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The current status of CCS regulation in Germany and Europe

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Initial situation

Since 2012, CO_2 storage in Germany has only been permitted for strictly limited research purposes; CO_2 transport across national borders is not permitted. Germany has thus transposed EU Directive 2009/31/EC on the geological storage of CO_2 into national law.
The background to the restrictive implementation was the political fears of the Greens that CCS technology could undermine the phase-out of coal-fired power generation. As a result, ongoing research work and demonstration projects on CCS were discontinued (e.g. Vattenfall CCS plant at the Schwarze Pumpe coal-fired power plant; planned CCS plant at the RWE lignite-fired power plant in Hürth), and only very few small research and pilot projects were continued in Germany (e.g. pilot CO_2 scrubbing plant at the RWE lignite-fired power plant in Niederaussem).

While the development of CCS projects continued in other EU countries, the USA, Canada and China, it was not until the end of 2022 that studies were published in Germany (including by research institutions close to the Greens, such as the Wuppertal Institute) pointing to the indispensability of CCS for achieving the climate targets in Germany (and NRW). In 2023, the EU also officially declared that the climate targets could not be achieved without CCS and in 2024 an EU target for CCS of 50 million tons of captured and stored CO2 per year by 2030. In spring 2024, the BMWK presented a key issues paper for a national "Carbon Management Strategy", which was adopted by the German government in May 2024.

Despite the end of the traffic light coalition, the draft of the "Carbon Dioxide Management Strategy" Act (KMS) was passed by the cabinet in Nov 2024, but was no longer tabled in the Bundestag due to reservations on the part of the Green and SPD parliamentary groups

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(The CDU had signaled its approval and the law could have been passed in Dec/Jan 2025). By not adopting KMS and the amendment to the
"Carbon Dioxide Storage and Transportation Act" (KSpTG), further time was lost. At the same time, the necessary amendment to the KSpTG and ratification of the "Addendum to the London Protocol" (regulating the transportation of CO2 across national borders) were being prepared.

The EU is also working on further developing its strategy for the capture and storage of CO_2 in order to achieve its climate targets, including the adoption of the **Industrial Carbon Management Strategy** by the European Commission on February 6, 2024.

Key points of the industrial carbon management strategy

- **Establishment of a platform to bundle CO_2 demand:** The EU plans to develop a platform that bundles demand for CO_2 transport and storage services. This should help to create an integrated market for CO_2 and promote investment in CCUS technologies.
- **Investment atlas for CO_2 storage sites:** A planned investment atlas is intended to identify potential CO_2 storage sites in Europe and make them transparent. This will make it easier for investors to make decisions and support the development of a functioning CO_2 market. The strategy aims to establish a uniform market for CO_2 in Europe in order to promote investment in technologies for CO_2 capture, use and storage.
- **Financial support from the Innovation Fund:** The European Commission provides funding from the Innovation Fund to support CCUS projects. In October 2024, grants amounting to 4.8 billion euros were awarded to 85 climate and energy projects in 18 countries, including 16 projects in the field of carbon capture and storage.
- **Development of sectoral roadmaps**: By creating specific roadmaps for different industries, clear guidelines and targets for the implementation of CO_2 management technologies are to be defined. A clear regulatory framework should create an attractive environment for investments in industrial CO_2 management technologies.
- **Guidelines for approval procedures:** The EU is developing guidelines to standardize and accelerate approval procedures for CO_2 storage projects. This should facilitate the implementation of CCS projects and reduce administrative hurdles.
- **Promotion of CO_2 transport and storage infrastructure:** Targeted investment in the infrastructure for CO_2 transport and storage is intended to create a comprehensive network that enables the implementation of CCS projects throughout the EU.
- **Support for CCS projects:** The strategy identifies measures at EU and national level to facilitate the implementation of CCS projects and build a comprehensive CO_2 storage infrastructure.
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In addition to the strategy, the guideline documents on geological CO_2 storage were updated in July 2024 in order to optimize approval procedures and support sustainable CO_2 storage solutions in the European Economic Area. An EU target of 250 million t/a for CO2 storage via CCS is envisaged for 2040.

