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THE FINAL REPORT

Project name:

FEASIBILITY STUDY ON THE USE OF CO2 CAPTURE AND STORAGE, HYDROGEN, AND OTHER INNOVATIVE TECHNOLOGIES IN LITHUANIAN INDUSTRIAL ENTERPRISES OPERATING IN THE MOST ADVERSELY AFFECTED AREA

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Introduction

Lithuania's commitment to achieving climate neutrality by 2050 requires a fundamental transformation of its industrial sectors, particularly in regions where energy intensive activities remain central to local economic structures. Kaunas, Šiauliai and Telšiai counties host several of the country's largest CO_2-emitting enterprises, making them essential focal points for developing long-term decarbonization pathways. Recognizing the strategic importance of these regions, the Innovation Agency of Lithuania commissioned this project to assess the feasibility of deploying carbon capture, utilization and storage (CCUS), hydrogen technologies, direct electrification and other innovative solutions in industrial enterprises operating in the most adversely affected areas. The work has been carried out by a consortium, composed of Vytautas Magnus University, Deloitte Technology & Transformation, S.L.U., and the Universidad Politécnica de Madrid.

The project represents the first comprehensive national effort to evaluate the technical, regulatory, infrastructural and economic conditions required for large-scale industrial decarbonization in Lithuania. It brings together a wide set of analytical elements: a detailed examination of industrial emissions, an assessment of technological options and their maturity levels, an evaluation of geological conditions for permanent CO_2 storage, an analysis of national and EU regulatory frameworks, and an exploration of future infrastructure needs related to CO_2 transport, hydrogen supply, and electricity system reinforcement. This work was complemented by structured engagement with industrial enterprises, public authorities, infrastructure operators, and academic experts. Through questionnaires, direct meetings and targeted consultations, the project captured the perspectives of key stakeholders and incorporated their insights into the analytical outputs.

The Final Report consolidates the results of a multi-stage process reflected in four key documents prepared during the project: the Feasibility Study Preparation Plan; the Report on the Assessment of the Possibilities of the Use of Hydrogen and Other Innovative Technologies and Carbon Capture and Utilization (CCU), Carbon Capture and Storage (CCS) Technologies in Industrial Enterprises, and on the Legal Analysis; the Action Plan for the Transition of Industrial Enterprises to Zero Emissions by 2050, and the present Final Report. Each document contributed to building a coherent evidence base, moving from initial methodological framing toward detailed sectoral analysis and finally to the formulation of actionable recommendations and lessons learned. Taken together, they provide Lithuania with a structured roadmap for industrial decarbonization and a clear understanding of the opportunities, constraints and strategic choices ahead.

This report summarizes the project's main activities, outlines the lessons learned throughout its implementation and presents an integrated view of the outcomes generated by the analytical work. It is intended not only as a concluding document for the present initiative but also as a reference tool for public authorities, policymakers, industrial stakeholders and future project teams seeking to design and implement similar studies. By bringing together technological assessment, regulatory analysis, geological evaluation, and strategic planning, the report aims to support Lithuania in its transition toward a competitive, resilient, and climate-neutral industrial economy.

1. A summary of the project activities

The project "Feasibility Study on the Use of CO_2 Capture and Storage, Hydrogen, and Other Innovative Technologies in Lithuanian Industrial Enterprises Operating in the Most Adversely Affected Areas" was implemented as a multi-stage analytical and consultation process involving national institutions, industrial enterprises, and academic partners, as a specialized Working Group member. Its purpose, as defined in the Feasibility Study Preparation Plan, was to evaluate technological, economic, regulatory, and infrastructural options for reducing CO_2 emissions in Kaunas, Šiauliai, and Telšiai counties, regions hosting Lithuania's largest industrial emitters.

Development of the Four Core Project Documents

Throughout the project, four main documents were prepared, each representing a distinct analytical milestone:

1. The Feasibility Study Preparation Plan

Completed at the beginning of the project, this document set the methodological, organizational, and analytical foundation for all subsequent work. It defined the scope, data requirements, stakeholder engagement approach, technological focus areas, and the scheduling of Working Group interactions.

