

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

Summary of CCS4CEE project

Slovakia

Implemented by:



Co-financed by:



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ze środków Programu Rozwoju
Organizacji Obywatelskich
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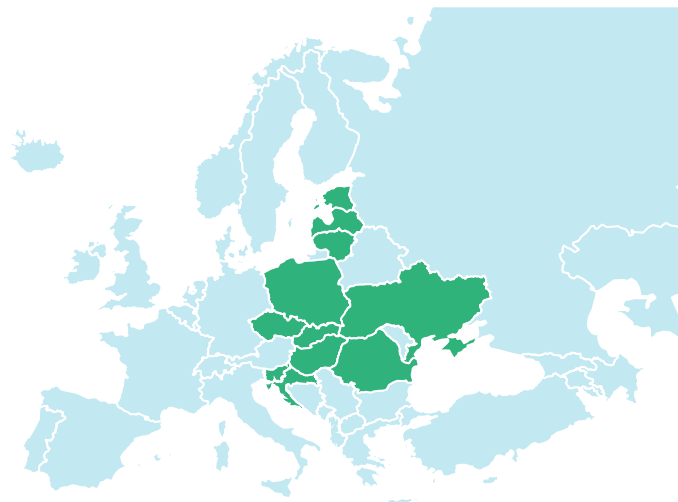


CCS4CEE project

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)¹ deployment may reduce industrial emissions, provide low-carbon industrial heat and improve 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.



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 utilisation (hereinafter – CCU), the captured CO₂ is transported to a facility in which it is utilised. 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:



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 organisation 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

Opportunities and barriers for CCS deployment

CCS4CEE PROJECT COUNTRIES

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

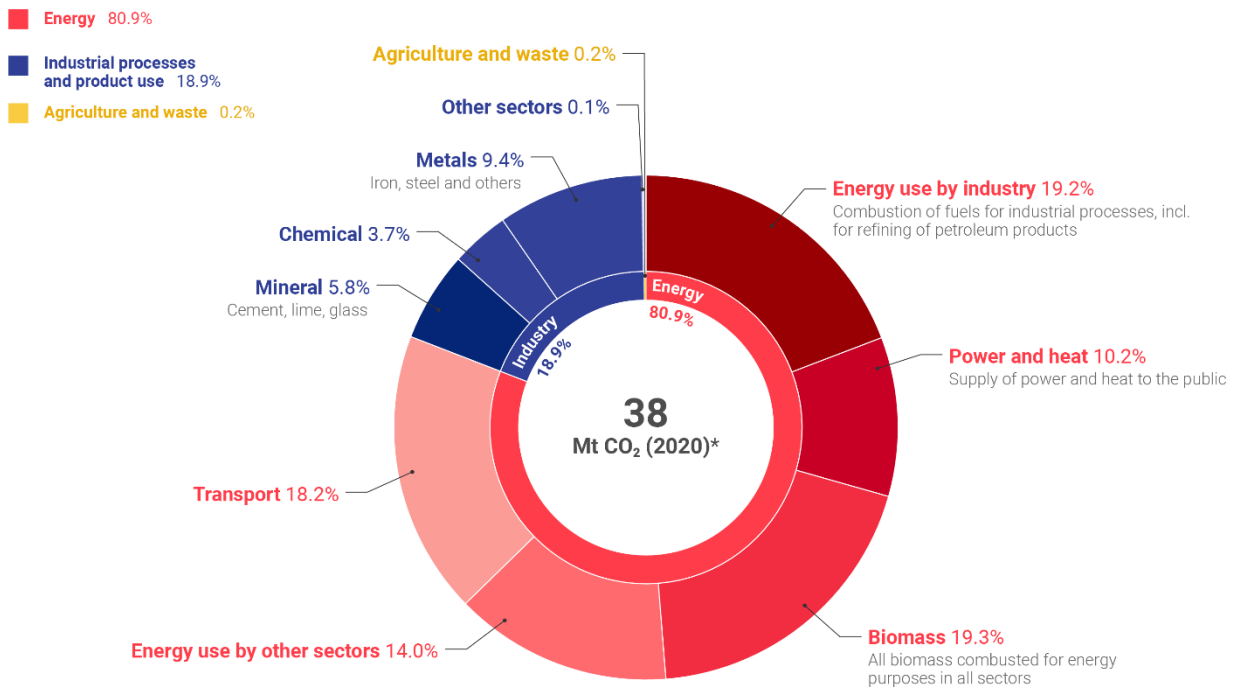
- Many project countries rely on manufacturing sectors, while their energy production depends heavily on fossil fuels. This condition, coupled with sometimes distant or uncertain deadlines for emissions reduction targets, means that CCS for the energy sector cannot be ruled out in the CEE region.
- Various transportation methods may be available to move CO₂ from emitters to storage sites in project countries or within the region. However, CO₂ transportation infrastructure is mostly absent.
- Amongst the 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 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.

