Geological data transparency Belgium – Net Zero Industry Act (NZIA) Art. 21.1

Obligation

NZIA Art. 21(1) - By the end of 2024 Member States shall:

(a) Make publicly available data on all areas where CO2 storage sites could be permitted on their territory;

(b) oblige entities which are or have been holders of oil and gas production authorisations as defined in Article 1, point 3, of Directive 94/22/EC on their territory to make publicly available on a non-reliance basis geological data relating to production sites that have been decommissioned or whose decommissioning has been notified to the competent authority (2).

This data should include, if available, economic assessments of the respective costs of enabling CO2 injection, information about the suitability of the site(s) for permanent CO2 storage (i.e. any data that can support the CO2 storage assessment, at the highest degree of maturity possible), and the availability or need for transport infrastructure and modes suitable for safely transporting CO2 to reach the site.

Belgian contribution

Consultation is ongoing between the national geological survey and regional authorities to coordinate and streamline the data collection and transmission, in line with the recommendations of the European Commission.

Geological data for Belgium in general and on potential storage formations is available here:

- At national level: https://gisel.naturalsciences.be
- For the Brussels Capital Region: https://geodata.environnement.brussels/client/brugeotool/
- For the Flemish Region: https://www.dov.vlaanderen.be
- For the Walloon Region: http://geoapps.wallonie.be/Cigale/Public/#CTX=CGEOL

The most recent and national assessment on potential storage reservoirs and storage capacity for CO_2 geological storage was published by Welkenhuysen et al. (2013). This data was also added to the European CO_2 storage overview of the CO_2StoP project, consultable on the European Geological Data Infrastructure (EGDI). Within the HyStorIES project, targets and geological data were updated for the very similar process of hydrogen storage. As member of EuroGeoSurveys, the national Geological Survey of Belgium is also involved in the process of setting up a Geological Service for Europe (GSEU), where a pan-European CO_2 storage atlas is being created.

New insights in research and societal needs require updates of these existing assessments. For example, CO_2 storage in abandoned coal mines in Belgium, as investigated by Piessens & Dusar (2004) is now regarded as less feasible. At the same time, new data is being collected, for example in the light of deep geothermal applications targeting the same potential reservoir layers. The Interreg DGE-Rollout project has created a cross-border North-

West European 3D model of the Lower Carboniferous limestone, as primary target for multiple deep subsurface uses, consultable at https://data.geus.dk/egdi/?mapname=dgerolloutwebtool.

With these and future efforts, the goal is to create regular updates on storage data and capacity assessments, create alignment between the governmental levels on data reporting, and to continue international cross-border harmonization.

References

- Welkenhuysen K., Ramírez A., Swennen R. & Piessens K., 2013. Strategy for ranking potential CO_2 storage reservoirs: A case study for Belgium. International Journal of Greenhouse Gas Control, 17, 431-449. http://dx.doi.org/10.1016/j.ijggc.2013.05.025
- EGDI, https://maps.europe-geology.eu/
- DGE-Rollout,
- Piessens, K. & Dusar, M., 2004. Feasibility of CO_2 sequestration in abandoned coal mines in Belgium. Geologica Belgica, 7 (3-4), 165-180. https://popups.uliege.be/1374-8505/index.php?id=308

For the Federal State:

The evaluation for geological storage of CO_2 in the subsurface of the Belgian Continental Shelf was made in 2011 (Piessens, 2011). The study of 2011 focused on the requirements of 'permanent containment' and 'no significant risk of leakage' of the CCS-Directive (Directive 2009/31/EC) . No additional data has become available since that changes the outcome of this assessment.