2. The Report on the Assessment of the Possibilities of the Use of Hydrogen and Other Innovative Technologies and Carbon Capture and Utilisation (CCU), Carbon Capture and Storage (CCS) Technologies in Industrial Enterprises, and on the Legal Analysis

This extensive Assessment Report formed the core analytical output of the project. It evaluated Lithuania's industrial structure, existing emissions, energy and transport infrastructure, decarbonization technologies, CCU/CCS readiness, geology for CO_2 storage, and the regulatory landscape. It also compared international best practices and provided the technological and legal basis for subsequent planning documents.

3. The Action Plan for the Transition of Industrial Enterprises to Zero Emissions by 2050

Building directly on the findings of the Assessment Report, this document provided a consolidated set of actions, timelines, regional priorities, and technology pathways tailored to the industrial profiles of Kaunas, Šiauliai, and Telšiai counties. It summarized the main conclusions of each analytical chapter and translated them into an actionable strategy for industry and government actors.

4. The Final Report

The Final Report (current document) consolidates all project activities, summarizes key findings from the previous three documents, formulates lessons learned, and outlines recommendations for Lithuanian public authorities on enabling long-term industrial decarbonization. Its required structure follows the specifications laid out in *Requirements for the Final Report* set in the contract between project consortium and Innovation Agency of Lithuania.

Together, these four documents represent a complete analytical cycle: from planning and data gathering to technological assessment, strategic planning, and final synthesis.

Stakeholder Engagement and Meetings Conducted

An important component of the project was extensive cooperation with industrial companies, state institutions (Lithuanian Geological Survey under the Ministry of Environment), and experts. From the outset, the team structured its work around continuous dialogue with the Working Group and the key CO_2 emitters located in the target counties.

Initial Outreach and Meetings with Industrial Emitters

At the start of the analytical stage, an initial meeting was held with CO_2-intensive industrial enterprises from Kaunas, Šiauliai, and Telšiai counties. During this session, the project objectives, scope, expected outputs, and cooperation mechanisms were introduced in detail. The meeting also served to establish direct communication lines for data sharing, interviews, and site-specific consultations.

To support systematic data collection, the consortium developed and distributed a detailed questionnaire: "Klausimynas apie galimybes mažinti išmetamo CO_2 kiekį pramonės įmonėse, diegiant CO_2 surinkimo, panaudojimo, saugojimo ir vandenilio technologijas."

The questionnaire addressed four thematic areas, such as emission reduction, CO_2 capture, CO_2 utilization, and CO_2 transport and storage, and was sent to major industrial facilities, including those in wood processing, cement, fertilizer production, and chemicals. This instrument gathered operational data, technological constraints, and company-specific insights into investment priorities and regulatory barriers.

Working Group Meetings and Continuous Consultations

Throughout project implementation, numerous online and face-to-face meetings were held with the Working Group and key national stakeholders. These consultations were instrumental in refining assumptions, validating analytical outputs, and integrating expert perspectives on infrastructure, geology, energy systems, and regulatory issues.

Participants in these discussions included, but were not limited to:

- KN Energies – providing insights on CCS Baltic Consortium project, Klaipėda port infrastructure, LNG and future CO_2 handling capabilities.
- Amber Grid – supplying data on the natural gas network, hydrogen readiness, and potential CO_2 transport corridors.
- Lithuanian Geological Survey – contributing expert insights on geological information and validation of storage assessments.
- Achema – the largest fertilizer producer and major CO_2 emitter, offering technical data on process emissions and capture feasibility.
- Kauno Stiklas – sharing technological insights on glass production, sector-specific decarbonization constraints, and potential for CCS/CCU.
- Ministry of Economy and Innovation, Ministry of Energy – providing insights on policy alignment, regulatory context, and support in stakeholder mobilization.
- Academic partners – including VMU, KTU, VU, and Klaipėda University, contributing research and technological expertise.

Beyond these formal sessions, frequent bilateral technical discussions were held with individual members of enterprises and institutions to gather data, clarify technical details, and evaluate the applicability of CCU, CCS, hydrogen, electrification, and efficiency-based solutions. The iterative nature of these meetings ensured that the analytical work remained closely aligned with industrial realities and sector specific needs.

Field-Level and Company-Specific Interactions

Where relevant, project partners carried out on-site consultations with industrial enterprises. These meetings allowed the project team to understand process configurations, quantify emission points, examine technology readiness constraints, and explore practical conditions affecting the integration of capture, utilisation, and storage technologies. Several companies expressed interest in follow-up studies, particularly regarding biogenic CO_2 streams, CCU opportunities, and future participation in regional CO_2 networks.

