

EURELECTRIC Comments on the preparation of the regulatory framework and the European demonstration programme for Carbon Capture and Storage

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KEY MESSAGES

General

- The European electricity sector regards carbon capture and storage (CCS) as **a crucial means of tackling climate change** and is strongly committed to developing and rolling out the technology as soon as possible, assuming that the right demonstration and regulatory framework is put in place.
- The authorities and industry should take a proactive approach to **public acceptance**, e.g. through early engagement with NGOs and other opinion formers. Public confidence in the long-term integrity of storage is clearly a key area.

Demonstration plants and programme

- Demonstration is the **final stage before commercial operation** of a new technology and needs to be distinguished from R&D or pilot projects. A demonstration programme should focus primarily on large-scale power plants of several hundred MWe.
- Electricity generation with CCS is at present significantly more expensive than conventional fossil generation. Consequently, **specific incentives** must be provided for an interim period to ensure that demonstration plants are built.
- An incentive scheme should be targeted at **a number of first-mover projects** and should as far as possible avoid distortions to the wholesale electricity market. **Up-front investment support**, e.g. through capital grants, low-interest loans or tax incentives, has a number of advantages in this respect.
- A Flagship Programme will provide a positive signal for the development of CCS in Europe. Such a Programme should adopt **an inclusive approach** to projects and employ streamlined processes to avoid delay.
- Project selection should be based on transparent technical criteria, with competition between projects, while ensuring some diversity in terms of technologies, fuels and geographical siting.
- The European Commission and Member States should work together closely to **maximise the funding** available for CCS demonstration plants from both European and national sources. Possible auction revenues from EU-ETS may provide one source of funding.
- In parallel with the demonstration phase, extensive R&D efforts must continue prior to upscaling some CCS technologies and with a view particularly to reducing the energy penalty associated with CCS.

Deployment and commercial operation of CCS plant

- ❏ In the long term, the **CO₂ price signal** will be **the main means** of providing incentives for CCS. Consequently, for CCS to develop, it must be economic under the EU-ETS scheme, competing with other carbon abatement technologies.
- ❏ Care must be taken to avoid interventions in the EU ETS such as carbon price floors, price ceilings or special treatment for specific technologies, which would reduce the effectiveness of the scheme.
- ❏ National governments should show leadership in developing **transportation infrastructure** to ensure cost-effective solutions. Access to and utilisation of transportation and storage should be based on transparent and non-discriminatory criteria and prices should be regulated.

Regulatory framework

- ❏ An **enabling and long-term regulatory framework** is needed to allow CCS demonstration projects to proceed. Demonstration plants are likely to achieve less consistent performance than mature technologies, and so the regulatory regime should be evolutionary.
- ❏ The regulatory framework will need to recognise and cater for the **three separate and distinct elements** of the CCS chain (capture, transportation and storage). Each element is likely to require differing regulatory solutions.
- ❏ CCS should be recognised under the EU-ETS and should be integrated in a way that provides equity of treatment for CCS relative to other technologies.
- ❏ It is not appropriate to pre-empt the results of the demonstration phase by requiring CCS technology to be fitted from a certain date or by mandating **capture readiness**.

1. INTRODUCTION

Following on from a recent EURELECTRIC position statement¹, this paper intends to set out some more detailed electricity industry views on the enabling regulatory framework for carbon capture and storage (CCS) and the strategies for CCS deployment, including incentives for demonstration plants.

Europe faces major challenges in tackling climate change while ensuring reliable and competitive sources of energy supply. Fossil fuels currently provide the bulk of Europe's energy needs² and will remain indispensable for the coming decades. Consequently, if Europe is to move to a low-carbon future, it is essential that fossil fuels are not only used more efficiently but that the environmental impact of their use is mitigated, amongst other means, by deploying CCS technologies. At the same time, Europe's competitiveness must be safeguarded, bearing in mind that some Member States, notably some of the new Member States, are highly dependent on coal and have considerable energy-intensive industry.