The geology of the Belgian Continental Shelf consists of deposits of Quaternary, Paleogene-Neogene and Cretaceous age that occur in a position that is too shallow to allow geological storage of CO_2. The Upper Palaeozoic and part of the Mesozoic are absent in this sector of the North Sea, and it are the Lower Palaeozoic units that form the basement. This geological entity is the offshore extension of the Brabant Massif. The drillings on the Belgian Continental Shelf have not reached the Lower Palaeozoic, but the depth to the top of the basement can be inferred from seismic sections. These show a basement that occurs in the southern corner of the study area at depths around 250 m. The top of the basement deepens in general in a northward direction, as it does onshore, to reach depths that may slightly exceed 600 m. The seismic line MPNI-9101 shows the Brabant Massif as a seismically transparent zone without internal reflections (Rijkers et al., 1993), similar to the onshore BELCORP seismic section, except for the southern part of the profile where south dipping reflectors can be identified which probably correspond to the Silurian and Ordovician succession. The onshore map of the Brabant Massif (Piessens et al., 2005) was extended to offshore based on structural understanding and geophysical data (aeromagnetic and gravimetric potential field data), and is therefore less detailed than the onshore part. A map and discussion of the map are available as an online publication (Piessens, 2015).
Following storage options can be excluded without in-depth discussion:
Hydrocarbon fields: The storage concepts related to oil and gas, either for storage in depleted fields or to enhance ongoing or future production, are not relevant for off-shore Belgium because of the absence of accumulations of hydrocarbons.
Coal sequences: Storage in coal or coal sequences is equally impossible in view of the clear absence of coal-bearing strata. The only significant coal occurrences in this part of Europe are linked to the Carboniferous, a part of the stratigraphy which is missing in the off-shore region of Belgium.
Mineral sequestration: Geological mineral sequestration, which relies on the chemical interaction of injected CO_2 with adjacent rocks, is not feasible in view of the absence of sufficient volumes of suitable rocks.
Aquifer storage options require a more detailed discussion, assessing the combined probability that the four principal elements of a storage complex (reservoir, primary seal, trap) are present somewhere in the subsurface of the Belgian Continental Shelf. This evaluation is negative. This outcome is corroborated by the similar negative evaluation of the onshore part of the Brabant Massif for geological storage of CO_2.

The conclusion therefore still stands that with confidence the geology in the off-shore part of Belgium excludes with almost certainty the safe and permanent geological storage of CO_2.

References

- European Parliament & Council of the European Union, 2009. DIRECTIVE 2009/31/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006, Directive 2009/31/EC, Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0114:0135:EN:PDF.
- Piessens, K., 2011. Evaluation of the off-shore storage potential for Belgium. Federal Public Service, Health, Food Chain Safety and Environment.
- Piessens, K., 2015. Off-shore map of the Brabant Massif. https://doi.org/10.13140/RG.2.1.3468.4002
- Piessens, K., Vancampenhout, P. & De Vos, W., 2005. Geologische subcropkaart van het Massief van Brabant in Vlaanderen.
- Rijkers, R. et al., 1993. Crustal structure of the London-Brabant Massif, southern North Sea. Geological Magazine, 130(5), 569-574.

For the Flanders Region:

*The Flanders Region has no hydrocarbon production areas that have been decommissioned or are under decommissioning (**b**). There are no conventional hydrocarbon reserves known on the territory and unconventional hydrocarbon reserves are theoretically present, but unproven. There has been exploration interest for coalbed methane (CBM) in the past, but apart from an unsuccessful pilot well in 1994, there have been no additional drillings to prove the potential.*

*The deep subsurface in Flanders has a small theoretical potential for CO2 storage in saline aquifers (Piessens et al., 2008 and 2012; Welkenhuysen et al., 2011), but extensive exploration would be needed to confirm such options. The theoretical potential is based on depth and thickness of aquifers, an estimated average transmissivity and presence of geological low permeable layers. There is large uncertainty about local and effective transmissivity, integrity of cap rocks, possible confining structures and role of faults with respect to leaking paths. All basic geological data is freely available via the Flemish database for the subsurface (Databank Ondergrond Vlaanderen, DOV; https://dov.vlaanderen.be/). There are so far no readily available storage options for CO2 to be permitted on the territory (**a**).*

For the Brussels Region:

Voor wat het Brussels Hoofdstedelijk Gewest betreft kunnen we kort zijn. De geologische opslag en de opslag in de waterkolom van CO2 is in ons gewest verboden. Zie hiervoor het ministerieel besluit van 2 februari 2012. https://www.ejustice.just.fgov.be/cgi/article.pl?language=nl&sum_date=2024-07-02&dt=Arr%EAt%E9&htit=captage&text1=transport&choix1=et&choix2=et&fr=f&nl=n&du=d&trier=promulgation&lg_txt=n&pd_search=2012-02-29&s_editie=&numac_search=2012031073&caller=list&2012031073=1&view_numac=2012031073F
In ons gewest zijn er ook nooit vergunningen geweest voor olie- en of gasproductie uit de ondergrond.

As far as the Brussels Capital Region is concerned, we can be brief. Geological storage and storage in the water column of CO2 is prohibited in our region. Zie hiervoor het ministerieel besluit van 2 februari 2012. https://www.ejustice.just.fgov.be/cgi/article.pl?language=nl&sum_date=2024-07-02&dt=Arr%EAt%E9&htit=captage&text1=transport&choix1=et&choix2=et&fr=f&nl=n&du=d&trier=promulgation&lg_txt=n&pd_search=2012-02-29&s_editie=&numac_search=2012031073&caller=list&2012031073=1&view_numac=2012031073F

Nor have there ever been any permits for oil and/or gas production from underground in our region.

