



## **OGP contribution to the CCS Directive evaluation**

**OGP considers that, before re-opening discussions to improve the existing CCS Directive, additional work related to demonstration projects is required.** Their deployment is now an essential milestone to generate progress in the development of the technology. It will provide technical information and operational data and give credibility to the implementation of CCS.

We therefore encourage Member States to move ahead with demonstration projects.

The deployment of such projects needs a stable legal and regulatory framework. As stated by the European Commission, the CCS Directive “*establishes a legal framework for the environmentally safe geological storage of CO<sub>2</sub> to contribute to the fight against climate change. It covers all CO<sub>2</sub> storage in geological formations in the EU and the entire lifetime of storage sites. It also contains provisions on the capture and transport components of CCS, though these activities are covered mainly by existing EU environmental legislation, such as the Environmental Impact Assessment (EIA) Directive or the Industrial Emissions Directive, in conjunction with amendments introduced by the CCS Directive*”<sup>1</sup>. **OGP considers that the CCS Directive, as it is, does provide an acceptable degree of clarity to investors for building and operating CCS projects in Europe.** One of the strengths of the Directive currently is that it offers a certain degree of flexibility to allow Member States to overcome the financial constraints generated by such projects.

OGP considers that there are nevertheless a number of policy improvements that should be introduced to support CCS demonstration projects in Europe. They are further described in the Annex.

However, the CCS Directive itself should not be regarded as the specific vehicle to drive these improvements. This would go beyond the Directive’s original scope and would risk causing a deferral of current investment decisions rather than expediting them. Its objective is to make the investment climate more favourable to this kind of project. OGP recommends therefore the wider CCS policy development discussion to be decoupled from the review of the Directive.

The CCS Directive, as adopted in 2009, was planned to be reviewed in 2015 as by that time it was envisaged that twelve CCS demonstration projects would have been carried out. Today, whilst the first permit has been successfully issued under the EU’s CCS Directive, the Directive has not yet had opportunity to be properly **road-tested since no project is being operated at full speed.** Some are in

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<sup>1</sup> [http://ec.europa.eu/clima/policies/lowcarbon/ccs/directive/index\\_en.htm](http://ec.europa.eu/clima/policies/lowcarbon/ccs/directive/index_en.htm)

the early stages of development for demonstration purposes, but final investment decisions are only expected in the next few years. Revising the CCS Directive now would most likely generate additional delays, which is really not what is needed.

In general terms, **OGP supports the purpose and the scope of the Directive**. The current wording allows the storage of carbon dioxide from a number of large point sources. Availability of regional storage capacities in Europe, as well as in other emitting regions, is crucial and more efforts and research are needed in order to develop sound methodologies to estimate CO<sub>2</sub> storage capacities. Confidence in the selected CO<sub>2</sub> storage capacities will be of significant importance for the development of CCS at the targeted scale (several hundred million tons per year in Europe).

The Directive, in its current form, also retains the possibility of storing carbon dioxide via **Enhanced Oil Recovery (EOR) operations**. As such it is consistent with the two EU policy objectives on climate change and security of energy supply:

- A significant fraction of the CO<sub>2</sub> used in such EOR operations will remain underground. Following the same rigorous monitoring and verification procedures as in any other storage project, this fraction should be counted as non-emitted CO<sub>2</sub>;
- EOR also has the potential to contribute significantly to the technological development of CCS. It will help improve the economic recovery of Europe's indigenous oil reserves and will offer additional CO<sub>2</sub> storage opportunities.

***About OGP:** Our membership spans the globe and accounts for more than half of the world's oil output and about one third of global gas production. We foster cooperation in the area of health, safety and the environment, operations and engineering, and represent the industry before international organisations, such as the UN, IMO and the World Bank, as well as regional seas conventions, such as OSPAR, where we have observer status. OGP Europe in Brussels represents OGP members who are active in Europe at EU level.*

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## Annex: OGP views on the CCS Directive Review

### On the Guidance Documents (Question A5)

OGP would like to voice its concern that, in their current format, the Guidance Documents (GDs) would, instead of helping CCS to be implemented in the EU, hinder its development at a large and commercially viable scale. There is a very real risk that the **GDs will become a significant barrier to the deployment of CCS in Europe**. In this context it would also be beneficial if the GDs were more explicit in stating that they are non-binding for the Member States (MS).

OGP recognises the importance of continual **risk management** as an ongoing process across the full project lifecycle, the strong reliance on the DNV process, in all GDs, raises a question as to whether this approach may limit flexibility to apply alternative approaches. The oil and gas industry has a longstanding experience in using risk assessment as an integral part of its processes and it would be beneficial for the GDs to recognise the role of existing risk management methodologies.

