D6.6: Revised Analysis of Policy Alignment

An update on changes between 2022 and 2025 for the EU, six Member States and the UK

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2. Executive summary

Due to the relative high degree of innovativeness, the realization of a Carbon Capture and Usage (CCU) or a Carbon Capture and Storage (CCS) project requires a positive strategic, legislative and financial supporting framework from policy. The political strategy to aim for ambitious climate targets is a pre-condition for the application of CCU and CCS technologies in a Member State. Legislation regulates the operation of capture, transport and storage sites. A well-defined framework is highly relevant for operators to know the risks and potential costs related to a project, to know their own responsibilities and responsibilities of others, expectations by the competent authorities and making clear the roles of all participants in the whole project. Furthermore, such a framework is useful to citizens who wish to assess the regulatory steps and timelines and understand their own opportunities for input. As well, such a framework helps the authorities to take adequate decisions in granting procedures in decent time. Financial support is needed as long as the current CO_2 price itself is not sufficient to make the application of CCU or CCS technologies economically viable. Although it is to be expected that costs for CCU and CCS activities will fall over time when it moves from being a very innovative first-of-a-kind application to a more mainstream technology, in particular the first-of-a-kind applications require specific support to cover for high costs under high risks. At the same time, a strong CO_2 price in the European Emissions Trading System (EU ETS) (in February 2022 prices reached levels as high as 90€/t CO_2, more recently prices in 2025 vary between 60 and 85 €/t CO_2 with a slight upward trend) along with the expectation that CO_2 prices will remain high in the future, and a clear signal that there will be a market for low-CO_2-products present strong financial incentives to invest into CCU and CCS projects.

In the present report, the political, legislative and financial support system for CCU, but mainly for CCS activities on the EU-level along with seven Member States and the UK are analysed, with attention to updates that may have taken place since the first edition of this deliverable was issued in 2022. The countries studied comprise the PilotSTRATEGY countries (Portugal, Spain, France, Poland and Greece) and in addition the Netherlands as a Member State and the UK, both as countries more advanced on developing frameworks for CCS. The report highlights the role of EU legislation in the context of development of CCS projects in the Member States. In addition, it analyses the transposition of EU legislation into national law and provides information on further national legislation or support instruments relevant in the context. It shows that while countries such as the UK and the Netherlands have put a strong political focus on the development of CCS clusters, other Member States so far can mainly refer to what has been developed on the EU level, making it clear that developing own CCS or CCU projects within the country require significant additional efforts on the legislative framework. Clear political signals along with additional national support instruments can help the development of project initiatives.

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3. Introduction

Due to the relative high degree of innovativeness, the realization of a Carbon Capture and Usage (CCU) or a Carbon Capture and Storage (CCS) project requires a positive strategic, legislative and financial supporting framework from policy (the role of public acceptance, also a key element in the realization of CCU or CCS projects will be discussed in the further actions[1] of PilotSTRATEGY project). The political strategy to aim for ambitious climate targets is a pre-condition for the application of CCU and CCS technologies in a Member State. Legislation regulates the operation of capture, transport and storage sites. A well-defined framework is highly relevant for operators to know the risks and potential costs related to a project, to know the own responsibilities and responsibilities of others, expectations by the competent authorities and making clear the roles of all participants in the whole project. It helps the authorities to take adequate decisions in granting procedures in decent time. Financial support is needed as long as the current CO_2 price itself is not sufficient to make the application of CCU or CCS technologies economically viable. Although it is to be expected that costs for CCU and CCS activities will fall over time when it moves from being a very innovative first-of-a-kind application to a more mainstream technology, in particular the first-of-a-kind applications require specific support to cover for high costs under high risks. At the same time, a strong CO_2 price in the European Emissions Trading System (EU ETS) (in February 2022 prices reached levels as high as 90€/t CO_2 and more) along with the expectation that CO_2 prices will remain high in the future and a clear signal that there will be a market for low-CO_2-products present strong financial incentives to invest into CCU and CCS projects.

In EU Member States typically political and regulatory provisions from the EU level mix with national views and regulations and sometimes even regional ones. Hence, EU-level targets and laws, regulations and directives and support instruments and the national implementations of those directives along with national policies provide the relevant framework for developing a CCU or CCS project in a Member State. In the following sections, we first present and discuss the framework the EU provides before looking into the frameworks on the national level for the countries France, Greece, Poland, Portugal and Spain. These are the countries where regions are explored for CO_2-storage within the project. In addition, we present the framework conditions in the Netherlands and the UK as examples of countries where a relatively high activity level can currently be seen in the development of new CCU and CCS project activities to have running CCU and CCS facilities by the mid of the decade.

The analysis looks into the three main policy areas relevant for the development of a CCU or CCS project: we start with an analysis of the political strategy to reach net-zero (which can be seen as a precondition for the commitment to develop CCUS projects) and the role that CCU and CCS plays in the available policy documents (in particular the long-term strategies and related scenarios). The second pillar of the analysis looks into the regulatory framework for allowing for the use of CCS technologies and in particular the relevant regulatory policies supporting or hindering the development of capture, transport and storage. The final building block is provided by an analysis of the existing support policies. Due to the nature of CCU and CCS projects, CO_2 prices will in the long-term play an important role to make CCU and CCS technologies competitive. However, due to the novelty of the technologies and the implementation of the full CCU or CCS chain, additional support

[1] https://pilotstrategy.eu/node/9

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policies are the main factor to allow for the development of pilot projects in the short- to medium-term.

While this report addresses both, CCU and CCS projects, a clear focus can be found on the CCS side in all three areas: political strategy, legislative framework and - although lesser developed than in the other two areas - support systems. The focus is particularly strong when we look into the legislative framework, where we find an existing framework for CCS, but no mentioning of CCU in the documents so far. Part of the financial support systems address CCS as well as CCU projects, however, in many countries the strong political focus on CCS translates into a strong focus on support for CCS projects, although support of CCU projects is in general often also possible. Hence, the following report focuses on CCS unless CCU is explicitly mentioned.

This report is an update of an earlier version from 2022 (as outlined as objective in Task 6.1 of the PilotSTRATEGY project). Instead of rewriting the existing sections, I opted for adding additional sub-sections that summarize developments since 2022. Sections labelled “Status by end of 2021” are largely unchanged compared to the earlier version and may present an outdated status. Nevertheless, in many cases, they contain useful information on the existing political, legal and financial frameworks. In addition, they – in addition with the new sections “Update since 2022” – illustrate the progress being made at the EU level as well as in the Member States. As an exception, the “Status by end of 2021” section in the section on Spain has been amended with additional information on the legal framework, which were already in place by end of 2021, but missing in the earlier version of this report.

4. CCS and CCU framework on the EU level

4.1 Policy strategy

4.1.1 Updates since 2022

Since end of 2021, the development of the policy strategy regarding Carbon Management at the EU level made significant progress. A highly relevant step was the adoption of an industrial carbon management strategy in the context of the impact assessment to the EU climate target proposal for 2040 in February 2024. The strategy focuses on three parts: carbon capture for storage (CCS), carbon capture for utilisation (CCU) and carbon removal from the atmosphere (carbon dioxide removal – CDR). It includes scenarios outlining the use of capture, usage and storage: 50 Mt CO_2 captured in 2030, approximately 280 Mt CO_2 captured by 2040 and 450 Mt CO_2 captured by 2050. In 2030 and 2040 most of the captured CO_2 is being stored. By 2050, only 250 Mt are being stored, the remaining CO_2 is for usage. In addition to fossil carbon, biogenic and atmospheric carbon are also relevant elements, becoming dominant over the decades. A relevant element for starting the development of CCS is the introduction of binding CO_2 injection capacity targets for 2030 and a splitting mechanism between countries and actors implemented in the Net Zero Industry Act. In addition, the document states the need for “an inclusive, scientifically informed and transparent debate on all industrial carbon management technologies” (p. 22) with the involvement of societal stakeholder before, during and after policymaking and project implementation.

The industrial carbon management strategy was developed in exchange with a stakeholder dialogue platform, the CCUS Forum, which consists of several working groups focusing on infrastructure,

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standards, public perception and industrial partnership. Another element was – as usual in EU policymaking processes – an open public consultation on the topic.

SOURCES:

European Commission (EC): Industrial carbon management https://energy.ec.europa.eu/topics/carbon-management-and-fossil-fuels/industrial-carbon-management_en (accessed on 03.11.2025)

European Commission (2024): Towards an ambitious Industrial Carbon Management for the EU.

4.1.2 Status by end of 2021

By the end of 2018, the EU Commission presented a long-term strategy for the EU including scenarios aiming at reaching net-zero GHG emissions by 2050 (EC, 2018a and EC, 2018b). Only 2 out of the 8 scenarios presented in the Commission's document "A clean planet for all - A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy" reach net-zero by 2050: 1.5LIFE and 1.5TECH. In particular in the 1.5TECH scenario, CCU and CCS play an important role in reaching the net-zero target, but also the 1.5LIFE scenario requires CCU and CCS to reach carbon neutrality. In total, CCU and CCS activities reduce emissions by 281-606 Mt in 2050 in those scenarios. 80-298 Mt CO_2 are stored underground, 201-307 Mt CO_2 are being used, going mainly into the production of synthetic fuels and partly into synthetic materials. Based on those figures, CCU and CCS are seen as one of seven key technology areas to reach carbon neutrality by the middle of the century.

In 2021, the EU adopted the European Climate Law (EU, 2021) which enshrines in law the EU's objective to become climate neutral by 2050. As interim target, the EU aims at reducing emissions by 55% below 1990 levels by 2030. Documentation on the European Green Deal and the European Climate Law further strengthens the role of CCU and CCS, which is seen as an important factor and plays a major role in the policy packages to be developed to reach those ambitious climate targets.

Not existing so far is a European CCU and CCS strategy as proposed by the CCUS SET-Plan (CCUS SET-Plan 2021). Available is, however, a Roadmap for CCU and CCS ("CCUS Roadmap") to 2030 developed under the CCUS SET-Plan. The European Strategic Energy Technology Plan (SET-Plan) is an activity to better coordinate energy technology development in the EU and its Member States and informs policy makers. In the CCUS Roadmap targets are being formulated for 2030 that should be met within the EU to be on track to meet its net-zero target by 2050. It includes the delivery of 15 commercial-scale industry CCS projects with another 10 having completed a Front-End-Engineering-Design (FEED) study and five of them having made an investment decision, along with the delivery of 10 commercial-scale power- or heat-related CCS projects and the first large-scale commercial CCU installations. As another important piece, the CCUS Roadmap also defines targets for the strategic planning and development of CO_2 infrastructure and identifies the need for national CCS strategies and/or roadmaps by the Member States.

Another piece of legislation strengthening the role of CCS and CCU in the European policy strategy is the document on the "sustainable management of the carbon cycle" published by the European Commission by the end of 2021 (COM 2021b). It highlights the role of negative emissions and of developing a carbon cycle for reaching a net-zero EU economy by 2050.

