

BUILDING MOMENTUM
FOR THE LONG-TERM CCS DEPLOYMENT
IN THE CEE REGION

Summary of CCS4CEE project

Poland

Implemented by:



Supported by:



Co-financed by:



Sfinansowano przez Narodowy Instytut
Wolności - Centrum Rozwoju
Społeczeństwa Obywatelskiego
ze środków Programu Rozwoju
Organizacji Obywatelskich
na lata 2018 – 2030

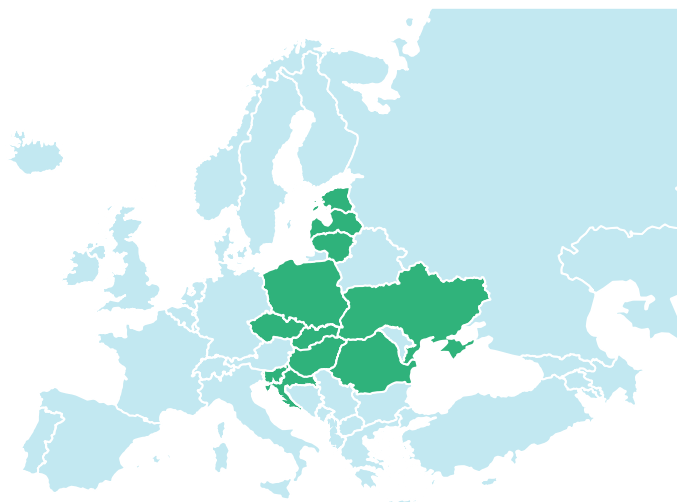


CCS4CEE project

PROJECT CONTEXT | Recent advances in several key areas (e.g., renewable energy sources, energy storage, electric vehicles) enable significant greenhouse gas (GHG) emission cuts but are not sufficient to reach deep decarbonisation consistent with Paris Agreement. This is recognised by International Energy Agency in its technology assessments and various modelling studies by both European Union institutions and independent researchers. Carbon capture and storage (CCS)¹ deployment may reduce industrial emissions, provide low-carbon industrial heat and improve the security of electricity supply by complementing short-term energy storage. However, its large-scale implementation requires a long-term policy framework. At the moment, the topic of CCS is not present in the mainstream debate on climate policy in the Central and Eastern European (CEE) countries. This may lead to uneven progress in CCS deployment across Europe, resulting in increased catching-up costs as well as missed opportunities for national development and regional cooperation. This project is designed to counteract this scenario.

PROJECT GOAL | The project aims to renew the discussion on the long-term deployment of CCS in the CEE region, leading to new policies and joint projects. It is expected that building evidence-based consensus among key stakeholders will pave the way to implement concrete policies and ventures. This will be achieved through combining analytical work, in the form of national and regional publications, with outreach, communication and capacity-building activities focused on the importance of timely CCS deployment and associated international cooperation.

SCOPE AND PHASES | The project covers Poland, Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Romania, Lithuania, Latvia, Estonia and Ukraine.



¹ CCS refers to “the capture of CO₂ from industrial installations, its transport to a storage site and its injection into a suitable underground geological formation for the purposes of permanent storage”, as defined by the European Commission. On the other hand, in carbon capture and utilization (CCU), the captured CO₂ is transported to a facility in which it is utilized. CCU exhibits fundamental differences stemming from the fate of the captured and transported CO₂ – in CCU, it is embodied into products, whereas in CCS it is permanently stored in underground geological formations. The main focus of the CCS4CEE project is CCS.

The project is implemented by four stakeholders from the CEE region in cooperation with the expert partner from Norway, Bellona Europa:



WiseEuropa is an independent think-tank institute located in Warsaw. It is the lead partner of the project and coordinator of the work in Poland, Croatia and Slovenia.



Institute for European Integration is a non-profit, non-partisan, and independent think tank focusing on European integration and cohesion. It coordinates the work in the Czech Republic and Slovakia.