Finally, a further serious concern relates to the impact that the GDs may have in terms of the **public perception of CCS**. The GDs seem to give the impression that there is no real experience of CO<sub>2</sub> storage and that CCS is a high-risk activity. In doing so, the GDs seem to neglect the existence of a number of projects of CO<sub>2</sub> storage.

In general, OGP would like to stress the need to ensure integration between individual GDs. In this context, integration between the guidance on site selection and the guidance on monitoring is key.

#### ▪ **Guidance document 1 Storage Life Cycle Risk Management Framework**

Furthermore, the scope of GD 1 should be clarified: is this GD supposed to focus only on containment risks, or on all storage project risks? As it is, it is 90% focused on containment risks but also considers some other issues, which could confuse users of this document. Moreover, the authors should ensure that the use of risk management terminology is consistent with established standards and practices. Overall, the language in the document is ambiguous in its terminology and different views on the interpretation of the language are possible. Clarity in terminology and language is key for the Competent Authorities (CA) who will make use of these documents and may not possess the necessary specialised technical expertise. The GDs might benefit from the addition of a glossary which would clarify the terminology used in the documents.

#### ▪ **Guidance Document 2: Site Characterisation, CO<sub>2</sub> Stream Composition, Monitoring and Corrective Measures**

In the context of GD 2, OGP would like to stress that **geological and oil industry experience around CO<sub>2</sub>** should be much more utilised and acknowledged. While there have been few commercial scale, pure CCS projects, it should not be assumed that the industry lacks knowledge around CO<sub>2</sub> site characterisation. CCS is mimicking what the earth has done for millions of years. CO<sub>2</sub> can be found in most sedimentary basins around the world, typically associated with hydrocarbons. Petroleum geologists are aware of how it is formed and trapped. In addition the oil and gas industry has been injecting CO<sub>2</sub> for enhanced hydrocarbon recovery for ~ 40 years (in thousands of wells and dozens of fields). In several places (e.g. p.8) comments are made on the early stage of implementation of geological storage of CO<sub>2</sub>. Whilst this is correct, it is important, early in the document, to distinguish

between saline formations and depleted oil/gas fields, as the latter have significantly more data to characterise them and hence to define the associated operational/safety risks and long-term environmental risks.

Notwithstanding, it is also important to bear in mind that, whilst, depleted oil and gas fields are very important because of the availability of data, saline formations **are also reliable storage sources**<sup>2</sup>. Depleted fields, are not always the easy option they first appear. Depleted fields can have greater containment concerns due to multiple penetrations and potential geo-mechanical issues. In the longer term, saline formations have a greater storage capacity. The GD should consequently avoid bias towards depleted fields.

Furthermore, in terms of methodologies, OGP would like to stress to need for caution in presenting tables of existing technologies as suggestions as they could be interpreted as being **prescriptive**. Although the GD outlines technology options for all phases of a storage project, some of the examples and tables included might be regarded by the CA as a “checklist” or qualification standard. One particular example in GD2 are the “primary”, “secondary” and “potential” monitoring methods (as listed in Table 11). The proponent may have to provide a technical case for not using a “primary” technology where a secondary or potential technology might actually be more cost-effective and safe for a given site.

Finally, GD 2 should provide **more clarity on the issue of “storage licensing”**. GD 2 does provide clear details on the licensing scope for a CO<sub>2</sub> storage activity within a specified geographic area. In consideration of the experience of the oil and gas sector in storage, we believe that a more flexible regime that fit for purpose is needed. Geologic data and geologic modelling would determine whether there is a need for a potential storage complex to be delineated more widely or more broadly in extent. Therefore the licensing regime would be adapted to cover the complex, providing at the same time a high degree of certainty to the project proponent.

#### ▪ **Guidance Document 3: Criteria for Transfer of Responsibility to the Competent Authority**

The CCS Directive and associated GD have been written with mature commercial scale CCS in mind. The current EU CCS demonstration projects aim to close the knowledge gaps which would be critical in being able to detail with much more certainty the technical and legal requirements governing CCS projects. It is important to allow MS and CAs the flexibility to be pragmatic in the application of the CCS Directive so as not to deter investment in the critical demonstration projects.