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4.2 Regulatory framework

4.2.1 Updates since 2022

In the wake of the industrial carbon management strategy from February 2024, the regulatory framework at EU level has significantly progressed. Key new elements are:

- An amendment to the Renewable Energy Directive (EU/2018/2001 and EU/2023/2413): Already since 2018, CCU was covered under the Renewable Energy Directive. Significant amendments, however, on the use of renewable fuels of non-biological origin (RFNBOs) have been made in 2023. It includes provisions, under which RFNBOs of different origin, including recycled-carbon fuels can be claimed to have a net-zero emission factor in combustion processes without the implementation of carbon capture technologies.
- The net-zero industry act (NZIA - EU/2024/1735): Being broader in nature, the net-zero industry act includes among other things the target of reaching an annual injection capacity for geological storage capacity for CO_2 within the EU of 50 Mt by 2030. The NZIA further identifies oil and gas producers in the EU as responsible to fulfil this target and defines explicit targets for individual companies. Certain flexibility is granted for reaching those targets if (i) MS's storage capacity overfulfills the total of companies' obligations identified for that MS (in that case, the MS can apply for partly or total suspension of companies' obligations) or by allowing companies to fulfil their obligations (ii) either by joint ventures, (iii) by investing in other countries or (iv) by investing in other storage projects.
- The Carbon Removal and Carbon Farming Certification Regulation (CRCF – EU/2024/3012): The CRCF provides a voluntary framework for the certification of carbon removals and carbon storage in products from atmospheric or biogenic origin. It distinguishes between permanent carbon removals (for which currently methodologies for the certification of DACCS, BioCCS and Biochar projects are being proposed), carbon farming and soil emission reductions (i.e. including nature-based solutions such as rewetting/restoring peatlands and wetland, agroforestry, soil protection, reforestation but also improving fertiliser use efficiency), carbon storage in long-lasting products (bio-based construction products)
- EU ETS regulation was amended to cover non-pipeline transport and permanent storage of carbon in products. Further adjustments, e.g. on the use of negative emissions and the integration of CCU into the EU ETS are planned.

SOURCES:

European Commission (EC): Industrial carbon management https://energy.ec.europa.eu/topics/carbon-management-and-fossil-fuels/industrial-carbon-management_en (accessed on 03.11.2025)

European Commission (2024a): Net Zero Industry Act (EU/2024/1735)

European Commission (2024b): Carbon Removals and Carbon farming Certification Regulation (EU/2024/3012)

European Commission (2024c): Directive 2023/2413 amending Directive 2018/2001, regulation 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652.

European Commission (2024d): EU Emissions Trading System Directive (2003/87/EC)

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4.2.2 Status by end of 2021

The regulatory framework for CCS in the EU consists of two major parts along with amendments to a number of existing legislations.

The **Directive on the geological storage of CO_2** (EC 2009, "CCS" Directive), implemented more than ten years ago, focuses on the establishment of a legal framework for the safe geological storage of CO_2. The main purpose is to allow for storage only if there is no significant risk of leakage and no significant environmental and health risks (Article 4). Among other aspects, the CCS Directive lays down requirements for selecting and operating storage sites. Exploration and storage permits are required in determining and using a storage side. The Directive further states that the CO_2 stream being stored underground shall consist overwhelmingly of carbon dioxide (Article 12), although not giving a percentage figure for the purity of the gas. In the case of leakage, the storage site operator has to take corrective measures immediately and notify the competent authority (Article 16). If the operator is not able to take adequate corrective measures, the competent authority takes over and has the right to retrieve the costs from the operator. The competent authority is responsible for organizing periodic inspections of the storage sites and facilities. Post-closure, the operator is responsible for monitoring and corrective measures in the case of leakage for at least another 20 years before the responsibility can be transferred to the competent authority (Article 18). Financial security to cover related costs (e.g. for monitoring and corrective measures) have to be proven by the operator before a storage permit can be obtained. In addition, a financial mechanism exists to transfer the responsibility for a storage site to the competent authority to cover at least the anticipated costs (for monitoring, but where applicable also for other activities needed to maintain the storage) for the following 30 years, so that if implemented well financial coverage of the potential costs of a storage site remains with the operator for 50 years after closure.

Transport is only a relatively small aspect in the CCS Directive. It states that transparent and non-discriminatory access to transport pipelines has to be provided by the operators of such infrastructure systems. Other forms of transport and other aspects of pipeline transport are currently not part of the CCS Directive. Capture activities are also not part of the CCS Directive.

All relevant decisions on permits for storage sites lay within the responsibility of the competent national authority such as dealing with monitoring and liability costs as well as connected to the closure of the site and the taking over of accountability after a certain period of time. However, the European Commission has the right to publish a non-binding opinion on the decision by the competent authority.

All Member States were required to implement the CCS Directive into national law by mid of 2011. With some delay, by October 2013, all Member States had communicated transposition measures. In 2017 the Commission reported that it considered the implementation in 16 of the Member States to be fully conforming with the Directive. Ways of implementation differ significantly between Member States, though. While some countries merely transposed the Directive by the wording, other Member States with a higher interest in CCS tried to fill the remaining gaps as far as possible. Another group of Member States such as Austria, Ireland, Latvia or Finland transposed the CCS Directive but also implemented a ban on storage.

Highly relevant in the context of CCS is also the **EU ETS Directive** (EC 2003) with its amendments. All three parts of the CCS process, i.e. carbon capture, transport (although so far restricted to pipeline transport) and geological storage, are activities mentioned in Annex I of the Directive. As a result, all

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CO_2 emissions in any of the process steps (including leakages) is regulated under the EU ETS and operators have the obligation to hand in an equivalent amount of allowances. All CO_2 captured and safely stored will be considered as not emitted under the EU ETS. This regulation under the EU ETS is supposed to provide an important financial incentive to store CO_2 instead of emitting it into the air and to provide finance for the additional costs for CCS activities in the future.

An aspect so far lacking from the EU ETS is other forms of transport apart from pipeline transport of CO_2. As a result, only CO_2 transported by pipeline qualifies for an exemption from CO_2 pricing under the EU ETS at the moment. The proposal for the revision of the EU ETS Directive in the context of the EU's Fit for 55-Package now foresees an inclusion of all forms of transportation (COM 2021a).

In addition to those two Directives, several legislation were amended to include CCS activities. Those are in particular:

- The **Environmental Impact Assessment Directive** (EEC 1985) requires environmental impact assessment procedures for all CCS activities, including a life cycle evaluation on environmental issues and social and economic effects of the project and a related risk assessment. It also requires monitoring significant effects on the environment and effectiveness of the control measures (see Barros, Oliveira and Lemos de Sousa 2012).

- The **Large Combustion Plant Directive** (EC 2001) was amended to require an assessment of the technical and economic conditions necessary for future application of CCS for the operation of combustion plants with a rated electrical output of 300 MW and more. In case of a positive assessment the operator is required to set aside suitable space on-site for the equipment needed to capture and compress the CO_2.

- CCS was also included in the **Waste Framework Directive** (EC 2008) to exclude the CO_2 captured and transported from the instruments associated with this Directive and the **Industrial Emissions Directive** (2010/75/EU) now covers capture as one of the activities that can help to control emissions from the industrial sector.

Not part of the EU legislative package, but highly relevant in the context of CCS activities within the EU are the London Protocol and the OSPAR Decision. The London Protocol prohibits all dumping of waste into the marine environment except for substances and activities listed on a "reverse list". In addition, it also prohibits the transboundary transport of substances for the purpose of dumping or incineration at sea. Not prohibited by the London Protocol are CO_2 storage activities in the context of enhanced oil recovery or as part of the offshore processing of natural gas streams (as is the case at the storage activities at the Sleipner field in Norway). An amendment to Annex I, that entered into force in 2006, opens up the opportunity for offshore storage activities in general when it is safe to do so and provides regulation on the injection of CO_2 into sub-seabed geological formations. In 2009, an amendment was adopted to also allow transboundary transport of CO_2 for sub-seabed geological storage. However, for the amendment to become effective 2/3rds of the contracting parties need to ratify the amendment, which is currently not the case. In 2019 it was decided by the Parties to the London Protocol to allow for a provisional application of the 2009 amendment. Thus, at the moment it is possible for countries to agree to export CO_2 for sub-seabed geological storage on a bilateral basis without breaking the London Protocol (IEAGHG 2021).

Also relevant in that context is OSPAR Decision 2007/02 by the OSPAR Commission (OSPAR 2007), a group of 15 country governments and the EU cooperating to protect the marine environment of the

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North-East Atlantic. The Decision states that OSPAR guidelines for Risk Assessment and Management of Storage of CO_2 Streams in Geological Formations need to be taken into account by a competent authority in the process of granting a CCS permit. The overall target is to avoid significant adverse effects on the marine environment.

4.3 Financial support framework

4.3.1 Updates since 2022

In contrast to the first two, the financial support framework at EU-level has not yet been significantly altered. Two key aspects, that are currently under discussion are:

- Integration of CCU and carbon removals into the EU ETS
- Financing of permanent carbon removals via a purchasing programme

SOURCES:

Clean Air Task Force (2024): The Balancing Act: Risks and Benefits of Integrating Permanent carbon Removals into the EU ETS

European Commission: DG ClimA and Ecologic Institute (2025): An EU purchasing programme for permanent carbon removals – Assessment of policy options and recommendations for short-term policy design.

4.3.2 Status by end of 2021

With low CO_2-prices for a long period of time, the **EU ETS** did not provide sufficient incentive for the investment into CCU or CCS projects in the past 15 years. However, recently a strong increase in prices could be seen with prices reaching close to 100 €/t CO_2 in December 2021 and in February-March 2022 price levels between 70 and 80 €/t CO_2 (see https://ember-climate.org/data/data-tools/carbon-price-viewer/ for current EU ETS prices). CO_2 prices like that will very likely play an important role in providing financing for CCU and CCS projects in the future.

Due to the long period with low prices and the low activity in developing CCU and CCS projects (and the cancelling of planned projects) resulting from that, the EU currently has different support programs in place for projects to get additional funding for CCU and in particular CCS projects (see Figure 1). The main source for funding of commercial scale demonstration plants is the **Innovation Fund**, which allows for funding of CCU and CCS projects in the energy and industry sectors. Resources initially available for the innovation fund were 450 million European Union Allowances (EUAs) from the EU ETS. The money that can be spent on projects is dependent on the price development of CO_2 in the EU ETS. Currently, the Commission is expecting a funding volume of 25 billion € for the period 2021-30 (https://ec.europa.eu/clima/system/files/2021-12/com_2021_800_en_0.pdf). The revision of the EU ETS under the fit-for-55 package foresees an additional 200 m EUAs to increase the budget available to fund innovative projects. The increase in resources is partly linked to a widening of the scope of the Innovation Fund to projects from road transport and buildings, two sectors that are proposed to become regulated under a second ETS on the EU level.

For the first large-scale call in 2020 a budget of 1 billion € was available. Four out of seven projects that were being chosen in the first round are large CCU or CCS industry projects (see https://ec.europa.eu/clima/system/files/2021-11/policy_funding_innovation-fund_large-

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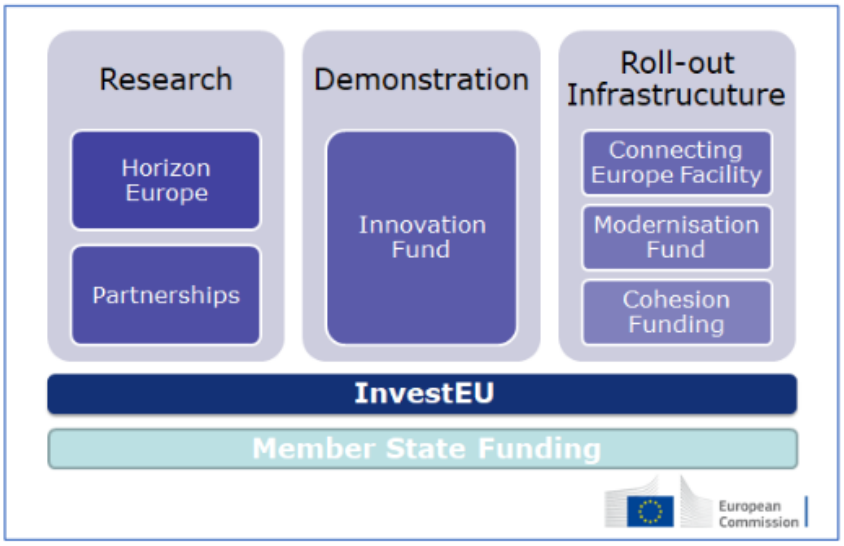
scale_successful_projects_en.pdf for information on the projects being funded). For the second large-scale call open from 2021 another 1.5 billion € of funding is available. Up to now, support is granted in the form of grants. In the proposal for the revision of the Innovation Fund legislation, the Commission intends to also include support of operational costs on the basis of carbon contracts for difference (COM 2021a).

