

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

# Summary of CCS4CEE project

Estonia

Implemented by:



Co-financed by:



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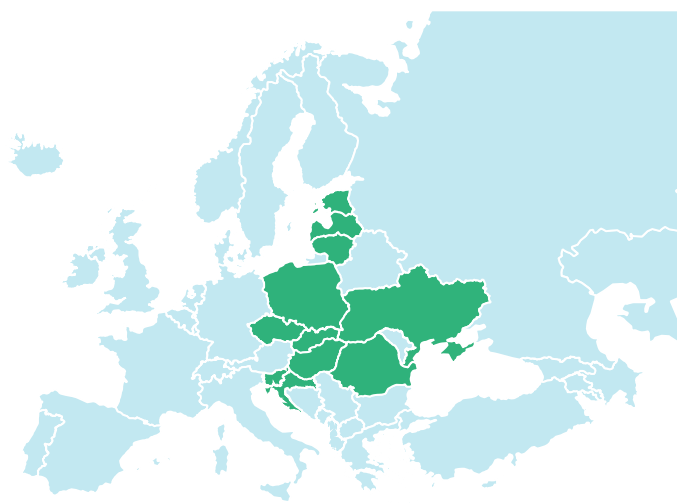


# CCS4CEE project

**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. 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)<sup>1</sup> 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 (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.



<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 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](https://ccs4cee.eu)

# Opportunities and barriers for CCS deployment

## CCS4CEE PROJECT COUNTRIES

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

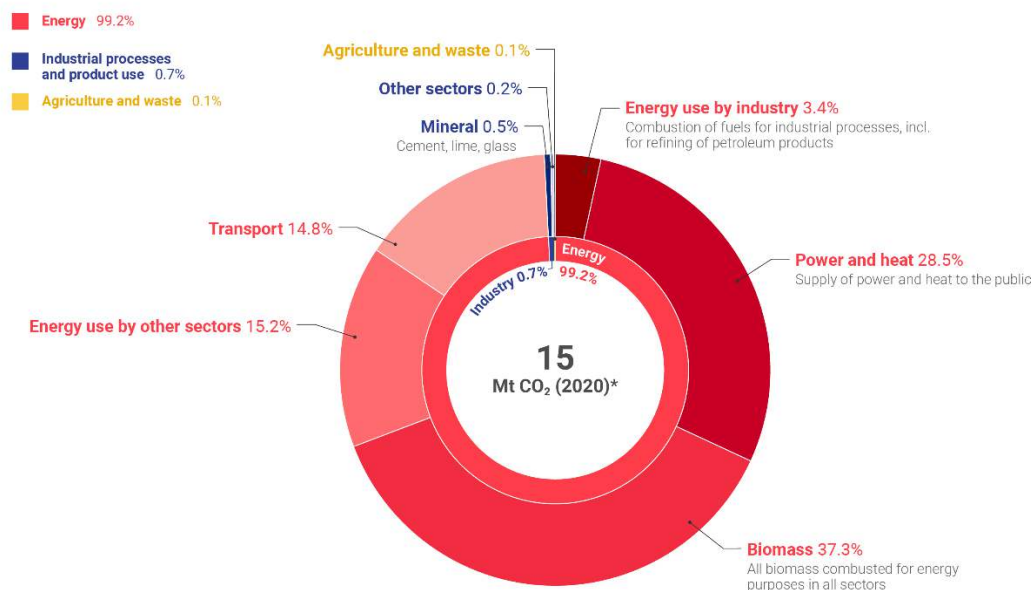
- Many project countries rely on manufacturing sectors, while their energy production depends heavily on fossil fuels. This condition, coupled with sometimes distant or uncertain deadlines for emissions reduction targets, means that CCS for the energy sector cannot be ruled out in the CEE region.
- Various 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 with 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 evident in project countries.

## ESTONIA

Findings from the Estonian national report regarding the main opportunities and barriers to the deployment of CCS:

- Estonia's total amount of CO<sub>2</sub> emissions has been declining on an annual basis. Since 1990, the emissions have declined by more than 71%. However, in the upcoming years, a slight increase can be expected due to the energy crisis and the continuous use of oil shale, as the majority of Estonia's emissions come from the energy sector (FIGURE 1).

### CO<sub>2</sub> EMISSIONS IN ESTONIA BY SECTORS



\* Total emissions exclude LULUCF but include, for informational purposes, CO<sub>2</sub> 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

To assess the potential for CCS, it is useful to highlight **the main point sources of CO<sub>2</sub>**, as such emitters are the most suitable and studied regarding the capture of emitted CO<sub>2</sub>. One major industrial carbon-intensive sector can be distinguished here – energy production. The largest CO<sub>2</sub> emitter in the energy sector is a combination of power plants in the northeastern part of Estonia belonging to Enefit. The three electricity power plants, together with the oil shale refinery in Auvere, created close to 5 000 kT of CO<sub>2</sub>-eq in 2021. Another major emitter is VKG – an energy and chemical producer from oil shale, with combined emissions of 1 337 kT of CO<sub>2</sub>-eq in 2021. More than 90% of Estonia's CO<sub>2</sub> emissions at the company level are produced by those two largest companies.

