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THE STATUS OF CCUS IN FRANCE : PRESENT & FUTURE OPPORTUNITIES

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WITH AN AMBITIOUS PLAN TO DECARBONISE ITS ECONOMY, FRANCE IS POISED TO BECOME A NEW KEY PLAYER IN THE EUROPEAN CCUS SPACE.

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Acknowledgements

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1.0 KEY TAKEAWAYS

1. The need to align France's commitment to climate neutrality with the plan to revive the national industry via a "reindustrialisation" has contributed to building a new momentum for Carbon Capture Utilisation and Storage (CCUS) in the country, marking a crucial shift in the government's approach to CCUS from intention towards action.

    1.1. As part of national efforts to meet its climate objectives, France released its updated national CCUS strategy on 4 July 2024. The strategy titled "Current status and outlook for CCUS deployment In France" (hereinafter referred to as the "French CCUS strategy") is built on the draft released in 2023 for consultation purposes. It outlines targets for CCUS as well as support mechanisms, including a proposed regulatory framework, and defines a trajectory for the development of transport infrastructures and domestic storage sites.

    1.2. The country aims to achieve a CO_2 capture capacity of between 4 and 8 Mtpa by 2030, with a potential increase to 12-20 Mtpa by 2040 and 30-50 Mtpa by 2050.

2. 2023 and 2024 represent crucial years for laying the groundwork for the deployment of CCUS in France because of the emergence of important regulatory developments and the announcement of dedicated support mechanisms. With several French companies positioning themselves as leaders in the CCUS value chain, France demonstrates great potential for CCUS adoption in the coming years.

    2.1. Facilitating public-private dialogue between the government and industry is a critical step for France to understand the main decarbonisation challenges faced by industrial players in the country. During the process that led to the establishment of the ecological transition contracts between the French government and the 50 highest CO_2-emitting industrial sites, CCUS emerged as an indispensable decarbonisation solution.

    2.2. French businesses across various sectors are showing significant interest in CCUS. Hard-to-abate industries are leading CCUS projects with the support of infrastructure and storage operators, as well as banks. Additional interest is emerging in sectors like waste-to-energy and power generation, signalling opportunities for further expansion of CCUS in France.

3. France expects CCUS to play an important role in decarbonising unavoidable emissions generated from sectors with limited cost-effective options to reduce their emissions.

    3.1. In the short and medium term, the country intends to achieve industrial emissions reductions by prioritising the application of CCUS to specific hard-to-abate sectors, such as chemicals, fertilisers, cement, lime and metallurgy industries.

    3.2. Other sectors like waste incineration, biomass transformation, paper and food industries might also potentially benefit from the application of CCUS in the long-term, depending on the evolution of the European Union Emission Trading System (EU ETS).

    3.3. The French CCUS strategy also envisages a role for Carbon Capture and Utilisation (CCU), and foresees leveraging Carbon Dioxide Removal (CDR) technologies like Bioenergy with Carbon Capture and Storage (BECCS) or Direct Air Capture (DAC) to deliver negative emissions and support the country's transition towards carbon neutrality.

4. Establishing the CO_2 transport infrastructure and the related regulatory framework is a prerequisite to enable the scale-up of CCUS in France. In recognising this, the French CCUS strategy outlines the government's intent to design a regulatory framework applicable to CO_2 transport, based on the principles of open, transparent and non-discriminatory access. Alongside the transport component, CO_2 capture and storage capacity should also be developed simultaneously to seek to ensure that all the components of the value chain are accessible at the same time.

5. While France has not yet developed its own geological sequestration capacity for CO_2, identifying suitable sites for domestic onshore and offshore storage will be crucial, not only to support the development of the full value chain in the country, but also to provide emitters located far from export hubs or CO_2 transport backbones with the possibility to store their emissions domestically and reduce costs. However, engaging local communities and stakeholders is necessary to address social concerns linked to the technology, as well as promote a good understanding of CO_2 storage and its environmental and social benefits.

6. France currently hosts numerous CO_2 capture, transport, storage and utilisation initiatives at different stages of development. Several projects are located in areas identified as highest emitting industrial clusters that are ranked as priority areas by the French CCUS strategy. Some of these areas have also been granted the status of Low Carbon Industrial Zones (ZIBaC), meaning that they can receive state support for coordinated decarbonisation projects.

7. Supporting mechanisms and financial incentives are essential for the commercial feasibility of CCUS projects. However, building a business case for CCUS remains highly challenging today due to the limited forms of public support available to address the gap between the CO_2 price under the EU ETS framework and CCUS costs. A proposal by the government for a Carbon Contract for Difference (CCfD) mechanism will be crucial to incentivise investment and help the first major CCUS projects get off the ground.

8. To meet its climate targets, France has established various bilateral and multilateral partnerships with other European countries to strengthen cooperation in the field of CCUS. To secure access to storage sites in the North Sea and the Mediterranean Sea, the country highlights in its CCUS strategy the intention to ratify the 2009 amendment to Article 6 of the London Protocol and establish the necessary bilateral agreements to allow the transboundary transport of CO_2 for geological storage.

9. Given its strategic geographical location, France plays a crucial role in unlocking positive regional synergies. The country is positioning itself as an enabler of continental CO_2 transport networks, as well as a critical CO_2 infrastructure player in Western Europe. Additionally, the parallel development of ambitious CCS strategies in France and Germany, which are among the largest emitters in the EU, presents a valuable opportunity to align objectives and drive further development of CCS policies at the European Union (EU) level.

10. Policy and legislative work was put on hold in France due to snap elections on 30 June and 7 July 2024. As a result of the changes in France's political landscape, additional CCUS policy developments might be facing delays.

2.0 INTRODUCTION

The EU's commitment to reach net-zero emissions and become the first climate-neutral continent by mid-century has created unprecedented momentum for the deployment of carbon management technologies. Among them, CCUS is emerging as an indispensable tool to support the EU's net-zero transition, potentially driven by recently announced supportive policy and financial incentives adopted at both the EU and national levels.

With an ambitious plan to decarbonise its economy, France is poised to become a new key player in the European CCUS space, alongside Norway, the Netherlands, Denmark and the United Kingdom (UK). Thanks to the emergence in the country of a number of CO_2 hubs entailing the cross-border transport of CO_2 to northern and southern Europe, as well as France's geographical location in the heart of the region, the country has the potential to drive the deployment of CCUS at the national level and be part of the creation of a trans-European carbon dioxide (CO_2) transport network.

France is taking positive steps towards CCUS, which is expected to contribute to the decarbonisation (the gradual reduction of greenhouse gas emissions) of industrial sectors with no alternative cost-effective solutions to reduce their emissions. In June 2023 the French government released a draft CCUS strategy for public consultation as part of national efforts to meet its climate objectives. As a result of the consultation process, the draft national CCUS strategy was updated in July 2024 with the release of a document unveiling the current status and future prospects for the deployment of CCUS in France (hereinafter referred to as the "French CCUS strategy"). The French CCUS strategy notes that the technology could have the potential to capture and store between 4 and 8 Mtpa of CO_2 emissions by 2030, 12-20 Mtpa by 2040 and 30-50 Mtpa by 2050.

This high-level assessment has been produced following a meeting of French and European stakeholders organised by the Global CCS Institute and GE Vernova in Paris on 12 June 2024.

A decree dissolving the French National Assembly on 9 June 2024 and the results of legislative elections on June 30 and 7 July 2024 have contributed to the creation of a highly fragmented political landscape in the country. As a result, policy developments on CCUS might be facing delay.

3.0 ROLE ENVISIONED FOR CCUS IN FRANCE

France has legally committed to reaching net zero by 2050 through its 2019 Energy and Climate bill[2]. Achieving this goal implies a 50% greenhouse gas (GHG) emissions reduction milestone by 2030 compared to the 1990 level. By 2050, the country anticipates 80 Mtpa of remaining unavoidable emissions to be mitigated by CCUS, CDR and other carbon sinks.

In 2022, GHG emissions in France amounted to 404 Mt CO_2-eq[3]. The manufacturing industry represented the third main source of the total GHG emissions in the country, following the transport sector (32%) and agricultural sector (19%). In particular, the industrial sector accounted for 18% of the country's emissions[4], with this share projected to increase as other sectors decarbonise further and the French government's "reindustrialisation" policies advance.

Thanks to the ability of CCUS to assist in decarbonisation efforts for sectors that face unique challenges to reduce their emissions, the French government sees it as an important tool to abate the remaining industrial emissions, while also fostering growth.