Major developing economies such as China and India are dramatically increasing their use of fossil fuels, particularly coal. In this light, it is all the more important that Europe takes the lead in promoting a global approach and developing technologies that reduce carbon emissions from fossil fuel combustion. One way of promoting CCS technology transfer to developing countries is through the Flexible Mechanisms of the Kyoto Protocol, in particular the Clean Development Mechanism. The full benefits from CCS will only be reaped if the technologies are commercialised globally.

CCS technologies show considerable promise as a route for significant carbon abatement. However, at present, before experience has been gained from pilot and demonstration projects, fossil generation coupled with CCS is significantly more expensive than conventional techniques. Investment costs are much higher and the capture process imposes a considerable efficiency penalty – up to 25% reduction in electricity output (ten-percentage-point reduction in thermal efficiency), requiring much greater primary fuel use. Although some elements of the process have been demonstrated and are already used in other industrial processes, there is a need to integrate them and to upscale some of the technologies in order to fit them to large scale power generation. An extensive separate infrastructure for carbon transportation will be needed and the long-term viability of storage facilities will have to be further researched.

In the long term, the carbon price will be the main means of supporting the deployment of CCS when it becomes commercially viable. Given the uncertainties about the long-term trend in the carbon price, electricity companies may, at this stage, be reluctant to finance very large capital investments in these emerging technologies. Consequently, for an interim period, it will be necessary to establish specific incentives for the construction of CCS demonstration plants.

2. REGULATORY FRAMEWORK

EURELECTRIC welcomes the progress which has already been made in amending the relevant international Conventions and in exploring the necessary changes to EU legislation.




¹ EURELECTRIC Position Paper on Carbon Capture and Storage in a European Energy Policy, June 2007.

² Coal, oil and gas account for 79% of EU gross inland energy consumption and 54% of EU gross electricity generation. Source: EC

Given the contribution which CCS could make to meeting climate change objectives, the regulatory framework should be designed to enable rather than hinder its deployment. European and national legislation should cater for CO₂ storage, e.g. through exempting it from waste regulations.

Demonstration plants by their very nature are likely to achieve a less consistent performance than mature technologies and so the regulatory framework should be evolutionary.

Development of transport, injection and storage could be undertaken in various ways, e.g. as:

-  an initiative of the public authorities,
-  a public-private partnership,
-  a private initiative.

Independent of this structure, the long-term monitoring and liability for stored CO₂ should be transferred to the Member State after completion of the CO₂ injection phase. Because of the very long timescales proposed for CO₂ storage, it is not feasible for private companies to carry the liability for monitoring and storing CO₂ indefinitely. This is primarily a Member State issue, but the Commission should promote consistency across the European Union in order to comply with state aid legislation. Rules and procedures as well as the necessary financial arrangements for this transfer of liability should be worked out based on well-established models, such as those existing in the mining and hydrocarbon sectors.

Member States should ensure that they develop permitting procedures for capture, transportation and storage in a timely and consistent fashion. Compliance with such permits should provide a defence in the event of leakage and the resulting liabilities.

2.1 LICENSING OF CAPTURE PLANT

Licensing of capture plant is not a particularly problematic issue and can be handled via the current provisions of the IPPC Directive³. However, as mentioned in section 2.4 below, EURELECTRIC regards it as premature to develop a BAT standard for CCS or capture readiness. In addition, it should be ensured that all Member States have the necessary national licensing procedures in place: the European Commission could play a pivotal role in this.

It should be noted that demonstration projects, covering all the phases of capture, transport and storage, also provide the opportunity for authorities to establish appropriate regulatory frameworks. This aspect should be taken into account when licensing demonstration projects.

2.2 CO₂ TRANSPORT AND INFRASTRUCTURE ISSUES

Availability of and access to carbon transportation and storage infrastructure is key to the development of CCS. A new network of carbon transportation pipelines will have to be established. This will raise planning and public acceptance issues which require the proactive involvement of national governments.

