

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

## Summary of CCS4CEE project

Slovenia

Implemented by:



Co-financed by:



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Organizacji Obywatelskich  
na lata 2018 – 2030

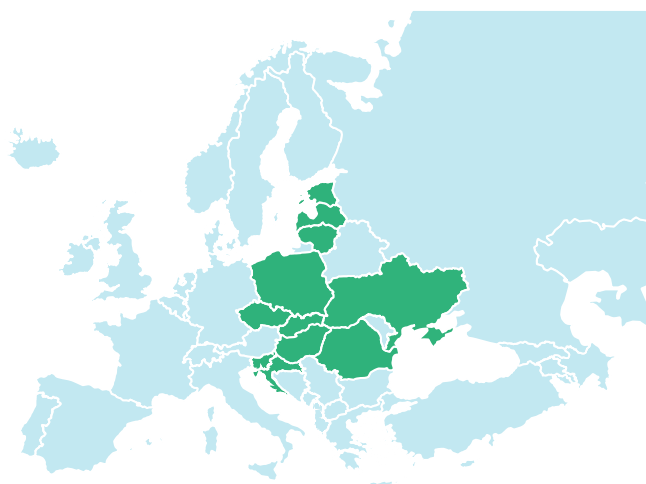


# CCS4CEE project

**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, as 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 (hereinafter – CCS)<sup>1</sup> deployment may reduce industrial emissions, provide low-carbon industrial heat and improve the energy security by allowing dispatchable power sources to continue operating with low emissions. 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 (hereinafter – 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 a series of national and regional publications and events, 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.



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<sup>1</sup> CCS refers to “the capture of CO<sub>2</sub> 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 (hereinafter – CCU), the captured CO<sub>2</sub> is transported to a facility in which it is utilized. CCU exhibits fundamental differences stemming from the fate of the captured and transported CO<sub>2</sub> – 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:



WiseEuropa

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

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

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

EPG  
ENERGY POLICY GROUP

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

BELLONA  
E U R O P A

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 are implemented in the project:

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](https://ccs4cee.eu)

# Opportunities and barriers for 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 CO<sub>2</sub> from emitters to storage sites in project countries or within the region. However, CO<sub>2</sub> transportation infrastructure is mostly absent.
- Amongst the project countries, Ukraine has the highest estimated potential for geological storage of CO<sub>2</sub>, 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 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 an important feature evident in project countries.

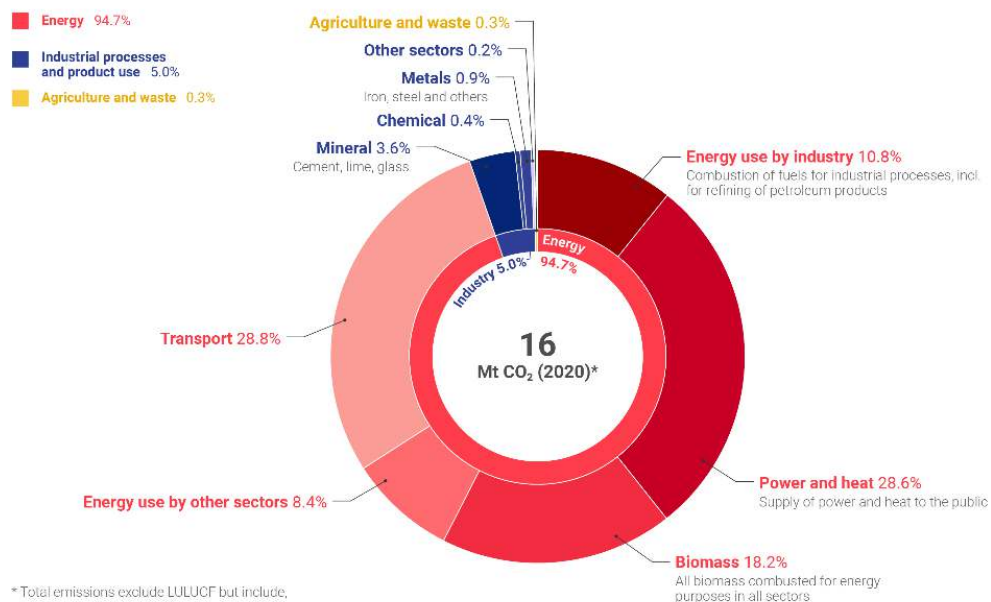
## SLOVENIA

Slovenia is a small country both by geographical and economic standards. Nevertheless, the energy-intensive industry sector is an important contributor to the country's GDP and its overall GHG emissions.