In the energy sector, due to the high penetration of nuclear energy and renewables, emissions amounted to 11% of France's total, mainly attributed to remaining gas power plants. Industry and energy generation collectively contributed to 118 Mt of CO_2-eq emissions in 2022, and CCUS can therefore play an important role in mitigating these emissions.

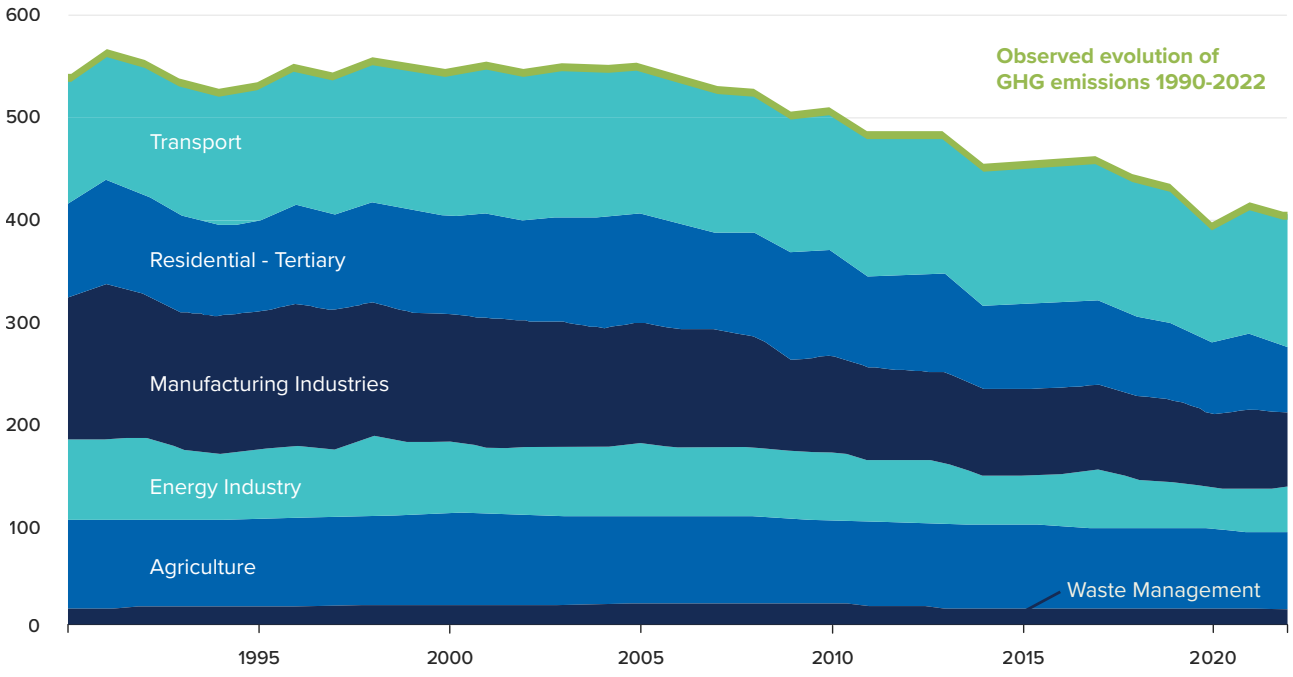

Figure 1: Evolution of greenhouse gas emissions in France between 1990 and 2022 in millions of tonnes of CO_2 equivalent, Ministry for Ecological Transition, 2023, based on data by Citepa[5]

[1] Ministry of the Economy, Finance and Industrial and Digital (2024), 'État des lieux et perspectives de déploiement du CCUS en France', July 2024. Available at: https://www.entreprises.gouv.fr/files/files/industrie/etat-des-lieux-et-perspectives-de-deploiement-du-ccus-en-france.pdf

[2] Legifrance (2019) 'LOI n° 2019-1147 du 8 novembre 2019 relative à l'énergie et au climat' 12 November 2023. Available at: https://www.legifrance.gouv.fr/dossierlegislatif/JORFDOLE000038430994/

[3] Ministry for Ecological Transition (2023) 'Émissions de gaz à effet de serre et empreinte carbone en 2022 - Synthèses des connaissances en 2023', 11 November 2023. Available at: https://www.statistiques.developpement-durable.gouv.fr/emissions-de-gaz-effet-de-serre-et-empreinte-carbone-en-2022-syntheses-des-connaissances-en-2023?rubrique=28&dossier=1274

[4] Ibid.

[5] Adapted from Ministry for Ecological Transition (2023) 'Émissions de gaz à effet de serre et empreinte carbone en 2022 - Synthèses des connaissances en 2023', 11 November 2023. Available at https://www.statistiques.developpement-durable.gouv.fr/emissions-de-gaz-effet-de-serre-et-empreinte-carbone-en-2022-syntheses-des-connaissances-en-2023?rubrique=28&dossier=1274

France has formally acknowledged the need for CCUS since the 2019 update of its National Low Carbon Strategy (SNBC), identifying CCUS as the second most significant technological contributor to GHG emissions reduction after the electrification of energy uses. This commitment is reinforced by the National Energy and Climate Plan (NECP) released in June 2024[6], which references targets and future instruments outlined, updated and developed in the final national CCUS strategy, serving as a basis for future action on CCUS.

Preliminary discussions between the public and private sectors indicate significant interest in CCUS in France. Several industrial clusters have already emerged as priority candidates for CCUS implementation, given the concentration of major emitters and proximity to storage sites, both domestically and abroad. Key players in industries, such as steel and cement, are actively considering CCUS to mitigate their emissions. CCUS is an alternative solution for carbon-intensive industries to reduce their exposure to the EU ETS, which is expected to see further price hikes. Moreover, with several French companies positioning themselves as leaders in the CCUS value chain, organised nationally through the Club CO_2, France demonstrates great potential for CCUS adoption in the coming years.

[6] European Commission (2024) 'National Energy Climate Plan of France', June 2024. Available at: https://commission.europa.eu/document/download/ab4e488b-2ae9-477f-b509-bbc194154a30_en?filename=FRANCE%20E2%80%93%20FINAL%20UPDATED%20NECP%202021-2030%20%28English%29.pdf

4.0 CCUS POLICY & REGULATORY DEVELOPMENTS IN FRANCE

France's dual commitment to climate neutrality and "reindustrialisation" has prompted consideration of technical solutions such as CCUS to align with these objectives. Since CCUS was first integrated into France's low-carbon strategy, the government has been increasingly proactive in crafting a comprehensive framework for its implementation. The release of a provisional national CCUS strategy[7] in June 2023 indicated a significant step forward, marking a shift in the government's approach from intention towards action.

Competences on CCUS in France are distributed among various institutions, as indicated in the table below, each with its own distinct expertise and experience. This distribution can contribute to administrative complexity, potentially impacting both the value chain and public action.

Table 1: Key institutions' role for CCUS

ROLE FOR CCUS	COMPETENT INSTITUTION
National Low Carbon Strategy (SNBC)[8]	Ministry for Ecological Transition
French CCUS strategy[9]	Ministry for Energy Transition & Ministry for the Economy, Finances, Industrial and Digital Sovereignty
Regulation of CO_2 transport infrastructures	Commission de Régulation de l'Energie (CRE, Energy regulatory commission)
Permitting for CO_2 storage projects (issuance of a Permis Exclusif de Recherche)	Direction Générale de la Prévention des Risques (Directorate General for risk prevention) – Ministry for Ecological Transition
Transposition of the EU's CCS directive	Bureau des Ressources Energétiques du Sous-Sol (Bureau for underground energy resources) - Ministry for Ecological Transition
France 2030 grants	Tender portal for France 2030 – French government (various "operators" distributing funds through specific tenders)[10]
ZiBac (Low Carbon Industrial Zone) scheme[11]	ADEME (Agency for ecological transition)
Carbon Contract for Difference (CCFD)	TBC

[7] Ministry for Energy Transition and Ministry for the Economy, Finance and Industrial and Digital Sovereignty (2023) Consultation, Stratégie CCUS, 23 June 2023. Available at: https://www.conseil-national-industrie.gouv.fr/files_cni/files/actualite/20230623_consultation_ccus.pdf

[8] Ministry for Ecological Transition (2022) 'Stratégie Nationale Bas-Carbone (SNBC), 21 July 2022, available at: https://www.ecologie.gouv.fr/politiques-publiques/strategie-nationale-bas-carbone-snbc

[9] Ministry for Energy Transition and Ministry for the Economy, Finance and Industrial and Digital Sovereignty (2023) Consultation, Stratégie CCUS, 23 June 2023. Available at: https://www.conseil-national-industrie.gouv.fr/files_cni/files/actualite/20230623_consultation_ccus.pdf

[10] French Government (2024) Tender portal for France 2030 grants. Available at: https://www.info.gouv.fr/france-2030/appels-a-candidatures

[11] Ademe (2022) Tender 'Favoriser le développement de Zones Industrielles Bas Carbone (ZIBaC)', 4 February 2022. Available at: https://agirpourlatransition.ademe.fr/entreprises/aides-financieres/20220204/favoriser-developpement-zones-industrielles-bas-carbone-zibac

4.1 National Strategy

4.1.1 Context

France has mapped its major CO_2 emitting industries and has engaged in bilateral discussions to understand their challenges and opportunities concerning decarbonisation. This public-private dialogue has led to the signing of ecological transition contracts between the government and the 50 highest CO_2-emitting industrial sites[12]. These contracts aim to foster public-private cooperation by identifying solutions and investments needed for ambitious decarbonisation objectives. Simultaneously, the identification of seven industrial clusters, accounting for 90% of the 110 largest CO_2 emitters, will facilitate their integration into future CCUS networks. CCUS has emerged as a solution of choice from this preliminary work, laying the ground for the French CCUS strategy.