It is equally key to bear in mind the applicable precedents which exist in the oil and gas industry. These precedents include, in particular, experience of: sub-surface modelling, CO<sub>2</sub> capture, transport and injection, site decommissioning and monitoring. Many wells have already been drilled into high-CO<sub>2</sub> concentration reservoirs in the past. The oil and gas industry has extensive experience in drilling, completing, monitoring, and plugging wells that have operated in corrosive environments such as that created by acid gases (H<sub>2</sub>S and CO<sub>2</sub>) and water. This experience has led to the development of sound processes and materials to mitigate any corrosive effects during the life of wells or beyond, after they are taken out of service and decommissioned. In depleted oil and gas fields or saline formations used for CO<sub>2</sub> storage there will not be a ‘stable end-situation’ for many years as reservoir pressures are expected to decrease very slowly to the pressures that are normal (near original pressure) at the reservoir depth. It is likely that the long term behaviour of CO<sub>2</sub> and pressure can be

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<sup>2</sup> As an example, since 1996, Statoil’s Sleipner West captures over one million tonnes per annum of carbon dioxide from natural gas production stored it in a saline formation more than 800 metres below the seabed.

reliably predicted by using the same reservoir engineering principles and computer models used by the oil and gas industry. It is not clear, therefore, why there is a need for these very extensive and elaborate abandonment, monitoring and transfer criteria, for CO<sub>2</sub> storage in depleted oil and gas fields. It is essential that vast new procedures for decommissioning oil/gas fields used for CO<sub>2</sub> storage are not legislated. Instead, current procedures should be extended and adapted as necessary to account for the increased assurance needed for CO<sub>2</sub> storage reservoirs to demonstrate containment for emission accounting purposes. Key, with respect to these precedents is that CCS regulations are developed to promote industry best practice in managing risk and uncertainty. The application and extension of existing laws where possible for the implementation the CCS Directive is crucial.

The GD should emphasise the use of performance-based approaches rather than time-based approaches for determining when handover can take place. Only a performance-based approach can provide the required certainty for the CA, and an additional time-based approach would not add further value. Furthermore, there is a concern over the stringency of an arbitrary and continuous 10-year demonstration that all wells remain in good shape without any leaks (p. 8). The project proponent should, at minimum, be allowed to plug those wells where prudent, keeping a few wells open for monitoring purposes. An opportunity should also be given to remedy any eventual leakage in a reasonable amount of time (but promptly) without automatic penalisation for any single leakage event in a continuous 10-year demonstration. If the suggested items need to be monitored (post-closure pre-transfer) for 5 or 10 years as offered in the GD then facilities would need to remain operational and wells accessible for at least 10 years; this is neither desirable nor necessary in most cases. The introduction of minimum periods in the GDs is not desirable as it would make it effectively impossible for CAs to opt for anything less than 10 years if and when adjusting downwards the minimum transfer period of 20 years or less as specified in the CCS Directive (Article 18). In cases where an incident has occurred during the monitoring period, it is crucial that the nature of the incident as well as concomitant corrective measures are understood and evaluated before any impact on handover is decided.

#### ▪ **Guidance Document 4: Article 19 Financial Security and Financial Contribution**

OGP would like to express its concern that GD 4 may create significant financial hurdles for CCS developers. The unintended consequence is likely to be to significantly discourage deployment of CCS in the EU (especially beyond the first phase of incentivised demonstration projects), in favour of businesses moving to jurisdictions with less onerous requirements or in favour of simply continuing to emit CO<sub>2</sub> into the atmosphere.

Moreover, GD 4 appears not to be taking the existing experience of the oil and gas industry into account. There are a number of references to the lack of “experience with geological storage of CO<sub>2</sub> or to the fact that “carbon sequestration is a new technology” (p. 13). It is key to bear in mind that CO<sub>2</sub> injection in hydrocarbon fields is a proven technology (13,000 wells worldwide). A risk-based approach should therefore be used to determine the required contingency because of ‘newness’ of the technology. Whilst there is indeed very little experience with CO<sub>2</sub> storage for climate change reasons very relevant experience gained by the oil and gas industry can be used:

**Natural geological CO<sub>2</sub> occurrences:** There are many examples of naturally existing CO<sub>2</sub> storage fields worldwide in different reservoir rocks and under different cap rocks. These have been stable for millions of years. In the US, CO<sub>2</sub> from several of these fields has been produced and transported for over 30 years for Enhanced Oil Recovery (EOR) purposes.

**Injection of CO<sub>2</sub> into the subsurface within the framework of CO<sub>2</sub> EOR operations:** even though these projects do not include very extensive monitoring programmes there is substantial evidence that CO<sub>2</sub> leakages from the surface facilities has been very limited and that there have not been any major leakages from the subsurface (this would be noted by reservoir pressure monitoring and anomalies in produced and recycled gas volumes). Furthermore, a recent geochemistry study at the world's oldest EOR site (SACROC in West Texas) indicated no evidence of migration of injected CO<sub>2</sub> into groundwater.

