



Key principles of the Federal Government for a Carbon Management Strategy

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Germany aims to become one of the first major climate-neutral industrialised countries by 2045. The Federal Government has made considerable efforts in the last two years to this end, for example on the expansion of renewable energy, the decarbonisation of industry, the ramp-up of the hydrogen economy, the roll-out of e-mobility, the strengthening of emissions trading, the acceleration of planning and approvals, and the heat transition in the buildings sector. The overarching goal is the avoidance of emissions. Decarbonisation is and will remain at the heart of climate action, i.e. the phase-out not just of coal, but of fossil energy in general.

From today's perspective, it is clear that carbon capture and storage (CCS) and carbon capture and utilisation (CCU) must play a part on the path to climate neutrality. The reason for this is that emissions in certain fields are difficult or impossible to abate. In its latest report the IPCC also assumes that, alongside other reduction measures, CCS/CCU is a necessary climate technology in hard-to-abate emission-intensive sectors if the 1.5 degree temperature rise is not to be exceeded. The Federal Government will therefore make it possible to use these technologies in Germany. The vast majority of scientific studies into greenhouse gas neutrality which were assessed for the Federal Government's last evaluation report on the Carbon Dioxide Storage Act (report of 22 December 2022, Bundestag printed paper 20/5145) arrive at the conclusion that, from as early as 2030, it will be necessary to capture and store or utilise relevant volumes of CO₂ if climate neutrality is to be achieved by 2045. This is particularly true of those industries – but not just of those industries – whose emissions are hard to abate and which are encountering increasing cost pressure due to the rise in the price of the European emissions trading allowances, such as the cement and lime industry, parts of the basic chemicals industry, and waste incineration. These sectors need prospects for climate-neutral business activity and a good future as part of the German economy.

For this reason, the Federal Government will lay down the foundations for the use of these technologies and the transport and storage of CO₂ in a Carbon Management Strategy. Following a broad-based stakeholder dialogue with representatives of civil society, academia and commerce, the Federal Government has agreed on the key principles for a Carbon Management Strategy set out below, and these will be further fleshed out in the coming weeks.

At international level, the ramp-up of CCS/CCU technology is proceeding apace. In Europe, Denmark, Norway, the Netherlands, Iceland, Italy, France, Croatia, Poland, Romania and the United Kingdom are operating or planning to operate geological storage capacities; the United States is promoting the use of CCS/CCU technologies via the Inflation Reduction Act. The European Commission is also driving the pan-European use of the technology, e.g. via the Net Zero Industry Act and the Industrial Carbon Management Strategy published on 6 February 2024.

The Federal Government is putting the following conditions in place for the next steps in the drafting of the Carbon Management Strategy:

- The current barriers blocking the use of CCS/CCU in Germany will be removed for the afore-mentioned reasons.
- The ramp-up of CCS/CCU must be in harmony with the greenhouse gas reduction targets set by the Federal Climate Change Act and the attainment of climate neutrality in 2045. The Federal Government is calling for an ambitious implementation of the European Methane Regulation, including the examination of future pricing for upstream chain emissions of fossil fuels placed on the EU market (methane slip).
- In order to avoid GHG emissions from electricity generation, the Federal Government is banking on the accelerated expansion of renewable energy and, on top of this, on the capacity mechanism described in the Power Plant Strategy and in advance of that, the new-build of gas-fired power stations which will be switched to hydrogen. For power generation facilities using gaseous fuels or biomass, the application of CCS/CCU will also be made possible with a view to a technology-neutral transition to a climate-neutral electricity system, but at least in the case of fossil fuels will not be given public funding. The coal phase-out will take place; for emissions from the coal-fired generation of electricity, access to CO₂ pipelines will not be enabled.
- Public funding for CCS/CCU will be focused on hard- or impossible-to-abate emissions.
- In order to be able to make a start on the construction of privately run CO₂ pipelines within a state regulatory framework, the Carbon Storage Act will be swiftly updated in line with the Federal Government's proposals in the evaluation report from the end of 2022, and areas of legal uncertainty in the application of the act will be remedied.
- Germany will ratify the amendment to the London Protocol to make CO₂ exports possible for the purpose of offshore storage, and will make the necessary amendments to the High Seas Dumping Act.
- Legislation will be passed to permit the investigation of offshore storage sites in Germany's exclusive economic zone (EEZ) and on its continental shelf. If a site is demonstrably suitable, taking safety standards and ecological criteria into account, corresponding storage facilities can be developed for industrial use. In order to comply with the special protection afforded to marine protected areas, no injection of CO₂ in marine protected areas will be permitted.