It will often be more economic to share transportation infrastructure rather than design it for individual projects. Governments and regulators should show leadership in the development of such infrastructure and should agree on methodologies for sharing costs and ensuring third party access to CO₂ infrastructure. Carbon capture projects are likely to be tied, at least initially, to a single storage location. For this reason, EURELECTRIC takes the view that

³ Directive 96/61/EC concerning integrated pollution prevention and control

transportation and storage prices should be regulated, at least until a significant CO₂ transportation and storage infrastructure is developed

The European regulatory framework should also take into account that CO₂ may be transported by ship to storage sites. Lessons can be drawn from the arrangements developed for LNG.

2.3 STORAGE PERMITTING, LIABILITY AND PUBLIC ACCEPTANCE

Storage is a key issue for the development of CCS. Enhanced oil- and gas-recovery (EOR and EGR) projects in the North Sea may serve as a first step to enable storage, but it is clear that onshore options will be indispensable and also need to be developed. Accepting and permitting the use of saline aquifers and other storage options onshore is a major challenge. In relation to depleted oil and gas fields, clarity is required whether the right to turn such a field into a storage site remains with the previous user or can be transferred to another party.

Member State governments should make sure that permitting procedures are in place for storage facilities.

The storage operator must be responsible for the safety of the storage site and ensuring verification and monitoring during the injection phase. This responsibility should be taken over by the Member State when the site is “full” and closed, according to detailed rules and arrangements. The rules and procedures should be clarified.

Public acceptance for storage sites, particularly onshore, will be vital. Both policy-makers and the industry must engage in a broad, open and transparent debate with the public and non-governmental organisations.

2.4 MANDATORY REQUIREMENTS FOR CCS IN POWER PLANTS

In the long-term, CCS will be deployed if CO₂ market prices can be expected to cover the cost of capture, transport and storage of CO₂, and so it is inappropriate for the use of CCS technology to be mandated either for new or existing plants. EURELECTRIC therefore does not agree with suggestions to set a deadline, e.g. 2020, when CCS would be mandatory for new fossil-fired plant. Notwithstanding the potential of CCS, it is not certain that full commercial viability will be achieved by 2020. One of the very purposes of the demonstration phase is to indicate the timescales likely to be required for introducing CCS. Moreover, storage options may not be available throughout the EU on this timescale.

Restrictions on new fossil-fired plant could also have negative economic and environmental effects if CCS technology was late, with older, less efficient plant being kept in service longer than would otherwise be the case. Mandatory requirements also run counter to the principle of the European Emissions Trading Scheme (EU-ETS) that industrial players should be able to choose the least-cost abatement action, thus minimising the overall impact on the European economy’s competitiveness.

As regards the concept of capture readiness, EURELECTRIC believes that it does not make sense to impose capture design requirements at a time when the technologies are not fully developed. Uncertainty about the introduction and the potential impact of this obligation is likely to have a negative effect on power companies’ investment decisions. Given the huge requirement for new generating capacity in Europe in a relatively short time, this could lead to tightened supply margins with adverse impacts on security of supply.

The European electricity sector is committed to developing CCS as quickly as possible and ensuring a rapid roll-out of the technologies once commercially available and competitive. A prescriptive approach to “capture readiness” and/or mandatory deployment of CCS is not helpful for achieving this.

2.5 CCS IN EU-ETS

EURELECTRIC agrees that CCS should be recognised under the EU-ETS. CO₂ captured at the plant and verified as stored underground should be recognised as non-emitted. Generators should not therefore have to surrender allowances for this CO₂.

CCS should be integrated into EU-ETS in a way that maintains the principle that the Scheme is technology-neutral. In other words, CCS should compete on a level playing field with other forms of carbon abatement. It should be noted that equity of treatment between CCS and conventional fossil plants is particularly important to the development of CCS whatever the allocation methodology used.