## THE BIGGEST EMITTERS IN ESTONIA

### EU ETS covered emissions of greenhouse gases in 2021

#### INSTALLATIONS WITH EMISSIONS (Mt CO<sub>2</sub>eq)

- above 250 000 tonnes of CO<sub>2</sub>eq

Sectors:

- Heat and power
- Oil refining

- 40 000–250 000 tonnes of CO<sub>2</sub>eq

Sectors:

Heat and power, Oil refining

#### HOW TO READ MINI CHARTS

250 000 t CO<sub>2</sub>eq = ■  
1 000 000 t CO<sub>2</sub>eq = ■■■■



### 6.9

Mt CO<sub>2</sub>eq

of total emissions covered by EU ETS

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

- **National planning documents currently do not envisage CCS solutions**, considering the high costs and the unassessed environmental impact. On the other hand, CCU solutions are presented in national planning documents as having somewhat more significant potential. However, at the current state, the level of CCU projects is minimal. The Environmental Development plan until 2030 (currently being drafted and is expected to be approved in the second half of 2023) will cover CCU and CCS as one of the potential ways how to mitigate carbon emissions, but it does not contain a more specific action plan that would allow implementing such solutions in Estonia.
- Currently, the main obstacle affecting CCS development in the regulatory framework is the **prohibition on the storage of CO<sub>2</sub>**. Although Estonia has amended existing legislation to implement Directive 2009/31/EC on the geological storage of CO<sub>2</sub>, there is still a prohibition of the storage of CO<sub>2</sub> in on-shore and offshore geological structures, except for research and development purposes.
- Generally, the **stakeholders are relatively well informed about CCS possibilities** and know the basic principles. However, most of the stakeholders for whom the introduction of such technologies could be relevant have a reserved position concerning this technology. This is mainly due to the economic aspects regarding the implementation of CCS technologies, as well as other limiting aspects. The exception is Enefit, which is very well-informed about this topic and is in favour of developing such technologies. It has developed a CO<sub>2</sub>-capturing technology for its oil shale production but has delayed the implementation due to different oil shale production technologies used. Postponing the project implementation allows ensuring higher installation efficiency for the producer.
- Stakeholders have brought up the potential for CO<sub>2</sub> storage in neighbouring Baltic countries, where the potential is more evident. However, **the transport infrastructure is non-existent**, and significant

investments are required. Therefore, the infrastructure and logistics plan should be developed. In addition, further research is necessary to understand the detailed technical specifications.

- **Geological conditions do not allow CO<sub>2</sub> storage in Estonia** as Estonia is located on the eastern edge of the Baltic sedimentation basin, where the thickness reaches only 800 m. Suitable aquifers for CO<sub>2</sub> storage, however, are located deeper than the Estonian basin reaches.
- During several stakeholder interviews and a workshop concluded during the project, the **option of CCU was emphasized more than CCS**, and was identified as a more optimal option for the CO<sub>2</sub> emission volumes produced in Estonia and would comply more with the circular economy principles.
- Based on currently available information, **no definite public image has been formed** in connection with CCS technologies, as this sector has not been developed in Estonia so far.
- **The position of stakeholders** can be grouped into two categories:
  - Pace-setters – some stakeholders see the potential of CCS in the near future and are working towards it. Enefit Group has been the most promising, together with the scientists from Tallinn University of Technology and the University of Tartu. They have selected and piloted 1-2 technological solutions easily scalable for use in the oil shale industry. Still, the storage possibility in Estonia is negligible. Therefore, the primary question comes down to the value chain on what to do with the captured CO<sub>2</sub>. Thus, the stakeholders can be described as pace-setters within the industry, but compared to other countries, Estonia has taken few actions to move forward with the CCS technologies.
  - Fence-sitters – the majority of other stakeholders in Estonia. The principal reasons for this position are lack of economic justification, lack of geological potential and uncertainty about the future macroeconomic outlook. Stakeholders having the fence-sitter approach often move the focus of the questions from themselves to the public institutions/government. The primary reason for a standstill with the topic is indecisiveness regarding adding a solid decarbonization plan and CCS initiatives to the national energy and climate plans. Also, for some stakeholders, a specific position for or against the CCS has not yet been taken, and they believe the question lies deeper in the oil shale industry and its future in Estonia. If the political view is that CCS technologies should be used only for biomass-related capture and are not politically suitable for energy producers, then the oil shale sector has no incentives to implement such solutions.

Since the publication of the Estonian national report, there have been some developments in the field of CCS and CCU:

- Enefit has publicly announced work in the field of carbon capture technology development. Together with scientists from Tallinn University of Technology, they have been screening the most promising and mature capture technologies and analyzing the suitability of those technologies with Enefit production processes. They have also been working to identify possible technology providers for suitable technologies, as well as analyzing possible CO<sub>2</sub> transportation, storage and, with the help of Tallinn University of Technology, screening potential CO<sub>2</sub> usage options.
- In the field of CCU, other companies have started to seek methods and technologies for products that promote the circular economy and carbon capture.

A detailed assessment of the current state, past experiences and potential for CCS/CCU deployment in Estonia 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 Estonia

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 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, the next and immediate steps are highlighted for the further advancement of CCS in Estonia:**

One of the main emphases for the advancement of this sector should be changes and further development of the regulatory framework. The first steps in this regard for the development of CCS (as well as for the next stage of this project) would be the nomination of a responsible person from the responsible ministry and the creation of the stakeholder working group or platform on this issue (which also contributes to the promotion of cooperation and knowledge/experience dissemination in general), as well as the adoption of the laws in a version which abolishes the current prohibition on CO<sub>2</sub> storage. However, the accomplishment and time frame of those activities depends on the interaction of several factors.

Stakeholders can also implement several continuous activities under WP5, such as monitoring available funding for further activities, implementing different studies and pilot projects, analyzing the existing experience of implemented and functioning projects / operating models, promoting cooperation and further communication between the largest stakeholders, supporting regional cooperation, etc.