SLOVAKIA

- What are the overall industrial ecosystem and CO₂ emissions sources?

Slovakia mostly depends on nuclear energy in its energy mix; however, fossil fuels still play an essential role, with a share of almost 25 per cent. Slovakia is a manufacture-oriented country with emission-intensive activities such as steel and iron production or chemicals and cement production. Overall, the CO₂ emissions equal more than 43 MtCO₂ (2020). As Figure 1 pinpoints, energy is the primary source of emissions. Industry (emissions from processes and combustion of fuels) is responsible for approximately one-third of total emissions. Interestingly, biomass used for energy production has a share of almost 20%, which offers a potential in biomass-to-energy or waste-to-energy CCS solutions.

CO₂ EMISSIONS IN SLOVAKIA BY SECTORS



* Total emissions exclude LULUCF but include, for informational purposes, CO₂ emissions from all biomass combusted for energy production, which could partly be abated with CCS (Bioenergy with carbon capture and storage – BECCS)

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

Figure 1: CO₂ emissions in Slovakia by sectors

The European Commission aims to support CCS development mainly in the manufacturing industry, especially in the hard-to-abate sectors such as cement, iron & steel or chemicals. In the energy sector, a significant potential of CCS is given to waste-to-energy and biomass-to-energy power plants. For this reason, Figure 1 highlights process and energy emissions in the industry and biomass used for energy production, where CCS could play a significant role.

The geographical element of the Slovak industry and energy sectors is highlighted in Figure 2. Many high-emitting businesses are located in the Vienna Basin (on the west of the country). Emission-intensive facilities under the EU ETS classification with more than 0.25 MtCO₂eq annual emissions are displayed. While many of these facilities lay close to each other in an industrialised region on the west, several cement and lime facilities, as well as the only large steel producer, are located on the east close to borders with Hungary.

THE BIGGEST EMITTERS IN SLOVAKIA

EU ETS covered emissions of greenhouse gases in 2020 and 2021

INSTALLATIONS WITH EMISSIONS (Mt CO₂eq)

- higher than 250 000 tons of CO₂eq

Sectors:

- Heat and power
- Cement and lime
- Chemicals
- Oil refining
- Iron and steel
- Metals