Figure 1: Support mechanisms for CCU and CCS in the EU



Source: CCUS SET-Plan, 2021

The NER 300 program, predecessor to the innovation fund between 2013 and 2019, was open for projects aiming at applying CCS in the energy sector, while industry projects were not eligible for funding. However, while several renewable energy projects were being funded, only one CCS project was awarded support under the NER 300 program. The White Rose project planned in the United Kingdom was never realized and financial support was not retrieved.

Another source for funding is the **Horizon Europe** program, the follow up to Horizon 2020, which also provided funding for CCU and CCS projects. Support from this program concentrates on supporting research and innovation activities.

Support for the roll-out of infrastructure for CCU and CCS activities can come from three different sources. Under the Connecting Europe Facility (CEF) so called **Projects of Common Interest (PCIs)** can be supported. In the category cross-border carbon dioxide network, currently six PCIs are receiving support for the development of an EU-wide CO_2 transport infrastructure.

Another two sources of support for transport facilities are the **Modernisation Fund** as part of the support for energy networks and the **Cohesion Fund** as part of the support for trans-European transport networks (TEN-T). Both mechanisms are available to lower-income Member States only.

Under the **Just Transition Fund** 40 billion € of funding are being provided to support the transition in a Member State's most affected regions. Facilities regulated under the EU ETS can receive support for substantial emission reduction activities including CCU and CCS activities if they are located in such a most affected region listed in a Member State's just transition plan.

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The European Green Deal is mentioned as one out of six Commission's priorities for the years 2019-24 under the recovery plan for Europe (InvestEU programme). 0.6 trillion € from the Next Generation EU Recovery Plan along with the EU's seven-year budget will finance the European Green Deal. Under the **Recovery and Resilience Fund (RRF)**, part of the EU's recovery package, Member States have to hand in their Recovery and Resilience Plans. Some countries such as Denmark use their plans to include support for CCS activities (Jan Steinkohl, Policy Officer, DG Energy, European Commission in a webinar on The Role of CCS in the EU Green Deal, 25 February 2021, https://cleanenergysolutions.org/training/ccs-eu-green-deal and Global CCS Institute 2021).

CCU and CCS are also one of ten identified priority actions under the **European Strategic Energy Technology Plan (SET-Plan)**. Under the SET-Plan, activities in the priority areas are coordinated and exchange is being organized. Limited funding is being provided for the activities of the Cooperation and Support Action project. However, information collected under these cooperation activities provide useful information on the status and funding of CCU and CCS projects in the EU. According to the 2020 report on the implementation of the SET-Plan (EC 2020) 645 millions € are currently being spent in 81 SET-Plan projects on CCU and CCS activities. About 50% of the money is coming from EU support programs (see the above mentioned).

Another source of financing for CCU and CCS activities that is in planning is a **certification scheme for carbon dioxide removals**. After the publication of the policy paper from the Commission on the "sustainable management of the carbon cycle" (COM 2021b), a legislative proposal is planned for the final quarter of 2022 (https://www.europarl.europa.eu/legislative-train/theme-a-european-green-deal/file-carbon-removal-certification).

Another piece in the support framework for CCU and CCS will be the **EU sustainable Taxonomy**. CCU and CCS, listed under the sustainable technologies provides access to European Green Bonds, an instrument to channel private investments to sustainable projects.

4.4 Summary

In the EU, quite early on a basis was developed for the legal implementation of CCS activities. In particular, the CCS Directive and other instruments such as the EU ETS provide the basis for the current or future implementation of CCS, but also CCU projects in the Member States. This fact results in a comparatively high ranking for all EU member states in the 2018 published CCS Policy Indicator report by the Global CCS Institute (Global CCS Institute 2018). Existing shortcomings such as the lack of other means of transport apart from pipeline transport in existing EU legislation are part of revision proposals under the fit-for-55 package and should soon be addressed. As usual in such cases, the CCS Directive gives leeway in some aspects that have to be filled by the Member States to provide the necessary clarity for project developers to take an investment decision.

The legislative framework was supplemented with a clear political signal in the development of the EU's long-term vision and with the implementation of the climate law and the net-zero target by 2050 as part of the climate law. Existing impact assessments and accompanying documents show the importance of CCU along with CCS for the EU to reach net-zero emissions in the announced timeframe. More recently, the EU’s industrial carbon management strategy from 2024 provided further insights into the role of CCU, CCS and CDR along with supporting legislative approaches.

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An important factor in the restart of project development on CCS and for the development of CCU projects in the EU is the Innovation Fund. Its start in 2020 broadened available funding from energy-related CCS projects to energy- and industry-related CCU and CCS projects. Together with the still high CO_2 prices under the EU ETS, which helps in itself to make CCU and CCS projects financially profitable, it provides a significant amount of funding for the realization of large-scale CCU and CCS projects in the coming years, further underlining the important role of CCU and CCS for the EU.

In addition, more recent elements to push the development of CCS include the implementation of a 50Mt injection target for CO_2 by 2030 within the NZIA and the developing discussions on carbon dioxide removals. With the CRCF framework, discussions on the role of permanent carbon removals in the EU ETS and purchasing programme for CDR it becomes a more realistic element in the CCUS landscape.

5. Country examples

5.1 Netherlands

5.1.1 Update since 2022

Backed by a comprehensive support system, Dutch CCS projects are continuing to develop although at a lower-than-expected speed. A specific focus is on the development of transport infrastructure (and close-by capture projects) in two cluster regions comparable to the UK approach.

IOGP currently lists 12 Dutch CCUS projects, the Global CCS Institute even lists 15 projects. The list of projects includes two trans-European transport and storage projects and a running CCU project (started operation in 2025). Several of the projects are located in or close to Rotterdam, another cluster can be found in the Dutch-Belgian border region close to Antwerp. Most projects are in early or advanced development.

The legislative framework was amended with regulations for third-party access to CO_2-transport infrastructure. In addition, transport operators are expected to disclose their pricing structure to increase transparency. An interesting fact is, that in the Netherlands state-owned Energie Beheer Nederland (EBN) cooperates in all transport and storage projects under market-based conditions.

In 2023, an additional instrument was introduced for the financial support for CCUS projects in the Netherlands. A subsidy for reducing CO2 emissions (Hernieuwbare Energietransitie – HER+) was introduced between 2023 and 2024, providing 30 M€ of grant-based project funding.

In 2025, the Dutch Government announced 639 M€ state support for the transport project ARAMIS outside the existing support systems - a reaction to the withdrawal of Shell and TotalEnergies from the project.

According to several sources, the Dutch Government is planning to end its SDE++ scheme by 2027 and introduce instead a two-way Contracts for Difference support scheme. However, it is unclear whether that applies to renewables support only or will also be applied to other parts of the SDE++ scheme.

In 2025, the Dutch government also published a roadmap for negative emissions. It reiterates the assumption of using 20 to 25Mt CDR in both, 2040 and 2050 to reach national climate goals. Both,

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natural as well as technical options are considered, and the roadmap states the relevance of being integrated into a European CO_2 network and a working CO_2 removal market.

SOURCES:

Carbon Herald website: Netherlands Steps In With $726M For Aramis Carbon Capture After Shell, Total Scale Back https://carbonherald.com/netherlands-steps-in-with-726m-for-aramis-carbon-capture-after-shell-total-scale-back/ (accessed on 20.11.2025)

Clean Air Task Force (2025): Building Future-Proof CO_2 Transport Infrastructure in Europe.

Dena (2024): Energiepartnerschaft Deutschland China. Factsheet CO2-Infrastructure regulation. https://www.dena.de/fileadmin/dena/Publikationen/PDFs/2025/ENTRANS/Entrans_FACTSHEET_CO2-INFRASTRUCTURE_REGULATION.pdf (accessed on 12.12.2025)

Dutch Government, Ministry of Climate Policy and Green Growth (2025): Netherlands Carbon Dioxide Removal Roadmap

Energymaz website: Netherlands Plans Shift to Two-Way CfD Scheme for Onshore Renewables https://energymagz.com/37741/netherlands-plans-shift-to-two-way-cfd-scheme-for-onshore-renewables/ (accessed on 20.11.2025)

Global CCS Institute (2025a): Facilities Database https://co2re.co/FacilityData (accessed on 19.11.2025)

IOGP website: Interactive map of CCUS projects in Europe https://iogpeurope.org/european-ccs-projects-map/ (accessed on 20.11.2025)

5.1.2 Status by end of 2021

5.1.2.1 Status of project development

The Netherlands is one of the countries of the European Union that decided early on that CCS should play an important part in reaching medium- to long-term climate targets. As a result, three projects had been started, but failed between 2000 and 2017, two of them being onshore storage projects, one of them being an offshore storage project. Two of them, both onshore storage projects, were stopped as a result of public acceptance issues, one was cancelled as a result of a lack of political support and a sustainable business case for coal-fired power generation in combination with CCS (Akerboom et al. 2021).

At the moment, the Zero Emissions Platform (ZEP) lists a total of eight CCU and CCS projects in the Netherlands and two joint projects on transport and storage between the Netherlands and Belgium. Of the eight projects, two are labelled as low-carbon hydrogen production projects (H-Vision and Hydrogen 2 Magnum) and two projects are labelled as CCU projects (AVR-Duiven and Twence Waste-to-Energy CO_2 Capture and Utilisation). Three of the remaining four projects are aiming at collecting, transporting and storing CO_2 from industry clusters (Aramis, Athos, Porthos), one project is a CCS project in a steel plant (HIsarna Pilot Plant). The Porthos project in the Port of Rotterdam is awarded 2.1 billion € from the Dutch government under the SDE++ scheme. The final investment decision for the project was awaited for the end of 2021/ early 2022, but is still pending and is now announced for 2022. If the project is continued, the full project shall be taken into operation in 2024. The project also receives funding (102 million €) as a project of common interest by the Connecting

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Europe Facility. Athos and Aramis are also listed under the cross-border carbon dioxide networks by the Connecting Europe Facility.

5.1.2.2 Policy strategy

Emissions in the Netherlands lay at around 200 Mt CO_2e in 2019 (see EEA GHG data viewer, 2021). In May 2019, the Dutch Government adopted its Climate Act which includes the target to reduce emissions by 95% below 1990 levels by 2050. By 2030, greenhouse gas emissions shall be reduced by 49% below 1990 levels. The National Climate Agreement contains information on the sector's contribution to reaching the climate targets. It states that CCS is an important building block in the decarbonisation of industry (about 7 Mt CO_2 by 2030 could be stored via CCS) and that funding will be provided over an extended SDE+ (see SDE++ in section 3.1.3) funding scheme. Until today, the Netherlands have not officially adopted the target to reach net-zero emissions.