As for Phase II of the current EU-ETS, because few installations are likely to come on line before 2012, EURELECTRIC can accept that the CCS chain is opted in as a whole. It must however be ensured that under Phase III it is possible to separate those projects / installations that were opted in this way under Phase II. This is due to the current understanding that most CCS projects will in the future involve several different actors along the chain. When different actors are involved, it is crucial that not all responsibilities and liabilities rest with the capture plant, but they are allocated at the proper place in the chain (e.g. transport and storage operators should surrender allowances for CO₂ leakage in their parts of the chain). Clarity should be provided on this issue as soon as possible.

3. DEMONSTRATION

3.1 DEMONSTRATION PROGRAMME

EURELECTRIC supports the establishment of a European demonstration (“Flagship”) programme to give the projects a common platform for knowledge exchange and better visibility on a global scale. Such a programme could also have considerable benefits in terms of promoting public acceptance of CCS.

EURELECTRIC considers that a demonstration programme should not be “exclusive”, i.e. cover a fixed number of selected projects, but should be an “inclusive” open programme, where a number of projects can be supported in line with transparent and non-discriminatory criteria. In EURELECTRIC’s view, the amount of funding available will be the main factor determining the number of CCS demonstration plants built, and consequently a restrictive selection procedure is not appropriate.

It is necessary to define the criteria for considering a project as a “demonstration plant” and to determine the rights and obligations of the operator. Demonstration is the last step before commercial deployment of the technology. A demonstration project should therefore be a full scale unit – probably several hundred MW_e.

Given the need for a rapid introduction of the technology, extensive R&D activities will need to be undertaken in parallel with the demonstration programme. Some smaller-scale pilot

projects could also be necessary prior to upscaling certain CCS technologies. A key prerequisite for developing CCS is to reduce the energy penalty arising from the capture process. A number of “intermediate” technologies, such as ultra-supercritical, PFBC and IGCC⁴ need further development if CCS is to become economically viable. It is crucial that advances in these technologies are not delayed by waiting for zero-emission processes.

Selection criteria

It is important that project selection is based on technical and economic factors, thus ensuring that the demonstration programme provides optimum value for money. The criteria for demonstration projects must be clearly defined to avoid confusion with other concepts, e.g. pilot projects.

Demonstration projects should compete for funding on the basis of transparent and non-discriminatory criteria. In principle, competitions should not be prescriptive in terms of which technology is used and cost-effectiveness should be the key criterion. Nevertheless, it is not yet clear whether pre-combustion, oxyfuel or post-combustion technologies will offer the best route to industrial-scale carbon capture. Consequently, there is merit in ensuring that a range of technologies and their combinations with different fuel options are further developed. A balance should also be maintained between technologies suitable for new-build and those for retrofit, as well as between geographical areas.

The CCS demonstration programme should be designed to demonstrate the operation of the full integrated CCS chain and to identify the costs of each element. This will provide an indication of likely costs to the European economy, allow companies to appraise future investments with greater certainty and promote public confidence in the safe operation of CCS facilities.

Most public funding for demonstration projects is likely to come from national governments, who will thus be the main decision-makers on the allocation of funds. Nevertheless EURELECTRIC would support a facilitating role for the European Commission in identifying technology gaps in the overall programme and in encouraging these gaps to be filled.

3.2 INCENTIVES

Rationale for funding

As explained earlier, financial support is essential for CCS demonstration plants. It is needed in order to address “first of a kind” technology, integration risks and to bridge the “uncertainty gap” until the necessary long-term carbon price signals for such developments appear. It is also important to achieve timely linking of EU-ETS to other relevant carbon markets.

Principles

An incentive scheme for CCS demonstration plants should be time-limited, in order to avoid introducing long-term distortions into the electricity market. The aim should be to develop competitive technologies as soon as possible, without locking Europe’s economy to long-term

⁴ Pressurised fluidised bed combustion and integrated gasification combined cycle, respectively

subsidy schemes to support uncompetitive technologies. Funding schemes must also be simple to facilitate their public acceptance.