CIVITTA is a leading management consultancy from CEE. It coordinates the work in Lithuania, Latvia, Estonia and Ukraine.



Energy Policy Groups is a non-profit, non-partisan independent think-tank located in Bucharest. It coordinates the work in Romania and Hungary.



The Bellona Foundation (expertise partner) is an independent non-profit organization that aims to provide expertise regarding the climate change issue by identifying and implementing sustainable environmental solutions.

The three phases of the project are as follows:

1. Determination of the starting point: assessment of the current state and potential of technological options, as well as European policy landscape and national contexts (Work Package 3, 2021);
2. Development of national roadmaps as well as regional cooperation roadmap for CCS deployment in the CEE region (Work Package 4, 2022);
3. Supporting implementation of the roadmaps through networking and capacity-building events (Work Package 5, 2023).

The project targets national and local policymakers, the business sector, research institutions and civil society. This will support the emergence of a socially accepted mix of appropriate policies, R&D and deployment activities. The project will ultimately benefit the CEE societies by supporting the timely implementation of CCS technologies which will ensure a smooth low-carbon transition.

PROJECT FUNDING | The project is funded by EEA and Norway Grants Fund for Regional Cooperation (project contract number 2018-1-1141).

ADDITIONAL INFORMATION ON THE PROJECT | Additional information about the project, including national and regional reports and deliverables can be accessed on the project website: ccs4cee.eu

Opportunities and barriers to CCS deployment

CCS4CEE PROJECT COUNTRIES

Across project countries, several commonalities relevant to CCS have been identified:

- Many project countries rely on manufacturing sectors, while their energy production depends heavily on fossil fuels. This condition, coupled with sometimes distant or uncertain deadlines for emissions reduction targets, means that CCS for the energy sector cannot be ruled out in the CEE region.
- Various transportation methods may be available to move CO₂ from emitters to storage sites in project countries or within the region. However, CO₂ transportation infrastructure is mostly absent.
- Amongst project countries, Ukraine has the highest estimated potential for geological storage of CO₂, followed by Romania and Poland. However, more research is needed to refine knowledge on storage potential, which often relies on theoretical estimates.
- Most project countries have a history of research (and occasionally testing) of CCS. Future projects would be supported by existing know-how and experience, including international cooperation.
- The regulatory environments of project countries are relatively underdeveloped and many fail to provide certainty for CCS, particularly regarding storage and transportation.
- Funding support is available at the EU level, and frameworks such as Projects of Common Interest may lend themselves to large-scale regional CCS projects.
- Many stakeholders in project countries are interested but cautious about deploying CCS, due to its high costs, lack of clear government support and financing, and challenging administrative procedures. Many also tend to favour CCU over CCS, due to perceived lower complexity and risks.
- An overall lack of public and institutional knowledge of CCS is evident in project countries.