5.1.2.3 Regulatory framework

In order to implement the CCS Directive the Dutch Government amended the Mining Act and subordinate legislation (Mining Decree and Mining Regulation) in 2011. The amendments particularly aim at the implementation of the following issues from the CCS Directive (see Akerboom et al. 2021 and van der Weijden 2011):

- CO_2 storage: Even before the amendments necessary to implement the CCS Directive, the Dutch Mining Act contained a general permit obligation for the storage of substances that included CO_2. The amendments that were being made to implement the CCS Directive particularly addressed the content of the permit (i.e. the application) and regulations associated with the transfer of responsibility for CO_2 stored after closure of a storage site. In particular, a monitoring plan, a termination plan and a provision of financial security have to be part of the storage permit in line with the EU CCS Directive while in other cases these aspects can be agreed at a later stage. The Mining Decree elaborates on the elements that must be regulated in the integral storage permit, including on the risk management, closure of a storage site and financial security. In case of severe leakage or other irregularities, a permit can be withdrawn.
- Exploration of storage site: The Mining Act was amended to enable the issuance of CO_2 exploration permits. According to the CCS Directive, those permits are required in case of drilling activities to gather information on a potential geological storage site. It is expected that in the Netherlands they will primarily be necessary in case of the exploration of aquifers as a sufficient amount of information should be available for depleted gas fields to apply for a CO_2 storage permit immediately.
- Exclusivity: Holders of a storage permit or an exploration permit have the exclusive right to develop activities there. As a result the holder of a regular exploration, production or storage permit, who decides to use the area for CO_2 storage must first return its regular permit to then apply for a CO_2 storage permit. In the Netherlands once the competent authority has received an application for a permit, other parties have the opportunity to also hand in applications for the same storage site. The decision on who is granted the permit is then made based on the information provided in the application. So it is not clear that the holder of an exploration permit will also get a storage permit for the same site. However, the holder of an exploration permit who has proven the suitability of a storage site should be prioritised in the process of granting a storage permit.

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- Leakages: In case of leakage or significant irregularities - in line with the CCS Directive - the operator of a storage site has to notify the competent authority and has to take the necessary corrective measures. The competent authority can take over if the operator is not able to do so. In case the competent authority takes over from the operator, the operator has to surrender emission allowances under the EU ETS for resulting emissions for at least 20 years, a timeframe that can be shortened or prolonged by the competent authority. Circumstances for a shortening or prolonging of the timeframe are not clear from the available legislative framework.
- Transport: So far, third-party access to transport infrastructure or other details on the transport of CO_2 in the Netherlands are not regulated.
- Closure of a storage site: Closure is managed by a post-closure plan. In particular, the operator is responsible for monitoring and - if necessary - corrective measures for another 20 years. After that timeframe, responsibility can be transferred to the competent authority, however, financial resources have to be provided by the operator for at least the monitoring of the site for another 30 years. A prerequisite for the transfer of responsibility to the competent authority is that the authority is convinced that the CO_2 is stored safely underground. In addition, in case the operator has not acted carefully the minister of Economic Affairs, Agriculture and Innovation can recover costs resulting from leakage from the permit holder beyond 20 years.
- Competent authority: The Minister of Economic Affairs and Climate Policy is responsible for permit application, inspection of storage sites, dealing with monitoring and liability costs and closure of a site. The European Commission has a consultancy role with the option to issue a non-binding opinion on the decision by the competent authority.

The Directive on Environmental Liability deals with the liability for damages to the environment. Damage to health and property is dealt with at the Member States level. In the Netherlands, the Dutch Civil Code foresees a length of liability between 5 years after discovery to 20-30 years after the activity has caused damages. After 30 years, any liability for damages under the Dutch Civil Code ends.

Although on-shore storage is not forbidden in the Netherlands, as a result of public opposition against on-shore storage projects in the past the Dutch Government decided to concentrate on off-shore storage for the time being (Akerboom et al. 2021).

Akerboom et al. (2021) see three main shortcomings in the current legislative framework in the Netherlands: (i) although roles, tasks and responsibilities are clearly defined by the legislative framework uncertainties exist in particular with regards to receiving a storage permit as the permit procedure is a competitive one and it is not clear in advance that an operator holding an exploration permit for a site will actually get the storage permit for that site. According to van der Weijden (2011), though, the holder of an exploration permit should be prioritized by the permitting authority, a fact that should at least limit this risk. (ii) Due to the possibility to shorten or prolong timeframes for liabilities, costs arising from those liabilities are not clear beforehand. (iii) In the current legislative framework is a lack of rules for access to existing transport infrastructure.

5.1.2.4 Financial support framework

In 2020, the Dutch Government broadened its support instrument for renewable energy technologies to also include emission reduction technologies such as CCU und CCS. Under the SDE++ ("Stimuleren Duurzame Energie") CCU and CCS projects are able to receive a subsidy, paid as a top-

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up on market prices to eliminate existing price risks. The maximum rate a project is able to apply for is fixed by the Government. In case of CCS projects, the maximum rate is between 62€/t for existing CCS installations and up to 194€/t in later application phases for new CCS projects in existing installations that are not regulated under the EU ETS (2020: 100€/t CO_2 for new CO_2 capture in existing production processes). In the case of CCS projects in installations regulated under the EU ETS, the maximum rate is reduced by the price for EU ETS allowances to reflect the financial incentives for storing CO_2 under the EU ETS. Operators applying for less than the maximum rate are more likely to receive funding. An SDE++ call is organized in 4 phases with an increasing CO_2 intensity limit. In Phase 1, projects could only apply for projects with CO_2 reduction costs of 60 (in 2020: 65) €/t CO_2. The maximum CO_2 price increases to 80 (2020: 85) €/t in Phase 2, 115 (2020:180) €/t in Phase 3 and 300 €/t CO_2 in Phase 4. The subsidies over all categories (i.e. not only CCS and CCU funding) are provided on a competitive basis with applicants with lower costs being more likely to receive funding than applicants with higher costs. This process shall help to ensure that the necessary subsidies decrease over time. Rates are paid for a maximum of 15 years (see Aurora 2021).

In the first call for projects under the broadened SDE++ in 2020, 5 billion € were available for funding, of which 4.7 billion € were being awarded. 2.1 billion € were awarded to CCS projects (see Aurora 2021). CCS project applications were found in Phase 1 and 2 of the first call. A second call for projects started in October 2021.

In addition to the SDE++ framework, the Dutch government also introduced a minimum price for CO_2 emissions from industry and power plants. A minimum price of 30€/t CO_2 in 2021, increasing by about 10,50€/t CO_2 per annum, was introduced via the Klimaatakkoord. The minimum price is implemented via a carbon tax reduced by the price for EUAs. Negative tax rates are excluded. In times of lower CO_2 prices under the EU ETS this minimum price can help to keep up the incentive for investments into CCU and CCS projects.

5.1.3 Summary

Interest for CCS projects was high in the Netherlands from the beginning. Between 2000 and 2017 three CCS projects started, but were never realized due to different reasons. Two of them, both on-shore storage projects, were stopped as a result of public acceptance issues, one was cancelled as a result of a lack of political support and a sustainable business case for coal-fired power generation in combination with CCS. Currently, the focus of Dutch CCS projects is on the installation of transport and storage infrastructure. Three large transport and storage projects are being developed in the Netherlands: the Porthos project at the port of Rotterdam, the Athos project in the North Sea Canal industrial cluster close to Amsterdam and the Aramis project at the port of Den Helder and more projects are under consideration. One CCU project (AVR Duiven) is up and running since 2019 capturing CO_2 from waste incineration and supplying it to greenhouse horticulture.

Despite the fact that the Netherlands so far have not adopted a net-zero target, the development of the new CCS projects was triggered by a clear political signal that CCS is seen as a key element in the decarbonization of industry in the Netherlands. Already by 2030 up to 50% of the emission reductions in industry according to current policy planning could come from CCS processes. The political willingness to use CCS projects to reduce industrial emissions was combined in 2020 by the broadening of the SDE++ funding mechanism, formerly used for the support of renewable energy technologies only and now open also to other technologies meant to reduce CO_2 emissions. With more than 2 billion € of the available 5 billion € going to CCS projects in the first call for projects in

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2020 the mechanism has become an important source of funding for Dutch CCS projects. However, the future of the SDE++ funding is currently unclear. In addition, the introduction of an - over time strongly increasing - minimum price for CO_2 from industry and power plants further strengthens the investment case for CCU and CCS. Direct state support for the transport project ARAMIS was granted upon the withdrawl of private actors from the project.

Although plans to realize a full CCS process in the Netherlands are at an advanced stage, no such project has yet been realized and progress in the past years was slower than expected. While the Netherlands implemented the European CCS Directive into national law by amending its Mining Act to include important aspects related to the storage of CO_2 and access to pipelines, the legal framework still contains a number of uncertainties that could become barriers to the implementation of CO_2 pipeline transport and storage sites in the Netherlands, such as costs related to cover for monitoring and unexpected leakage. Step by step Dutch Government is making progress in adding additional elements to the legislative framework.

5.2 United Kingdom

5.2.1 Updates since 2022

The UK is strongly progressing on the path to develop CCUS in the country. Key elements are the first four supported clusters along with clear financing announcements, which have generated a highly dynamic project development. Step by step additional pieces for the legislative framework are being developed to support the development of a CCUS market.

The Global CCS Institute currently lists 78 CCU and CCS related projects in its database, a significant increase from 2021 and showing the dynamic development of CCS and CCU activities in the UK. Many of the projects are still either in early or in advanced development, however, there are also projects listed as under construction.

In 2023, the government under Sunak published a CCUS vision document for CCUS. With the aim of developing a commercial and competitive CCUS market in the UK, it aims for 20-30 Mt CO_2 capture and storage annually by 2030. The first four CCUS clusters to be developed by 2030 play a key role in that plan. Afterwards, the vision foresees the buildup of a competitive, self-sustaining market by 2050. A key element of the vision is close interaction with stakeholders and in particular industry to realize the developments envisioned. A second element is a 960 m£ Green Industries Growth Accelerator which is open for CCUS projects, which was launched in November 2023.

On the legal framework, the UK Government established third-party access and operational standards for CO_2 transport and included regulation on non-pipeline transport in the UK ETS, thus adding additional pieces to the already well-advanced framework. In mid 2025, the UK Government also announced the inclusion of permanent carbon removals (engineered greenhouse gas removals – GGRs) into its UK ETS from 2029 onwards.

In 2024, the UK Government announced the availability of 21.7 bn£ of funding over 25 years for CCUS and hydrogen projects for projects within the first two clusters in Teesside and Merseyside. As a reaction, three projects reached financial close by April 2025: the transport and storage network for ECC, the transport and storage network for HyNet and the project NetZero Teesside.

SOURCES:

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Global CCS Institute (2025a): Facilities Database https://co2re.co/FacilityData (accessed on 19.11.2025)

Global CCS Institute (2025b): Global Status of CCS 2025. Staying the Course.

UK Government website: UK carbon capture, usage and storage (CCUS) https://www.gov.uk/government/collections/uk-carbon-capture-usage-and-storage-ccus#recent-milestones (accessed on 20.11.2025)

5.2.2 Status by end of 2021

5.2.2.1 Current status of project development

Similar to the Netherlands, the UK was also quite early on very active in developing CCS projects. Currently ZEP lists 14 CCU and CCS related projects in UK, the CCS project database from the global CCS institute even lists 16 CCU and CCS projects including a Direct Air Capture project.

In October 2021, the Government named two CCS clusters which will be funded via the UK CCS Infrastructure Fund (see below): the East Coast Cluster and HyNet. They can now start negotiations with the Government on the specific amount of funding they need to become operational. The goal is to build up a transport and storage infrastructure by mid of 2020 (see https://www.upstreamonline.com/energy-transition/uk-government-picks-ccus-clusters-in-england-for-state-funding-cop26-host-scotland-loses-out/2-1-1084639).

5.2.2.2 Policy strategy

In 2019, the UK Government committed to reach net-zero GHG emissions by 2050 as recommended by the British Climate Change Committee. Already by 2035 a 78% reduction of GHG emissions below 1990 levels shall be reached.

In a report from 2019 by the Committee on Climate Change it states that "CCUS is a necessity, not an option." (Committee on Climate Change 2019). This is reflected in the "Ten Point Plan for a Green Industrial Revolution" (HM Government 2020), published in November 2020, which lists CCS as one central point for reaching the net-zero target. It aims at having the capacity to capture 10 Mt CO_2 annually by 2030. To reach that target CCS shall be established in two industrial clusters by mid of 2020 and another two in the second half of the decade. The Ten Point Plan also announces that business models will be established to attract the necessary investment to meet this target.

