

# CCS: the Innovation Fund and beyond



## Key points

- The oil and gas industry is well placed to help CCS deployment given its decades of experience in dealing with the underground while investing in R&D and low-carbon technologies.
- CCS, when commercially viable, combined with gas-to-power plants or via hydrogen can play an important role in securing a stable, flexible and low-emissions power mix, while CCS in industry can contribute significantly in preserving industrial jobs, delivering low carbon key products like steel, cement, chemicals, etc and in helping the European industry to thrive. For these sectors CCS would be the only possible solution to challenge of decarbonisation.
- Focused support from the Commission and Member States is required to enable investment in full scale CCS projects. R&D should also be continuously supported so that new, innovative solutions can be identified and help a large scale deployment of CCS.
- Lessons should be drawn from NER300 so that the ETS Innovation Fund benefits CCS as well as promising low-carbon technologies. The new fund should define clear and transparent criteria (e.g. €/MWh), avoid restrictive funding limits for a single project, allow projects to complement the support from other funds, focus on fewer impactful projects and remove the requirement for Member States to match funding.
- These specific principles combined to Commission work on identifying the priorities for the development and the deployment of strategic projects and technologies – like for example the SET implementation plan – could form a solid basis for clean technology development in Europe.

# Introduction

According to IEA, CCS provides 14% of the cumulative emission reductions needed in the period to 2060 to limit future temperature increases to 2°C and 32% in between 2DS and Beyond 2°C Scenario (B2DS)<sup>1</sup>. At EU level, it will be an important enabler in the 2050 Energy Roadmap. In particular, according to a recent study by the Zero Emission Platform<sup>2</sup>, not only the cost of reaching the EU's CO<sub>2</sub> reduction targets for power increases by at least €1 trillion when CCS is not part of the portfolio, but also CCS is the only option for substantially reducing CO<sub>2</sub> emissions for industries as refining, steel and cement.

IOGP represents companies producing more than one third of world's oil output and global gas production and around 90% in Europe. We welcome the Commission's work in building the future Innovation Fund and we believe that the current debate offers a timely opportunity to showcase the role of CCS in EU decarbonisation policies including in the Commission's roadmap toward a sustainable finance<sup>3</sup>.

In this context, IOGP would like to share our views on the role of CCS, to present some features to be taken into consideration for building a well-functioning Innovation Fund and to highlights some key technology challenges for the future of CCS.

## 1. The oil & gas industry and CCS

IOGP members have many years of experience working in the UK and Norwegian Continental Shelves and other places around the world, building up geological, engineering, scientific, commercial and legal expertise. This work has contributed to the development of technological expertise in the three main components of CCS: capture, transport and storage. Naturally, our members' knowledge and experience on CO<sub>2</sub> storage and utilisation are specific to the oil and gas sector, but this experience can be beneficial to other sectors as well, such as energy intensive industries. In a low-carbon economy, CCS is essential for these sectors to achieve zero net emissions and therefore preserve their sustainability and the industrial jobs.

To facilitate the energy transition, we believe that a number of gas technologies should be qualified as sustainable assets and financial products and therefore should benefit from R&D&I programmes. In particular, natural gas will have a significant role in the low-carbon economy. Applied to CCS this translates into less CO<sub>2</sub> to capture, transport and store. Moreover, gas has the potential to be converted into hydrogen and CO<sub>2</sub> which would be then captured through CCS.

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<sup>1</sup> IEA, *Energy Technology Perspective 2017*.

<sup>2</sup> ZEP, *CCS and Europe's Contribution to the Paris agreement Modelling least-cost CO<sub>2</sub> reduction pathways*, March 2017.

<sup>3</sup> *Towards an EU strategy on sustainable finance*, European Commission

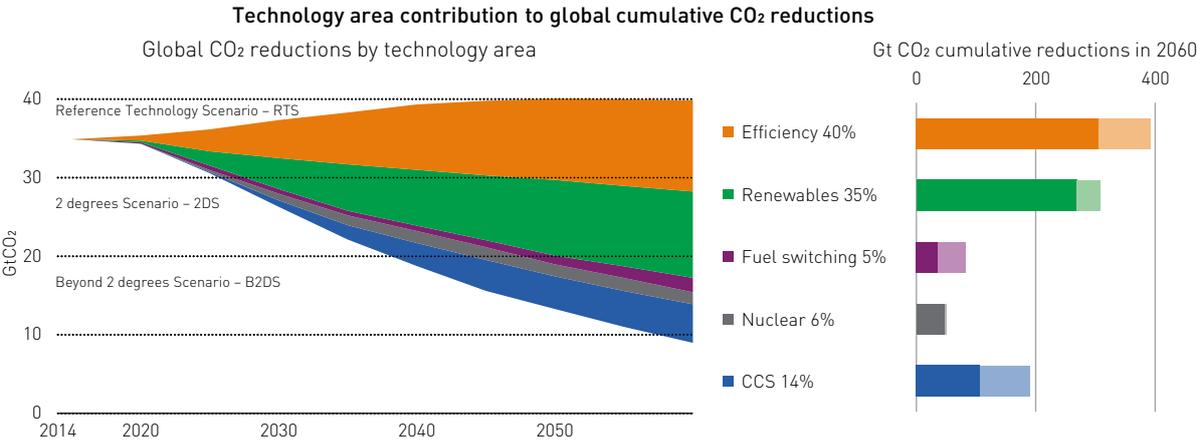
## 2. CCS and the Innovation Fund

IOGP believes that the Innovation Fund is a key tool to enable the implementation of CCS and other low carbon technologies allowing European economy to remain competitive.