For the Walloon Region:

No conventional hydrocarbon exploration and/or production licenses have been applied for, issued or are currently pending in the Walloon Region; consequently, there are no abandoned or decommissioned facilities of this type in its territory.

The collection of firedamp was carried out in some coal mines during their period of operation; since the end of mining and the flooding of the de-hollowed massifs, this collection has ceased.

Currently, a permit has been issued to exploit mine gas (for power generation) on a single reservoir at Anderlues.

As far as geological storage of CO2 is concerned, it is unthinkable to store it in the part of the coalfield where coal mining took place. This reservoir is not watertight (an attempt to store natural gas underground failed). Injecting CO2 would increase CH4 desorption in an ancient massif (extremely folded) which has been mined on all sides and in which the state of abandonment of the installations is largely unknown. This would lead to a risk of excessive desorbed firedamp production (and accumulation) beneath densely populated areas.

Theoretically, CO2 storage could have been envisaged in the Carboniferous limestone aquifer and, above all, in the Houiller massif deep beneath the Midi fault.

CO2 storage in carbonate aquifers is a priori an obstacle to geothermal energy and therefore to the production of renewable energy (which is a priority for Wallonia, but also for the EU).

The "competition" between these two superimposed activities implies choices and raises questions about issues whose implications have yet to be studied, such as: the (supposed) watertightness of the Midi fault, natural wells (Quaregnon...) in the Houiller, the exact nature of the subsoil beneath the Midi fault, the effects of injecting CO2 into a flooded deposit, etc....

All these questions show that the geological storage of CO2 in the Walloon Region will not be possible in the near future without serious studies on the issues raised, not to mention the cross-border impacts of this CO2 storage on the coal gas reserves of neighboring French regions.

Annex 1:

A. State of play related to legally binding framework, to make relevant geological data publicly available.

Currently there are insufficient legal provisions to include data in above mentioned links, related to confidential or proprietary data, related to hydrocarbon production areas that have been decommissioned or are under decommissioning, held by (previous) titleholders of the respective fields.
Public data on all areas where CO_2 storage sites could be permitted will progressively be detailed on regional, national or European data platforms.
In cooperation with the European Commission and in close collaboration with and inspired by the best practice of geological surveys of other members we hope to develop such legal framework and a mandate for the coordinating Belgian national geological survey organization and its regional counterparts.

B. State of play related to the availability of all geological data for areas where CO_2 storage sites could be permitted, or hydrocarbon production areas that have been decommissioned or are under decommissioning, held by (previous) titleholders of the respective fields and/or by public authorities..

Basic geological information is freely available, see links above for regional, national and European platforms. Efforts are and will be made to maintain, update and extend data. Some information is confidential or proprietary and cannot be included under the current legal provisions. In particular, hydrocarbons have been extracted only in the form of coal. Geological data on these areas are currently only partly publicly available. An evaluation is needed to which extent this data is relevant for potential areas for CO_2 storage, before additional legal provisions can be considered.

Member State Contribution CCUS – Net Zero Industry Act (NZIA)

Relevant provisions

NZIA Art. 21(2) & (3) - By the end of 2024, and thereafter annually, Member States shall report to the Commission and the public on:

- a mapping of CO2 capture, transport and storage projects in progress, with expected permit and FID dates;
- any national support measures, national strategies and targets that have been or will be adopted;
- any cross-border cooperation for CO2 transport & plans to facilitate the decarbonisation of industrial sectors, if no CO2 storage projects are in progress on their territory.

Belgian contribution

CCS is regulated by Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide. Offshore (transboundary) CCS must also comply with the London Protocol (anti-dumping treaty) and OSPAR.

By 2030, initial projections indicate that industrial plants in Belgium will capture about 5 Mt of CO2, entirely in the Flemish Region. The potential in the Walloon Region is still under further investigation. After 2030, this capture will be further expanded in both the Flemish and Walloon Regions. For the further implementation of CCS in Belgium, in terms of the entities interested in deploying it, the lack of cost-effective storage potential on home soil creates a need for storage capacity in third countries. One of the legal conditions for this cross-border cooperation is the conclusion of a bilateral agreement between the exporting and importing State to meet the requirements of the London Protocol.