Initial levels of funding should not be available to follow-up projects to avoid “first-mover disadvantage”. The financing level should be set case-by-case according to the special features of each plant based on objective and transparent criteria.

Incentive schemes should as far as possible avoid distortions of the wholesale electricity market. For instance, all CCS projects should pay their share of network access and balancing costs. Similarly, distortions of the EU Emissions Trading Scheme should be avoided – CCS should be integrated in a way that maintains the principle that the Scheme is technology neutral.

Type of support

EURELECTRIC supports the use of market-based mechanisms for rolling out new technologies. We support the basic principle of funding technology development, i.e. in the demonstration phase, rather than sustained funding of long-term deployment. The aim should be to develop competitive technologies as soon as possible, without locking Europe’s economy to long-term subsidy schemes to support uncompetitive technology.

In principle, additional funding for demonstration projects should compensate for the additional cost of capture technology in both capital/investment and operating expenses, thus ensuring that demonstration plants are not only built but also operated. Both types of cost should therefore be covered.








The primary focus should be placed on upfront support, i.e. investment / capital support rather than support of operation, as this would have the least impact on markets and would ensure concentration of funds for technological development. CCS projects will initially have higher operating costs than conventional fossil plant, notably because of the reduced energy efficiency and lower reliability levels, and these must also be taken into account. However, additional operating costs should increasingly be offset by the CO₂ price and by economies from improved performance.

Sources of funding

A major share of demonstration plant funding will come from industry. Various schemes by Member States will most likely represent the other main source of funding for CCS projects. The European Commission has an important role to play in applying the state aid rules in a way conducive to the development of CCS demonstration projects. EURELECTRIC welcomes the Commission’s recognition of the importance of CCS technologies in the draft guidelines for environmental state aids.

It can be expected that some support for CCS demonstration will be available via the Research Framework Programme. In addition to this, the European Commission should make efforts to encourage funding from European programmes such as the Structural Funds and to ensure that CCS is a priority area for European infrastructure lenders.

There are several financing sources and each Member State may decide on which one would be most appropriate in its particular situation. Different sources have been proposed in the recent discussions:

-  guaranteed minimum CO₂ price
-  fiscal incentives, such as tax breaks
-  feed-in tariffs
-  auction revenues
-  soft loans by EIB, etc.
-  financial incentives such as capital grants by Member States
-  etc.

EURELECTRIC favours market-based instruments and therefore does not think it appropriate to use instruments such as guaranteed minimum CO₂ price or feed-in tariffs, which would distort market functioning or competition. However, this will remain an issue for the Member States to decide.

If EU-ETS auction revenues become more substantial in Phases II and III, Member States should consider allocating some part of these revenues for financing CCS demonstration projects.

4. CCS DEPLOYMENT

The business case for CCS as a means of CO₂ mitigation will rely upon the value of emission reduction. This is determined by the carbon price in the EU ETS on the one hand, and by the cost of capturing, transporting and storing the CO₂ on the other hand. CCS will be used when the allowance price is high enough to cover the costs of the whole chain of capture, transport and storage of CO₂. It is important to emphasise that the electricity market price – integrating the carbon price – should remain the sole economic driver for CCS market deployment.

EURELECTRIC emphasises that care must be taken to avoid interventions such as carbon price floors, price ceilings or special treatment for specific technologies, which would reduce the effectiveness of the EU-ETS as a whole.

Since the CO₂-capturing power generator will probably not in most cases operate the whole CCS chain, commercial agreements will play a key role in determining the content, liability provisions, conditions, price and risk sharing of the CCS activities, including monitoring and reporting. It is therefore crucial that the regulatory framework caters for various parts of the CCS chain and that clarity concerning the rules is provided at the earliest possible stage.