A draft of France's CCUS strategy was jointly released in June 2023 by the Ministries of Energy Transition and Industry, for consultation purposes[13]. Incorporating the feedback received and aligning with the EU's Industrial Carbon Management Strategy[14], the government released in July 2024 its "Current status and outlook for CCUS deployment in France"[15] acting as the country's definitive strategy. It aligns with France's vision for long-term sustainable development and complements policies like the National Low Carbon Strategy and the France 2030 plan, a EUR 54 billion investment package supporting, among other objectives, the country's "reindustrialisation".

The French CCUS strategy strictly defines the scope of CCUS in France to encourage the capture of unavoidable emissions, either in the absence of other economically viable decarbonisation solutions or as a transitional measure in the medium term. Financial support to CCUS projects is set to target specifically hard-to-abate industries such as lime, cement, steel, chemicals, or aluminium. Other sectors, including waste incineration, heat, biomass transformation or the paper and food processing industries, could benefit from CCUS in the future depending on the evolutions of the EU ETS.

However, other sectors also covered by the EU ETS, such as electricity generation, will be granted access to CO_2 transport and storage infrastructure but are not set to benefit from the support mechanisms announced in the French CCUS strategy. CDR technologies like BECCS or DAC are also considered as a solution to achieve negative emissions it the long term, in accordance with the targets of the EU's Industrial Carbon Management Strategy.

As France prepares to co-host the 2024 edition of the Industrial Carbon Management Forum on 10-11 October in Pau, there is the opportunity to envision a harmonised approach to CCUS at the EU level.

4.1.2 Targets and deployment roadmap

The French CCUS strategy outlines France's goals for CCUS capacity and broader implications of CCUS deployment for the country's CO_2 emissions. By 2030, the country aims to achieve a CO_2 capture capacity ranging between 4 and 8 Mtpa, with a potential increase to 12-20 Mtpa by 2040 and 30-50 Mtpa by 2050. It is expected that CCUS implementation could enable a 5 to 10 % reduction in industrial CO_2 emissions by 2030 and deliver negative emissions by 2050.

The French CCUS strategy aims to create a comprehensive value chain, including the development of transport infrastructure and domestic storage sites. CCU is also envisaged by the French government. Measures and targets announced relative to CCU are primarily focused on the production of e-fuels for aviation and maritime transport, in line with the objectives of ReFuelEU maritime[16] and aviation[17] regulations, as well as the Renewable Energy Directive. CCU is also foreseen to benefit other industries, such as chemistry or food processing.

[12] Ministry of the Economy, Finance and Industrial and Digital Sovereignty (2023), Contrats de transition écologique des 50 sites les plus émetteurs, 13 December 2023. Available at: https://www.entreprises.gouv.fr/fr/publication-contrats-transition-ecologique-50-sites-industriels#:~:text=Les%20contrats%20de%20transition%20%C3%A9cologique%20sont%20le%20fruit%20d'un,lutter%20contre%20le%20r%C3%A9chauffement%20climatique.

[13] Ministry for Energy Transition and Ministryof the Economy, Finance and Industrial and Digital Sovereignty (2023) Consultation, Stratégie CCUS, 23 June 2023. Available at: https://www.conseil-national-industrie.gouv.fr/files_cni/files/actualite/20230623_consultation_ccus.pdf

[14] EU Commission (2024) COM(2024) 62 final COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Towards an ambitious Industrial Carbon Management for the EU, 6 February 2024. Available at : https://energy.ec.europa.eu/system/files/2024-02/Communication_-_Industrial_Carbon_Management.pdf

[15] Ministry for Energy Transition and Ministry for the Economy, Finances, Industrial Sovereignty and Digital (2024), État des lieux et perspectives de déploiement du CCUS en France, July 2024, available at : https://www.entreprises.gouv.fr/files/files/industrie/etat-des-lieux-et-perspectives-de-deploiement-du-ccus-en-france.pdf

[16] EU Commission (2023) Regulation (EU) 2023/1805 on the use of renewable and low-carbon fuels in maritime transport, 22 September 2023. Available at: https://eur-lex.europa.eu/eli/reg/2023/1805

[17] EU Commission (2023) Regulation (EU) 2023/2405 on ensuring a level playing field for sustainable air transport, 31 October 2023. Available at: https://eur-lex.europa.eu/eli/reg/2023/2405/oj

Given the geographical distribution of France's biggest emitters, the government has opted for an incremental cluster-based approach for CCUS implementation. The latter consists of three successive phases, aiming for a rapid deployment from 2025 onwards, as outlined in the CCUS roadmap of the French CCUS strategy:

- Phase 1 (2025-2030): Initial deployments targeting 4-8 $MtCO_2$/year (Million ton of carbon dioxide) in industrial hubs such as Le Havre, Dunkirk, Saint-Nazaire, and the Rhône axis.
- Phase 2 (2030-2040): Expanding to capture 12-20 $MtCO_2$/year, driven by new CCS networks and domestic storage sites, regulatory changes in the EU carbon market, and extending CO_2 capture to other sectors like waste incineration and biogenic emissions.
- Phase 3 (2040-2050): Achieving deep decarbonisation and climate neutrality, capturing 30-50 $MtCO_2$/year. This will involve capturing residual emissions from high-emitting industrial sites and developing new CO_2 sources like biogenic CO_2 or direct air capture (DAC).

4.2 Transport & Storage Regulatory Framework

4.2.1. CO_2 transport framework

The French CCUS strategy prioritises rapid CO_2 capture implementation, necessitating parallel efforts to enable CO_2 transport to storage or utilisation sites. With a cluster-based approach, the primary focus is on establishing a pipeline network linking emitters to a central backbone. To address the initial shortage of domestic storage options, CO_2 export hubs will be set up in major ports near capture clusters, enabling maritime transport to storage sites (e.g. in the North Sea and Mediterranean Sea). For isolated sites, interim transportation methods like inland waterway and train transport are prioritised, before pipelines can be deployed.

The development of a comprehensive regulatory framework for CO_2 transport has been deemed essential to incentivise private investments and ensure the deployment of CCS infrastructures suited for the need of the value chain. This responsibility has been entrusted to the French energy regulatory authority (CRE), collaborating closely with industry stakeholders, public entities, and academia[19].

