ENTEC

Energy Transition Expertise Centre

Terms of Reference

EU regulation for the development of the market for CO_2 transport and storage

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EU regulation for the development of the market for CO₂ transport and storage

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Disclaimer

Content

1 Background and objectives

1.1 Original request from EC

*In order to develop the market for **CO_2 transport and storage**, DG ENER would need to look into **regulatory issues** including i. a. solutions on third-party access, tariff setting, infrastructure planning and regulatory oversight in general. Moreover, it would be good to analyse **business models** as regards transport and storage services, including knowledge into the 'market' prices of the different pieces of transport and storage infrastructure (this information will be useful for Connecting Europe Facility (CEF) evaluations, too).*

1.2 The current status of CCS sector in EU

The European Union's GHG reduction target of 55% by 2030, and the climate neutrality objective by 2050 enshrined in the European Climate Law will require the deployment of all low carbon technologies and solutions. All credible scenario modelling shows that Carbon Capture and Storage (CCS) will be needed to meet the goals set out in the Paris Agreement. In particular, CCS is one of the key options to address emissions in energy-intensive industries such as cement, iron and steel, and the chemical sector.

Given the above consideration, CCS technologies have been re-gaining momentum. For example, in four out of the seven awarded projects of the first call for large-scale projects under the Innovation Fund featured components of the carbon capture and utilisation value chain.[1]

CO_2 infrastructure development falls within the scope of the Trans-European Networks for Energy. Such that CO_2 infrastructure projects can be considered projects of common interest (PCIs) and subsequently be supported under the Connecting Europe Facility (CEF). The fifth PCI list published in November 2021, included six CO_2 trans-European infrastructure projects focused on supporting development of CO_2 hubs.[2] In line with these developments many European countries are developing infrastructure for CO_2 transport and storage. The most advanced are the Northern Lights project in Norway with construction work ongoing and the Porthos project in the Netherlands with a Final Investment Decision (FID) expected in 2022.

In order to support the development of a CCS market in Europe, a better understanding of business models that can underpin the expansion of this market and result in positive business cases for projects will be crucial. In addition, development of CO_2 infrastructure will need to be supported through appropriate regulation to provide direction and stability for the markets. This study will provide an analysis of options for a regulatory framework to support the infrastructure for CO_2 transport and storage in Europe as well as an analysis of market based options to support business cases for CO_2 transport and storage projects.

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[1] European Commission (2021) Carbon Capture Storage and Utilisation. Available at: https://energy.ec.europa.eu/topics/oil-gas-and-coal/carbon-capture-storage-and-utilisation_en#:~:text=to%20the%20atmosphere.-,Carbon%20capture%2C%20storage%20and%20utilisation%20in%20the%20EU,of%20the%20EU%20decarbonisation%20effort.

[2] Ibid.

1.3   Project objectives

Analyse options for a regulatory framework to support the infrastructure for CO_2 transport and storage and business models in Europe

The existing CO_2 transport networks and storage sites in Europe are still limited, but it is important to understand where, when and how these CO_2 networks will grow in the coming decade to link emitters to storage sites. The JRC has been asked to develop such an estimate to indicate where and when potential networks might develop. In parallel (and in cooperation with the JRC project), the Commission wants to understand which regulatory interventions are required to support these networks and how these networks will be organised/financed. Therefore, this project has four objectives:

1) Analyse regulatory options (and their limits) for CO_2 transport networks
2) Analyse regulatory options for CO_2 storage sites (beyond the current CCS Directive)
3) Analyse potential business models for the construction and operation of the CO_2 transport networks
4) Analyse the potential business models for the development and operation of the storage sites

Considerations

a) To meet all four objectives, the potential roles for the EU, Member States and the private sector must all be identified, well elaborated and justified, based on thorough analysis.
b) Requirements regarding third-party access, tariff setting, infrastructure planning and regulatory oversight in general must be reviewed on the basis of Art. 21 of the CCS Directive.
c) Lessons to be learned from other energy transport regulation must be included.
d) Information on the current way of establishment and the level of market price for both transport and storage infrastructure elements.
e) Business model and regulatory framework must be aligned.
f) In volume estimates, also some rough estimates on (possible) future Direct Air Capture (DAC) volumes will be included to make the results 'future-proof'.