Commercial scale CCS demonstration projects are necessary to confirm the economic viability of CCS as a cost-effective measure to mitigate greenhouse gases (GHG) in the power and industrial sectors. They will also help raise public awareness and acceptance of the technology. For this to happen, the Innovation Fund needs to be designed to match CCS development.

Commercial-scale deployment of CCS across industrial sectors will help optimize both operations and cost reductions. According to the IEA, industrial sectors such as cement, iron and steel, chemicals and refining account for one-fifth of total global CO<sub>2</sub> emissions<sup>4</sup>. The Innovation Fund can enable the formation and development of CCS-equipped industrial clusters which achieve economies of scale, paving the way for a sustainable European industrial vision. In addition, CCS will be needed for large scale 'negative emissions' projects likely to be necessary in the future, including through bioenergy with CCS (BECCS).

Our recommendations are in line with the [SET-PLAN implementation plan on CCS and CCU](#) which identifies eight Research and Innovation activities and highlights their associated implementing instruments.



Source: OECD/IEA 2017

### Examples of process CO<sub>2</sub>

<b>Cement:</b>	$\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ (calcination process)
<b>Steel:</b>	$2\text{Fe}_2\text{O}_3 + 3\text{C} \rightarrow 4\text{Fe} + 3\text{CO}_2$ (ferrous oxide reduction)
<b>Hydrogen:</b>	$\text{CH}_4 + 2\text{H}_2\text{O} \rightarrow 4\text{H}_2 + \text{CO}_2$ (Steam Methane Reforming)

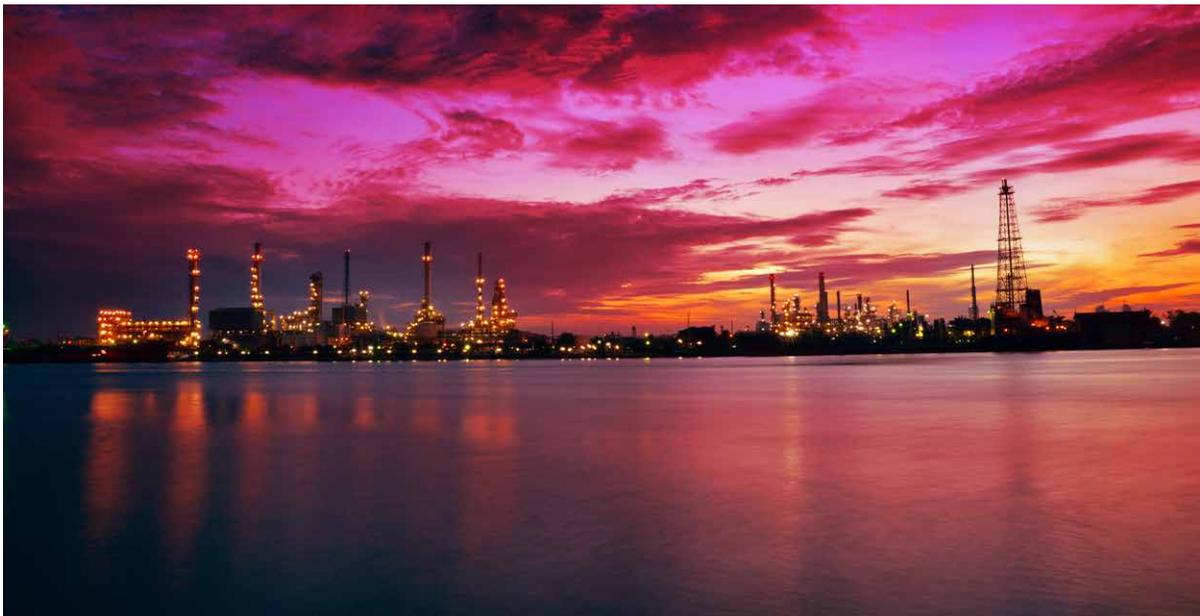
<sup>4</sup> IEA, [Global Action to Advance Carbon Capture and Storage Accelerating the Transition to Clean Energy Technologies. a Focus on Industrial Applications, 2013.](#)

### 3. An Innovation Fund that delivers

#### i. Lessons from the past

Experience with NER300 should be used to ensure that this Innovation Fund would fully consider the specific merits of the different solutions, which means for CCS to recognize the lack of competitors for process CO<sub>2</sub>, for BECCS, and the fact that gas-to-power combined with CCS will complement variable renewables.