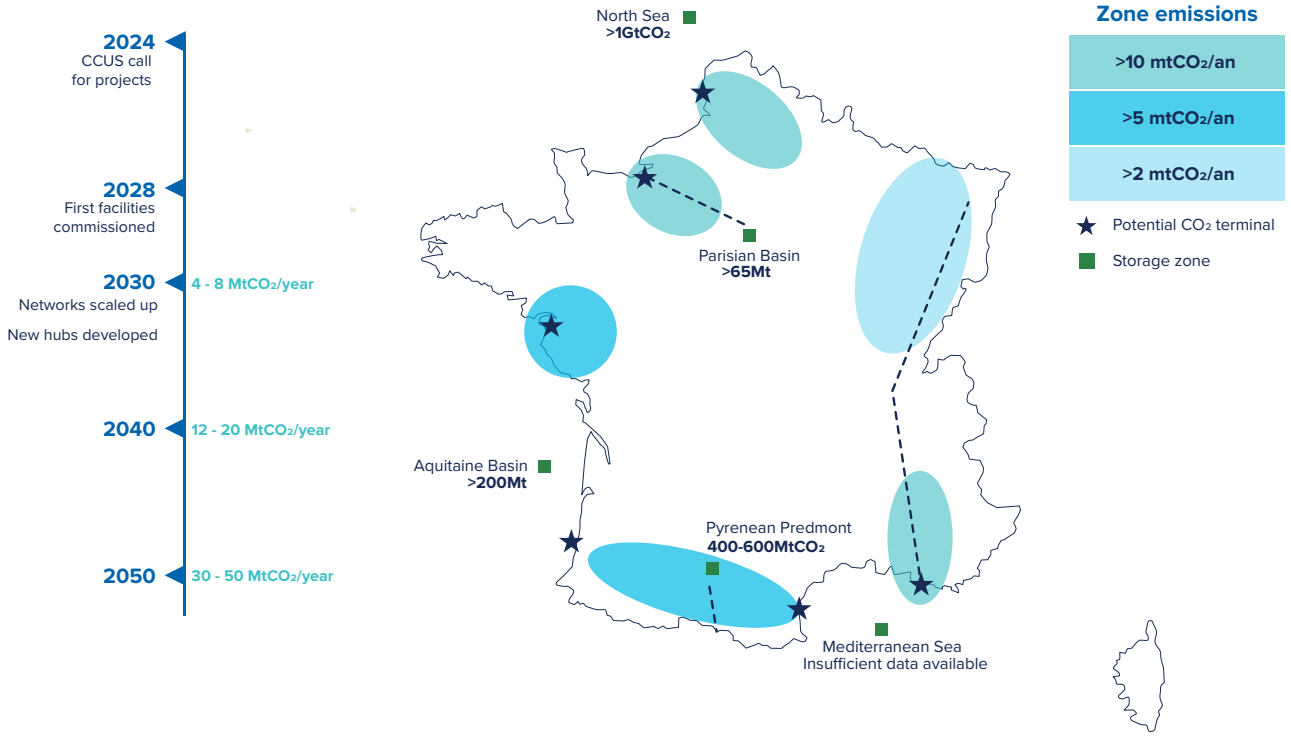

Figure 2: Map of France's CCUS trajectory. Source: Current status and outlook for CCUS deployment in France.[18]

[18] Adapted from Ministry of the Economy, Finance and Industrial and Digital Sovereignty (2024) État des lieux et perspectives de déploiement du CCUS en France, July 2024. Available at: https://www.entreprises.gouv.fr/files/files/industrie/etat-des-lieux-et-perspectives-de-deploiement-du-ccus-en-france.pdf

[19] CRE (Energy Regulatory Commission) (2023) Lancement d'un groupe de travail sur la capture et le stockage du carbone (CSC), 26 July 2023. Available at: https://www.cre.fr/actualites/notre-magazine-parlons-energie/parlons-energie-n11/lancement-d-un-groupe-de-travail-sur-la-capture-et-le-stockage-du-carbone-csc.html

The CRE issued recommendations to regulate third party access and pricing for future CO_2 pipeline and liquefaction terminals to provide stakeholders with certainty and ensure a fair compensation for operators. The CRE will submit its final report to the government by the end of 2024, and the government is expected to develop legislation based on these recommendations. This proactive approach aims to anticipate an EU-wide CO_2 transport regulatory framework by promptly adopting a national framework, aligned with the principles of the CCS Directive. The intention being to enable rapid infrastructure deployment, with the first operational CCUS networks expected by 2028.

4.2.2 CO_2 storage framework

Despite the initial unavailability of domestic storage for CCUS, France sees significant potential in various onshore formations nationwide. Efforts to develop domestic storage resources in the medium-term involves reassessing geological capacities, conducting further research, and injection tests on pilot sites. In this respect, a call for interest was launched on 29 April 2024[20] to identify stakeholders committed to developing domestic storage capacity. Additionally, a tender will be launched between late 2024 and early 2025 to subsidise projects aimed at improving the knowledge of geological formations for CO_2 storage. Public engagement campaigns are also planned to address social concerns, while engaging industries and local communities.

The short-term priority however is to foster access to foreign storage sites, mainly in the Mediterranean and the North Sea, which are readily available. The cross-border CO_2 transport framework relies mainly on the London Protocol, to which France is a party. It regulates all sources of marine pollution and aims to prevent sea pollution by regulating disposal activities. A 2009 amendment allowing for the cross-border transport of CO_2 streams for CCS purposes is set to be presented to the French parliament for ratification in 2024. France is also concluding bilateral and multilateral partnerships to allow for regional synergies and facilitate further exports of French CO_2 abroad.

France also leverages the EU's comprehensive regulatory framework for the environmentally safe geological storage of CO_2 to contribute to the fight against climate change. CO_2 storage is governed by the EU CCS Directive, transposed nationally through the Grenelle 2 law[21] in 2010. In particular, it allows the selection of CO_2 storage sites on the whole territory – while some EU Member States decided to restrict it to specific areas. It also appointed the Bureau for underground energy resources (BRESS), a division of the Ministry for Ecological Transition, as the national authority for fulfilling the requirements of the EU CCS Directive[22].

In parallel, guidelines for storage operations were published in 2011 by the General Directorate for Risk Prevention (DGPR)[23], another department of the Ecology Ministry responsible for issuing permits for storage sites. Under this framework, an exploration permit, or Permis Exclusif de Recherche (exclusive research permit) in French mining law, is required for research and testing activities. Meanwhile, a storage permit, taking the form of a mining concession in French law, is necessary for the exploitation of a geological formation. These measures are complemented by the monitoring, reporting and verification (MRV) rules of the EU ETS framework, which recognises carbon emissions reduction induced by CCS.

Additionally, the government unveiled plans on 12 April 2024 to reform the French mining code, aimed at streamlining permitting procedures for CO_2 storage and facilitating the repurposing of depleted hydrocarbon wells into storage facilities. The Ministry of Economy and Industry has included these provisions in a draft "Simplification of Economic Life" bill[24] submitted to the French Senate for first reading on 3 June 2024[25]. This initiative aims to standardise permitting procedures for geothermal, mining and CO_2 storage projects. The objective is to shorten the process duration for an exploration permit from a theoretical 12 to 18 months (often extending to 3 years in practice) to 6 to 9 months. However, in the context of the dissolution of the National Assembly on 9 June 2024, the Senate, while not directly impacted by this political development, has decided to suspend its legislative work, and the draft bill has been put on hold.

[20] Direction générale des entrerpises (2024), APPEL À MANIFESTATION D'INTÉRÊT - CAPTURE ET STOCKAGE DE CARBONE, 29 april 2024. Available at : https://www.entreprises.gouv.fr/fr/aap/appels-projets-appels-manifestation-d-interet/appel-manifestation-d-interet-capture-et-stockage-de-carbone

[21] Legifrance (2010) 'LOI n° 2010-788 du 12 juillet 2010 portant engagement national pour l'environnement' 27 October 2010. Available at : https://www.legifrance.gouv.fr/loda/id/JORFTEXT000022470434

[22] EU Commission, Member State report on Implementation of Directive 2009/31/EC on the geological storage of carbon dioxide ("CCS Directive"), 2023. Available at: https://ec.europa.eu/assets/clima/ccs/2023/policy_ccs_country_report_2023_france_en.pdf

[23] INERIS (National Institute for industrial environment and risks) (2011) 'Lignes de conduite pour la sécurité d'un site de stockage géologique de CO_2' October 2011. Available at: https://www.ineris.fr/sites/ineris.fr/files/contribution/Documents/lignesdeconduite-gtsecuriteCO2-brgm-rp-60369-fr-1370529129.pdf

[24] Ministry of the Economy, Finance and Industrial and Digital Sovereignty (2024) Press release - Simplification des procédures minières pour accélérer la transition énergétique et renforcer la sécurité d'approvisionnement française, 12 April 2024. Available at: https://presse.economie.gouv.fr/simplification-des-procedures-minieres-pour-accelerer-la-transition-energetique-et-renforcer-la-securite-dapprovisionnement-francaise/

[25] Sénat (2024) 'PJL23-550 Projet de loi de simplification de la vie économique', 24 April 2024. Available at: https://www.senat.fr/dossier-legislatif/pjl23-550.html

4.3 Support mechanisms

Recognising the pivotal role of CCUS in France's sustainable development, efforts are underway to secure financial support across all stages of the value chain. Direct grants can be allocated to CO_2 capture as well as research and development (R&D) projects under the France 2030 investment plan[26] with a total budget of EUR 5.6 billion. Their eligibility is defined in accordance with the industry decarbonisation targets. France 2030 funding is distributed to a variety of programs, among which is the Low Carbon industrial Zone (Zone Industrielle Bas Carbone - ZIBaC[27] scheme. The ZiBaC framework provides government subsidies to legal entities grouping different stakeholders of an industrial cluster to foster coordinated decarbonisation projects. By 2024, several major CO_2 emitting industrial clusters (including Dunkirk, Fos-sur-Mer, Saint-Nazaire, Le Havre) have received subsidies under the ZIBaC framework for decarbonisation projects, including CCUS. Furthermore, the DECARB IND 2023 program, also funded by France 2030 and managed by ADEME, offers grants of up to EUR 30 million for projects including CCS and mineralisation.

