***BRGM*** - Bureau de Recherches Geologiques et Minieres; **IFPEN** - IFP Energies nouvelles; Germany: ***BGR*** - Bundesanstalt für Geowissenschaften und Rohstoffe; ***GFZ*** - German Research Centre for Geosciences / Deutsches GeoForschungsZentrum; Greece: ***CERTH*** - Centre for Research and Technology Hellas; Italy: ***OGS*** - National Institute of Oceanography and Experimental Geophysics; ***URS*** - Universita di Roma "La Sapienza"; The Netherlands: ***TNO*** - Netherlands Organisation for Applied Scientific Research; Norway: ***NORCE*** - Norwegian Research Centre AS; ***NIVA*** - Norwegian Institute for Water Research; ***SINTEF*** - SINTEF Industry; Poland: ***GIG*** - Główny Instytut Górnictwa / Central Mining Institute; ***PGI-NRI*** - Polish Geological Institute - National Research Institute; Portugal: ***ICT*** - Instituto de Ciências da Terra; Romania: ***GeoEcoMar*** - National Institute of Marine Geology and Geoecology; Slovenia: ***GEO-INZ*** - Geoinženiring d.o.o.; Spain: ***CIUDEN*** - Fundación Ciudad de la Energía; ***IGME*** - Instituto Geológico y Minero de España; Sweden: ***UU*** - Uppsala University, Department of Earth Sciences; Switzerland: ***ETH*** - Swiss Federal Institute of Technology Zurich; Turkey: ***METU-PAL*** - Middle East Technical University Petroleum Research Center; UK: ***BGS*** - British Geological Survey; ***HWU*** - Heriot-Watt University; ***IMPERIAL*** - Imperial College London, Dept. of Earth Science and Engineering.

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

CO_2GeoNet Secretariat: info@co2geonet.com
Website: www.co2geonet.eu