The federal state, the Flemish Region and the Walloon Region will also seek harmonization, or at least alignment, of bilateral agreements at the North Sea level. This can be done through further participation in European expert group meetings and in the North Sea Basin Task Force.

The following Memoranda of Understanding have been concluded to implement the London Protocol:

- Memorandum of Understanding between the Minister for Environment of the Flemish Region and the Minister for Energy and Climate of the Walloon Region and the federal Minister for the North Sea of Belgium and the Minister for Climate, Energy and Utilities of Denmark on cross border transportation of CO2 with the purpose of permanent geological storage, signed on 26th September 2022;
- Memorandum of Understanding (MoU) between the Minister for Environment of the Flemish Region and the federal Minister for the North Sea of Belgium and the Minister for Energy and Climate of the Walloon Region and the Minister of Economic Affairs and Climate Policy of the Netherlands on cross border transportation of CO2 with the purpose of permanent geological storage, signed on 22nd of June 2023;
- Memorandum of Understanding (MoU) between the Minister for Environment of the Flemish Region and the federal Minister for the North Sea of Belgium and the Minister for Energy and Climate of the

Walloon Region and the Minister of Energy of Norway on cross-border transportation of CO2 with the purpose of permanent geological storage, signed on 15th of April 2024

Furthermore, Belgium (federal State and Flemish Region) has also signed a Memorandum of Understanding with Norway on the laying and operation of a pipeline for transportation of CO2 from Belgium to Norway, on the 18th of June 2024. Negotiations on a Convention between both States are underway.

For the Federal State:

The federal level has a facilitating and coordinating role in the both interactions with other EEA and EU member states as well as the UK, as well as intra Belgian officials and stakeholder-meetings.

For the Flemish Region:

Mapping of CCUS projects

In Annex 1, an overview is given of the CO_2 capture and transport projects in progress and under development in the Flemish region. For each project, information is provided regarding the project name, type of CCUS project, project leader, relevant stakeholders, estimation of the need for transport capacity, estimation of the need for storage capacity, the status of permitting, expected or actual Final Investment Decision date, and expected or actual date of entry into operation. It is important to note that this data is indicative and based on the information available today. The data can evolve in the future based on new developments.

Flemish CCUS measures and policies

The Flemish Region has established its long-term climate policies and additional measures in the draft update of the Flemish Energy and Climate Plan (2021-2030) and the Flemish Climate Strategy 2050. The Flemish Region recognizes CCUS as one of the promising avenues to reduce emissions. In this light, the Flemish Government has issued the CCUS Vision Note on the 26th of November 2021. It outlines the priorities of the Flemish Government regarding CCUS.

Following up on these policy objectives and priorities and under impulse from emerging Flemish CCUS projects, Flanders adopted in 2024 a legislative framework to regulate the transport of CO_2 by pipelines in the Flemish region. Multiple support mechanisms have also been put into place for CCUS projects in Flanders. Additionally, the recent governmental agreement of the new Flemish government has indicated various pathways for further support which may be explored. These ideas have been elaborated upon in the policy notes of the relevant ministers submitted to the Flemish Parliament.

Below, more information is given on the key Flemish CCUS policies and support measures.

- *CCUS policy priorities in the new governmental agreement*

In the new Flemish governmental agreement, general support for CCUS is expressed. The Flemish government supports the Flemish industry on the road to carbon neutrality and wants to seize on the opportunities provided by a frontrunner policy and supports a future-oriented sector that creates sustainable jobs.

Specifically, the possibility to work out the following support measures is mentioned:

- **Focus on infrastructure**
  The Flemish Government is starting a participatory process within *Klimaatsprong* between infrastructure managers, large industrial clusters, large SME zones and the government to determine

infrastructure needs, and to see how these can be realized through collective infrastructure (electricity, power grids, hydrogen grids, heat grids, infrastructure to liquefy and transport CO_2...).

- **OPEX-support**
  The pilot project *bijpascontracten* (contracts for difference) to support the Flemish basic industry in the transition to low carbon processes was launched and is continuously monitored. Based on the foreseen evaluation, the Flemish Government will decide on the further implementation and execution of that instrument. A benchmark study about the deployment of that instrument by our neighboring countries will be initiated once the Flemish government is formed.
- **Project support**
  The Flemish government is exploring support for major projects at its ports related to CO_2 capture with permanent storage (CCS) and the use of captured CO_2 (CCU).