### I. Emissions and energy mix in Slovenia

The largest consumers of energy in Slovenia remain transportation and industrial sectors, while electricity generation is evenly supplied by nuclear power, hydroelectricity and coal, with a small percentage also coming from photovoltaics and natural gas. Overall, the power and heat, transport, and energy use by industry represent the largest part of Slovenia's CO<sub>2</sub> emissions (see graphs below).

FIGURE 1: CO<sub>2</sub> EMISSIONS IN SLOVENIA BY SECTOR



Data source: European Environment Agency (2020), infographics by Fakta o klimatu

FIGURE 2. LARGEST CO<sub>2</sub> EMITTERS IN SLOVENIA



While the transportation sector, as well as the power and heat sector, represent the largest components of CO<sub>2</sub> emission, the energy-intensive industry sector in Slovenia is still a significant contributor of CO<sub>2</sub> (and other GHG) emissions, as well as to the overall Slovenian GDP (2,5%). Approximately half of all CO<sub>2</sub> emitted in 2018 in Slovenia came from point sources that could implement carbon capture technologies (see Figure 2 above).

The energy mix in 2020 in Slovenia is dominated by fossil fuels, followed by nuclear and hydropower.

Coal	Oil	Nuclear	Natural gas	Biofuels and waste	Wind and solar	Hydropower
16%	29%	25%	11%	<1%	1%	17%

Key contributors of CO<sub>2</sub> emissions from the energy-intensive industries are cement and aluminium producers, Salonit Anhovo and Talum, with respective CO<sub>2</sub> emissions of 196 kt CO<sub>2</sub>eq and 612 kt CO<sub>2</sub> eq in 2017 (or 23% and 9% of all CO<sub>2</sub> emissions within the ETS sector in Slovenia). Thermal power plant Šoštanj in the power generation sector accounted for 4 073 kt CO<sub>2</sub> eq (or 62% of all CO<sub>2</sub> emissions within the ETS sector in Slovenia). These three actors, at present, hold the most potential for the application of CCS technologies in Slovenia.

## II. State-level strategic approach towards CCS deployment

While there is recognition of CCS in Slovenian national planning documents, there is a lack of clear ambition to develop the technologies. It is mentioned in the Slovenian **National Energy and Climate Plan (NECP)**, the **Long-Term Climate Strategy**, and the **Slovenian industrial strategy**. Whereas the first two refer to the technologies as potential pathways for Slovenia to achieve carbon neutrality, the latter notes that the technology is proven yet not economically feasible.

There is a clear need for a strategic approach towards CCS implementation and deployment in Slovenia, as currently, the technology lacks political momentum that would spur pilot and demonstration project development and consequently allow for large-scale projects to be deployed.

The NECP in Slovenia is being revised in 2023. As per the European Commission Notice on the Guidance to Member States for the update of the 2021-2030 national energy and climate plans, which was published in December 2022, the current government is considering including a decision to evaluate long-term CO<sub>2</sub> storage opportunities for process emissions. In Slovenia, CO<sub>2</sub> storage is currently prohibited. Nevertheless, within the efforts to revise its Climate Fund, through which climate change mitigation and adaptation measures are funded, public funding could be made available for investment in CO<sub>2</sub> capture, transport and storage. Furthermore, an option to fund innovation projects through carbon contracts for difference (CCfD) is currently also being discussed in the policy circles at various levels.

## III. National CCS legislation and regulatory barriers

While the CCS Directive has been implemented in the Slovenian legal system, there are no specific CCS regulations in place. The key barrier to CCS projects remains the Environment Act which does not allow any CO<sub>2</sub> storage in Slovenia. CO<sub>2</sub> utilization is not covered by Slovenian legal acts, however, there are no legal or regulatory barriers either.

One of the key identified barriers to the development and deployment of CCS had been identified as being of bureaucratic nature. Streamlining permitting procedures is said to remove a significant barrier to project development and deployment.

Furthermore, if policy options such as the CCfD would be made available to project proponents, this was identified as being their key decision-making tool for proceeding with or expediting their investment decisions.