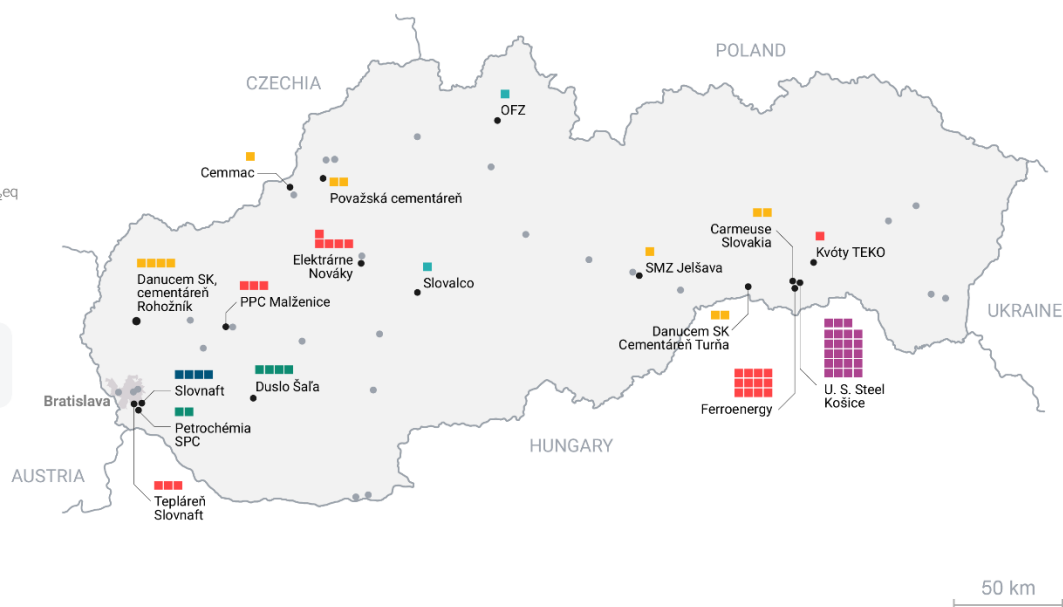
- 40 000–250 000 tonnes of CO₂eq

Sectors:

- Heat and power, Cement and lime, Oil refining, Iron and steel, Other

HOW TO READ MINI CHARTS

- 250 000 t CO₂eq = ■
- 1 000 000 t CO₂eq = ■■■■



20.9
Mt CO₂eq
of total emissions
covered by EU ETS

Data source: EU ETS (2021), infographics by Fakta o klimatu

Figure 2: The biggest emitters in Slovakia

- Where we stand: Is there any CCS project?

Slovakia has yet to wait for a CO₂ storage pilot project. Several limitations prevent the geological survey, such as areas where the geological survey is prohibited. These areas with prohibited geological survey cover a significant part of Slovakia. Still, storage capacity estimates have been known for many years, as pan-European projects for CO₂ storage potential have focused on these estimates since 2004. Conservative storage potential is estimated at over 1.7 GtCO₂, which is almost exclusively due to the large estimated capacity in saline aquifers.

The capture and transport of CO₂ also have yet to be explored in any pilot project. CO₂ utilisation remains a prospective option for many industrial subjects that aim to utilise CO₂ in their daily operations. The State Geological Institute of Dionýz Štúr actively participated in several projects on mineral carbonation. Selected industrial players also considered CO₂ storage via underground mineral sequestration. However, these plans remain in the drawer.

Who can change it: What are the institutions involved in the CCS debate?

Currently, not many stakeholders are actively participating in the debate on CCS. State Geological Institute and the Slovak Academy of Sciences engage in the activities; however, they are not supported or backed by

any other governmental institution. Private stakeholders remain in a stand-by position – especially SLOVNAFT and Duslo Šála are monitoring and evaluating the legislation and necessary steps towards decarbonising their activities, where CCS can potentially play a crucial role. Other companies, such as cement and lime producers, were not yet very loud; this, however, could easily change as CCS is becoming one of the leading decarbonisation tools in these sectors.

On the governmental level, three ministries remain the most important players – the Ministry of Environment (MoE), the Ministry of Economy (ME) and the Ministry of Finance (MF). Currently, the MoE published a [study](#) on the decarbonisation of the Slovak economy, where CCS also plays its part. Otherwise, the ministries are not directly involved in discussions on CCS deployment in Slovakia.

To successfully deploy CCS in Slovakia, there would need to be a broader and more proactive discussion between stakeholders on the private and governmental levels. From the latest media appearances, the Slovak government is mostly occupied with drafting plans for hydrogen utilisation. The biggest single CO₂ emitter in Slovakia, U.S. Steel Košice, and Ferroenergy (its energy production facility), are planning to deploy sizeable electric arc furnaces. Potential for CCS remains then mostly in cement and lime, chemicals or waste/biomass incineration processes.

- [Can we change anything despite the incomplete legal framework? What has to be amended?](#)

The EU CCS Directive has been transposed into Slovak law², yet it introduces a “limitation” in the sense that priority for geological exploration is given to the storage of hydrocarbon, waste, geothermal and other energy sources. An implementing decree on the financial security of CO₂ storage is yet to be drafted and approved. Moreover, areas of permitted geological exploration are updated annually – these areas can be another limiting factor to CCS deployment.

In 2023, however, MoE and ME will have to update national strategies such as the National Climate and Energy Plan (NECP). The European Commission, in its guidance document for the update of NECP, has, besides other tasks, encouraged the inclusion of a [long-term strategy and update on CO₂ storage](#) potential and the foreseen role of CCS in the decarbonisation strategy of Slovakia. While the European Commission is yet to propose its EU-wide [CCS strategy](#) (so-called CCUS Vision document), Slovakia could prepare for this EU-wide strategy in advance – as Slovakian stakeholders from the gas sector prepare for building hydrogen infrastructure, CO₂ infrastructure could potentially be included in such planned projects.