CCUS projects in France are also eligible for grants from EU funds[28]. Several programs offer funding avenues, including the Innovation Fund, fuelled by EU ETS revenues, or the Connecting Europe Facility – Energy (CEF-E) scheme, offering PCI or PMI status (Project of Common Interest & Project of Mutual Interest) to projects and funding for works and studies. Similarly, Horizon Europe, the EU's research and innovation program, explicitly targets CCUS under its 'Global challenges and European industrial competitiveness' pillar.

However, making a business case for CCUS remains highly challenging without additional public support. In response, the government is developing a CCfD scheme as part of its CCUS strategy to bridge the gap between CCUS costs and the CO_2 price under the EU ETS. This subsidy, proposed for a 15-year term, will provide annual payments to emitters based on actual CO_2 capture volumes. The French CCfD aims to de-risk CCUS investments while preserving a level playing field with other decarbonisation solutions. The scheme is currently under EU Commission review for state aid approval since January 2024, with a public consultation initiated in June 2024.

[26] French Government (2024) Tender portal for France 2030 grants. Available at: https://www.info.gouv.fr/france-2030/appels-a-candidatures

[27] Ademe (2022 Tender 'Favoriser le développement de Zones Industrielles Bas Carbone (ZIBaC)', 4 February 2022. Available at: https://agirpourlatransition.ademe.fr/entreprises/aides-financieres/20220204/favoriser-developpement-zones-industrielles-bas-carbone-zibac

[28] GCCSI (2024) 'From proposals to reality: How EU funds can help jump-start CCS projects' February 2024. Available at: https://www.globalccsinstitute.com/wp-content/uploads/2024/02/From-Proposals-to-Reality-How-EU-Funds-Can-Help-Jump-Start-CCS-Projects-GCCSI.pdf

5.0 CCUS INVESTMENTS AND PROJECT DEVELOPMENT IN FRANCE

5.1 Ongoing projects

The capture, transport, storage and utilisation of CO_2 is advancing in France, where many CCUS initiatives are underway at different stages of development [Table 2]. Several projects are located in the industrial clusters identified as priority areas by the updated French CCUS strategy to develop CCUS hubs. Some of these areas have also been granted the status of Low Carbon Industrial Zones (ZIBaC) that the French state is supporting financially to advance the deployment of decarbonisation technologies, infrastructures and networks in the country. As making all the components of the value chain available at the same time can provide more predictability, developing the CO_2 capture, transport and storage capacity in parallel will be important to drive CCUS scale-up in France.

5.1.1 Capture

In line with the country's intention to apply CCUS to industrial sectors with limited alternative cost-effective solutions to reduce emissions, several projects in the country are aimed at reducing emissions generated from cement, lime, iron and steel. Some of them have plans to commence operation already between 2025 and 2028.

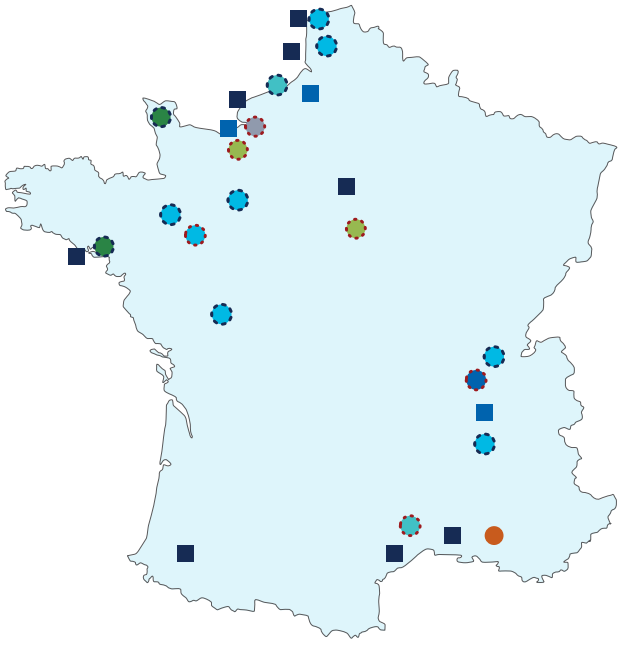

Figure 3: CCUS Projects in France with known locations

The 3D pilot project running at the DMX™ Demonstration plant at ArcelorMittal's steelworks in Dunkirk, for example, aims to demonstrate the application of the DMX™ process on an industrial scale and lay the ground for the first industrial unit at the ArcelorMittal site in Dunkirk that could be operational in 2025. The K6 Programme seeks to modernise the Eqiom's Lumbres cement plant and produce the first carbon-neutral cement in Europe, while CalCC aims to reduce the CO_2 emitted during lime production at the Lhoist Group's Réty site. Both the latter projects are scheduled to start operations by 2028.

Other carbon capture initiatives in France are also underway in the field of hydrogen and oil refining. Certified low-carbon hydrogen, for example, has been produced by Air Liquide at its hydrogen production unit in Port-Jérôme since 2015. The company is also partnering with TotalEnergies to support the decarbonisation of the hydrogen production at the Gonfreville refinery, contributing ultimately to the development of a low-carbon hydrogen network in the Normandy industrial basin.

5.1.2 Transport

With most French industrial emitters concentrated in seven large industrial clusters, establishing transport networks to connect industrial sites to clusters and ultimately to CO_2 storage sites is needed. Currently, priority industrial clusters have been identified in proximity of major French industrial ports: Dunkirk, Fos-sur-Mer, Le Havre and the Rhône axis.

The Dunkirk territory and hinterland, responsible for nearly 20% of France's Industrial emissions[29], is actively pursuing decarbonisation initiatives to achieve net zero by 2050. One of the key projects underway in the area is the EU PCI D'Artagnan, which will establish an open multi-modal CO_2 Export Hub. Supported by the EU's CEF-E, the project aims to build an 80-km pipeline collecting CO_2 from main industrial emitters in Dunkirk harbour and its hinterland and an export terminal to transport the captured CO_2 by ship for permanent storage in the North Sea.

France's Dunkirk industrial area was also object of an agreement signed in June 2024 between GRTgaz and Equinor to develop a 30-km onshore pipeline project to transport CO_2 emissions from France's Dunkirk industrial area to storage sites in the North Sea offshore Norway via the large-scale CO_2 pipeline project "CO_2 Highway Europe"[30].

The Normandy industrial basin is advancing CO_2 capture and transport infrastructure with the ECO_2-Normandy project. The purpose of the project is to capture emissions from the Seine-in-Normandy axis and transport them to the shipping terminal in Le Havre, where they will be exported for permanent geological storage beneath the North Sea.

[29] GRTgaz (2023) 'Decarbonising industry. GRTgaz launches a call for expressions of interest for transporting CO_2 in the Dunkirk basin', 7 February 2023. Available at: https://www.grtgaz.com/en/medias/press-releases/decarbonising-industry-ami-CO_2-dunkirk

[30] Equinor (2024) 'Equinor and GRTgaz sign agreement to develop CO_2 transport infrastructure in France', 17 June 2024. Available at https://www.equinor.com/news/20240617-grtgaz-agreement-develop-CO_2-infrastructure

Map of the study corridor of the underground pipeline network and scope of the preliminary consultation.