5.2.2.3 Regulatory framework

The Energy Act of 2008 and the Carbon Dioxide Regulations from 2010 provide the basis for CCS activities in the UK and transpose the requirements from the CCS Directive into national law. According to the legislations, storage is allowed in offshore areas comprising UK territorial sea and beyond which are designated as gas importation and storage zones under the Energy Act of 2008. Licensing powers, which were originally given to the Secretary of State for Business, Energy and Industrial Strategy (BEIS) were in 2016 transferred to the Oil and Gas Authority (OGA). Licensing powers for storage sites located within the territorial sea adjacent to Scotland are being held by the Scottish ministers. While OGA is in charge of the issuance of storage permits, the Crown Estate & the Crown Estate Scotland hold the seabed rights for CO_2 transport and storage. In addition to perceiving the required permits from OGA and conditional on reception of such a permit project developers also have to obtain a grant of the appropriate rights from the Crown Estate respectively the Crown Estate Scotland (see https://www.gov.uk/guidance/uk-carbon-capture-and-storage-government-funding-and-support#regulatory-regime-for-ccus-in-the-uk). According to the Government, while no

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CCS project has so far been realized under the existing legal framework, the Scottish Government coordinated a scenario project to test the existing regulatory framework in Scotland (which is quite similar to the UK). The report states that the legal framework is emerging well, but also highlighted the complexity and size of CCS projects and that a large number of permits are being required further complicating the process (DECC 2012).

In addition to regulating offshore carbon dioxide storage, approving and issuing storage permits OGA also maintains a carbon storage public register where all UK offshore carbon storage sites are listed.

In 2021 the Government started a consultation process for the installation of an economic regulator for carbon dioxide transport and storage networks. This regulator is supposed to oversee the activities of the monopolistic transport network structures that are foreseen. Ofgem, the British energy regulator, is proposed to take over this position as regulator (BEIS 2021a).

5.2.2.4 Financial support framework

While no longer part of the EU ETS, the UK has since 2021 established its own UK ETS, applying similar rules than the EU ETS. CCU and CCS activities are - as under the EU ETS - included and CO_2 that is being captured and stored is exempted from the allowances obligation. Prices in the UK ETS reached 70 £/t CO_2 in October and December 2021.

In addition, a set of different support schemes is being established in the UK to further support the development of CCU and CCS. Funding will be provided for different areas with differing support systems addressing the particular challenges for the development of technologies in that area: transport & storage (addressing the development of the four planned clusters and more), power, industrial carbon capture, bioenergy with carbon capture and storage (BECCS) and low carbon hydrogen production. Further, in most areas the support instruments include a funding scheme on the one hand to support up-front investments (mainly grants) and a business model development on the other hand to support active projects in receiving the required return on investment.

The key instrument to support the development of transport and storage infrastructure as well as for the early development of early industrial capture and storage projects is the **CCS Infrastructure Fund** (BEIS 2021b). It was announced at Budget in March 2020 and an allocation of 1 billion £ was confirmed in November 2020. The aim of the fund is to develop 2x2 CCUS clusters with the necessary transport and storage network infrastructure. The first two clusters shall be operational by 2025, another two clusters by 2030. The choice of the first two clusters funded under track 1 were announced in October and are now in the process of negotiating funding conditions with the Government.

Transport & storage business models (BEIS 2021c) are available to the operator of the infrastructure to grant the licensee a regulated revenue stream. The payments are based on a "User Pays" revenue model ensuring that users of the infrastructure also cover for the costs for their usage of the infrastructure. Based on an "Economic Regulatory Regime", the monopolistic infrastructure operator has an annual allowed revenue reflecting efficient operating costs and a reasonable rate of return. Potential revenue gaps for the operator (in particular due to the fact that a network's capacity in the beginning is likely to be higher than what is demanded by firms for transport and storage) are expected to be filled with the up-front investment from the CCS Infrastructure Fund.

Industry CCS projects can receive financial support under the **Industrial Energy Transformation Fund** (BEIS 2020). With 315 million £ the fund is meant to support capital expenditures for on-site capture

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projects. In Phase 1 funding is technology-neutral and can be used either to finance feasibility and engineering studies or early movers to complete on-site carbon capture projects. From Phase 2 onwards the scope is extended to include decarbonisation deployment projects.

Business models for industrial carbon capture (BEIS 2021d) are designed to cover for higher running costs (e.g. operational expenses, fees to be paid for the use of the transport and storage infrastructure or repayment of capital investment). The so-called ICC Contracts define a strike price that is negotiated bilaterally on a project basis. The strike price takes into account capital expenses along with operational expenses required for the capture, transport and storage activity as well as - where relevant revenues from free allocation of allowances under the UK ETS. While the latter two will be taken into account for the whole period of time of the contract, the add-on for the capital expenses shall only be paid until the capital expenses have been paid back. The contract has a contractual period of 10 years with an option to extend the contract once for another five years.

CCS projects in the power sector will be funded through a **Dispatchable Power Agreement** (BEIS 2021e). The mechanism consists of two payments: a payment for low carbon generation capacity along with a variable payment in case of production.

CCS projects in combination with hydrogen production can be supported under the **Net Zero Hydrogen Fund** with a volume of 240 million £. In addition, specific business models will also be made available for hydrogen to support the variable costs of production. However, the process is ongoing and more information on the business models is currently not available.

5.2.3 Summary

In the UK, a clear political will comes together with a strong legal framework (based on experience from oil and gas exploitation and other energy market regulations) and with a strong support package. A special feature of the support package is the fact that it includes (mainly grant-based) funding instruments to cover for high up-front investment costs together with business model packages which shall help to cover - in particular in the beginning, but e.g. for transport & storage infrastructure over the total lifetime of the infrastructure - running costs that arise from using CO_2 capture and storage opportunities. The development of the first four clusters has stimulated a dynamic project development. Currently, databases list more than 70 CCU and CCS projects. Further, government is step by step adding additional pieces to the regulatory framework, including visions for CCUS and legislative developments for market development.

5.3 Portugal

5.3.1 Updates since 2022

Activity on CCUS in Portugal was limited. The two main developments are the clear mentioning of CCUS in its updated National Energy and Climate Plan (NECP) along with the announcement to assess geological storage potential and develop a carbon management strategy along with financial support for – among others – CCU and CCS projects from a grant-based support scheme. No industrial project activities for Portugal could be found.

In its revised NECP, CCUS is mentioned as an essential technology to help Portugal meet its decarbonisation targets in hard-to-abate sectors where reducing emissions is challenging (e.g. cement) and where other forms of decarbonization might be more difficult or less effective. The plan also emphasizes the need for innovation and investment in CCUS, pointing to the need for research

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and development to improve the efficiency and cost-effectiveness of these technologies and to plan the necessary infrastructure. Furthermore, CO_2 utilization may foster the production of low carbon hydrogen and other synthetic fuels. It particularly states the assessment of the geological storage potential as well as the development of a national carbon management strategy. In October 2025, the Portuguese Government started a national registration platform and published related documents for the development of a voluntary carbon market for carbon removals and emission reduction projects.

The new carbon neutrality target for 2045, set in the Portuguese Climate Framework (Law 98/2021), led to a revision of the carbon neutrality roadmap which, according to information from Agency for Climate in the scope of the "Talk with Authorities" task of PilotSTRATEGY, indicates CCUS as inevitable for achieving net zero. According to the new roadmap, CO_2 capture will be necessary not only in the hard-to-abate sectors, but negative emissions, via Direct Air Capture with Storage and Bioenergy with Storage will be required. The updated roadmap is not yet publicly available.

In 2024 Portugal launched a 1bn€ support scheme to reach climate-neutrality in strategic sectors, including the deployment of CCS and CCU. Support is provided in the form of direct grants and will run until December 2025. The activity was approved by the European Commission under the Temporary Crisis and Transition Framework.

SOURCES

Bellona (2024): NECP Assessment. Carbon Capture & storage in the national Energy and Climate Plan – Portugal.

European Commission (EC) (2024): Commission approves €1 billion Portuguese State aid scheme to support investments in strategic sectors necessary to foster the transition to a net-zero economy https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip_24_4822/IP_24_4822_EN.pdf (accessed on 12.12.2025)

Government of Portugal (2024a): National Energy Plan and Climate 2021-2030 (NECP 2030). Update/Review

Government of Portugal (2024b): Government signals the start of the Voluntary Carbon Market https://www.portugal.gov.pt/en/gc25/communication/news-item?i=governo-signals-the-start-of-the-voluntary-carbon-market (accessed on 12.12.2025)

5.3.2 Status by end of 2021

5.3.2.1 Current status of project development

According to ZEP and the 2021 CCS status report there are currently no CCUS project planned or under development in Portugal.

5.3.2.2 Policy strategy

With roughly 80 Mt GHG emissions (including emissions from LULUCF) Portugal is a medium emitter in the EU (EEA GHG data viewer, 2021). They have the target of reaching net-zero GHG emissions by 2050 in their long-term strategy published in 2019 (República Portuguesa 2019a). The low-carbon roadmap does not identify CCS as a solution for the Portuguese economy so far due to its very limited applicability and relatively high costs. According to the roadmap, the main sectors for which CCS could be an option are cement and lime. To being able to open the debate at a later point in time the roadmap states that the role of CCS could change if costs for the technology decrease

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significantly. The National Hydrogen Strategy (Resolution of the Council of Ministers 63/2020) can be seen as another entry point into a later discussion of CCS as it states explicitly the need for CO_2 to produce e-fuels which could be derived from CCS processes.

The National Act No 98/2021 however, which establishes the Portuguese Climate Framework Law, refers that the State will monitor and support the development of CCUS technologies (Article 59). Moreover, paragraph 2 of Article 59 affirms that the State, its autonomous and local administrations shall promote pilot projects for the implementation of these technologies in areas with major CO2 emissions.

5.3.2.3 Regulatory framework

As required, Portugal implemented the EU's CCS Directive into national law with the Decree-Law 60/2012, published in March 2012 (https://dre.pt/home/-/dre/553447/details/maximized). The implementation of the CCS Directive includes amendments required in other legislations such as the legislation on environmental impact assessments to implement the need for an impact assessment for CCS activities or the Legal Regime of Liability for Environmental Damages (Decree Law 147/2008) to cover for potential damages from CCS activities. This includes in particular the need to set up "one or more financial guarantees, ... which enable them to assume the environmental liability inherent to the activity they perform" through "insurance policies, obtaining bank guarantees, participating in environmental funds or constituting own funds reserved for this purpose". Another amendment is being made to the legal regime concerning integrated pollution prevention and control by adding CO_2 capture for storage purposes to the list of installations covered.

However, in Decree-Law 60/2012, it is stated that the document does not apply to CO_2 storage in geological reservoirs when the total injected CO_2 mass is less than 100 kt and the storage is aimed at developing scientific research or new products and processes (Article 2, paragraph 3).[2]

Offshore CCUS activities must also consider the regulatory framework of activities in the maritime area, namely the Portuguese Maritime Spatial Plan (PSOEM). According to the Decree Law No. 38/2015 and the Resolution of the Council of Minister No. 203-A/2019, which establishes the policy for the planning and management of the national maritime space in accordance with the European Directive n.º 2014/89/UE, the pilot phase does require the acquisition of a “Title for the private use of the maritime space” (TUPEM) that shall be awarded by the Directorate-General for Natural Resources, Safety and Maritime Services (DGRM, Article 51º). The Decree Law No. 38/2015 states that the awarding of a TUPEM for new activities depends on the previous approval of an allocation plan (Article 50(1)). Nevertheless, for the development of scientific research activities, the TUPEM may be exempted from previous approval of an allocation plan by decision of the members of the Government responsible for the sea affairs and environment (Article 50(2)).