The NER 300 programme was complex to administer. It included requirements that favoured smaller projects over larger ones (and so disadvantaged projects with a large CO<sub>2</sub> abatement impact like full scale CCS projects) and had a market impact by, for example, releasing early allowances. Moreover, eligible projects, in addition to EU funding, were highly dependent on national funding. **Therefore, NER300 has not delivered a single, large scale CCS demonstration project and lessons should be learned based on that experience.**



#### ii. Criteria for the future Innovation

The following adjustments are necessary for the Innovation Fund to support investments in CCS:

- **Identify clear and transparent criteria.** IOGP is in favour of clear and transparent criteria and acknowledges that it may be necessary to have more than one criteria in place considering the range of technologies.
- **The 15% funding limit included in the NER300 for any single project should not be replicated in the Innovation Fund Delegated Act.** We believe that too rigid and restrictive funding limits, like the one contained in NER300, can and have been detrimental to large scale CCS demonstration projects. For example, in 2011, this limit meant that when the ETS price fell to ~€8 (down from ~€30) there were insufficient funds available to support a large-scale CCS project.

- **For the scheme to be more effective, it should give funding to fewer impactful projects rather than spreading funds across too many projects**, which may not make possible any support to larger projects such as large-scale or part-chain CCS projects such as CO<sub>2</sub> transport and storage infrastructure projects.
- **The NER300 requirement for Member States (MS) to match any funding award should be scrapped or made more flexible**. For instance, MS contribution in the form of tax relief, or other measures, should be allowed. The existing funding match requirement for MS was one of the reasons why, in our view, no CCS projects could receive funding in the first round of the NER300. The financial crisis combined with the collapse of the EU ETS price, were two factors which lead to some MS cutting back on expensive projects. As a result, these projects became ineligible for NER300 funding.
- **The Innovation Fund should be made compatible with other EU funds**, allowing MS to cumulate different funding options and to use the revenues in the most efficient way.
- **The Innovation Fund should be better coordinated between MS, as in the SET Plan, to help harmonise and streamline the fund and to ensure a more efficient and effective application process**. This would allow an optimised alignment of the funding process both at EU and MS level.
- **A milestone approach should be taken into consideration**, as the report from the [stakeholder's consultation](#) conducted in 2017 highlights. The level of funding support should mirror the development of technologies as they progress along the technology learning curve i.e. support level should be adjusted downwards as technologies become more mature and more economic. At the current stage different CCS projects are at various levels of development. Therefore, their costs forecasts differ. This implies that any potential financial support needs to be tailored to their stages of technical maturity and provided to a limited number of key CCS R&D and demonstration projects.
- **Finally, the Innovation Fund should deal not only with CAPEX (capital costs), but also with OPEX (operating costs)**. In particular it should be designed in a way which allows adjustments when the OPEX estimate does not match with the OPEX assumption at the time of the application (fuel cost variation).

## Looking ahead

### Storage capacity

A key challenge for CCS is the timely availability of CO<sub>2</sub> storage capacity. We believe joint efforts are needed to address the technological and methodological aspects of appraising storage capacity and that, at EU level, this work would increase confidence regarding storage capacities.

Developing a sound methodology to estimate effective storage capacity at EU level is a key requirement before any study should be conducted. Oil and gas companies have unequalled knowledge of methodologies which are essential for designing a CCS project. The SET Plan Implementation plan identifies storage appraisal as one of the key flagship activities building on the prospecting opportunities of an overall European CO<sub>2</sub> Storage Atlas.

### Hydrogen

Some of our members are exploring the potential for decarbonisation of natural gas value chains by conversion into hydrogen while storing CO<sub>2</sub>. The most economic method for hydrogen production nowadays is conversion of hydrocarbons by means of Steam Methane Reforming or Auto Thermal Reforming. The CO<sub>2</sub> emissions generated from the hydrogen production process via these routes can be captured transported and stored. This also provides opportunities to limit emissions from many small emission sources where CO<sub>2</sub> capture technically is not possible or economically not viable. Combined with CCS these techniques can have a profound impact on the cost and pace of the energy transition. In this area as well, the SET Plan Implementation Plan assessed that the development of European hydrogen infrastructure is a crucial element of EU low carbon strategy.

### R&D

Finally, we believe that an area of interest for R&D related to CCS would be that of breakthrough technologies for capture which would allow the current cost and energy penalties to be significantly decreased. Our members have been participating in initiatives focusing on innovation such as the [Technology Center Mongstad \(Norway\)](#), the [CO<sub>2</sub> Capture Project](#), the [OGCI clean gas project \(CGP\)](#).

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### About IOGP

The International Association of Oil & Gas Producers (IOGP) is the voice of the global upstream industry. Oil and gas continue to provide a significant proportion of the world's energy to meet growing demands for heat, light and transport.

Our Members produce 40% of the world's oil and gas. They operate in all producing regions: the Americas, Africa, Europe, the Middle East, the Caspian, Asia and Australia.

We serve industry regulators as a global partner for improving safety, environmental and social performance. We also act as a uniquely upstream forum in which our Members identify and share knowledge and good practices to achieve improvements in health, safety, the environment, security and social responsibility.

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