Overall Coordination and Knowledge Integration

Across the project's duration, the consortium engaged in continuous communication with the Working Group to ensure that the content of the work is in proper alignment with national strategies and EU objectives. Technical data from industry, international best practices, legal analyses, geological assessments, and infrastructure studies were combined into a unified evidence base supporting the three completed documents and the current the Final Report.

This collaborative process, linking industry, academia, government, and infrastructure operators, ensured that all recommendations emerging from the project are grounded in real technological, regulatory, and economic conditions and reflect a broad consensus among Lithuania's key industrial and institutional stakeholders.

2. A concise summary of the lessons learnt from the project

The implementation of this project has provided a wide range of practical insights that are relevant not only for the client but also for Lithuanian public authorities planning similar initiatives in the future. The experience demonstrated the complexity of evaluating carbon capture, utilization, storage, hydrogen technologies, and the broader industrial decarbonization landscape, as well as the organizational and procedural challenges that arise when multiple institutions, documents, and stakeholders must be aligned around a single analytical framework.

One of the most visible lessons emerged from the overall project structure itself. The project required the preparation of four separate documents: the Feasibility Study Preparation Plan; the comprehensive Assessment Report on hydrogen, innovative technologies, CCU, CCS and the associated legal framework; the Action Plan for the transition of industrial enterprises to zero emissions by 2050; and finally, the Final Report synthesizing the entire process. While each document played a clear role in the planned workflow, the sheer number of deliverables, each complex, extensive, and requiring review, created difficulties for both the service providers and the Working Group. Instead of providing clarity, this structure often led to potential duplication of effort, increased administrative workload, and confusion among reviewers about which comments applied to which document. For future projects, it would be beneficial to consider a more streamlined set of deliverables, or a modular structure in which intermediate documents are shorter, more focused, and directly linked to final outcomes or consider preparing just one document, which consist fulfilment of all the requirements. In particular, although all received comments and opinions are useful and can be taken into account, in some cases, an excessive detail on specific topics has been asked, according to the specific interests of the reviewers.

A second lesson concerns the organization and functioning of the Working Group, which brought together more than ten representatives from different institutions and sectors. Each member provided individual remarks and expectations, but these comments were not consolidated before being returned to the project team. Consequently, the service providers often had to respond to overlapping, divergent, or sometimes contradictory feedback. Without a mechanism for internal coordination within the Working Group, the review process became unnecessarily burdensome and time-consuming. Consolidated feedback, or a system in which Working Group representatives jointly validate the main comments before issuing them to the project team, would substantially improve efficiency and reduce the risk of inconsistent expectations.

A related challenge emerged from the project scope, which extended across virtually every technological, regulatory, economic, social, and environmental aspect associated with CCUS and hydrogen. The documents prepared during the project became very extensive, hundreds of pages long, to address all the required topics. At the same time, some Working Group members expected in-depth analysis of highly specific technological or sectoral questions, analyses that would normally require their own stand-alone research projects, extensive data collection, modelling, or pilot-scale validation. This mismatch between the wide range of technical requirements and the depth expected by individual reviewers created recurring difficulties in ensuring that all expectations were met within the limits of time, scope, and available data. Future projects would benefit from clearer prioritization of topics and better alignment between general strategic analysis and the level of detail required for particular technical areas.

Another important lesson relates to the timing of review processes. After submission of each document version, the Working Group review period sometimes extended to more than a month. The service providers then required additional weeks to incorporate all comments, especially when the remarks were numerous, overlapping, or addressed issues outside the project's defined scope. This extended review cycle had a cumulative delaying effect on the overall project timeline.

Moreover, new sets of comments sometimes emerged during the second or third round of reviews, even when they were unrelated to earlier remarks already addressed. This created a moving-target problem and made it difficult to fully close any document. For future work, establishing clearer review timelines, limiting the number of review rounds, and ensuring that new comments relate only to revised sections would significantly enhance procedural clarity and reduce delays.

The project also highlighted a recurrent issue concerning data availability and data expectations. All analytical outputs were based on Open Data accessible to the general public, industry, and research institutions. Despite this, some members of the Working Group expected the project to incorporate data available only on the internal premises of their own organizations, including operational data not published or accessible in Open Data Repositories. The service providers could not lawfully or methodologically use information that was not officially submitted or accessible through public channels. For future projects, it is essential that any institution expecting its data to be used officially in analyses make that information openly available either through submission to the project team (with the permission to use it publicly) or via public Open Data Platforms. This will ensure transparency, traceability, and methodological consistency.