The approval of a moratorium on ocean floor mining in the national maritime space, Law 36/2025, by banning any mineral exploration activities, inadvertently introduced further complexity to commercial deployment of CO_2 storage in the Portuguese offshore, as the CO_2 geological reservoirs are described as “mineral deposits”. A clarification of Law 36/2025 is required, making clear that it applies to deep sea mining and not to decarbonization activities such as CO_2 storage.

[2] This is the case of the pilot phase that is envisaged to be developed offshore at Figueira da Foz, as proposed by PilotSTRATEGY.

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The legislative package names the Member of Government in charge of Geological Resources and the Directorate-General of Geology and Energy as the person in charge of the acts foreseen in the diploma.

5.3.2.4 Financial support framework

As CCS is currently not seen as key building block in bringing down emissions in Portugal, no additional national financial support for CCS activities is currently available. However, there is the possibility to open up the national Environmental Fund to CCS projects in the future.

5.3.3 Summary

Compared to the status in 2022 the awareness and reflection of CCS and carbon management in Portuguese has significantly increased. So far, however, this has not resulted in the development of industrial projects or significant changes in the national legislation that may be necessary for a large-scale deployment of CCS in the future. This may change in light of the availability of national funding which can be used for the development of CCU and CCS projects, which is however currently limited in time until end of 2025.

5.4 Spain

5.4.1 Updates since 2022

Limited progress on the development of CCS can be seen in Spain.

A storage project has received funding from the Innovation Fund 2024: the project TarraCO2, led by Repsol, plans to store up to 2 Mt CO_2 annually offshore from 2030 onwards. It was awarded 205 M€. The project is still waiting for national governmental approval. On the Innovation Fund 2025, the project CO2net2Sea has been selected. This project aims at demonstrating a replicable, large-scale low-emission maritime CO_2 transport service, shipping-liquefied CO_2 from cement plant to a permanent geological storage in Spain. This project is led by ENAGAS, technical responsible of the national gas infrastructure.

In addition, the Global CCS Institute lists four commercial CCS projects in early development for the capture of emissions from cement plants (Heidelberg Anorga Cement Plant, Heidelberg Arrigorriaga Cement Plant, Calcinor Lime CCS and MOSSOL NetCO2 project). As well, national gas infrastructure company, ENAGAS, is studying the creation of transport hubs using existing regasification plants close to industrial areas such as Gijón Plant (Asturias).

At regional level, a new exploration permit under the CCS law in the Aragón area has been requested in summer 2025. Currently, this permit is under evaluation.

Spain still lacks a dedicated carbon management or CCS strategy. The updated NECP / PNIEC 2023-2030 recognises CCUS as an option for hard-to-abate industrial process emissions, but it does not yet define a comprehensive carbon-management strategy, quantitative CCS deployment targets or specific support instruments.

There have been no major changes in the CCS-specific regulatory framework, and no dedicated national support scheme for CCS has been introduced; CCS projects rely mainly on EU-level funding (Innovation Fund) and generic industrial decarbonisation programmes.

SOURCES

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Bellona: NECP Assessment – Carbon Capture & Storage in the national Energy and Climate Plan – Spain.

CINEA website: https://ec.europa.eu/assets/cinea/project_fiches/innovation_fund/101191313.pdf (accessed on 12.12.2025)

Clean Air Task Force: carbon Capture & Storage in Spain. Spain's Need and Potential for Carbon Capture and Storage

Government of Spain (2024): Integrated National Energy and Climate Plan – Update 2023-2030

5.4.2 Status by end of 2021

5.4.2.1 Current status of project development

ZEP currently lists one CCU project in Spain. The project aims at capturing the CO_2 from a cement plant in Carboneras and to recycle the gas for use in the agricultural sector for accelerated crop production. Until 2021, Spain was the only country having an active onshore injection site in the European Union. At the Hontomin Technology Development Plant (close to the city of Burgos) injection of CO_2 and its effects to the surrounding as well as whether the CO_2 actually stays underground was monitored. In 2018, it was granted a storage permit for a period of 30 years (10 years to inject a maximum of 100 kt of CO_2 and 20 years for site monitoring) conditional on the environmental bond which was never actually provided by the Ministry of Ecological Transition. At the end of 2021, the Ministry announced the official closure of the storage plant. Hontomin Technology Development Plant was officially recognized by the European Parliament as a key test facility.

5.4.2.2 Policy strategy

Total greenhouse gas emissions in Spain in 2019 were estimated to be 296 Mt CO_2e (EEA GHG data viewer, 2021). This makes Spain the fifth largest emitter in the EU. In 2020, the Spanish Government adopted a law to cut emissions to net zero by 2050. The role of CCU and CCS is specified in the documentation to Spain's long-term strategy (MITECO 2020a and 2020b). The long-term strategy aims at a reduction of emissions by 90% by 2050. The remaining 10% shall be offset by natural sinks (LULUCF). CCU and CCS are seen to be relevant in particular for the lime and cement production, for the production of fertilizers and in pulp and paper production. Steel and refineries might present other options for the use of CCU and CCS technologies dependent on the development of other alternatives for decarbonization. However, the long-term strategy also highlights that CCU and in particular CCS is still in the early stages of development and does not include negative emissions from BECCS for reaching the net zero target.

5.4.2.3 Regulatory framework

The transposition of the CCS Directive into Spanish law took place in December 2010 by the adoption of the law on Geological Storage of CO_2 (40/2010 Law). The law focuses on the storage of CO_2 and does not regulate transport or capture activities. Further, it explicitly states that planned storage capacity of less than 100 kt is not regulated under this law (in line with the requirements of the CCS Directive), but under Law 22/1973, of 21 July on Mines.

An assessment of the law (Sun et al. 2021) came to the conclusion that there are a number of aspects in the law that have not been further developed in the transposition of the CCS Directive into Spanish law, but that require further normative development for a useful application. Hence, the law presents a limited framework for the storage of CCS and requires further specifications in

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the future. Parts that are particularly well developed according to the assessment are the presence of a penalty system as well as the substantial technical content in particular for site characterization and the monitoring requirements of prospective storage sites.

As required additional amendments have been made for:

- Environmental impact assessments (Law 21/2013) to require for an environmental impact assessment for all activities in the context of CCS activities (drilling, storage sites, capture facilities, pipelines for the transport of CO_2)
- Compatibility with the marine environment (Law 41/2010) to require compatibility reports to be carried out on the protection of the marine environment
- Integrated environmental authorisation (Royal legislative Decree 1/2016) to reduce and control pollution of the atmosphere, water and soil. Therefore an integrated environmental authorisation is required.
- Authorisation of greenhouse gas emissions (Law 1/2005) under the EU ETS (required for capture, pipeline transport and geological storage of CO_2)
- Environmental liability (law 26/2007 and Royal Decree 2090/2008) requiring a quantitative environmental risk analysis as well as the provision of environmental financial guarantees to cover the environmental liability of operators activities

Still missing is a regulatory framework for the permitting process of CCS activities at larger scale. Exploration and storage permit for the storage site at Hontomin have been issued under the Mining Regulation. The storage permit requirements were established by a Task Force from the Mining Authority (IGME and CIUDEN). Law 40/2010 was taken into account in the process where the Mining Regulation itself was not sufficient. Based on the work of the Task Force a storage permit was granted in July 2018 to the Hontomin Technology Development Plant (Sun et al. 2021).

5.4.2.4 Financial support framework

To our knowledge, currently no additional national funding is available for the development of demonstration projects in Spain.

5.4.3 Summary

Despite Spain being one of the first countries of adopting the net-zero target by 2050 in law, CCU and in particular CCS are still not a key pillar in the Spanish decarbonization strategy. While a role is seen for CCS in the context of some industry sectors, a clear carbon management strategy or quantitative CCS deployment targets are still missing. Nevertheless, projects in Spain are beginning to develop, including industry projects as well as transport projects. Some of those projects receive funding under the EU Innovation Fund.

5.5 France

5.5.1 Updates since 2022

Between 2022 and 2024 France saw a quite dynamic development in the field of CCUS with the development of a CCUS strategy and a first call for interest for project funding. In light of those developments some new projects were developed. However, the current political situation has put the developments on hold mid 2024 and so far, no projects have been selected for funding whereas planned projects face delays.

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Currently, a total of 10 CCS projects (and 1 running CCU project) are listed by the International Association of Oil & Gas Producers (IOGP). New projects include the transport and storage projects (as part of PCI projects) Callisto (planned start in 2027, capacity unclear) and Pycasso (planned start in 2030 with a capacity of 1 to 2.5 Mt annually and an additional potential capacity of 3.4 Mt CO_2 from 2035 onwards). New capture projects include capture from cement plants in Martres-Tolosane (CarbonClearTech project, start planned for 2025/26, supported under the Innovation Fund), Montalieu-Vercieu (HyNoVi project, start now planned for 2027, production of methanol) as well as a lime production plant in Rety (CalCC project, start planned for 2028, supported under the Innovation Fund). Another two projects focus on hydrogen production (Grandpuits Zero Crude Platform and TotalEnergies' Normandy Platform).

In 2024, the French government released a CCUS strategy. It outlines carbon capture targets for France in the order of 4-8.5 mtpa CO_2 captured by 2030, 12-20 mtpa capture by 2040 and 30-50 mtpa by 2050 from industrial sources and an additional 10 mtpa captured from non-industrial sources. It further announces the development of CCUS hubs in up to four major industrial clustery by 2030 along with the development of a new regulatory framework for CO_2 transport, the will to allow for export of CO_2 and development of domestic geological storage sites as well as the implementation of a carbon-contracts-for-differences based support scheme.

In 2024, the French Ministry of Industry launched a first call for expressions of interest for support of CCUS projects. While several applications were received under the first call, so far no support for CCS projects has been released.

Another important update in 2025 is the adoption by the French National Assembly of a law enabling the adoption by France of the Amendment to Article 6 of the London Protocol. Thus, export of CO_2 from the French territory for offshore storage in other countries (Norway, Denmark, etc.) will be authorized.

SOURCES:

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French Government (2025): LOI n° 2025-566 du 23 juin 2025 autorisant la ratification de la résolution LP.3(4) portant amendement de l'article 6 du Protocole de Londres de 1996 à la Convention de 1972 sur la prévention de la pollution des mers résultant de l'immersion de déchets et autres matières (1) https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000051782992 (accessed on 12.12.2025)

French Ministry of the Economy (2024): Etat des lieux et perspectives de deployment du CCUS en France. https://www.ecologie.gouv.fr/sites/default/files/documents/%C3%89tat%20des%20lieux%20et%20perspectives%20CCUS_0.pdf (accessed on 12.12.2025)

Global CCS Institute (2024): The Status of CCUS in France: Present & Future Opportunities.

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5.5.2 Status by end of 2021

5.5.2.1 Current status of project development

In France, currently three CCS projects are being listed by ZEP: A low-carbon hydrogen production in Port Jerome (Port Jerome CO_2 capture plant), a CCS-equipped steel-making plant in Dunkirk (3D Projekt DMX Demonstration in Dunkrik) and a CO_2 transport and storage project in the Dunkirk harbor (D'Artagnan). In addition, with the K6 Program, France won one out of four CCU or CCS projects funded under the first EU Innovation Fund call for proposals round. The project in the Lumbres cement plant aims at significantly reducing CO_2 emissions from cement production by maximizing the use of biomass-containing and alternative fuels, using already-decarbonated raw materials and applying an oxy-fuel kiln which will be able to capture 90% of the remaining CO_2 (see https://ec.europa.eu/clima/system/files/2021-11/policy_funding_innovation-fund_large-scale_successful_projects_en.pdf).