1.4   Scope of covered topics

Time horizon

The time horizon for the regulatory framework should focus on developments up until 2030, as this is the date until when the EU and national policies are focused. However, the 2050 horizon should also be kept in mind, as the full development of a CO_2 market has to be in place by 2050. Thus, while the analysis will look at how markets could look like by 2030 and the regulatory elements needed to support the development of these markets, it will also include, where appropriate, a description of how the markets and regulatory elements in place by 2030 could evolve in the long-term and the possible implications for the market and regulatory landscape by 2050.

Covered regulatory issues

As a basis, the regulatory analysis should review elements from regulatory framework already applied for natural gas, hydrogen and electricity sectors to see how these can be mirrored in CO_2 applications, taking into account the already applicable rules under the ETS and CCS Directives. These can be divided into networks and market regulation. The main regulatory elements are:

Network regulation:

- Role of network/pipeline operators
- Network planning
- Third party access
- Tariffs and revenue regulation
- Vertical and horizontal unbundling
- Cross-border infrastructure development
- Permitting issues
- Network balancing
- Safety and CO_2 quality (including minimum CO_2 standards)

Market regulation:

- Market access
- Cross-border trade development
- Trade platforms and exchanges
- Definition of market product types
- Licensing for market participants
- Certification of CO_2
- Incentives for storage operators (non-financial)

Value chain coverage

Although the original request from the EC suggests that the focus should be on the transport and storage infrastructure, at least the **market analysis** part of the project (see Section 2 for the distribution of project tasks) will probably have to include a larger scope covering the whole value chain on the EU territory, in order to develop the representative business cases.

The **regulatory analysis** (analysis of regulatory options and policy design) can however omit the upstream part of CO_2 value chain, focusing on:

→ CO_2 transport in all transport modes (pipelines, shipping, railways etc.)
→ CO_2 storage (but not carbon use for other purposes)

Issues specific to CO_2 sector

There are some issues specific to CO_2 sector, requiring special regulatory treatment (not applied at all or in the same way as in gas or electricity sector):

CO_2 quality

While the CO_2 transport networks do require CO_2 with high purity, the current storage regulation requires less stringent CO_2 purity standards. Although the quality standards will be most probably developed by the industry itself, it should be investigated whether there is a role for the EU in coordinating/overseeing this effort.

CO_2 certification (& link to ETS)

In order to reinforce the link with EU ETS and national reporting (on emission reductions) under the Renewable Energy Directive, it should be ensured that the CO_2 transports and removals (through permanent storage) are properly accounted in the EU certification system. Especially, the monitoring of volumes and transfer points and possible losses need attention.

Long-term liability for CO_2 storage

The regulation for the liability of CO_2 storage providers is given in the current directive. However, in this study, we will analyse if this is still apt and in line with the current ideas of the business model for CCS.

2 Tasks and approach

The work will be divided in two main work streams – regulatory and market analysis.

The regulatory analysis will assess whether there is a need for regulatory intervention on the EU level, define the scope of the intervention and finally propose and assess the available policy options.

The market analysis will draw upon the work of the JRC study[3] on the future scenarios of CO_2 network development, and add further analysis to estimate the current costs of infrastructure investments and to develop the business cases for CO_2 transport network and CO_2 storage operation.