Key contents of the draft "CO2 Management Strategy" Act ("KMS")

The KMS CCUS a supplementary role as part of the national pathway to achieving the climate targets ("net zero"), which essentially sees the application of CCUS for "hard-to-abate" sectors (cement, lime, waste incineration, etc.). These represent the priority sector of a five-stage gradation (sector scoring) of possible CCUS applications: Political
CCUS would therefore be "desirable" in cement, lime, waste incineration plants, chemicals and steam crackers. It would be tolerated, but not promoted, in iron production (DRI with natural gas), in the glass industry or for the production of blue hydrogen; politically, it is viewed critically in the paper, aluminum, blast furnace and power generation sectors. In the electricity sector, the expansion of renewable sources should have absolute priority, with CCS being more of an exception in certain areas: Thus, a connection for CHP power plants, industrial power plants, and gas-fired power plants (each without public funding) to the national CO2 core network is possible, but a connection of coal-fired power plants is prohibited. CO2 storage is primarily planned abroad (Norwegian North Sea), as well as offshore in the German North Sea (Germany's exclusive economic zone); there is also an "opt-in" rule for federal states, which could then also allow $_{CO2\ storage}$ "onshore".

The comprehensive draft law leaves a number of questions unanswered, including

- How a "CCUS business model" possible without funding? (Currently, some individual CCS projects can be funded via the EU Innovation Fund, IPCEI etc., which serves especially technology testing)
- How should the CO2 core network be dimensioned - this requires clarity, e.g. on the use of CCS in new gas-fired power plants (necessary for the capacity market as part of the power plant strategy)

Status of the prepared amendment to the "CO2 Storage and Transportation Act" (KSpTG)

The adaptation of the KSpTG is necessary for the development of a $_{CO2\ transport\ core\ network}$ and for $_{CO2}$ storage in Germany. Initial drafts for a $_{CO2\ core\ network}$ as part of a north-west European $_{CO2\ core\ network}$ are available (e.g. from OGE: approx. 4,500 km, costs € 9-14 billion). Ideally, the KSpTG would also clarify the issue of financing the $_{CO2}$ core network (the model could be private financing via the so-called amortization account concept of the hydrogen core network for Germany, which transport charges to be smoothed over time). If the KSpTG is passed in 2025, including clarification of the financing, the first $_{CO2\ core\ network\ sections}$ could go into operation > 2032 at the earliest, a NW-European core network around > 2035. However, this would require the classification of the $_{CO2\ infrastructure}$ as being in the
"overriding public interest", which is not yet provided for in the current KMS draft law and is regarded by all stakeholders as essential for rapid approval procedures.

However, other questions are likely to remain unanswered:

- If the CO2 $_{network}$ and storage is regulated: like natural gas/hydrogen - this would make sense.
- Uniform European specifications for $_{CO2\ transportation}$ - the EU gas industry is working on this ("C 260"), but the draft is not expected before mid-2026.

Requirements with regard to the London Protocol

The London Protocol is an international agreement to protect the marine environment from pollution caused by the dumping of waste and other substances. Originally, Article 6 of the Protocol prohibited the transboundary transportation of waste for dumping at sea. In 2009, however, an amendment was adopted that allows the transboundary transportation of CO_2 for geological storage under the seabed. For this amendment to enter into force, it must be ratified by at least two thirds of the Parties.

However, as of November 2024, only a few states have ratified this amendment, meaning that it not yet entered into force. In order to nevertheless enable cross-border CO_2 transport, contracting parties can provisionally apply the amendment by concluding corresponding bilateral or multilateral agreements and notifying the International Maritime Organization (IMO). Some countries, such as Norway, Denmark and the Netherlands, have already taken this route.