- The permanent storage of CO₂ in the geological underground on German (onshore) territory will still not be permitted. If the Länder request this, the Federation could establish a legal basis in the Carbon Storage Act which permits an opt-in by individual Länder to store CO₂ onshore.

The Carbon Management Strategy must be distinguished from the Long-term Strategy on Negative Emissions, which will cover the “unavoidable residual emissions” cited in the coalition agreement and their offsetting by negative emissions. For this purpose, the Long-term Strategy will consider not only measures of natural climate change mitigation, but also technologies like Direct Air Capture and Storage (DACCS) and Bioenergy and Carbon Capture and Storage (BECCS). However, the two strategies do have overlaps, particularly regarding the necessary CO₂ infrastructure and CO₂ storage, which is also a precondition for DACCS and BECCS. BECCS, in combination with the limited potential of sustainably available biomass, is also addressed in the National Biomass Strategy, which is currently being drawn up.

We now move on to the planned content of the Carbon Management Strategy in detail:

1. Fields of application for CCS/CCU

The deployment of CCS/CCU is part of a combination of instruments and technologies for comprehensive decarbonisation, particularly in industry and the waste management sector. In the case of certain process emissions, the deployment of CCS/CCU is indispensable for the attainment of climate neutrality. For example, given today’s technologies, the processes needed for the production of lime and cement inevitably entail the release of CO₂. Without CCS/CCU, carbon neutrality of the cement and lime sector in particular will not be realistically attainable, even assuming ambitious use of the circular economy, recycling and alternative construction materials. At the same time, it is vital to retain lime and cement production in Germany and thus to safeguard industrial jobs and value creation. This means that lime and cement production must become climate-neutral, and the deployment of CCS/CCU opens up corresponding possibilities for this.

In the case of thermal waste treatment, as well, emissions are produced which cannot be avoided – as of today, we do not have any alternative utilisation process for waste which could avoid these emissions. This means that, if the waste management sector is to be climate-neutral whilst maintaining high standards of waste separation and recycling, and whilst achieving waste avoidance targets, the use of CCS/CCU will be a fundamental component in the attainment of climate neutrality. At the same time, CCS/CCU can also be used in other industrial processes, as long as the switch to electrification or hydrogen will foreseeably not be possible on a cost-efficient basis.

In the field of electricity production, the Federal Government is primarily relying on the expansion of renewable energy. This is to cover 80% of electricity consumption by 2030. In the case of coal-fired electricity generation, the national Coal Consensus has set the course for the phase-out of coal. The deployment of CCS and CCU is not to be made possible here. The Carbon Storage Act will be adapted to state that emissions from coal-fired power generation installations may

not be transported via CO₂ pipeline networks. In the interest of technology neutrality, the deployment of CCS/CCU is to be made possible for generation facilities using gaseous fuels, and for the use of biomass (BECCS).

Further to this, the Federal Government is drawing up a concept for a market-based, technology-neutral capacity mechanism, which is to be operative in 2028 and into which, alongside other reliably available capacity, the power stations incentivised by the Power Plant Strategy are also to be integrated. In advance of this, auctions are to be held in the near future for part of the additionally necessary power plant capacity in the context of the Power Plant Strategy, with this capacity being covered by gas-fired power stations which will be converted to hydrogen from a switch-over date between 2035 and 2040 which will be decided in 2032.