In the policy note on energy and climate, the Flemish Minister for Energy and Climate indicated that the Flemish government will facilitate the capture, transport and use or storage of CO_2 (CCUS). In particular, the Flemish government will facilitate the transport of CO_2 through the conclusion of the necessary international agreements and the implementation of the CO_2 transport network decree. By 2028 at the latest, the Flemish government will submit an evaluation report on the implementation of the CO_2 transport network decree to the Flemish Parliament. The Flemish government will take into account the European evolutions, such as the elaboration of the European Industrial Carbon Management Communication and the revision of the ETS Directive. Support for major projects in the Flemish ports regarding CO_2 capture with permanent storage (CCS) and the use of captured CO_2 (CCU) will be explored.

The policy note on economy and industry clarifies that the Flemish Government is currently examining support for major projects at our ports related to CO_2 capture with permanent storage (CCS) and the use of captured CO2 (CCU) for which the contracts for difference are a possible avenue of support.

- *Flemish vision note*

The CCUS Vision Note outlines the Flemish Government's priorities regarding CCUS, focusing on seven key areas:

- **Cost-Effective Climate Policy with attention for competitiveness of the industry is crucial**
  The Flemish government prioritizes cost effective climate measures, focusing on reducing greenhouse gas emissions while maintaining industrial competitiveness.
- **Positive Stance on CCUS**
  The Flemish government recognizes CCUS as a useful technology to reach the climate targets in a cost-efficient manner. The storage of CO_2 in the underground relies on existing technologies and is reliable. CCU opens possibilities to consider CO_2 not as a waste products but as a circular raw material.
- **Enabling European policies for the industrial climate transition and the application of CCUS**
  An enabling European framework for CCUS is essential and should be based on the deployment of European support mechanisms, an ETS system that stimulates both CCS and CCU, and European state aid and other rules that allow sufficient support for large-scale CCUS projects.
- **Ensuring a maximum success rate in EU Funding in Flanders**
  To maximize access to European funding, the Flemish Government commits to co-financing promising CCUS projects, increasing their likelihood of receiving EU subsidies and creating leverage through this Flemish support.
- **Developing suitable CCUS Infrastructure**
  The Flemish government support the development of a CCUS backbone. CO_2 pipeline transport between industrial clusters and ports both within Flanders and in cooperation with neighboring countries will be expanded.
- **Developing a regulatory framework for CO_2 Transport**

Updating existing and adopting new legislation around CCS, focusing on the framework of CO_2 transport via pipeline. This has already been accomplished with the newly adopted decree on CO_2 transport by pipeline that is currently being implemented (*see infra*).

- **Strategic Partnerships with frontrunner countries**
  The Flemish Government aims to secure international agreements for cross-border CO_2 transport and storage, fostering collaboration within the North Sea Basin to strengthen regional CCUS efforts.

- *Target and measures within the draft updated NECP*

In the draft updated NECP it is stated that, based on initial projections, the industrial installations in Belgium will capture around 5 Mt of CO_2 by 2030, entirely in the Flemish region. After 2030, this capture will further develop in the Flemish and Walloon regions.

The Flemish contribution to the draft updated NECP explicitly refers to the CCUS Vision Note for the vision of how Flanders intends to exploit its CCUS potential. Flanders is committed to supporting CCS networks and CCU facilities through multiple measures. In addition to the measures mentioned under the CCUS Vision Note, the draft updated NECP adds that in the framework of the support mechanism *Klimaatsprong*, there is a working group on infrastructure (with four sub-working groups: "Port and import infrastructure", "Electricity networks", "Pipelines" and "Permit"). This working group will identify infrastructure needs for CO_2 networks as part of the Industrial Transition Programme. In consultation with the competent authorities and pipeline companies, the relevant routes and ways to build or reuse the infrastructure shall be studied. Efforts are being made to develop pipeline transport between industrial clusters and ports, both in Flanders and in cooperation with neighbouring countries.

- *Flemish legislation on CO_2-transport through pipelines*

For the transport of CO_2 on the territory of the Flemish Region, new legislation was adopted in the first half of 2024 to regulate different types of pipeline infrastructure in the Flemish region. The CO_2-Decree was voted in the plenary session of the Flemish Parliament on March 27, 2024 and was published in the Belgian Official Journal on April 25, 2024. The implementing decision of the Flemish government (CO_2-Decision) was definitively approved on June 7, 2024.

On October 25, 2024, the Flemish Minister for Energy and Climate signed the ministerial decision that initiates the procedure for the designation of a carbon net operator of the CO_2 transport network in the Flemish Region. Through this ministerial decree, published in the Belgian Official Journal on Nov. 6, 2024, the procedure for appointing the transport network operator is launched. The designation conditions, criteria, and procedure to be followed are included in the CO_2-Decree and CO_2-Decision.