A CCS pilot-scale project in Lacq-Rousse was operated by Total (2006-2013) and injected more than 51 kt of CO2 during 2010 and 2013 (Total 2013).

5.5.2.2 Policy strategy

With 460 Mt CO_2e in 2020, France is the second largest absolute emitter in the European Union following Germany (EEA GHG data viewer 2021). Already in 2019, France adopted in its law no. 2019-1147 on energy and the climate the target to become carbon neutral by 2050. Details of reaching this target are specified in the national low carbon strategy. The first version of the strategy was published in 2015 (aiming at a target of 75% reduction below 1990 levels by 2050) and it was amended in 2020 to reflect on the updated target of carbon neutrality by 2050 (Republique Francaise 2020). In the amended low carbon strategy from 2020 different policy objectives towards CCU and CCS are presented. CCS technologies are seen as an integral part to reduce non-energy emissions in industry by 81% by 2050 compared to 2015. According to the report, up to 6 Mt CO_2 from industry could be captured annually by 2050. Sector roadmaps for steel, chemicals and cement from 2021 go even further and explicitly name CCS as a lever for decarbonization by 2030 (steel and chemicals) or 2035 (cement). Explicitly no future role is seen for CCS in the energy sector after 2050 except for the combination with biomass to generate negative emissions (BECCS). A potential of about 10 Mt CO_2 is seen for BECCS activities in 2050. CCU is mentioned as a priority area for research.

5.5.2.3 Regulatory framework

According to the national low-carbon strategy the legislative framework for CCS activities in France is ready. The CCS Directive has been implemented into national law in 2011 (French national decree on the geological storage of CO_2 - Decree n°2011-1411).

Further legislation relevant is that from 2009 any new coal fired power plant needs to be CCS read and have a full-scale demonstration program.

Already in May 2010 the French parliament had adopted exploration permit principles and granting processes based on the country's mining code, which handles access rights to underground resources. In addition to the approval, injection tests must include public consultations. In France, the Ministere de la transition ecologique is the competent authority dealing with the operation of CCS projects.

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5.5.2.4 *Financial support framework*

Different sources can be accessed for the support of CCS projects (ADEME 2019). Projects in the R&D phase can find national financial support either via the ADEME thesis program, a program designed to support students in writing a phD thesis, or via specific calls for R&D projects. Investments into demonstration projects and for further industrial development can be accessed via the Investments for the future program. The program as a whole has a budget of 57 billion €, of which 4 billion € are available for funding of projects for the environment and in the renewable energies sector. This part is operated by ADEME. There are two support possibilities: via state-aid combining grants and refundable loans (up to 2.8 billion € are spent that way) or via capital investments by ADEME in the form of co-investments either with corporates or financial partners in project companies or with venture funds in SME's companies. For the later part 1.2 billion € are available. A broad spectrum of projects can be funded under the Investments for the future program including renewable energy projects, environmentally friendly buildings, green chemistry, energy storage, hydrogen production, water and biodiversity, waste and industrial ecology projects, polluted site remediation and projects in the area of transport for the future. Specific funding programs focusing on CCU or CCS activities were not identified.

5.5.3 Summary

Until 2024, France made significant progress in implementing a regulatory CCUS framework. It includes a clear carbon management strategy along with a dedicated support scheme for CCUS development. This progress is reflected in the development of new CCS projects, some of which are also supported under the Innovation Fund. The projects include capture as well as transport and storage. Also, export of CO_2 has been integrated into the regulatory framework by adopting the Article 6 amendment of the London Protocol. In 2025 developments have been slowed down by political instabilities. As a result, the national financial support system for CCUS put in place in 2024 has not yet released support for CCS projects

5.6 Poland

5.6.1 Updates since 2022

Although the legal framework for CCUS has partly been adapted in Poland since 2021, there is still no clear sign from the government on the role of CCUS. Project activities are developing slowly.

Project activities in Poland are still limited. In 2022 the Go4ECOPlanet project to reduce emissions from a cement plant started. It secured innovation fund support in the order of 228 M€ and is aiming at capturing around 1.2 Mt CO_2 annually from 2027 onwards. In 2023 ECO2CEE started, a marine terminal for the shipment of carbon dioxide with a capacity of up to 3Mt CO_2 annually in Phase 1. The project is part of the PL-EU Interconnector initiative listed as PCI and supported with 2.54 M€ by the Connecting Europe Facility for the front-end engineering design. These projects are supplemented by a trans-European transport project (CO2 Routes Across Europe).

So far, Poland has only submitted a draft updated NECP. Although the updated plan contains a new, more ambitious climate projection scenario it does not contain a clear strategy on CCS, but only mentions demand for research for the further application of CCS. Final update of the plan has not yet been published.

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In 2023 the Polish Geological and Mining Law and the Energy Law were amended with the aim of allowing for the development of CCUS projects in Poland. In particular, existing barriers were removed that limited the use of CCUS technology to demonstration projects. Further, the need of a licence for identification of a location of a CCUS installation at investment planning stage were removed along with the need for licence for small installations (e.g. storage with a total amount of less than 100 kt). As a third building block, the law now allows for a direct connection between a capture and a storage site without usage of a transport network. Since 2025, the law also allows for onshore storage. An amendment to Article 6 of the London Protocol has not yet been ratified. So international transport of CO_2 for offshore (under-seabed) storage is still not possible.

Despite the amendments to the Geological and Mining Law and the Energy Law in 2023, Poland still lacks updated secondary legislation specifying the permissible locations for underground CO_2 storage. The country continues to operate under the Regulation of the Minister of the Environment of 3 September 2014, which restricts CO_2 storage exclusively to offshore areas within the exclusive economic zone and to depleted hydrocarbon reservoirs. A new regulation intended to expand the range of eligible storage locations — including onshore areas such as Lower Cretaceous, Lower Jurassic and Middle Cambrian aquifers, as well as depleted hydrocarbon fields — has been announced but has not yet been adopted. As a result, practical implementation of onshore CO_2 storage remains impossible until the new executive regulation is issued.

A working group on Carbon Capture, Storage and Utilization technologies, established by the Ministry of Climate and Environment is continuing to meet.

SOURCES:

Carbongap website: Policy Tracker Poland https://tracker.carbongap.org/regional-analysis/national/poland/ (accessed on 12.12.2025)

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Cms law now website: Poland enacts regulations to accelerate development of carbon dioxide capture, utilisation and storage technology (CCUS)https://cms-lawnow.com/en/ealerts/2024/02/poland-enacts-regulations-to-accelerate-development-of-carbon-dioxide-capture-utilisation-and-storage-technology-ccus (accessed on 19.11.2025)

Polish Government/ Ministry of Climate and Environment (2024): National Plan in the Field of Energy and Climate by 2030.

5.6.2 Status by end of 2021

5.6.2.1 Current status of project development

Currently, ZEP shows only one CCS-related project in Poland. The project aims at the development of an open access multi-modal CO_2 hub in the Port of Gdansk. The project is being funded as one out of six projects of common interest related to the development of cross-border CO_2 networks (Poland EU CCS Interconnector, see https://ec.europa.eu/energy/sites/default/files/fifth_pci_list_19_november_2021_annex.pdf).

In September 2021 HeidelbergCement announced the launch of a new CCS project at the Gorażdże cement plant in Poland under the lead of the Norwegian Sintef Energi AS. The project ACCSess, which receives 15 million € funding under H2020, builds on a consortium of 18 industry partners and

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research organisations. It aims at testing an enzyme-based capture unit. The project is running until 2025 (see https://www.heidelbergcement.com/en/pr-17-09-2021).

In March 2021, the 3-years project 'CCUS.pl' (*Strategy for the development of technologies for capture, transport, utilization and storage of CO_2 in Poland and the pilot of the Polish CCUS Cluster*) of Ministry of Economic Development, Labour and Technology began. The project is only concerned with the development of a disposal strategy, but through the participation of relevant actors, it may be an opportunity for faster amendment of the law for CCS in Poland.

5.6.2.2 Policy strategy

GHG emissions in Poland were at 380 Mt CO_2e in 2019 (EEA GHG data viewer), fourth highest in the EU. For the time being, Poland has not implemented a net-zero target for 2050 yet and has also not formally endorsed the EU's 2050 climate neutrality goal. Further, Poland so far has not submitted a long-term strategy from which information could be taken on the country's approach to decarbonize its economy. In September 2020, Poland's deputy climate minister stated that "climate neutrality is something that we are committed to", which was seen as a positive signal (https://www.euractiv.com/section/energy-environment/news/warsaw-says-committed-to-eus-climate-neutrality-goal/). In January 2021, Greater Poland, the country's second largest region announced that it intends to become climate neutral by 2040. In the region, one coal-fired power plant and seven coal mines are in operation. Greater Poland sees itself as a "laboratory on the road to climate neutrality" (https://www.euractiv.com/section/energy/news/west-poland-subregion-aims-to-be-first-in-the-country-to-hit-net-zero/).

Research scenarios from independent organisations (Kobize, a Polish Think Tank part of the Institute of Environmental Protection - National Research Institute) indicate that CCS, CCU and BECCS could play an important part in the decarbonization strategy of Poland's economy (see https://climatecake.ios.edu.pl/wp-content/uploads/2021/07/POLAND-NET-ZERO-2050.-The-roadmap-toward-achievement-of-the-EU-climate-policy-goals-in-Poland-by-2050.-Summary_FINAL.pdf). In contrast, a report by WWF Poland reaches climate neutrality without the use of CCS technology.

In October 2021 the Ministry of Climate and Environment launched public consultations on the role of CCS projects in Poland in the future. An attempt to put CCS to the political agenda is the publication of a green paper by an industry group consistent of LOTOS Petrobaltic, LOTOS Group and Azoty Group, representatives of the Polish oil and gas industry as well as a chemical company in November 2021. The "Green Paper for CCS development in Poland. Business proposals in the legislative process" identifies shortcomings in the existing legal framework and makes recommendations for changes in the existing legislation to allow for CCS development in general (https://grupaazoty.com/en/news/green-paper-for-ccs-development-in-poland).

5.6.2.3 Regulatory framework

In Poland, implementation of the CCS Directive into national law took place in 2013 by the announcement of the uniform text of the Act of June 9, 2011 Geological and Mining law. It solely allows for and regulates the underground storage of CO_2 in order to conduct a CCS demonstration project. Furthermore, only one offshore storage site in the Baltic Sea is currently approved for storage, onshore storage is hence currently banned. By the end of 2024, a report containing an analysis of the projects carried out is to be prepared to present the experience. The national

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authority in charge of storage projects is the Polish Geological Institute - National Research Institute, who is the National Administrator of Underground Carbon Dioxide Storage Sites (KAPS CO_2).

In 2014 (Journal of Laws of 2014, item 1272) the Minister of the Environment issued a regulation on the areas where it is allowed to locate an underground carbon dioxide storage complex and an ordinance on the register of mining areas and closed underground carbon dioxide storage (Journal of Laws of 2014, item 1469).

The Regulation of the Minister of the Environment of December 8, 2017 on mining plant operation plans (Journal of Laws of December 11, 2017, item 2293) contains the detailed requirements for the mining plant operation plan required for underground storage of carbon dioxide. In line with the requirements from the CCS Directive, the operation plan should specify the quantity composition and characteristics of the injected gas, characteristics of the underground storage site, geological, hydrogeological and engineering conditions of the underground carbon storage complex, a description of the mining area, natural, technical and environmental hazards, anticipated organizational and technical measures necessary for ensuring occupational safety and universal safety as well as protection of mineral deposits, groundwater and other elements of the environment as well as envisaged undertakings aimed at preventing carbon leakage.

5.6.2.4 Financial support framework

Currently, there is no national financial support framework for CCU or CCS in place in Poland.