The tasks identified in the analysis are as follows:

1) Regulatory analysis (T1)

    a) Current situation – overview of existing regulation

        i) What are the policy goals for CO_2 networks?

    b) Lessons learned from EU regulation of network industries

        i) Review of approaches and best practice in regulating emerging network industries – in particular hydrogen sector, where the EU regulation precedes the development of the sector into maturity (as opposed to electricity and natural gas sectors, where the EU regulation was imposed on existing, well developed networks). Regulation of CO_2 networks in third countries (focus on UK, US, CAN, AU) can also serve to draw recommendations on best practices.

    c) Analysis of the need for regulatory intervention

        i) Are CO_2 transport networks or storage sites a natural monopoly?

        ii) Are there barriers to CO_2 market development? (for the business models defined in section 2.c.)[4]

        iii) Are there barriers to cross-border trade?

    d) Scoping the regulatory intervention

2) Market analysis (T2)

    a) Analysis of current situation

        i) Analysis of existing CCS value chains

            (1) Analysis to delineate the exact scope of the value chains for the areas specified thereafter (technical, financial and business models)

        ii) Technical analysis

            (1) Identification of technological gaps, missing standards, market readiness of required technologies

        iii) Financial analysis

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[3] Note that expected timeline for the JRC study is based on developing the methodology by December and work on the scenarios until May 2023. To be able to maximise synergies between the two studies and to take advantage of early JRC results, the market analysis in this study will be developed in the second stage of this project.

[4] Note: this aspect will need to be analysed after the business cases are defined and thus might need to be postponed for a couple of months to align with the timeline of the JRC study.

3) Estimating the investment costs for CCS infrastructures

    a) Analysis of the JRC report – scenarios of CO_2 sector development

        i) Defining the future development scenarios to be used for the development of business cases and for the regulatory analysis

    b) Definition of possible business models for CO_2 transport and storage

        i) Long-list of possible regulatory elements to be considered (TPA, tariffs, network planning, CO_2 quality, certification...)

        ii) Selection of relevant regulatory elements feeding into Task 1.c.

    c) Definition of policy options for selected regulatory elements
    d) Assessment of policy options
    e) Policy recommendations

3   Deliverables and reporting

For the purpose of this specific study, the following deliverables will be produced and meetings held.

For efficiency, we propose not to provide revised versions for the interim deliverables, and rather to address the Commission's comments individually in case further agreement is needed, or on the following deliverable otherwise.

Further meetings will be needed for each task in order to discuss specific issues – thus only the main project management meetings are indicated below.

Final results from the JRC study should be available in the first half of October to meet the deadlines and milestones from mid-October onwards.

Table 1:   List of Deliverables and submission dates

Delivera-ble/ meeting	Contents	Date (original)	Date (New)**	Outputs
M1	Kick-off for all tasks	August*	Sep 7	pptx
D1	Draft T1 outputs	Early October	Mid-October	
M2	Discussion of T1 draft outputs Discussion of T2 progress	Mid-October	End October	pptx
D2	Final T1 outputs Draft T2 outputs (excluding policy recommendations)	End October	Mid-November	docx
M3	Discussion of T1 and T2 draft out-puts	End October	Mid-November	pptx
D4	Draft report with revised version for all tasks	Late December	Early January	
M4	Final meeting	Early January 2023	End January 2023	pptx
D5	Final report	January 2023	Feb 2023	docx

*   Note that the project can officially start only after the final approval of the Terms of Reference (ToR) (i.e. this document) and a kick-off meeting with the Client. In the case that these two are delayed, the overall project timeline will have to be adjusted accordingly.

**   These dates might still be slightly modified to adjust for required inputs from the JRC based on their highly complementary study which will commence later than the EnTEC project. A meeting with the JRC will be scheduled in mid-Sep to agree on timelines and align the work between these two projects.

4   Work organisation

Table 2:   Lead, contribution, start and completion date per task

Deliverables	Start	Completion
Project coordination	August 2022* September 2022	January 2023 February 2023
Task 1: Regulatory analysis	September 2022	End of October 2022 Mid-November 2022 (final)
Task 2: Market analysis	October 2022	End of January 2023 February 2023 (final)

*   Same remark about project timeline applies as above. Dates in green are the updated dates, based on actual KoM date and maximising.

5 Resources

Table 3: **The following table shows the planned resources by task**

Task/Resource	Resource needs in days	Share of total resources in percent
Project coordination	15	10%
Task 1: Regulatory analysis	60	45%
Task 2: Market analysis	60	45%
Total	**135**	**100%**

6   List of tables