**Underground gas storages:** there are many examples worldwide of geologic storage of natural gas (which is combustible) including many within the EU<sup>3</sup>. These reservoirs are filled up and produced on an annual basis without consequence. Storage site operators use geomechanical models (that are used to predict the effects of pressure changes on reservoir and cap rock integrity) are sound to monitor the performance of these sites thereby validating this technology.

Regarding **storage in depleted gas fields, GD 4 is inappropriate.** The starting assumption is that there is no relevant experience, that there is no idea what the probabilities are of things going wrong, no idea of what the consequences will be if things go wrong, and no idea what it will cost to fix things, if they go wrong, each of which is incorrect. This is not the case with regards to storage in gas reservoirs and will lead to large, unnecessary cost increases to storage site developers. Whereas it is true that the presence of another gas complicates CO<sub>2</sub> storage, it is incorrect that the processes involved are not understood and that no relevant experience exists. Compositional simulators can predict phase behaviour and there is pilot level field experience in injecting CO<sub>2</sub> into depleted gas reservoirs (K12B, offshore Netherlands; Lacq, France; Otway Basin, Australia). Like any other prospective storage venue, it is more a matter of site selection, modelling and monitoring that will allow CO<sub>2</sub> storage to occur safely and effectively in depleted gas fields.

Furthermore, GD4 could have an impact on the **public perception of CCS**, leading the neighbours of storage locations to view CO<sub>2</sub> storage as being very risky. Indeed, in comparison with gas production and gas storage facilities, large securities seem to be needed to provide for leakages and risks which will lead most to the only logical conclusion that CO<sub>2</sub> storage must be very risky.

#### **On an EU policy framework for CCS (Questions B1, B2, B3)**

With regard to **policy mechanisms** to be implemented at EU level, as an international association, we prefer worldwide measures to tackle global challenges. If they are not possible, we are in favour of EU-wide policy mechanisms and approaches as they underpin the EU internal market by reducing intra-EU trade distortions and thus support EU competitiveness. For these reasons, national roadmaps and strategies should be technology neutral.

Furthermore, OGP suggests taking an EU approach towards development and demonstration phases of CCS technology. This could be done through, for example, preparing, together with Member States and all relevant stakeholders, an **EU Roadmap on CCS**.

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 different stages of technical

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<sup>3</sup> There is for instance a large underground storage reservoir 300m below the Olympic stadium in Berlin, venue for the 2006 football World Cup, which has worked safely for decades. There are numerous underground gas storage facilities in Europe.

maturity and provided to a limited number of key CCS demonstration projects (e.g. sufficient support should be given to fewer projects rather than a small part to a larger number of projects). For example, special consideration should be given to demonstration projects for CCS at power station scale, in particular applied to gas power plants. In fact, gas power plants have an advantage in terms of infrastructure compared to coal. For the same power generation production, the capacity of the infrastructure will be twice smaller for gas than for coal, and for the same cumulative production of power with CCS, the extensions of the infrastructure network for gas will be smaller than for coal because it will take more time to fill the CO<sub>2</sub> storage sites for gas than for coal.

Pre-commercial/demonstration programmes should stimulate and maximise learning, as well as sharing and broadening knowledge in areas where there are gaps. This would increase confidence in CCS and also improve public support. Any transitional incentive for low-carbon technologies, including CCS, should be time- and funding-limited, and phased out as soon as possible in order to force these technologies to demonstrate their ability to compete in the market. Recycled auction revenues can also contribute funding for R&D. Consideration may also be given to allocating a proportion of the potential revenue streams for research and development of low- emission technology.

There is no evidence that CCS certificates would help early deployment, but they would place an unnecessary cost and administrative burden on the oil and gas industry.

We do not believe that other policy measures are compatible with a liberalised electricity market.

One of the problems with the existing basket of policies is that many of them are chasing the same reductions. This leads to perverse outcomes and makes it extremely difficult to understand which policy is driving results. Introducing further policy measures is likely to exacerbate this situation. Specifically, such measures may lead to life-extensions for inefficient power stations instead of their replacement with efficient gas-fired power stations, which can significantly reduce emissions even where they are not yet equipped with CCS.

Such measures may also endanger the role of gas-fired power plants as backup for renewable energy and therefore risk diminishing security of supply in the electricity sector. In this context it is important to remind that gas power plants with CCS have several positive characteristics compared to coal power plants. Gas with CCS emits twice less CO<sub>2</sub> than coal for the same power generation<sup>4</sup>.