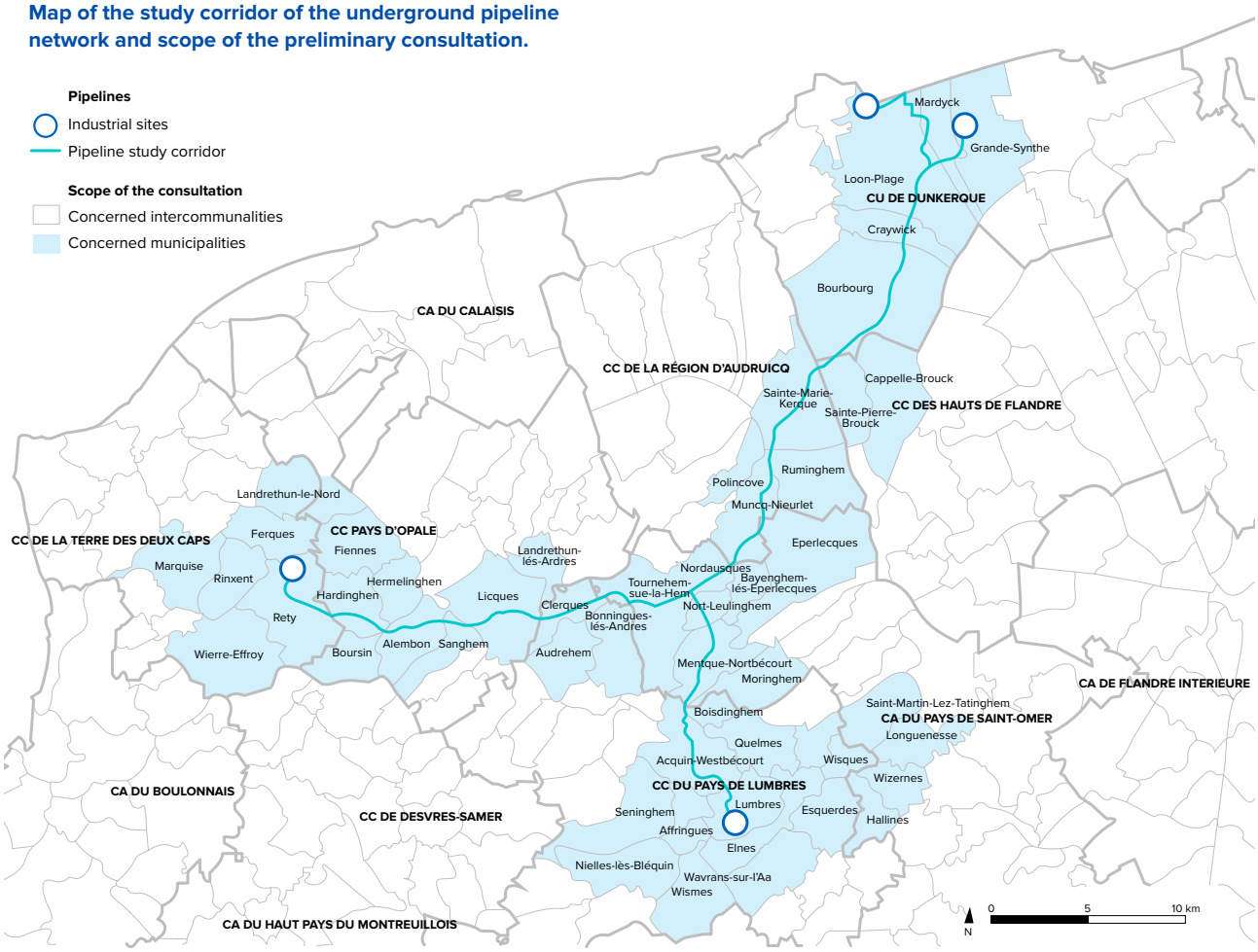

Figure 4: Map of the CO_2 network of the D'Artagnan project in France[31]

Although most of the CCUS projects in the country envisage exporting domestic CO_2 to the North Sea, France has also taken steps towards the decarbonisation of its Fos-Marseille Hub as part of the Callisto project, which aims to develop the largest CCS network in southern Europe. The project aims to contribute to the decarbonisation of the Rhône Valley in France via a dedicated CO_2 transport infrastructure, based on existing or new onshore pipelines, and a liquefaction hub, which will allow the export of CO_2 via ship from the Fos-Marseille terminal to the Ravenna Hub in Italy.

Beyond the clusters with a direct sea access for CO_2 export, areas in the Paris basin, the South-West, or even the Grand Est will require available onshore storage or alternatively access to a CO_2 transport network.

The French Grand Ouest region's decarbonisation efforts are driven by the GOCO$_2$ project, a large-scale CCS initiative which aims to capture CO_2 from different emitters and transport it via a 350 km pipeline to the Saint-Nazaire maritime export terminal, where it will be shipped for permanent geological storage under the North Sea.

[31] Adapted from Cap décarbonation (2022) D'Artagnan : un projet d'infrastructures CO_2 au service des industriels locaux. Available at: https://cap-decarbonation.fr/fr/le-projet-d-artagnan-dunkerque

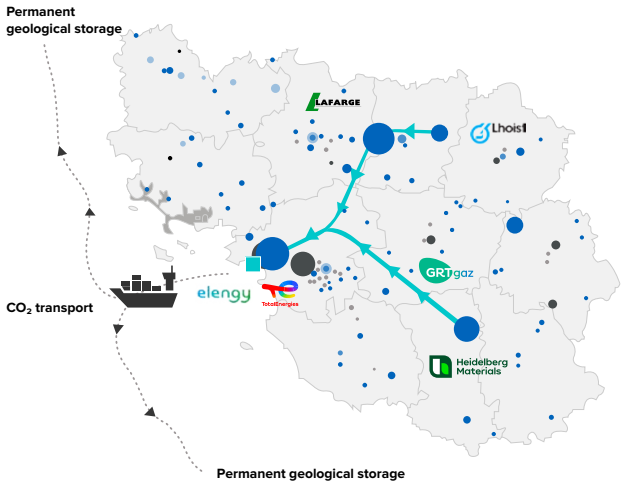

Figure 5: Map of the GOCO$_2$ project in France[32]

In the Pyrenean Piedmont area, the full value chain CCUS project PYCASSO aims to establish a cross-border CO_2 network to support the decarbonisation of both industrial emitters in southwestern France and northeastern Spain. Its transport infrastructure comprises dedicated pipelines linked to shipping and rail extensions, as well as export and import terminals.

5.1.3 Storage

While France has not yet developed its own geological storage capacity for CO_2, the French CCUS strategy underscores the importance for the country to identify suitable CO_2 storage sites and storage volumes that can be made available to French emitters, as well as CO_2 transportation and storage service providers.

Regions surrounding the Aquitaine and Paris basins, as well as the Mediterranean and Atlantic offshore areas hosting depleted hydrocarbon reservoirs or deep saline aquifers, have been identified as potentially suitable for geological CO_2 storage. Estimates suggest that a number of domestic hydrocarbon fields could be used to store around 800 Mt of CO_2, contributing to fulfilling the French CO_2 storage needs over the next 50 years.

The PYCASSO project is already investigating how depleted gas fields in the Aquitaine Basin could be leveraged to develop CO_2 storage sites in the country. If the project advances as planned, it is projected to enable the storage of 1-3 Mtpa of CO_2 from 2030 to 2034, and 5 Mtpa of CO_2 as of 2035. The PilotSTRATEGY project is a five-year international research project exploring the use of deep saline aquifers for the purpose of geological CO_2 storage across different industrial regions in southern and eastern Europe, including the Paris basin in France.

Although these projects represent a positive step towards CO_2 storage development in the country, further studies are needed to estimate more precisely France's storage capacity and the feasibility of its potential storage sites.

While France works towards building its national CO_2 storage capacity, the country is also undertaking efforts to strengthen collaboration on CCUS and secure agreements with other European countries to ensure access to CO_2 storage sites outside its national borders. Although the country has yet to deposit an instrument of acceptance of the 2009 amendment to Article 6 of the London Protocol, or a declaration of its provisional application pending its entry into force, the French CCUS strategy outlines France's intention to take positive steps in this direction and continue building cross-border cooperation on CCUS, including on the export of CO_2 to countries with storage site capacities in the North Sea or the Mediterranean Sea outside the European Economic Area.

5.1.4 Utilisation

Due to the possibility of using the captured CO_2 for the production of low-carbon fuels and other materials, CCU is a complementary tool to CCS that can contribute to the decarbonisation of certain sectors, such as the chemicals, aviation and maritime industries.

Ongoing CCU initiatives in the country plan to capture CO_2 from steel and cement plants, chemicals production and biorefineries. Among them, the eM-Rhône project supported by the EU Innovation Fund aims to produce 150,000 tonnes per year of e-methanol from renewable hydrogen and the capture of industrial emissions generated by the OSIRIS site and the Lafarge plant in Le Teil.

In Dunkirk, the Reuze project aims to establish one of Europe's largest e-fuels facility, converting the CO_2 emissions generated by the ArcelorMittal steel production site in Dunkirk into clean electrofuels.