The project further showed that changes in technical conditions during implementation, although manageable, can create additional challenges. At the beginning of the project implementation, the Innovation Agency expanded the list of CO_2 emitters that the project was required to analyze. This adjustment was feasible, but it required additional coordination, data collection, and restructuring of analytical tasks already underway. While such changes are sometimes unavoidable, the lesson is that technical conditions should, as much as possible, remain stable once the project has commenced. If modifications are necessary, they should be introduced with clear justification, accompanied by an assessment of how deadlines, workload, and analytical scope will be affected.

Beyond the procedural and organizational aspects, the project also yielded broader lessons relevant to policymaking. It demonstrated that industrial decarbonization, especially involving CCUS and hydrogen technologies, is deeply interdependent with national energy, transport, infrastructure, and geological planning. Effective policy development requires coordination across ministries, infrastructure operators, industrial associations, and academic experts. The fragmented nature of data, institutional responsibilities, and regulatory competences complicates the development of coherent long-term strategies. This project showed that public authorities should consider establishing permanent inter-institutional platforms, not only temporary Working Groups, to ensure continuity and consistency in national decarbonization planning.

Another important insight is the need for a clearer distinction between strategic-level analysis and project-level feasibility studies. This project included both conceptual assessments and quasi-technical evaluations across sectors, industries, and geographical regions. In several cases, stakeholders requested plant-specific or technology-specific modelling that lies outside the mandate of a strategic feasibility study. Future initiatives should explicitly define whether the purpose of the work is to identify general pathways and national priorities, or to conduct detailed feasibility assessments for specific facilities. Without this clarity, expectations inevitably diverge, and service providers face the difficult task of balancing strategic insight with operational technical depth.

The project also underscored the importance of developing standardized national data repositories for emissions, technological characteristics, geological parameters, infrastructure capacities, and industrial activities. Given that all project analyses relied on public data, establishing more consistent, centralized, and updated datasets would significantly improve the accuracy of future studies. Some institutions expressed a desire to provide internal information, but without formal procedures for integrating such data into public repositories, the ability to use it within national-level studies remains limited. Lithuania would benefit from institutionalizing the publication of industrial emissions, energy consumption, geological surveys, and technological indicators in open formats easily accessible to researchers, public authorities, and service providers alike.

A final lesson concerns the growing expectations around CCUS and hydrogen technologies within Lithuanian institutions. While the Assessment Report, Action Plan, and ongoing discussions demonstrated strong interest in these technologies, it also became clear that CCUS and hydrogen are complex systems, requiring long-term planning, significant capital investment, and cross-border infrastructure cooperation. Public authorities should be prepared for the fact that assessments of such systems will always involve a high degree of uncertainty, dependence on international developments, and the need for flexible implementation pathways. Therefore, expectations for absolute precision or exhaustive technological modelling within short-term projects should be moderated in favour of strategic clarity, adaptability, and alignment with European frameworks. Besides, innovative technologies, by their own nature, can have not been tested in all geographies, so specific Lithuanian-level data are not always available, and information from the US or other European zones has to be used, to estimate parameters such as costs, or efficiencies.

In conclusion, the project revealed both strengths and challenges in Lithuania's approach to industrial decarbonization studies. It demonstrated the value of broad stakeholder engagement, interdisciplinary analysis, and alignment with EU objectives, while also highlighting areas where processes can be streamlined, expectations clarified, and institutional coordination improved. These lessons provide a clear foundation for enhancing the design and management of future projects in this field and for strengthening national capacity to plan and implement complex decarbonization strategies.

3. Summary of the project outcomes and reports

The project on assessing the potential of carbon capture, utilization and storage (CCUS), hydrogen technologies, direct electrification and other innovative decarbonization solutions in the industrial sectors of Kaunas, Šiauliai and Telšiai counties has produced one of the most comprehensive analytical foundations created in Lithuania to date on industrial transformation toward climate neutrality. Over the course of the project, the consortium developed a set of interlinked documents which collectively provide a full picture of technological pathways, sectoral potential, infrastructural needs, regulatory requirements and long-term strategic actions. These outcomes form a coherent analytical chain guiding Lithuanian public authorities, industrial enterprises, and research institutions in planning future steps toward industrial decarbonization.