For Germany, this means that the German government must ratify the amendment to Article 6 of the London Protocol to enable the export of CO_2 for geological storage abroad. In November 2024, the Federal Cabinet passed a treaty law that creates the basis for this ratification. However, as the entry into force of the international rule change may still some time, the German government plans to apply the change provisionally. This requires the adaptation of national laws, such as the aforementioned Carbon Dioxide Storage Act (KSpG), in order to create the legal framework for cross-border CO_2 transportation and storage.

In addition, bilateral agreements with potential recipient countries are required to clearly regulate the responsibilities and licensing responsibilities for CO_2 transport and storage. These agreements ensure that both exporting and importing countries comply with the high environmental standards of the London Protocol.

In summary, Germany must take the following steps to ratify the amendment to the London Protocol and enable cross-border CO_2 transport:

- Ratification of the Protocol amendment: The Bundestag must ratify the amendment to Article 6 of the London Protocol adopted in 2009.
- Provisional application: Until the amendment enters into force, Germany may declare provisional application and notify the IMO accordingly.
- Conclusion of bilateral agreements: Agreements should be made with potential recipient countries that regulate responsibilities and approval processes.

With these measures, Germany can pave the way for cross-border CO_2 transportation for geological storage and thus take a further step towards climate neutrality.

Results of the Clean Energy Forum event on CCS on January 31, 2025

At this discussion event in Berlin, one of the issues discussed was whether it would be better for a new government to adopt the traffic light KMS draft law or to revise it first - particularly with regard to more areas of application. The majority of the stakeholders present advocated the adoption of the traffic light CMS draft law as part of a 100-day program of the new government (instead of a time-consuming amendment, which could then only come into force in 2026), but including a revision.
Inclusion of "overriding public interest" for CO2 grid & storage.

The KMS Act adopted in 2025 could then be amended in 2026/27 following the adoption of any outstanding, possibly more far-reaching EU regulations as part of a revision.

The adoption of the KSpTG, the ratification of the addendum to the London Protocol and the clarification of the financing of the CO2 core network should also be driven forward in 2025.

Rating

Germany has lost a valuable 15 years from around 2010 to 2025 to further engage in the development and commercialization of CCUS technology and will now need the help of neighboring countries to catch up again. Without the adoption of the 3 key regulatory points (KMS, KSpTG, addendum to the London Protocol), there will be no significant decisions in the economy for conceived CCUS projects. Extended funding opportunities will also play a key role in FID decisions for the first major CCUS projects. The adoption of the three regulatory requirements for CCUS by mid-2025 would also be crucial with regard to the tendering of urgently needed new power plant capacities (15-20 GW required by 2030), which is now expected to take place in early 2026. The players in the CCUS value chain at home and abroad will only be able to become active with clear framework conditions, including clarity about possible CCUS application areas for CCUS:

(a) Prepared projects from lime and cement manufacturers and waste incineration plants can be developed
(b) The chemical industry could plan CCU in its own manufacturing processes and the use of CO2 from CCS in other sectors
(c) Providers of dispatchable electricity generation capacity can use the technical option "gas-fired power plants with CCS" with a reasonable degree of planning certainty and offer them as part of capacity market auctions. This would be a much more favorable option for dispatchable capacities for power plants with utilization > 3000 FLH/a compared to the use of green hydrogen, and could thus make a decisive contribution to curbing the expected increase in electricity system costs in Germany.
(d) Companies with large process heat requirements at a high temperature level: with natural gas+ CCS, they would have an alternative to switching to green hydrogen, which is currently and foreseeably prohibitively expensive.
(e) Natural gas with CCS can also be a much more cost-effective option for parts of steel production than DRI with hydrogen.

From GES's point of view, a broad application of CCS for larger CO2 point sources in various sectors and the creation of "CCS clusters" would ensure that costs are minimized through economies of scale. For example, the first cross-industry

demonstration projects in the UK. Accordingly, the legal framework for CCS must also be created quickly in Germany, ideally as part of a "100-day program" of the new government.