[32] Adapted from GRTgaz (2023) The launch of GOCO$_2$. Available at: https://www.grtgaz.com/en/medias/press-releases/launch-goCO$_2$

[33] Ministère de l'Economie, Des Finances et de la Souveraineté Industrielle et Numérique (2024) 'Roland Lescure lance un appel à manifestation d'intérêt pour développer les capacités de capture et stockage de carbone de la France', 30 April 2024. Available at: https://presse.economie.gouv.fr/roland-lescure-lance-un-appel-a-manifestation-dinteret-pour-developper-les-capacites-de-capture-et-stockage-de-carbone-de-la-france/

Table 2 - List of CCUS projects in France [34]

PROJECT NAME	LOCATION	OPERATIONAL DATE	FACILITY INDUSTRY	FACILITY CATEGORY	PUBLIC SUPPORT (IF ANY)	REFERENCE
Air Liquide Hydrogen Production Unit at Port-Jérôme	Port-Jérôme	2015	Hydrogen Ammonia / Fertiliser	Commercial Facility	Haute Normandie Region; Community of Caux Vallée de Seine communes; ADEME	Here
3D Project - DMX™ Demonstration Dunkirk	Dunkirk	2019: Launch of the Project 2022: Start of the first tests of the DMX™ demonstrator 2025: First industrial unit at the ArcelorMittal site in Dunkirk	Iron and Steel	Pilot and Demonstration Facility[35]	Horizon 2020 (2019-2024)	Here
PilotSTRATEGY	Project across five industrial regions, including France (the Paris basin)	2021-2026	CO_2 Transport and Storage	Pilot and Demonstration Facility	Horizon 2020	Here
Jupiter 1000	Fos-sur-Mer; Bouches-du-Rhône	2020-2024	Iron and Steel	Pilot and Demonstration Facility (CCU)	Region Sud; ADEME's Future Investment Programme; European Regional Development Fund (ERDF)	Here
Northern Lights	Involve multiple countries, including France	2024	CO_2 Transport and Storage	Commercial Facility	Connecting Europe Facility - Energy	Here
Grandpuits Zero Crude Platform	Seine-et-Marne	2025	Biorefinery/ Ethanol	Utilisation Facility		Here
Hynovi project	Montalieu-Vercieu	2025	Cement and Concrete	Utilisation facility		Here
Reuze	Dunkirk	2026	Iron and Steel	Utilisation Facility	ADEME	Here
Callisto Mediterranean CO_2 Network	France (Rhône Valley and Fos - Marseille emitter zone clusters) and Italy	2027	CO_2 Transport and Storage	Commercial Facility	PCI status	Here
Aramis	Involve multiple countries, including France (transportation of CO_2 from Le Havre and Saint Nazaire)	2027	CO_2 Transport and Storage	Commercial Facility	PCI status	Here
KerEAUzen	Le Havre		Chemicals	Utilisation Facility		Here
Salamandre (Linked to KerEAUzen)	Le Havre	2027	Bioenergy/ Ethanol	Commercial Facility		Here
D'Artagnan Dunkirk CO_2 Hub	Dunkirk	2028	CO_2 Transport and Storage	Commercial Facility	Connecting Europe Facility – Energy; Part of Nautilus (PMI)	Here
CalCC (part of D'Artagnan)	Réty	2028	Cement and Concrete	Commercial Facility	Innovation Fund	Here

[34] Global CCS Institute (2024) based on its own research.

[35] The 3D project aims to prepare the implementation of a full-scale CCS plant by 2025 and the future CCS cluster Dunkirk-North Sea by 2035. The cluster will rely on the transport infrastructure developed by the Northern Lights project.

PROJECT NAME	LOCATION	OPERATIONAL DATE	FACILITY INDUSTRY	FACILITY CATEGORY	PUBLIC SUPPORT (IF ANY)	REFERENCE
K6 Programme (part of D'Artagnan) [36]	Lumbres, Hauts de France	2028	Cement and Concrete	Commercial Facility	Innovation Fund	Here
ECO$_2$Normandy	Le Havre and l'Axe Seine	2028	CO_2 Transport and Storage	Commercial facility	Part of Nautilus (PMI) and Northern Lights (PCI)	Here
EM-Rhone	Rhône Valley/ Roches-Roussillon	2028	Chemicals	Utilisation Facility [37]	Innovation Fund	Here
Lafarge Le Teil (part of EM-Rhone)	Le Teil	2028	Cement and Concrete	Commercial Facility	Innovation Fund	Here
Take Kair Project	Pays de la Loire ; Saint-Pierre-La-Cour	2028	Cement and Concrete	Pilot Demonstration Facility (CCU)		Here
Smeaheia / CO_2 Highway Europe	Involve multiple countries, including France (Dunkirk area)	2028	CO_2 Transport and Storage	Commercial Facility		Here
EU2NSEA	Involve multiple countries, including France	2029	CO_2 Transport and Storage	Commercial Facility	PCI Status	Here
HYNOVERA	Provence-Alpes-Côte d'Azur	2029	Biorefinery/ Ethanol	Utilisation Facility		Link 1; Link 2
Grand Ouest CO_2 ($GOCO_2$) Hub	Nouvelle-Aquitaine, Pays-de-la-Loire, Bretagne, Centre Val-de-Loire, Saint-Nazaire	2030	CO_2 Transport/ Storage	Commercial Facility	ADEME (ZIBaC)	Here
Neau lime plant(part of $GOCO_2$)	Neau	2030	Cement and Concrete	Commercial Facility		Here
Airvault $GOCO_2$ CCUS (part of $GOCO_2$)	Airvault, France	2030	Cement and Concrete	Commercial Facility		Here
Saint-Pierre-la-Cour Cement Plant (part of $GOCO_2$)	Saint-Pierre-La-Cour	2030	Cement and Concrete	Commercial Facility		Here
GRTGaz CO_2 backbone (part of $GOCO_2$)	Saint-Nazaire – Montoir-de-Bretagne	2030	CO_2 Transport and Storage	Commercial Facility		Here
Donges Refinery (part of $GOCO_2$)	Donges	2030	Oil Refining	Commercial Facility		Here
PYCASSO Hub	Southwest of France and North of Spain; Pyrenean Piedmont area	2030	CO_2 Transport and Storage	Commercial Facility	PCI status	Here
Gonfreville Refinery	Gonfreville	2030	Oil Refining	Commercial Facility		Here
Rhône CO_2	Rhône Valley; Fos-sur-Mer		CO_2 Transport and Storage	Commercial Facility	ADEME (ZIBaC)	Here
NAUTILUS CCS	Involve multiple countries, including France		CO_2 Transport and Storage	Commercial Facility	PMI status	
VAIA Project	Montalieu-Vercieu		Cement and Concrete	Commercial Facility		Here
Waste-to-energy Aker CC			Waste-to-Energy	Commercial Facility		Here
Aluminum Dunkerque CO_2 Transport	Dunkirk		CO_2 Transport / Storage	Feasibility Study	ADEME (ZIBaC)	Here

[36] The K6 Programme aims to leverage the transport infrastructure provided by Northern Lights and the PCI D'Artagnan.

5.2 Challenges

5.2.1 Economic feasibility

Despite increasing project investment and ongoing regulatory developments, the economic viability of CCUS in France remains challenging. ADEME, the national ecological transition agency, estimates CCUS costs in France to be between EUR 69 and EUR 144/tCO_2[38], surpassing the current trading range of EU ETS allowances (EUR 52 to EUR 99/tCO_2 over the 2023-2024 period[39]). Hence, public intervention is crucial to bridge the existing gap between CCUS costs and the carbon price in Europe.

Access to CO_2 transport networks and storage is vital for CCUS viability, requiring significant investment and timely availability to de-risk capture projects. While initial infrastructure costs may be higher, prioritising rapid deployment may necessitate costlier transport and storage solutions until cost-effective options and economies of scale are in place.

In parallel, commercial demand for CO_2 is projected to rise during the next decades for applications in chemistry or e-fuels for aviation and maritime transport. ADEME estimates that demand for CO_2 for e-fuels alone could range between 5.8 and 18.6 Mtpa of CO_2 in 2050[40]. Despite prioritisation of biogenic CO_2 for e-fuels, future demand for CO_2 could potentially strengthen CCUS business models.

The French CCUS strategy largely addresses those concerns with measures targeted at supporting both CCUS business models and infrastructure deployment planning and cost. However, it has not yet been translated into specific policies, a critical step for enhancing CCUS's economic feasibility. The success of CCUS deployment will therefore largely depend on the swift adoption of those key policies.

5.2.2 Public perception

Domestic political discourse on CCUS remains relatively immature, partly due to its late integration into national policies. Most political parties are yet to take a formal stance on CCUS.