2. Public funding for CCS/CCU

EU emissions trading (EU ETS) already provides incentives for the deployment of CCS/CCU. The possibility to include CCS in the EU ETS creates a direct economic incentive for CCS when the carbon price is higher than the costs of CCS. At the same time, the entire CCS chain is subject to the provisions of the EU ETS Monitoring Regulation. The recent reform of the EU ETS also regulates the inclusion of CCU, alongside CCS, in emissions trading, and removes practical barriers to the establishment of transport infrastructure. As a result, irrespective of the mode of transport, allowances no longer have to be surrendered for CCS. This is an important precondition for the economic viability of CCS. In the case of CCU, the requirement to surrender allowances is also dropped where CO₂ is permanently absorbed in products.

However, according to current analyses, it cannot be assumed that the carbon price alone will be able to offset the cost of CCS/CCU technologies in the short to medium term in comparison with conventional, emission-intensive production of basic materials such as cement and lime, but also of some basic chemicals, so that public funding for the ramp up of the technology will continue to be needed. For this reason, public funding for CCS/CCU – where it proves necessary – will be focused on hard- or impossible-to-abate emissions in industry and the waste management sector. The funding priorities are to be identified in the Carbon Management Strategy. No public funding will be available for the deployment of CCS/CCU at power stations using fossil fuels.

The draft of the “funding guideline for federal funding for industry and climate action” (FRL BIK) envisages the introduction of a funding module for CCS/CCU. This module is to be able to provide funding towards projects of industry and the waste management sector for the use or development of CCS and CCU as long as these are sectors, as defined by the Carbon Management Strategy, in which hard- or impossible-to-abate carbon emissions arise. This covers both investment and innovation, research and development projects, and installations to realise negative emissions.

Carbon contracts for difference are contracts between companies and the state which hedge companies against price risks (e.g. for H₂ or CO₂), and offset their extra costs incurred by switching to climate-friendly production. The current version of the funding guideline provides that

in future – i.e. as soon as the regulatory framework permits – installations which process emissions which cannot otherwise be avoided, in which the GHG reductions are largely achieved by CCS/CCU, can be defined as eligible for funding under certain preconditions.

3. Ensuring climate neutrality in 2045

Given today's technologies, CCS is not a fully climate-neutral technology due to the less than 100% CO₂ capture rates. The ramp-up of CCS/CCU must be in harmony with the greenhouse gas reduction targets set by the Federal Climate Change Act and the attainment of climate neutrality in 2045. The reduction in the availability of allowances in EU emissions trading will in any case mean that, probably well before 2045, residual CO₂ emissions from CCS facilities will only be possible to a limited extent and will have to be offset by negative emissions. As laid down in the coalition agreement, the Federal Government will, in dialogue with companies, seek solutions as to how operating licences can be issued for fossil fuel energy infrastructure (power plants or gas pipelines) in a way which ensures, with legal certainty, that they can only continue to operate beyond 2045 using non-fossil fuels, without this triggering a halt to investment, stranded investments and compensation claims.

As long as natural gas is still being consumed in Germany, it will also be necessary to reduce to a minimum the extremely climate-damaging methane emissions which take place around the world in the course of extraction and transport. The Federal Government is therefore calling for an ambitious implementation of the European Methane Regulation, including the examination of future pricing for upstream chain emissions of fossil fuels placed on the EU market (methane slip).