Overview of the Document Package

The project consisted of four major deliverables, each addressing a specific stage of the analytical and strategic process:

1. *Feasibility Study Preparation Plan*. A methodological blueprint defining the project scope, analytical approach, data-collection needs, and stakeholder engagement structure. It established the criteria for emissions analysis, the technologies to be evaluated, the regulatory and geological dimensions to be assessed, and the sequence of activities and interactions with the Working Group.
2. *Assessment Report.* A comprehensive analytical study evaluating the technological, industrial, legal and geological conditions necessary for deploying CCUS, hydrogen technologies, electrification and other innovative solutions in Lithuania's industrial system. This report mapped the emissions profile of the three counties, analysed the potential of each decarbonization technology, reviewed the national and EU regulatory landscape, assessed Lithuania's geological suitability for permanent CO_2 storage and examined in detail the opportunities and barriers for industrial transformation.
3. *Action Plan for the Transition of Industrial Enterprises to Zero Emissions by 2050*. A forward-looking guidance document translating the findings of the Assessment Report into a structured decarbonization pathway. It outlined the actions required from industry and government, specified priority interventions for the three counties, examined technological readiness levels, proposed infrastructure development priorities (including CO_2 transport and hydrogen corridors), and set long-term objectives consistent with Lithuanian and EU climate strategies.
4. Final Report. By integrating the previous documents into a consolidated synthesis, summarizing project outcomes, identifying lessons learned, and providing recommendations for future policy design and project management. This report acts as the summary of the entire initiative and as a reference point for future national-level decarbonization projects.

Together, these documents represent a complete cycle of analytical and strategic work, from initial assessment and evidence collection to the development of a long-term roadmap for industrial transformation.

Key Analytical Outcomes

Industrial Emission Landscape

The project confirmed that Lithuania's industrial emissions are highly concentrated in a small number of facilities, with Achema, ORLEN Lietuva, Akmenės Cementas and major heat and waste-to-energy plants forming the core of the national emissions profile. This structure implies that targeted interventions in these sectors can unlock a significant portion of Lithuania's decarbonization potential.

Each county demonstrates distinct industrial characteristics:

- *Kaunas* features high-purity chemical CO_2 streams suitable for early CCUS deployment and a sizeable district-heating and waste-to-energy sector.
- *Šiauliai* is dominated by cement and construction materials with unavoidable process emissions.
- *Telšiai* hosts the refinery, producing complex multi-stream industrial emissions comparable to those found in larger European industrial clusters.

Technological Feasibility

The Assessment Report established that a combination of solutions will be required for Lithuania's industrial transition:

- *Energy efficiency and digital optimization* offer immediate, cost-effective reductions.
- *Electrification of process heat,* including industrial heat pumps, can decarbonize medium-temperature processes.
- *Hydrogen,* though currently costly, will play a strategic long-term role in refining, chemicals and heavy transport.
- *Biomass and biogenic CO_2 streams* provide unique early opportunities for low-cost capture and negative emissions. In addition, by combining green hydrogen with biogenic CO_2, new industrial possibilities in the production of green hydrocarbons emerge.
- *CCUS is indispensable* for fertilizer production, cement, refining and waste management and is the only scalable option for eliminating unavoidable process emissions.

Infrastructure and Transport Systems

The project identified the need for a future national CO_2 transport network comprising a mix of road/rail/shipping solutions and pipeline corridors. Klaipėda seaport was highlighted as a strategic node for CO_2 export to North Sea storage sites. Hydrogen transport infrastructure will also require dedicated planning, coordinated with the development of renewable electricity generation and high-voltage grid reinforcement.

Geological Storage Potential

Geological assessments, mainly based on information of research projects published in scientific articles, showed that western Lithuania contains promising Cambrian formations capable of storing between 41.5 and 407 million tonnes of CO_2, with saline aquifers such as Syderiai, Vaškai and D11 meeting the depth, porosity, permeability and sealing conditions required for long-term geological sequestration. Additionally, the Gargždai zone of uplifts could provide 31.3 to 267 Mt of CO_2 storage capacity. However, Lithuania's current legal restrictions prohibit geological storage, meaning that full-scale deployment will require regulatory reform and additional seismic and reservoir characterization work.