5.6.3 Summary

A remaining key barrier for the development of CCS projects in Poland is the missing political will. It is unclear which role the Government foresees for CCU or CCS activities and whether the country is actually willing to commit to reaching net zero by 2050. Despite the missing political will certain activities show that at least some progress is being made. Updates of the legal framework for CCUS have been made to allow for storage. However, storage is currently limited to offshore sites. Further, a ratification of Article 6 of the London Protocol is still outstanding. As a result, project activities in Poland are developing slowly.

5.7 Greece

5.7.1 Updates since 2022

Compared to 2021, the development of CCS in Greece has accelerated significantly. Key developments include the emergence of a storage project as part of a transboundary PCI initiative, the inclusion of CCS in the Hellenic NECP update of 2025 and various implementation activities undertaken both by government bodies and project developers.

EnEarth, a subsidiary of Energean PLC, a British oil and gas company, is developing a storage project in the Kavala region. The Prinos offshore CO_2 storage project, which was awarded a storage exploration licence in October 2022 and applied for permitting in July 2024, shall be able to store up to 1 Mt CO_2 per annum in its first phase (starting 2026/27) of development and up to 2.8 Mt CO_2 per annum in its second phase (planned for 2029/30 and for injection of up to 20 years). The project received PCI status in 2024 and 150 M€ state aid under the Recovery and Resilience Facility and a grant of approximately 120 M€ under the Connecting Europe Facility were approved by the European Commission.

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In addition, three capture projects have secured Innovation Fund support:

- the IRIS project aiming at capturing 8.6 Mt over the first ten years of operation from fossil hydrogen production secured 127 M€,
- the project IFESTOS plans to capture 1.9 Mt CO_2 annually from a cement plant secured 234 M€ (capture start planned for 2029) and
- the OLYMPUS project aiming at capturing 1.9 Mt CO_2 annually again from a cement plant (capture start planned for 2029) secured 124.5 M€.

The project pipeline is complemented by the ApolloCO2 project, a potential transport project aiming at pipeline transport onshore with shipping of CO_2 to the Prinos offshore storage site. The capacity is announced to reach 3 Mt annually in Phase 1 and can be expanded to 5 Mt annually in Phase 2. Along with Prinos it is listed as PCI project by the EU.

In its NECP update from 2025, Greece introduces a clear strategy for CCS viewing it as a bridging technology for hard-to-abate sectors such as cement production and refineries for Greece. The plan also specifically addresses direct air capture of CO_2. In total, carbon capture from industry and the energy sector is projected to reach 3.3 Mt in 2030 and increases to 3.9 Mt CO_2 by 2050. Direct air capture is expected to being after 2045, reaching 4.5 Mt CO_2 in 2050. CO_2 storage volumes are projected to increase from 3.1 Mt CO_2 in 2030 to 5.7 Mt CO_2 in 2050.

In the 2025 update of its national resilience and recovery plan, "component 5.1: REPowerEU REFORMS" Greece announces the development of a licensing and regulatory framework for CCS (including the development of financial support instruments) along with the establishment of relevant standardisation and certification processes for captured and stored CO_2 and the adoption of a third-party access framework for transport infrastructure and storage. According to the document, the implementation of the reform should have been completed by 30 June 2024. However, in November 2025 the legislative framework was still open for public consultation.

In February 2025, a draft legislation on transport and storage of CO_2 was presented. It announced investments of 390 M€ by June 2026 into CCS and hydrogen. Total investments into CCS are announced to reach 2 bn€ by 2030 (including EU funding). Already in 2022, Law 4920/2022 appointed Hellenic Hydrocarbons and Energy Resources Management Company (HEREMA) as the competent authority for licensing of geological storage sites.

For the identification of geological formations deemed suitable for permanent storage of CO_2 two competent authorities are named: the Hellenic Hydrocarbons and Energy Resources Management Company (HEREMA) and the Hellenic Survey of Geology and Mineral Exploration (HSGME). In its updated NECP, Greece also announces its intention to propose reforms for the relevant framework, at the EU level, in order to enable the development of CCS projects where CO_2 from EU industries can be stored in suitable geological formations located in neighbouring non-EU countries (e.g. Egypt).

Available public funding for CCS projects is announced to be 150 M€ between 2025 and 2030.

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5.7.2 Status by end of 2021

5.7.2.1 Current status of project development

Up to today, to our knowledge no CCS projects are under development in Greece.

5.7.2.2 Policy strategy

Emissions in Greece were 86 Mt CO_2e in 2019 (EEA GHG data viewer). Industrial installations under the EU ETS with annual emissions over 0.5 Mt are very limited (8 in 2020). Therefore, the applicability of CCS in industry in Greece is likely very limited.

Transposition of climate neutrality into law shall be enacted via the government bill "National Climate Law - Transition to Climate Neutrality and Adaptation to Climate Change", in particular Article 7. A draft text is currently in the Ministry of the Environment where stakeholder input from a public consultation is considered.

5.7.2.3 Regulatory framework

As required the CCS Directive has been implemented into national Greek law without extensions to the EU text. The competent authority for CO_2 storage in Greece is the Ministry of Environment (Gazzetta B' 2516/7-11-2011).

The implementation of the CCS Directive restricts storage sites. Accordingly, storage is not permitted in areas where the storage complex extends beyond Greek territory (Shogenova et al. 2014).

5.7.2.4 Financial support framework

Currently, no specific funding for CCU or CCS projects is in place.

5.7.3 Summary

Since 2022, Greece has rapidly advanced its CCS agenda, centered on the Prinos offshore storage project developed by EnEarth/Energean. Prinos is supported by over €270 million in EU and national funding and aims to store 1–2.8Mtpa CO_2 annually from 2029 onward and is part of a broader PCI-linked CCS network. Major capture projects (IRIS, IFESTOS, OLYMPUS) have secured Innovation Fund

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support and are expected to begin capturing CO_2 from 2029. The ApolloCO_2 transport project will provide 3-5Mtpa transport capacity to Prinos.

Through the 2025 NECP update, Greece defines CCS as a bridging tool for hard-to-abate sectors and also examines additional storage potential in regions such as Western Macedonia (Mesohellenic Basin), where geological formations may offer future opportunities. Regulatory reforms - still under consultation in late 2025 - are being developed to enable licensing, certification and third-party access. In contrast, up to 2021, Greece had no CCS activity, marking the recent developments as a major strategic shift.

6. Key findings

6.1 Updates since 2022

The analysis has shown that at different levels progress is being made to develop a working CCUS market within Europe. Both, the EU, but also Member States are becoming more and more active in developing the topic.

At the EU level, we see that, on one hand, missing elements are being provided such as a clear CCUS strategy and an amendment of existing legislation to better integrate CCUS (e.g. in case of the RED or the EU ETS). On the other hand, additional legislation strengthens the development of geological storage sites within the EU. The two are being complemented with a new aspect, also relevant in the context of CCS: the discussion on permanent carbon dioxide removals. The EU COM foresees a strong role for permanent carbon removals and shows a clear will to provide a legal framework for the development of a market for permanent carbon dioxide removals in Europe.

Developments at the member state level show more awareness and a stronger focus on CCUS activities in all countries analysed for the report:

- Most progress could be found in the UK and Greece. While the UK already had a well-advanced framework by the end of 2021, the country managed to add missing pieces and provides strong incentives for the development of a CCUS market in the UK which is reflected in a very dynamic development of the project chain. In Greece, CCUS was not very high on the agenda by the end of 2021. This has changed completely with CCUS now being part of the updated NECP, the development of the legislative framework along with financial support. This has resulted in the development of transport, storage and also first capture projects in Greece.
- Like the UK, the Netherlands show progress along the way to develop a CCUS value chain. Missing pieces in legislation have been added. A strong driver remains the clear political strategy along with strong financial support and strong state involvement in the development of – in particular – transport and storage projects.
- France has shown some dynamic with the development of a CCUS strategy and financial support instruments. However, the current political situation in France has so far prevented the realization of first steps.
- Several countries (UK, Netherlands, France, Portugal) now not only focus on hard-to-abate sectors and fossil CCUS, but mention the role of permanent carbon removals for the development of CCS.

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6.2 Status by end of 2021

The EU provides a well-established framework for CCS projects consisting of a clear political willingness to make the EU climate-neutral, regulatory requirements and financial support instruments. In particular, the EU Commission decided quite early on to develop a common legal framework for CCS activities. The CCS Directive along with the Directives on the EU ETS and amendments to key directives such as the Environmental Impact Assessment Directive, the Large Combustion Plant Directive and the Waste Framework Directive present the existing legal requirements for the realization of geological transport and storage projects in EU Member States. While in particular the CCS Directive provides certain minimum standards and requirements for transport and storage projects, it is itself not sufficiently detailed, giving leeway to the Member States in formulating their own standards and regulations. In addition, in the past the existing financial support from the EU level (i.e. CO_2 prices and funding of projects from NER 300) was not sufficient to provide a business case for the realization of CCS projects in the Member States. Therefore, in 2020/21 an update in the provision of financial support was developed by the introduction of the Innovation Fund and the opening up of funding availability not only to power-related projects, but also to projects from industry along with CCU projects. In addition, increases in CO_2 prices under the EU ETS to prices close to 100 €/t CO_2 further set increasingly strong incentives for saving CO_2 emissions with the help of CCU or CCS technology.

The activities on the EU level show effects in the Member States. Most of the countries analyzed for this report have introduced or are on their way to introduce a net-zero target by 2050 into national legislation. The examination of this net-zero target in long-term strategies along with their implications for the medium term targets for 2030 in the NECPs have resulted in an examination of the role of CCU and CCS in many of the countries. While the outcomes of that process are quite heterogeneous, certain clusters can be identified:

- A specifically high level of activity can be found in particular in the UK and the Netherlands. Both countries possess of large storage capacities in offshore regions which they plan to use not only for themselves, but which could also be used for providing other countries the opportunity to store CO_2 there. That is, those countries see clear market potential by offering storage capacities to countries with limited storage capacities, but in need of storage due to their economic structure. While the approaches taken to support the development of CCS infrastructure differ between UK and the Netherlands, both countries provide significant (additional) financial support and formulate a clear political will to have CCS clusters running in the next 5-10 years. Also, quite similarly in both countries, the focus is currently on the development of the transport and storage infrastructure with the development of actual capture projects following in a second phase. In particular in the UK, but also partly in the Netherlands, it can be seen, that the transposition of the CCS Directive into national law included not only the implementation of the minimum requirements but that additional regulations were being developed to clarify the process and liabilities arising from CCS activities.
- At the other end of the spectrum are countries like Greece or Portugal. Their economic structure does not require the development of strong CCS capacities and so far strong political signals for the realization of CCU or CCS projects are missing. The implementation of the CCS Directive was merely a 1-to-1 translation of the European law into national law, leaving open questions for project developers that would need to

be addressed by the government in the process of realizing a CCS project (likely also partly in case of CCU projects). As a result of the missing political signals and legal uncertainties activity in those countries are low.

- For Spain, France and Poland, the situation is different again. Here, the economic structure opens up a way for CCU and CCS projects being a suitable way to reach climate neutrality. As a result, a certain activity level can be found driven by the private sector and particularly concerned industries. However, in all three countries a clear political signal is to date missing. Hence, neither a dedicated financial support system for CCS (or CCU) projects nor a very much adapted legal framework for the transport and geological storage of CO_2 can be found in these countries. In particular the second one can present a high barrier for the timely realization of CCS projects as it means that, on the one hand, a high level of uncertainty exists on costs and liabilities for the project and, on the other hand, approval procedures may take a lot of time in cases where specific details have to be clarified along the way.

Finally, it shall be highlighted once more that in none of the countries analysed for this report - except for the testing installation in Spain - a transport system or storage site is currently running. Hence, the real world testing of the existing frameworks will come in the coming years when final investment decisions are being made and applications are being filed by companies.

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