- *Overview of support measures for CCUS projects in Flanders*

To achieve ambitious climate goals, the Flemish government encourages industrial innovation in reducing CO_2 emissions, among which CCUS is one of those solutions. The Flemish region provides various funding mechanisms to support CCUS projects at different stages of development.

- **Pre-FEED Feasibility Study Funding**
  Supports early-stage feasibility studies assessing the technical and financial viability of CCUS projects. This initial funding enables industries to conduct research, evaluate risks, and explore the potential of CCUS initiatives.
- **Strategic Ecological Support (STRES)**

Aimed at large-scale industrial transformation, STRES funding supports long-term CO_2 reduction technologies. This "stres support" helps companies initiate significant structural changes, exemplified by support for the Steelanol project in the steel industry.

- **Co-Financing for EU Innovation Fund Projects**
  Provides additional financing for projects approved by the European Union's Innovation Fund, which targets breakthrough CCUS innovations. VLAIO co-financing enhances the feasibility and financial structure of such major projects within Flanders, mainly in line and based on GBER.
- **Innovation Funding for R&D Projects**
  Offers funding for research and development, from initial technology development to pilot phases. This support facilitates CCUS technology advancement through experiments, trials, and scaling efforts in CO_2 reduction.
- **SME Growth Subsidy for Sustainable Innovation**
  Focused on small and medium enterprises (SMEs), this subsidy aids businesses in adopting sustainable innovations, including CCUS. Funding covers costs for external expertise and new hires, helping SMEs integrate CCUS in their operations. At the moment this has not been used to support any CCUS projects, but it remains a possibility for SMEs in the future.

As stated earlier, the Flemish Government is currently assessing the possibility of extending the pilot project of contracts for difference (CfD) as OPEX financing mechanism to support the Flemish basic industry. The Flemish Government will decide on the further implementation and execution of this instrument after thorough examination. Part of this examination will be on the CfD scope and whether to extend the mechanism to support major projects at our ports related to CO_2 capture with permanent storage (CCS) and the use of captured CO_2 (CCU).

<u>Cross-border cooperation and access for CO_2 transport & plans</u>

Flanders is well-placed to develop and deploy CCUS technologies:

- Flanders has the necessary know-how in its institutions and companies to apply advanced capture technologies;
- Flanders occupies a central position in the North-West European industrial cluster and is relatively close to the major CO_2 storage sites in the North Sea basin;
- The presence of Europe's largest integrated fuel and chemical cluster in Flanders generates significant CO_2 emissions concentrated on a relatively small surface area. The existing or planned pipeline network, clusters and ports make it possible to organise the transport of CO_2 efficiently. This makes Flanders a place to create new collaborations and integrate innovative systems that capture, collect or sequester up to tens of millions of tonnes of CO_2, or transform them into useful products.
- The Flemish Region is part of the North Sea Basin Task Force (NSBTF), together with representatives from Denmark, France, Germany, the Netherlands, Norway and the United Kingdom. This task force aims to develop common principles for CCS in the North Sea area. NSBTF members have ambitions for CCS in their countries and wish to take a collaborative approach to develop and promote cross-border CCS.

Given the lack of available local sites in Flanders, cross-border storage in the North-Sea basin is the most realistic storage option. In that respect, the Flemish Region has been actively involved in the negotiation of bilateral agreements or arrangements under the London Protocol to enable the cross-border transport of CO_2 for geological storage (the first section of this report gives an overview of these agreements). The Flemish Government also conducted a separate memorandum of understanding with Norway to initiate an agreement to facilitate a CO_2 transport pipeline.

- *Flemish CO2-Decree: cross-border aspects*

Because of its unique location, presence of major ports and of energy-intensive industry, Flanders is well placed to play a central role in the development of the future European CO_2 transport network. Flanders therefore has the ambition to become a hub for CO_2 transport in the heart of Europe. The supply of important volumes of CO_2 from neighboring countries to future Flemish terminals for liquefaction and offshore pipelines will be crucial for this.

To enable the development of essential cross-border interconnections, the Flemish legislation on CO_2 transport establishes the main CO_2 transport network. The carbon net operator of this transport network will have the task of developing interconnections with infrastructure of EEA Member States and maybe even third countries once this is made possible, enabling the transport of CO_2 captured by Flemish emitters to storage sites.

For the Brussels-Capital Region:

Nothing to report :

- CO2 storage is forbidden (following a geological survey). There is currently no request or authorization to capture or transport CO2.
- No measures to encourage CCSU have been included in the NECP: given the limited size of the region, the absence of industrial cluster and its urban nature, and the absence of national border, the priority for regional action is to reduce emissions at source. However contacts have been established with Fluxys.

