Driving CCS towards implementation

Key messages of the 12th CO_2GeoNet Open Forum

San Servolo Island, Venice, Italy, 8 – 9 May 2017

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

CCS DEPLOYED ON A GLOBAL SCALE IS ESSENTIAL FOR ACHIEVING THE COP21 OBJECTIVES

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As the targets of the Paris Agreement are translated into actions by countries worldwide, the need for large-scale deployment of CO_2 Capture and Storage (CCS) will become even more apparent. The 12th CO_2GeoNet Open Forum focused on driving CCS towards implementation and the critical role that CO_2 storage must play in climate change mitigation strategies to achieve crucial low carbon targets.

Below are some of the main messages that emerged during the CO_2GeoNet Open Forum presentations and discussions with the audience.

No success without CCS

It is essential to act quickly: the carbon countdown is ticking (carbon brief 2016). Globally, we're currently on track to overshoot our target for keeping global temperature rise below 2°C and are heading for a global average temperature increase well beyond 4°C. Even if all policies currently in place or proposed are enacted, we are still facing a temperature increase close to 3°C. Mitigation costs are expected to be more than double for the 2°C scenario (2°S) if CCS is not deployed.

We only have four years left in which to reach neutral CO_2 emissions if we want to achieve the 1.5 scenario (1.5°S). Not emitting CO_2 into the atmosphere, which is the aim of the majority of emission reduction technologies, is no longer enough: to meet the Paris Agreement, negative emissions, i.e. a net removal of CO_2 from the atmosphere, will be necessary even to meet the 2°S. The need for negative emissions indicates there is a huge role for bioenergy coupled with CCS (BECCS) and emerging technologies such as direct removal of CO_2 from the air. BECCS has been demonstrated at industrial scale, and will be needed to compensate for the lack of progress in reducing emissions over the past decades.

How to break the current inertia and get things moving

Lack of progress in implementation of CCS at large scale indicates the need for greater engagement with a broader group of stakeholders. In order to move CCS forward, it is essential to 'leave no one behind'. Better engagement with the financial and insurance sectors, regulators, policy makers, thought-leaders and the general public is required. The language used is also very important; messages need to be understandable for strategic planners, politicians, economists, etc. CCS projects designated by more business- and market-friendly titles and themes would attract more attention (e.g. 'low carbon solutions' highlighting examples of good practices worldwide, emphasising benefits for the local community and business, etc.).

CCS has progressed over the last two decades, but has not yet reached its full potential to reduce emissions. The portfolio of CCS projects running has diversified, with an increasing variety of projects coming to fruition. However, there seems to be a lack of projects in the pipeline, which could lead to stalled progress.

What can we do about this in the immediate future?

- Get small-scale projects going that can de-risk storage formations enabling later upscaling
- Seek synergies with low carbon technologies outside CCS, e.g. geothermal and biomass with CCS pilots - this targets businesses outside the CCS community and facilitates development of carbon-negative businesses in the case of biomass
- Decouple the CCS chain into capture and transport, and storage infrastructure using hubs (collection and multiple stores) to help share the financial burden and risks
- Provide 'storage ready' ('plug and play') solutions for emitters to utilise storage sites
- Develop tailored solutions for small industrial installations to meet their specific requirements. A flexible decoupled network could connect small emission sources
- Deploy CCS at industrial sources where pure or high-concentration CO_2 is emitted (cement and hydrogen production, etc.). This offers considerably lower capture costs which helps strengthen the business case. However, a mixture of capture options including retrofitting, oxyfuel, etc. need to be considered as CCS needs to be applied to a wide range of sources
- Seek utilisation opportunities as an enabler for storage and cooperation, e.g. organise regional CCUS coordination bodies (market makers) in CO_2 intensive industrial areas, which will then oversee optimal matching of shared infrastructure. Their role should also help share the cost burden and organise a coalition to seek funds in the EC.

Stable policy support is essential

A stable policy framework is critical for implementation of CCS and wider community engagement. Policy support has fluctuated over recent years (2009-2015) and is now rising again. An enormous leap is needed within just one generation in terms of volumes of CO_2 stored: from 40 Mt/y to 4000 Mt/y to achieve the 2°S. Therefore, it is crucial to convince policy makers and the public on the role of CCS. So far, only around 10 Nationally Determined Contributions (NDCs) include CCS, and all the national commitments will not allow us to achieve the Paris Agreement targets: a clear and consistent message is needed from all involved stakeholders both within and beyond the CCS community; CCS is needed and now. The benefits and advantages of CCS also need to be clearly demonstrated and explained.