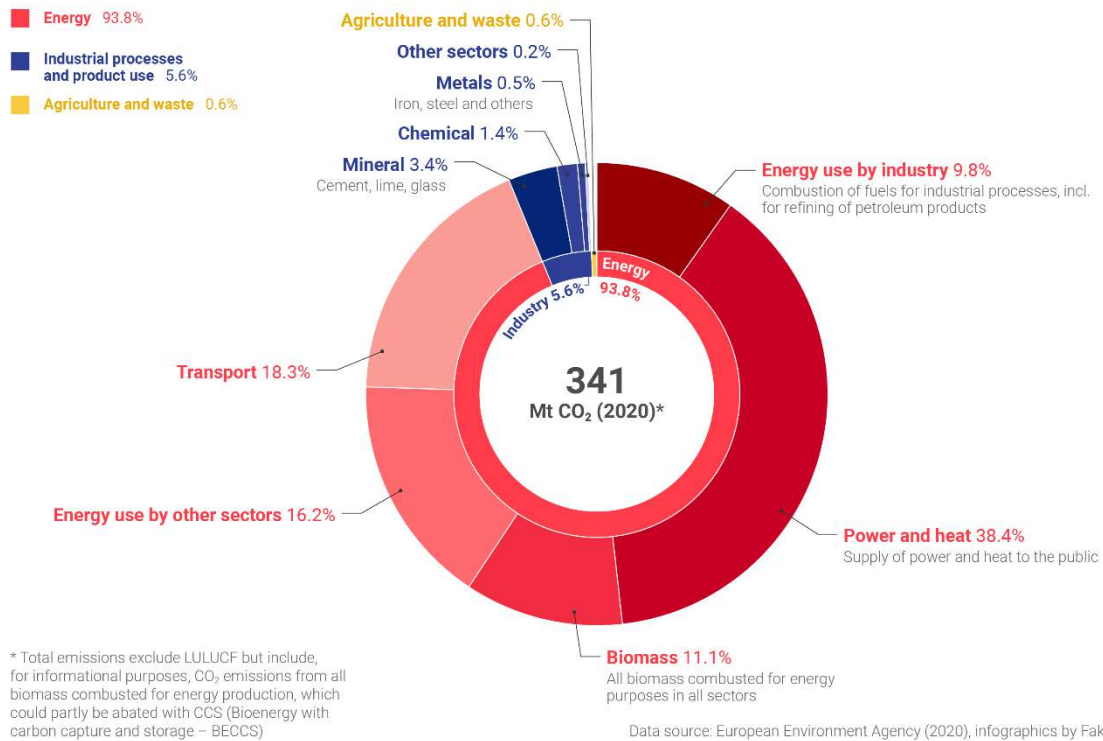
POLAND

Polish carbon-intensive sectors, where carbon capture installations could be applied on a commercial scale, are mainly energy supply (both electricity and heat) and industry. When it comes to industry, there are so-called process emissions² that can be hardly avoided without CCS implemented. These emissions occur mainly in the cement industry (process emissions from cement production only were responsible for as much as 2.3% of Polish annual CO₂ emissions in 2020), chemical industry (1.4% share of process emissions in total CO₂ emissions in 2020) and metal industry (0.5% share of process emissions in total CO₂ emissions in 2020). Therefore, based solely on the data on CO₂ emissions, in Poland, **there is a significant potential for CCS deployment** on the path to climate neutrality (see: Figure 1).

² Emissions that are arising from industrial production processes which chemically or physically transform materials, not from fuel combustion.