For the Walloon Region:

<u>Mapping of CCUS projects</u>

In Annex 1, an overview is given of the CO2 capture and transport projects in progress and under development in the Walloon region. For each project, information is provided regarding the project name, type of CCUS project, project leader, relevant stakeholders, estimation of the need for transport capacity, estimation of the need for storage capacity, the status of permitting, expected or actual Final Investment Decision date, and expected or actual date of entry into operation. It is important to note that this data is indicative and based on the information available today. The data can evolve in the future based on new developments.

Regional strategy

In its 2019-2024 political commitments, the Government intends to develop and strengthen Wallonia's position in strategic sectors such as those of environmental transition technologies, including nuclear power and the treatment of its waste, carbon capture and storage technologies, hydrogen, and cybersecurity. The Air Climate Energy Plan 2030 (adopted on March 21, 2023) plans to support the implementation of CO2 capture and reuse projects. This support program will be accompanied by increased support for applied research.

Wallonia has developed a comprehensive strategy for carbon capture, utilization, and storage (CCUS) to address its industrial CO2 emissions:

- Industrial Collaboration: Wallonia is working with major industrial companies like Holcim, ArcelorMittal, and Lhoist to capture CO2 emissions at the source. These companies are part of a broader initiative to connect with Norway's advanced carbon storage projects.

- CO2 Transport Network: The region is developing a network of pipelines to transport captured CO2 to strategic terminals in Zeebruges and Antwerp. From there, the CO2 will be shipped to storage sites.
- Economic and Environmental Goals: The strategy aims to reduce the environmental impact of heavy industries while ensuring their economic viability. This includes integrating CCUS with other green technologies like hydrogen production.

This approach not only helps in reducing CO2 emissions but also positions Wallonia as a key player in the European green economy.

Regional legal framework :

Wallonia has implemented several legal frameworks to facilitate carbon capture and storage (CCS), via:

- EU Directives: Wallonia adheres to the European Union's CCS Directive (2009/31/EC), which provides a legal framework for the geological storage of CO2. This directive ensures that CCS activities are safe and environmentally sound.
- Permitting Process: The region has established a detailed permitting process for CCS projects. This includes environmental impact assessments, public consultations, and stringent monitoring requirements to ensure compliance with safety and environmental standards.
- Liability and Long-term Storage: Legal provisions address the liability for CO2 storage sites, ensuring that operators are responsible for the integrity of storage sites both during operation and after closure. This includes financial security measures to cover potential risks.

Transport of CO2

The new decree for CO2 transportation in Wallonia is part of the region's broader climate strategy to reduce greenhouse gas emissions. Here are the key aspects:

- Regulatory Framework: The decree establishes a comprehensive regulatory framework for the safe and efficient transportation of CO2. This includes detailed guidelines on the construction, operation, and maintenance of CO2 pipelines.
- Safety Standards: It mandates strict safety standards to prevent leaks and ensure the integrity of the transportation infrastructure. Regular inspections and maintenance are required to comply with these standards.
- Environmental Impact Assessments: Before any CO2 transportation project can begin, an environmental impact assessment must be conducted. This ensures that potential environmental risks are identified and mitigated.
- Permitting Process: The decree outlines a clear permitting process for companies involved in CO2 transportation. This includes obtaining necessary approvals from relevant authorities and ensuring public consultations are held.
- Cross-border Cooperation: Given the importance of cross-border CO2 transport, the decree facilitates cooperation with neighboring regions and countries. This is crucial for accessing suitable storage sites, particularly offshore.

These measures are designed to support the deployment of carbon capture and storage technologies while ensuring environmental protection and public safety.