## V. Level of knowledge and experience and future outlook for CCS in Slovenia

There is quite a large gap in terms of knowledge and experience with CCS technology in Slovenia. Whereas civil society and NGOs view it as an unnecessary and expensive tool that would allow for the continuation of the use of fossil fuels, several industry stakeholders, namely the cement manufacturer Saloniit Anhovo, see it as a decarbonisation tool. Although CCS is mentioned in national policy documents, employees of various ministries do not realistically see it as a decarbonisation tool.

Only Saloniit Anhovo is currently in the process of developing a pilot CO<sub>2</sub> capture project by 2028, with the potential for large-scale deployment by 2035. The thermal powerplant Šoštanj is also in discussions to look to develop a pilot CO<sub>2</sub> capture project. In addition, there is also some research activity at the National Chemistry Institute and universities on CO<sub>2</sub> capture methods.

Public perception of CCS in Slovenia is limited in terms of low awareness of the process itself and low acceptance (where awareness exists). With effective engagement, however, public opposition should not pose a major barrier to project development in Slovenia (from the project developer's perspective).

There are no significant infrastructure barriers to CO<sub>2</sub> transport in Slovenia. However, given that CO<sub>2</sub> storage is not allowed in Slovenia, complemented by public opposition issues (i.e. stemming from mistrust in government policies), it is most likely that regional clusters (namely with Italy and Croatia) will determine the level of CCS deployment in Slovenia.

## VI. Recent developments

It should be noted that following the publication of the National Roadmap for Slovenia, two stakeholders, Salnit Anhovo and thermal powerplant Šoštanj have undertaken pre-feasibility studies for either capture, transport and storage components. There have also been several meetings where cooperation on the CCS process was discussed. However, the extent of the success of this cooperation depends on developments over the upcoming year as far as securing public funding is concerned, as well as long-term policy assurance is received.

Furthermore, on December 2022, the European Commission launched a 12-week consultation seeking public and stakeholders' views on the list of candidate Projects of Common Interest. Within the thematic area of CO<sub>2</sub> networks, a project titled PRINOS CO<sub>2</sub> STORAGE, which looks to further develop a CO<sub>2</sub> storage hub in the North of Greece for hard-to-abate industries in the country and the region, also includes Slovenian stakeholders, as Slovenian industries have been identified as potential suppliers of captured CO<sub>2</sub>.

A detailed assessment of the current state, past experiences and potential for CCS/CCU deployment in Slovenia and other project countries is available on the project website: [ccs4cee.eu](https://ccs4cee.eu)



# Policy roadmap for the scaled-up deployment of CCS in Slovenia

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 and under which enabling conditions. The roadmap provides an overview of various policy actions along the innovation cycle, from research and development to potential commercialization of these technologies in order to reach climate targets set by the EU and national strategies. 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.

Slovenia has indicated that it is ambitious in terms of its climate goals, having included a goal of carbon neutrality by 2050 and getting off coal as an energy source by 2033. Nevertheless, several general barriers are preventing the development of both renewable energy sources and other technologies such as CCS. These relate primarily to long administrative procedures and relatively unstable government cycles. Slovenia also lacks awareness and understanding regarding CCS, among all types of stakeholders, particularly among policy-makers. Furthermore, other barriers for deploying CCS in Slovenia include a lack of availability of funding for initial pilot and demonstration projects, societal and NGO opposition, and no clear governmental support or strategy for deployment in national policy and legislative documents.

Based on the developed roadmap, the next and immediate steps are highlighted for the further advancement of CCS in Slovenia.

While some steps have been identified as mid- to long-term steps to be taken, there are six key steps that must be taken in the short term not to delay development and deployment further:

1. Increase awareness among policymakers, NGOs, and political representatives, as well as the general public
2. Establish a CCS advocacy group (within the Chamber of Commerce or as a standalone group)
3. Provide a clear political signal that CCS has a role to play in the decarbonisation of the energy-intensive industries in Slovenia (i.e. develop a national CCS strategy and increase visibility in NECP)
4. Increase funding in the Climate Fund for technological innovations, development and demonstration of low-carbon technologies, including measures that would support the development of feasibility studies (for CO<sub>2</sub> capture, transport and storage options),
5. Provide greater policy certainty (i.e. via CCfD) for CCS projects
6. Increase engagement with international fora.

A detailed CCS national roadmap for Slovenia and other project countries is available on the project website: [ccs4cee.eu](https://ccs4cee.eu)