4. Transport infrastructure for CO₂

The ramp-up of CCS/CCU technology, the transport of significant volumes of CO₂ and a joint use of the technology across Europe is likely to necessitate a pipeline infrastructure which is operated by the private sector. Also, the availability of CO₂ pipeline infrastructure is a prerequisite for closer European cooperation in the field of carbon management. This is because, whilst CO₂ can already be captured and transported by rail, ship and truck, pipelines are the cheapest option for the transport of significant volumes of CO₂. Under current legislation, planning approval procedures for pipeline projects in Germany fail due to a lack of references in and to obsolete references by the Carbon Storage Act to the Energy Industry Act and due to various other areas of legal uncertainty, so that it is not currently possible to realise joint European pipeline projects. For this reason, the Federal Government intends to revise the legal framework accordingly. There is great pressure to adjust the legal framework for a CO₂ pipeline network. For example, the potential operators of the core hydrogen network overlap with those interested in building the CO₂ pipeline network. But at the same time there are differences: in particular, a CO₂ pipeline network will involve far fewer pipelines than is the case with the core hydrogen network. Expedited planning and approval procedures will be provided for the rededication of existing gas pipelines and the building of a new CO₂ pipeline network.

Furthermore, it can be necessary to build a connection to a storage facility in another EU country, e.g. because Germany will not have suitable CO₂ storage facilities available in the foreseeable future. In order to make this possible, Germany will ratify a corresponding amendment to the London Protocol and undertake the necessary changes to national legislation for the purpose of CO₂ exports to offshore CO₂ storage facilities.

5. CO₂ storage

The Federal Government is resolved to make offshore storage possible. There are several reasons for this. Firstly, the safety of geological CO₂ storage has been sufficiently demonstrated. For example, approx. 1 million tonnes of CO₂ has been injected into the Sleipner project in the Norwegian North Sea each year since 1996. Secondly, where storage takes place in the German exclusive economic zone, the high German environmental and marine protection standards will apply, and the costs of storage will be lower where facilities are located closer to the German coast.

In this way, Germany is taking on responsibility for the CO₂ generated here, whilst also making itself more independent of access to the storage capacities of its European neighbours. By developing its own storage capacities, Germany will also live up to its responsibility as the EU's largest emitter of CO₂, and thus as the greatest beneficiary of European storage sites.

The Industrial Carbon Management Strategy and the Net Zero Industry Act presented by the European Commission also serve the coordinated EU-wide establishment of CO₂ storage facilities. The Federal Government supports this approach and welcomes the use of European cooperation and synergies in the storage of CO₂. This is all the more the case as some storage projects of Germany's neighbours are already relatively far advanced, and will be available for industrial use at an earlier juncture than any German facilities. It is therefore vital to ensure swift connection of Germany to these projects.

However, in line with the "polluter-pays" principle, it is also important to make storage possible in Germany. Germany has considerable potential offshore storage capacity for CO₂ in the exclusive economic zone and on the continental shelf. However, current legislation has prevented detailed exploration and investigation.

The Carbon Storage Act will therefore be revised to permit potential storage capacity in the German EEZ to be investigated, and to be developed if sites are found to be suitable. To this end, areas of legal uncertainty regarding the approval of exploration of suitable rock strata are to be remedied.

In addition to economic criteria, ecological criteria are also to be considered in the examination of the suitability of sites. Potential environmental impacts must be minimised. High safety standards for CCS and a comprehensive monitoring system for potential leakages must be in place. In order to comply with the special protection afforded to marine protected areas, no injection of CO₂ in marine protected areas will be permitted. There must always be an environmental impact assessment. In view of the large number of competing uses of space, e.g. use for offshore wind

energy, CCS must be integrated into comprehensive spatial marine planning. To this end, CCS infrastructure and CO₂ storage facilities must be integrated into the future spatial planning of the EEZ.

The permanent storage of CO₂ in the geological underground on German (onshore) territory will still not be permitted. However, the research project in Ketzin (Brandenburg) has shown on a demonstration scale that onshore storage can be “realised safely and reliably without any danger to people and the environment”, according to the Potsdam-based German Research Centre for Geosciences. Against this background, where the Länder request this in the course of the coordination of the legislation, the Federation could establish a legal basis in the Carbon Storage Act which permits an opt-in by individual Länder to store CO₂ onshore.