Regulatory Environment

The legal analysis underscored several misalignments between Lithuania's national legislation and European climate policy. The prohibition on geological storage, complex permitting procedures and lack of clear frameworks for CO_2 transport, hydrogen use and CCU markets were identified as the most significant regulatory barriers. Alignment with EU directives (CCS Directive, EU ETS, Net-Zero

Industry Act, TEN-E/TEN-T, CBAM, RED III) will be essential to ensure technological readiness and competitiveness.

Regional Strategy and Action-Oriented Outcomes

The Action Plan synthesized analytical findings into concrete actions. It emphasized that decarbonization must follow a regional cluster approach linking industrial zones across the three counties. This structure enables shared CO_2 transport corridors, coordinated infrastructure planning, and cost-effective deployment of both capture and utilization technologies.

Key technological strategic objectives include:

- *Deployment of CCUS for the major emitters*, such as Achema, Akmenės Cementas and ORLEN Lietuva, as the only viable pathway for eliminating unavoidable process emissions.
- *Development of renewable hydrogen* as a complementary vector for refining, chemicals and selected high-temperature applications, enabling integration with biogenic CO_2 utilisation.
- *Electrification of medium-temperature industrial processes* through heat pumps, e-boilers, and digital optimisation.
- *Modernization of district heating systems*, including heat-pump deployment and flexible low-carbon peak capacity.
- *Reinforcement of electricity grids* to accommodate industrial electrification and future hydrogen production.
- *Replacement or electrification of small emitters*, supported by targeted support schemes.
- *Strengthening research, innovation, and pilot demonstration capacity* related to CCUS and hydrogen technologies in Lithuanian universities and research institutes in collaboration with the industry entities.

The plan outlines timelines extending to 2050, details responsibilities across ministries and agencies, and identifies financing instruments, including but not limiting national subsidies, the EU Innovation Fund, the Just Transition Fund and private-sector co-investment.

Cross-Cutting Project Insights

Across all documents, several strategic insights emerged:

1. *Climate neutrality cannot be achieved without CCUS.*

   Unavoidable process emissions in cement, fertilizers and refining, as well as growing biogenic CO_2 flows, make CCUS a central long-term solution.

2. *Hydrogen is a complementary, not a standalone, quick-in-time solution.*

   Its uptake will depend on cost reductions, renewable energy expansion and cross-sector cooperation.

3. *Infrastructure planning must become integrated.*

   Electricity, hydrogen and CO_2 transport systems must be developed in coordination, not in isolation.

4. *Data gaps remain an important obstacle.*

   Industrial data must be more transparent, standardized and made available through national open-data systems.

5. *Geological potential exists but is currently legally inaccessible.*

Without regulatory reform, Lithuania will remain dependent on foreign storage projects.

6. *Decarbonization is a regional challenge, not an individual-company problem.*

Industrial clusters must be treated as interconnected ecosystems.

Overall Impact and Strategic Value

The combined outcomes of the project provide Lithuania with a:

- *Comprehensive knowledge base* on industrial decarbonization pathways.
- *Clear long-term vision* for the role of CCUS, hydrogen, electrification, and innovation.
- *Regional strategy* tailored to the industrial profiles of Kaunas, Šiauliai and Telšiai counties.
- *Coherent action plan* aligned with EU climate and industrial policies.
- *Deep geological assessment* enabling future storage development.
- *Structured set of policy recommendations* for national institutions.
- *Methodological framework* that can be replicated in future national decarbonization initiatives.

The project has established, for the first time in Lithuania, an integrated understanding of how different technologies, sectors, regulatory frameworks, and infrastructure systems must interact to achieve climate neutrality. It demonstrates that industrial transformation is achievable but requires coordinated public-sector action, sustained investment, regulatory alignment, and strong cross-institutional cooperation.

Concluding Note

The project outcomes and the four documents it produced have created a strategic platform upon which Lithuania can now build targeted policies, initiate investment programmes, and develop cross-border partnerships for CO_2 transport and storage. The findings show that timely decisions, particularly in the areas of regulation, infrastructure and data management will determine how effectively Lithuania can integrate into the emerging European carbon management and hydrogen landscape. The work carried out in this project will serve as a reference point for future national projects, shaping long-term industrial competitiveness and supporting Lithuania's commitment to achieving climate neutrality by 2050.