FIGURE 1. CO₂ EMISSIONS IN POLAND IN 2020 BY SECTORS

CO₂ EMISSIONS IN POLAND BY SECTORS

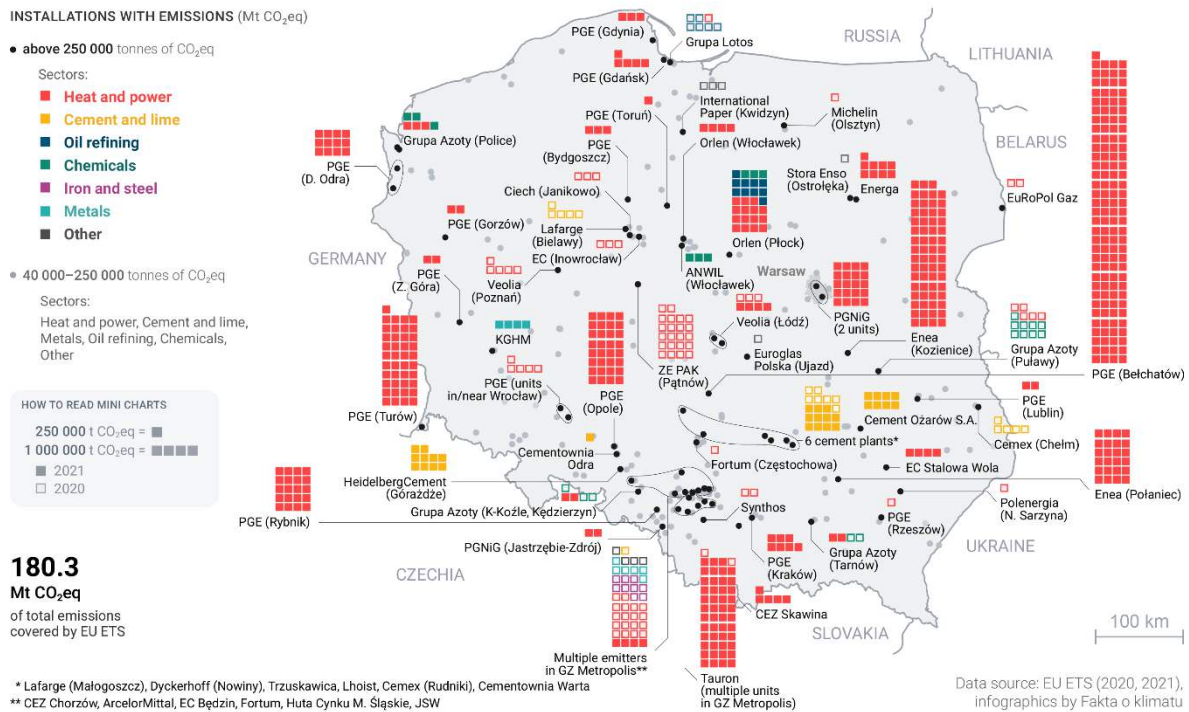


Large point-source CO₂ emitters are generally concentrated in the south of Poland: there is the mid-south region with cement factories and GZ Metropolis in Upper Silesia and Dąbrowa Coal Basin with plenty of plants from different CO₂ emission-intensive industries. However, also the mid-north region with facilities owned by Anwil, Ciech, Lafarge, Lotos and Orlen might be considered a CO₂ cluster (see: Figure 2). The high concentration of carbon-intensive industries in the landlocked south of Poland is a major impediment to the development of CO₂ transport networks, given current efforts aimed at developing CO₂ transport from Poland to storage sites in the North Sea.

FIGURE 2. POLAND'S LARGEST EMITTERS IN THE EU ETS IN 2020 AND 2021

THE BIGGEST EMITTERS IN POLAND

EU ETS covered emissions of greenhouse gases in 2020 and 2021



The volume of emissions from heat and power plants might be striking (especially in the case of Belchatów), but as the usage of renewable energy is becoming a more viable solution to mitigate emissions from the electricity supply, **implementation of CCS is more relevant in hard-to-abate sectors**, i.e. cement, steel and chemical production. However, given the extent to which the Polish heating sector lags behind in the transition to climate neutrality, implementation of CCS is also possible in this sector.

Besides many CO₂ emission sources, Poland has other prerequisites for CCS deployment. One of these is high underground CO₂ storage capacity, estimated at between 10.1 Gt and 15.5 Gt, the major part of which is located in onshore saline aquifers. Given that annual process emissions from hard-to-abate industrial branches (i.e. cement production, chemical industry, and iron and steel production) amounted to approximately 14 Mt CO₂ in 2019 and 2020, this **geological capacity is more than sufficient for CO₂ storage in Poland over several decades**. What is more, it enables Poland to become a CO₂ storage cluster for neighbouring countries without sufficient CO₂ storage capacity.

Prospects for CCS in Poland also emerge from the **high research experience** of Polish academia and research institutes in this field. A few already conducted pilot projects on CO₂ capture and storage do also increase the country's potential.

However, CCS development in Poland is hampered by regulatory barriers. The most important one is that onshore CO₂ storage is not allowed. Moreover, a minimum capacity threshold for CCS installations does not allow for pilot projects. Although forthcoming amendments to CCS regulations are to remove these barriers, they do not address the issue of financial securities required from potential developers of CO₂ storage sites. **The amount of financial securities is unreasonably high**, as reported by the stakeholders (several hundred million zlotys³, i.e. ca. EUR 100 million) and it efficiently prevents the development of CO₂ storage sites and makes it possible only for the largest corporate groups. To make matters worse, the state does not provide any support scheme dedicated to CCS, nor does it pay much attention to CCS in climate and energy strategies.