Lessons should be learned based on experience to date with **NER300**. A critical component to achieving real CO<sub>2</sub> reductions in the EU will be to change the qualifying criteria to take into account the lower carbon content of gas (and so the lower volumes of CO<sub>2</sub> generated). This would address the current perverse advantage for coal under NER300. The criterion should not be the extra cost per tonne of stored CO<sub>2</sub>, but rather the extra cost per kWh of electricity.

Further, the Commission should consider a different distribution of the funding: the scheme might be more efficient funding providing sufficient financial support, if it gave sufficient funding to fewer

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<sup>4</sup> Emissions of CO<sub>2</sub> from coal power generation in Europe are around 850 Mt CO<sub>2</sub> per year (average emission around 920 g/kWh) and that the conversion of the corresponding coal power plants to modern CCGT (350 g/kWh), would result in a decrease of the emissions by 530 Mt CO<sub>2</sub>. Without any CCS, the switch from coal to gas for power generation will significantly contribute to the mitigation of climate change.

projects rather than a thin layer of funding too many projects. The mechanism should also take into consideration operational costs which are likely to remain high until the energy penalty issue is solved.

#### **On public acceptance (Question C5)**

On the topic of public perceptions of CCS, OGP recognises that this is a critical issue to be addressed in any major energy project, including CCS. However, since the concept of 'public acceptance' is a dynamic issue that is determined by often very local, community-level concerns and/or national considerations, we believe that this should remain the domain of national governments and regulators since they possess the most relevant knowledge and expertise relating to their local or national public interests. Therefore we do not believe that the CCS Directive should be the specific vehicle to drive improved approaches towards greater public acceptance of CCS.

#### **On the contribution of the CCS Directive to storage permits (Question D3)**

Key concern for the oil & gas industry is how to deal with any potential overlap between CO<sub>2</sub>-related activities and oil and gas production or storage. We believe the EU should ensure that the rights and interests of oil and gas operators and license holders have sufficient protection in this regard, as energy security remains a critical issue for all countries and the companies that are operating within those titles.

Under **Art. 33 of the CCS Directive**, Member States have to ensure that operators of all combustion plants with a rated electrical output of 300 MW or more have assessed whether the conditions of 1) availability of suitable storage sites; 2) economic and technical feasibility of transport facilities and 3) retrofit for CO<sub>2</sub> capture are met. If so, the competent authorities shall ensure that suitable space on the installation site for the equipment necessary to capture and compress CO<sub>2</sub> is set aside.

At this stage, OGP believes implementation of Article 33 is sufficient until such time as CCS is proven at scale.

OGP is aware that a procedure is in place for the Commission to review of **draft storage permits**. We think that the permitting procedure should remain exclusively the responsibility of Member States which already have permitting authorities with appropriate competencies. We think that the same national authority which is responsible for the exploration and production of hydrocarbons should be responsible also for the storage of carbon dioxide. This authority already has the technical and management experience and is able to oversee any conflicting CCS and hydrocarbon production activities. The involvement of the Commission would lead to an unnecessary complication and delay of the permitting procedure. It also seems to be contrary to the subsidiarity principle. We propose that these provisions should be removed.

#### **On the transfer of responsibility for a storage site (Article 18) (Question E2)**

OGP welcomes the principle that the responsibility for the closed storage site will be assumed by the state. It is important for both the operator and the state entity to know under which conditions this transfer of responsibility can take place. Before committing large amounts of money potential investors and operators need to know the criteria for the transfer of responsibility after the end of injection. Without such certainty the required large-scale investments are unlikely to be made. With



this in mind prescribing a long post-closure period under operators' responsibility would be unlikely to be an incentive for potential investors in CCS projects.

**On the financial security and financial mechanism for the storage sites (Articles 19 and 20 of the CCS Directive) (Question E10)**

The Directive envisages a system of EU CO<sub>2</sub> pipelines and storage facilities that are developed by companies on a purely merchant basis. This model seems not to be relevant for the development of an industrial technology such as CCS with a complex infrastructure requiring phases like transport and storage to be planned well ahead of the needs. Moreover, it is important to bear in mind that, until CCS will reach an adequate level of maturity, there will be a considerable level of risks to be shared by both the party capturing the CO<sub>2</sub> and the party storing it. As such, mandatory Third Party Access would ensure their use by all potential market entrants (assuming surplus capacity). Such a regulatory scheme is unlikely to encourage the large scale investment required to build the necessary infrastructure. To ensure that the proposed regulatory framework does not create obstacles to the deployment of the CCS potential in the EU we propose introducing derogation to Third Party Access provisions, in line with the provisions already established by the second gas directive.