- [Has anything significant happened during the last year or the Czech EU Council Presidency \(CZ PRES\)?](#)

There is important news to the heavy industry stakeholders, such as cement and lime, chemicals or iron and steel. CZ PRES has been able to finalise the trilogues on EU ETS reform. The legislators agreed on a stricter decarbonisation pathway towards 2030, and financial instruments such as Innovation Fund and Modernisation Fund will be strengthened. This money in the bank should give way to more CCS pilot projects around the EU, including Slovakia. In the first two large-scale project calls, there has yet to be a successful project application from Slovakia. CCS and permanently stored CO₂ via CCU is exempt from surrendering EU ETS allowances under agreed conditions, and now it has been extended to CCS projects that will use non-pipeline transport.

² The EU CCS Directive has been transposed into Slovak law by Act No. 258/2011 Coll. on the Permanent Storage of Carbon Dioxide in the Geological Environment and Amending Certain Acts.

Neighbouring Poland has moved significantly towards the future application of CCS in the industry. Currently, the Polish government is working on a national CCS strategy. More than two projects are currently ongoing to prepare the CCS industrial ecosystem – for example, the Polish [EU CCS Interconnector](#) in Gdansk, a project of common interest, and [Go4ECOPlanet](#), an Innovation Fund large-scale CCS project in the cement industry. Moreover, [the ACCSESS](#) project aims to pilot a carbon capture technology in a cement plant (Górażdże). Therefore, the Slovak stakeholders should closely monitor the CCS development in Poland.

- [What to expect in 2023?](#)

We perceive 2023 as a turning year for CCS development in the CEE region. Not only will the national strategies be amended and could reflect on the current scale-up of CCS activities around the EU, but also the EU-wide CCS strategy³ (CCUS Vision) could represent a turning point for CCS in the EU.

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

³ CCUS Vision could be published in Q4 2023; however, one could expect certain delays and see the strategy published only in Q1 2024.

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

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 the potential commercialisation 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 organisations, academia, private sector) in one or more stages along the carbon capture, transport, storage and utilisation chain, and create linkages to gain knowledge and experience from more experienced stakeholders across the globe.

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

- [Launch of a national CCS-dedicated platform and an advisory body to ministries](#)

The CCS-dedicated platform should be launched and become an advisory body to the ministries involved in discussing Slovak decarbonisation pathways. The Institute for Environmental Policy under the MoE and the Value for Money Department under the MF could play a role in launching such a platform. Channelling the EU-wide and international expertise to the local business and political environment seems crucial.

- [Becoming a proactive member of international platforms and fora](#)

The Slovak government and businesses can monitor the CCS development in other countries and channel the knowledge and expertise from EU blueprints. MoE, ME, the private sector and other relevant stakeholders could play a more proactive role in the international platforms and fora such as the CCUS Forum, [Zero Emissions Platform](#), [CCUS SET-Plan Working Group](#), or [Carbon Sequestration Leadership Forum](#).

- [Amendment of the national policies and strategic documents, preparation of NECP update, including the CO₂ storage assessment](#)

Slovakia is obliged to submit a draft of the NECP update by the end of June 2023. Based on the guidelines issued by the European Commission, CO₂ storage assessment should be an inherent part of the update. Moreover, MoE and ME could publicly demonstrate the importance of CCS in the Slovak decarbonisation scenarios by its inclusion in the upcoming update.

- Allocation of appropriate public finance to support CCS R&D, pre-feasibility and feasibility studies of pilot projects

Currently, finance for R&D projects, pre-feasibility and feasibility studies for successful CCS deployment is missing. Moreover, financing saline aquifer exploration is vital to enable local large-scale CO₂ storage in the future, as it offers the most significant storage potential of all storage options.

- Finalising the CO₂ storage financial security implementing decree

Without the implementing decree on the financial security of CO₂ storage, companies responsible for CO₂ storage and monitoring cannot estimate the cash flows and possible financial risks connected to the CO₂ storage business. MoE could start drafting the legislative proposal and consult it with the Czech MoE, which is currently preparing its national draft.

A detailed CCS national roadmap for Slovakia and other project countries is available on the project website: ccs4cee.eu