Onshore storage requires good understanding and support from local communities. For instance, the PYCASSO project in the Pyrenees raises concerns among local communities and elected officials despite efforts to facilitate dialogue through citizen consultation[41]. Concerns about economic and environmental impacts, especially around the Lacq formation and industrial cluster, led to project delays, highlighting the importance of positive engagement with stakeholders, information provision, extensive consultations and trust building.

The lack of near-term storage prospects, which typically receive more support from stakeholders, could delay CO_2 storage deployment crucial for France's CCUS expansion. Public perception issues pose obstacles for CCUS projects in France, emphasising the need to address public awareness. Engaging stakeholders and communities through constant dialogue and involvement is essential at local levels to foster acceptance, as addressed in the French CCUS strategy through proposed information and exchange campaigns. However, raising awareness among the general public more broadly is also a necessity to foster CCUS's development.

[38] Ademe (2020) Avis technique - Le Captage et Stockage géologique du CO_2 (CSC) en France. Available at : https://presse.ademe.fr/wp-content/uploads/2020/07/captage-stockage-geologique-CO_2_csc_avis-technique_2020.pdf

[39] Ember Climate (2024) Carbon Price Tracker. Available at: https://ember-climate.org/data/data-tools/carbon-price-viewer/

[40] Ademe (2023) 'Electro-carburants en 2050 : Quels besoins en électricité et CO_2?. Available at: https://librairie.ademe.fr/mobilite-et-transport/6680-electro-carburants-en-2050-quels-besoins-en-electricite-et-CO_2-.html

[41] France Bleu (2023) 'Pycasso, un programme d'enfouissement massif de CO_2, inquiète sur le bassin de Lacq', 9 December 2023, Available at : https://www.francebleu.fr/infos/economie-social/un-programme-d-enfouissement-massif-de-CO_2-inquiete-sur-le-bassin-de-lacq-8148906

6.0 MULTILATERAL AND BILATERAL COLLABORATION INVOLVING FRANCE

6.1 Bilateral efforts

To meet its climate targets, France has established various partnerships with EU Member States, European Economic Area European Free Trade Association (EEA EFTA) states and third countries to strengthen cooperation on CCUS, including on the cross-border transport of CO_2 for geological storage purposes.

- In December 2022, France and Norway signed a letter of intent[42], followed by a strategic partnership between the two countries announced in January 2024, to bolster their dialogue and cooperation on various aspects of the green industrial transition, including CCS[43].
- A statement of cooperation on energy encompassing CCUS was also signed in March 2023 between France and the United Kingdom[44].
- A Pact for Innovation and Sustainable Growth was established in April 2023 between France and the Netherlands with the purpose of enabling joint work also in the field of CCS[45].
- In March 2024, Denmark and France signed a letter of intent to strengthen cooperation on CCS, including through a joint Working Group to discuss and prepare the conditions for the transport and storage of CO_2 between the two countries, and a Memorandum of Understanding (MoU) allowing the provisional application of the 2009 amendment to the London Protocol[46].

6.2 Multilateral efforts

In addition to bilateral partnerships, France has also taken part in a number of multilateral efforts in the field of CCUS.

- In early 2023, the country joined the North Sea Basin Task Force (NSBTF), an initiative launched in 2005 and currently composed of public/private entities from Norway, the UK, the Netherlands, Germany, Flanders and France. The NSBTF was formed to set common principles underlying the development, and regulation of CO_2 transport, injection, and permanent storage in the North Sea[47].

[42] Norway and France will strengthen cooperation on CCS, 12 December 2022. Available at: https://www.regjeringen.no/no/aktuelt/norway-and-france-will-strengthen-cooperation-on-ccs/id2952199/

[43] Letter of Intent Between the French Republic and the Kingdom of Norway on a Strategic Partnership on Green Industrial Transformation. Available at: https://www.regjeringen.no/contentassets/58e673f66ae64a3fbe50d0024af87cad/industripartnerskap-frankrike.-letter-of-intent.-engelsk-2024.pdf

[44] Statement of Cooperation on Energy between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the French Republic. Available at: https://assets.publishing.service.gov.uk/media/647f6f59103ca6000c039a63/uk-france-joint-energy-statement.pdf

[45] Franco-Dutch Pact for Innovation and Sustainable Growth. Available at: https://www.government.nl/documents/publications/2023/04/12/franco-dutch-pact-for-innovation-and-sustainable-growth

[46] The letter of intent and Memorandum of Understanding between the Ministry of Climate, Energy and Utilities of Denmark and the Ministry of the Economy, Finance and Industrial and Digital Sovereignty of the French Republic can be accessed at: https://en.kefm.dk/Media/638453122366837867/MoU%20Frankrig.pdf

[47] More information about the North Sea Basin Task Force can be found at the following link: https://ens.dk/sites/ens.dk/files/CCS/nsbtf_strategic_plan_updated_16.3_final_002.pdf

- In March 2023, France, Greece and Italy strengthened their cross-border collaboration on CCS by putting forward the Mediterranean Carbon Capture and Storage Plan, a non-binding regional plan to boost the deployment of CCS infrastructures in the Mediterranean Sea basin within the scope of application of the TEN-E Regulation[48].
- France signed in November 2023 the Aalborg Declaration with Denmark, Germany, the Netherlands and Sweden calling for the development of a European CCUS market[49].

Figure 6: Multilateral and bilateral cooperation agreements signed by France in the field of CCS in 2023 and 2024

[48] More information about the Mediterranean Carbon Capture And Storage Plan can be found here: https://www.mase.gov.it/sites/default/files/PNIEC_2023.pdf; https://www.conseil-national-industrie.gouv.fr/files_cni/files/actualite/20230623_consultation_ccus.pdf

[49] Aalborg Declaration on Enabling Cross-border Carbon Capture utilisation and Storage (CCUS) in Europe. Available at: https://en.kefm.dk/Media/638366861585598350/EU%20CCUS%20Aalborg%20declaration%20231127%20SEFR.pdf

7.0 RECOMMENDATIONS

The following recommendations should be considered to facilitate the deployment of CCUS in France:

- Adopting a technology-neutral approach to CCUS that would support its comprehensive application to all sectors covered by the EU ETS, including power generation. All sectors considering CCUS to assist in decarbonisation efforts should be granted access to infrastructures as well as support mechanisms. This paves the way for economies of scale for network infrastructure and for a further increase of the French economy's decarbonisation potential.

- Taking steps toward supplementing the country's CCUS strategy and vision with laws and regulations able to create an enabling environment to accelerate CCUS deployment. Quantifiable and verifiable milestones for CCUS deployment set by the French CCUS strategy provide a clear pathway for the technology's scale-up.

- Further clarifying how industrial CDR solutions (such as BECCS and DAC) can contribute to the country's climate ambition and establishing the necessary regulatory framework and incentives to enable CDR deployment. As France will need both emissions reduction and carbon removals to achieve its climate ambitions by 2050, it is important to start planning in the short-term how to scale-up CDR solutions in the country towards 2050 to ensure the necessary infrastructure will be in place and readily available to deliver negative emissions.

- Ensuring that the development of a regulatory environment enabling the utilisation component of the value chain is accompanied by additional technical work to determine eligibility and carbon accounting.

- Ensuring that the development of a dedicated and comprehensive framework regulating the CO_2 transport and storage infrastructure is designed to remove potential bottlenecks that could prevent more CCUS projects from succeeding. The government's intention to address transboundary CO_2 transport considerations is a welcome move, but further actions are needed to facilitate operations and risk management, as well as the allocation of liabilities.

- Facilitating alignment and strategic coordination amongst the different parts of the CCUS value chain to ensure that the CO_2 capture, transport and storage/utilisation capacity in the country will be developed and made accessible simultaneously. This may contribute to the scale-up of CCUS in the country in a timely manner. Adopting an approach based on coordination and consultation could help achieve this result.

- Continuing fostering public-private forms of cooperation on CCUS by identifying solutions and investments needs to help projects transition from the announcement phase to the starting of operations. Establishing risk-sharing mechanisms among the parts of the value chain may prove helpful to provide investors with more confidence. In addition, streamlining permitting procedures would also facilitate timely development of domestic storage and transport infrastructure.

- Working with the European Commission to improve coordination of financial support between the different financial avenues available for carbon management in Europe. Finding synergies between EU funds, national subsidies and private investments available to CCUS may help get more projects off the ground.

- Raising awareness of CCUS not only among the communities and stakeholders directly affected by projects, but also among the general public. Taking active steps towards promoting the role of CCUS in meeting our shared global climate goals, as well as outlining the environmental and social benefits could help build a positive public perception around CCUS. The latter may prove essential to move projects to the operational phase more quickly and demonstrate concretely that the technology can deliver.

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