Project	Type of project	Project lead	Relevant stakeholders	Aggregated CO2 transport capacity	Aggregated CO2 injection/storage	Permitting status	Expected FID date	Expected date of commissioning	
Antwerp@C	Transport and liquefacti	Fluxys, Air Liquide, Port of Antwerp Bruges	BASF, AirLiquide, Fluxys, TotalEnergies, ExxonMobil, Ineos, Borealis, Port of Antwerp-Bruges	2,5 MTPA (phase 1) 10 MTPA (fully operational)	2,5 MTPA (phase 1) 10 MTPA (fully operational)	All permits granted	phase 1: Q2 2025	phase 1: 2028	
Kairos@C	Capture	BASF - project manager	BASF, AirLiquide	1,5 MTPA	1,5 MTPA	All permits granted except	Q2 2025	2028	
ARCaDe (Antwerp Carbon Capture and DeNOx)	Capture with transport and permanent storage contracting	Integration Manager CCS Project, TERA	Permanent storage via TotalEnergies sequestration solutions in	750 kt CO2 per year	750 kt CO2 per year	Capture part : to start in 2025	Mid 2026	Dec-29	
Ghent Carbon Hub	Transport, liquefaction and storage	Fluxys Belgium	ArcelorMittal Belgium, North Sea Port Flanders	4 Mtpa	4 Mtpa	Still to be launched	2026	2030	
CO2 backbone	Transport	Fluxys c-grid	Fluxys c-grid (Fluxys-BE/PoAB/Socofe/SFIM), Belgian emitters	15MTPA	15MTPA	Ongoing	2026	2030	
CO2hub Zeebrugge	Transport	Fluxys-Equinor	Fluxys, Equinor, Belgian & German emitters	31MTPA (11+20)	31MTPA (11+20)	Ongoing	2026	2030	
CO2-corridor Zeebrugge-Duits	Transport	Fluxys c-grid	Fluxys c-grid (Fluxys-BE/PoAB/Socofe/SFIM), German emitters	20MTPA	20MTPA	Ongoing	2026	2030	
CO2 Highway Europe	Transport	Equinor	Fluxys	18 mtpa	18 mtpa	Permit request in preparati	June 2026	2030	
H2BE	Capture + Transport	Engie & Equinor	- Potential customers : steel Industry and chemical industries - Infrastructure partners :	circa 1,8 M t/year	circa 1,8 M t/year	Permitting process started - permit application in preparation - -> the process will take	by the end of 2026	2030	
Steelanol + potential calisto project (to be decided)	technology to convert siderurgical gas to ethanol (Steelanol), calisto to purify and store remaining CO2 emissions	ArcelorMittal Belgium	LanzaTech as partner, fuel & chemical market in general (Steelanol). NipponGases as partner for Calisto	ethanol is main product, calisto would give around 300 kton CO2/year	ethanol is main product, around 300 kton CO2/year from calisto	permit received (Steelanol), calisto: the project is still in feasibility phase	unit in operation (Steelanol), calisto: the project is still in feasibility phase	unit in operation (Steelanol), calisto: the project is still in feasibility phase	
CAPTUS (https://captusproject.eu/captus-demonstration-site-1/; Horizon Europe No.	CCU with capture	Fundación CIRCE, ES	Arcelor Mittal, Bio Base Europe Pilot Plant, CSIC (ES)	0 Mtpa [CCU demonstratie: 75kg totaal CO2 afgevangen over 30 dagen]	0 Mtpa	Not applicable	Jan-23	Jan-26	
FUELPHORIA (Horizon Europe No. 101118286) https://fuelphoria.eu/demos/	CCU with capture	CERTH Center for Research and Technology Hellas (GR)	Aquafin,Bio base Europe Pilot Plant, CERTH (GR), CSIC (ES)	0	0	Permit available/received for biomethane installation (biogas upgrading unit providing CO2) at the wastewater treatment plant of Antwerpen-Zuid. Permit trajectory towards BBEPP pilot included in the EU Fuelphoria project -	Mar-23	Sep-25	
Blue Plasma	CO2 conversion	D-CRBN	D-CRBN, Talenco, VOPAK, VITO, UAntwerpen, ArcelorMittal, BASF,	0	0	Not applicable	Jan-23	Nov-24	
IVM Milieubeheer	CCU	IVM	15 municipalities in the Meetjesland		50000 à 100000 ton	Development	2025/2026	2026/2027	
GO4ZERO	CCU with capture	HOLCIM	Air liquide, Fluxys, Antwerp@ExportHub, Total Energies, Shell, Wintershell Dea, Northern	1.100.000 ton/year	1.100.000 ton/year	Ongoing	2025/2026	2026/2027	
ANTHEMIS	CCS	HEIDELBERG MATERIALS		800.000 ton/year	800.000 ton/year	Ongoing	2025	2025/2026	
BUTTERFLY	CCS	CARMEUSE	CRM, TECforLime, EuroBureau, UMons, ULiège PEPs			Permit received	2023	2025	
GLOBE	CCS	LHOIST				Ongoing	2025	2026	
CONCREAT	CCS	LHOIST				Development	2025		
CAPCO2	CCS	HEIDELBERG MATERIALS				Development	2025		
WASTE2EMISSIONS	CCS	IPALLE	UMons, VEOLIA			Development	2025		