Nevertheless, as a result of EU climate policy and the increasing pace of the transition to climate neutrality, CCS is gaining momentum in Poland. Because of the barriers to onshore CO₂ storage, Polish stakeholders are considering the export of their captured CO₂ emissions to storage sites in the North Sea. This is an idea behind the [EU CCS Interconnector](#) and Go4ECOPlanet projects. The second one received financial support under Innovation Fund and it assumes to capture CO₂ from the Kujawy cement plant owned by Lafarge. The final financial support agreement between Lafarge and Innovation Fund was concluded in January 2023. The project costs are EUR 380 million and the installation is to be operational by 2027. Another new initiative, currently (as of March 2023) applying to the Project of Common Interest status, is an ECO2CEE, an extension of CO₂ transport infrastructure to Lithuania under the EU CCS Interconnector project. But as CO₂ exporting projects are developing, **the more urgent becomes the issue of London Protocol**, the international treaty which currently forbids CO₂ export to foreign offshore storage sites.

If CO₂ onshore storage is to be finally developed in Poland, **one should take the issue of public acceptance into serious consideration**, as it already proved to halt the CCS investment in Bełchatów in 2013. The issue of onshore CO₂ storage should be addressed and solved, especially since for the time being in the Góraźdze cement plant, where CO₂ is captured within the ACCSESS project, it is piped back into the kiln, since there are no feasible transport and storage solutions – Góraźdze is located in the south, i.e. far from emerging CO₂ transport hub in the north of Poland. The onshore storage issue has been also raised in the report on CCS delivered by AGH University of Science and Technology in Cracow to the Polish Cement Association in January 2023.⁴

A detailed assessment of the current state, past experiences and potential for CCS deployment in Poland and other project countries is available on the project website: ccs4cee.eu

³ [Green Paper for CCS development in Poland](#) (2021) by Lotos and Azoty, two important stakeholders from oil refining and fertilizers production industries, respectively; page 29.

⁴ The report is not publicly available, however it has been presented to the relevant Parliamentary Group, which is reported here (in Polish): <https://www.polskicement.pl/aktualnosci/dla-wprowadzenia-technologie-ccs-u-kluczowe-jest-szybkie-uchwalenie-zmian-prawa-geologicznego-i-gorniczego/>. The report discusses three potential onshore CO₂ storage locations in Poland.

Policy roadmap for the scaled-up deployment of CCS in Poland

Based on the assessment of past experiences and CCS potential, a national policy roadmap was prepared to outline how the future development of CCS technologies could proceed in Poland and under which enabling conditions. The roadmap provides an overview of various policy actions along the innovation cycle, from research and development to enabling policy and financial frameworks for commercialization. While the roadmap aims to describe an enabling environment to deploy CCS projects, it also focuses on ways to develop transferable knowledge and skills by national stakeholders (governments, research organizations, academia, private sector) in one or more stages along the carbon capture, transport, storage and utilization chain, and create linkages to gain knowledge and experience from more experienced stakeholders across the globe.

Based on the developed roadmap, immediate actions (i.e., to be delivered by 2025), that should be continued where necessary, for the further advancement of CCS in Poland are as follows:

- 1) Changes to the regulatory framework:
 - Allow onshore CO₂ storage;
 - Remove minimum capacity threshold for CCS installations;
 - Allow prospecting and exploration of (potential) onshore CO₂ storage sites;
 - Set the amount of financial securities required from the promoters of CCS projects at a reasonable level, but still compliant with the EU CCS Directive.
- 2) Solve the issue of the London Protocol and mitigate the risk of non-compliance of already developing CCS projects with international law:
 - Poland, as a party to the London Convention (LC), but not a party to the London Protocol (LP), should investigate whether by virtue of the provisions of the LC the export of CO₂ from Poland to other countries for offshore underground storage is allowed;
 - Identify whether there is a need to accede to the LP, ratify the 2009 amendment to article 6 of the LP, deposit a declaration on provisional application of this amendment, and, finally, sign an agreement with the destination country (e.g. Norway) for the exported CO₂.
- 3) Engage with EU and international fora and act for CCS-friendly policies and regulations (especially when it comes to EU law).
- 4) Launch efforts to update and deepen the assessment of geological CO₂ storage capacity.
- 5) Assess “CCS readiness” of Polish industrial plants and, if necessary, power plants.
- 6) Develop national CCS strategy and decarbonisation strategies for hard-to-abate branches (including CCS).
- 7) Provide an up-to-date analysis of public approval of CCS and, hence, deliver a strategy for building public acceptance of CCS.
- 8) Start a debate on national financial support schemes for CCS (e.g., Carbon Contracts for Difference).

Longer-term actions (to be delivered, consecutively, beyond the immediate actions, i.e. up to 2030 and 2040) which are considered the most important to enable CCS in Poland are as follows:

Scaling-up RD&D activities and building national knowledge and experience

The measures in this area, picked up from the roadmap as the most important ones, are focused on “bridging the valley of death” and are presented as follows:

- Match technology providers with potential recipients in the industrial and power sector.
- Deploy different parts of the CCS value chain separately (but in a coordinated manner), so as not to burden a single (private) entity with excessive costs.
- Focus on conventional road/rail/water CO₂ transport in initial projects of pilot character, which are to investigate the feasibility of CCS technology in Poland.
- Locate new industrial/heating plants in the proximity of (potential) CO₂ storage sites.
- Set up the cooperation mechanism of multiple companies in terms of financing CO₂ pipelines in the future or move the burden of financing the deployment of the pipeline grid to the state (especially since the CO₂ pipeline network can be managed by a state-owned enterprise in the future, like electricity and natural gas transmission system) or to a separate special-purpose entity.

Policy, standards and regulations

Since steps to be taken in this area are the most feasible to be done in the short term, the majority of them are already listed above. Some of them, however, require more continuous efforts and they are presented as follows:

- Adopt ISO standards (applies to stakeholders developing CCS).
- Raise the issue of misallocation of the revenues from the EU ETS, as they can be spent on CCS according to the ETS Directive and they can be a substantial source of finance for decarbonisation.
- Implement national support programmes, such as:
 - Carbon Contracts for Difference;
 - Green public procurements;
 - Tax incentives.
- Present CCS as a tool to conduct the just transition of coal and carbon-intensive regions.
- Implement CCS strategies, which can be particularly efficient in state-controlled sectors, i.e. the chemical industry in Poland, given their reliance on political will and not market conditions only.
- Maintain the policy and regulatory framework stable and clear in the long term.

Stakeholder engagement, cooperation & know-how dissemination

Actions in this field apply to a large extent to private stakeholders. They are focused on building CCS clusters and making use of the economy of scale, and are presented as follows:

- Establish CCS clusters and hubs (through stakeholder matching).
- Develop sector coupling between CO₂ emitters and CO₂ consumers in the manufacturing process.
- Deploy international/regional CO₂ transport and storage networks.

Social aspects and public support

Public acceptance might be the most important barrier to the deployment of onshore CO₂ storage sites and inland CO₂ transportation infrastructure. The measures how to address this issue carefully are presented as follows:

- Create information centres, websites, platforms with FAQ sections.
- Build on the success (in terms of security) of the imminent pilot projects.
- Shape the narrative about CCS around the local content of the CCS value chain and potential benefits.
- Address the fear of CO₂ leakage.
- Organise tours of CO₂ storage sites or natural gas underground storage sites.
- Involve the local community in the decision-making process.

A detailed assessment of the current state, past experiences and potential for CCS deployment in Poland and other project countries is available on the project website: ccs4cee.eu