It is also essential that CCS gets the same backing and 'image' as other clean energy technologies, such as renewables; this is about policy parity. Over the last 20 years, investment in renewables has outweighed investment in fossil fuels. CCS needs similar consideration based on the equally crucial role for CCS in a low carbon future. Current financing mechanisms are not yet strong enough to drive implementation and this needs to be communicated to policy makers. Investment of public funds in CCS has been shown to have a strongly positive effect in leveraging larger investments from the private sector. Member States should initiate infrastructure and possibly storage to accelerate implementation. Targeted deployment incentives are needed (capital and operation).

Stable policies and establishing an effective business case is urgent. Without this, implementing CCS represents a high risk for the operator. Increased uncertainty increases the cost of projects, decoupling the CCS chain is therefore expected to encourage investors (e.g. storage operators will not be penalised for issues with the capture plant).

Bringing CCS to new regions of the developing world

Only a few developing countries recognise CCS as an essential mitigation option. The main priority in developing countries is to improve living conditions for the population. CCS can support socio-economic development while limiting impact on the climate. CCS projects will look different in

different regions of the world. Local drivers and incentives (e.g. job creation) are extremely important. For instance, in Africa, where less than 60% of the population has access to the national electricity grid, the approach has to be totally different than in Europe. CCS projects and other new technologies must create jobs to boost local/national economy and bring benefits to society in order to satisfy the climate and socio-economic needs of the stakeholders. CCS development requires better geological assessments and mapping of potential storage capacities and creates opportunities for carbon trade.

We must support developing countries in considering CCS as a low carbon technology through raising awareness, undertaking knowledge sharing activities, capacity building and technology transfer. Onshore pilots are needed to pave the way for demos and full-scale projects.

CCUS is only acceptable if it ends with "S"

Without storage, CO_2 use in most cases does not contribute significantly to decarbonisation. CO_2 use is an enabler technology to help build a CCS economy but on its own will not solve the anthropogenic emission problem. Various studies agree that the use of CO_2 can only account for 2-4% (at best) of total yearly CO_2 emissions (current CO_2 market equivalent to 0.5 % of annual emissions).

Carbon dioxide Capture Utilisation and Storage (CCUS) can help build a CO_2 economy and engender a more positive image for CCS by providing environmental, economic and societal benefits (i.e. using waste from one plant to provide feedstock for another). Replacing CO_2 feedstock sourced from natural accumulations with anthropogenic CO_2 leads to emission reduction and could be a small step towards a CO_2 economy. CO_2 should not be considered as a waste, but as an asset. Synergistic activities including utilisation of CO_2 can help advance storage and storage sites (e.g. reservoir performance prediction). Instead of EOR, we should be talking about EOR+, i.e. EOR with maximised CO_2 storage. Coupling CCS with EOR seems to be a particularly appealing option for some developing countries.

EU regulations on use of CO_2 are not yet in place. However, the European SET Plan Action 9 includes targets for CCS and CCUS to help kick-start a CCS economy. Targets for the SET plan and the EU Research and Innovation agenda include a full-scale CCS project in Europe linked to an industrial source, regional CCS clusters (Norwegian industrial CCS cluster, Port of Rotterdam CO_2-hub, North-East UK CCS cluster, etc.), Projects of Common Interest, a European Storage Atlas and small scale/pilot CCS and CCUS projects. The intention is that actions will be driven forward by Member States.

Learning by doing is essential: Pilot/small scale projects are part of the process

Current research shows test beds, pilots and demo projects are performing as originally planned – no major deviations have been observed to date - this confirms that CCS projects can be managed safely and that CCS is ready to be implemented at industrial scale. Experience is key to better planning, reducing time spent on site design and construction, optimising costs and more effective public engagement. Lessons learned from demonstration projects such as Boundary Dam will allow significant reductions in cost for the next generation of CCS projects. Research to refine issues that are identified through these first generation demonstration projects are also needed.

Collaboration on research is a positive step toward optimisation of research infrastructure and contributes to maximised utilisation and development of expertise. An example of this is ECCSEL, which draws together European CCS facilities and enables access to a unified research infrastructure to the CCS research community.

Pilot projects are key in reducing storage site monitoring costs and represent excellent communication opportunities to prove the safety and sustainability of CCS operations to regulators and the general public.

Over the years, numerous pilot and demo projects have been launched/finished – a comprehensive analysis on what went well and what did not would be noteworthy information for the future deployment of CCS. This will be prepared through the ENOS project (www.enos-project.eu), an initiative of CO_2GeoNet funded through the H2020 programme.

Full details of the 12th CO_2GeoNet Open Forum are available at
http://conference2017.co2geonet.com/

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About CO_2GeoNet

CO_2GeoNet is the European scientific body on CO_2 geological storage. The Association currently comprises 28 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

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