

A photograph of an industrial facility, likely a power plant or refinery, with several tall smokestacks and complex piping. The image is partially obscured by green trees in the foreground, creating a contrast between nature and industry.

National Study on Capacity Gaps in Carbon Management: Emphasising Carbon Capture and Storage Deployment in Romania

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The opinions put forward in this study are the sole responsibility of the author(s) and do not necessarily reflect the views of the Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN).

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List of Abbreviations and Acronyms

ANMAP	National Agency for Environment and Protected Areas
ANRE	National Energy Regulatory Authority
ANRMPSG	National Regulatory Authority for Mining, Petroleum and Geological Storage of Carbon Dioxide
BAT	Best Available Techniques
CCS	Carbon Capture and Storage
CCU	Carbon Capture and Utilisation
CCUS	Carbon Capture, Utilisation and Storage
CEF	Connecting Europe Facility
CID	Clean Industrial Deal
CIROM	Employers' Association of the Cement and Other Mineral Construction Products Industry in Romania
CM	Carbon Management
CONPIROM	Employers' Confederation of the Romanian Industry
COP	Conference of Parties
CO ₂	Carbon dioxide
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EII	Energy-intensive industry
EPG	Energy Policy Group
EO	Emergency Ordinance
EOR	Enhanced Oil Recovery
ETC	Et cetera
EU	European Union
EU ETS	European Union Emissions Trading System
EUA	European Union Allowances
GeoEcoMar	National Institute for Marine Geology and Geoecology
GNM	National Environmental Guard
ICCC	Interministerial Committee on Climate Change
ICM	Industrial Carbon Management

IDAA	Industrial Decarbonisation Accelerator Act
ISPE	Institute for Energy Studies and Design
LTS	Long-Term Strategy
MIPE	Ministry of European Projects and Investments
MMAP	Ministry of Environment, Waters and Forests
MRV	Monitoring, Reporting and Verification
Mt	Million tonnes
NECP	National Energy and Climate Plan
NGO	Non-governmental organisation
NZIA	Net-Zero Industry Act
OJEU	Official Journal of the European Union
PAM	Policies and Measures
PATROMAT	Employers' Federation of the Construction Materials Industry
PCI	Projects of Common Interest
PDA	Project Development Assistance
PMI	Projects of Mutual Interest
PNRR	National Recovery and Resilience Plan
PPAM	Employers' Association of Mineral Aggregates Producers in Romania
RDA	Regional Development Agencies
ROMCHIMICA	Romanian Chemical Companies Association
RRF	Recovery and Resilience Facility
SNTGN	National Natural Gas Transportation Society
WAM	With Additional Measures
WG	Working Group

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Executive Summary

The aim of this study is to assess Romania's institutional readiness for the deployment of Carbon Capture and Storage (CCS) as a key component of its decarbonisation strategy. Critical gaps across governance, administrative capacity, public engagement, financing, and workforce development have been identified:

- **Governance and Administrative Capacity:** While Romania has taken initial steps towards establishing coordination mechanisms for CCS, inter-ministerial collaboration remains weak, and there is still no clear political commitment to CCS implementation. Furthermore, roles and responsibilities at regional and local levels are insufficiently defined, limiting integrated and effective action.
- **Administrative challenge:** Lies in the disproportionately high workload faced by institutions, combined with a limited number of personnel with specialised expertise, which constrains the ability to design, implement, and monitor CCS-related policies effectively. The working groups established under the General Secretariat of the Government should be maintained and strengthened as formal coordination and, where appropriate, decision-making platforms for CCS policy.
- **Public perception:** Despite Romania's strong theoretical geological potential for CO₂ storage, public perception remains a key challenge, marked by low awareness of CM and limited trust in institutions. A national survey of 1,000 respondents across urban and rural areas shows high curiosity and cautious openness, with acceptance depending on transparency, safety, and visible local benefits, while a latent *Not In My Backyard* attitude persists for projects perceived as close to communities.
- **Financial Architecture:** The country has not established dedicated national funding instruments for CM and has not effectively leveraged available EU funding opportunities.
- **Research and Workforce Development:** Academic initiatives are fragmented, and there is no coordinated strategy for developing the necessary skills and workforce to support CM deployment.

1. Contextual Understanding

1.1 Political Landscape

The European Union has introduced a set of instruments that support the deployment of CCS technologies. The **EU Emissions Trading System (ETS)** remains a central pillar, and its upcoming inclusion of **carbon removals** will have direct implications for CCS deployment. For industrial operators in hard-to-abate sectors, this shift increases the importance of **permanent CO₂ storage** as a cost-effective compliance strategy. In this context, CCS becomes a necessary solution for maintaining competitiveness under stricter emissions rules.

The Net-Zero Industry Act (NZIA), in force since June 2024, reinforces these dynamics by setting a binding EU-wide target of 50 million tonnes of annual CO₂ injection capacity by 2030. It mandates open-access storage and contributions from oil and gas producers, aiming to address one of the major barriers to CCS scale-up: the lack of accessible, shared CO₂ storage infrastructure.

Complementary initiatives such as the Clean Industrial Deal, the Projects of Common Interest (PCI) framework, and the Innovation Fund are also designed to support new CCS projects by improving access to funding. They aim to streamline and simplify permitting procedures through the Net Zero Industry Act and foster cross-border cooperation. These instruments can benefit Romania, provided national frameworks are aligned and capable of absorbing such support.

At the same time, the general landscape of CCS project development in the EU remains uneven. Infrastructure and investment are heavily concentrated in Western and Northern Europe, leaving Central and Eastern European (CEE) countries dependent on storage capacity developed in other Member States – a solution that is not desirable in Romania's case. While the EU-level framework offers a strong foundation, its effective implementation depends on national action. The following assessment analyses how Romania is responding to these developments and what remains to be done to enable CCS deployment at scale.

In this regulatory context, **Romania's three main oil and gas operators**, OMV Petrom¹, Romgaz², and Black Sea Oil & Gas³, must collectively account for over **20% of the EU's total CO₂ storage targetⁱ**, despite Romania's currently limited domestic CO₂ storage infrastructure. While the NZIA obligation has been introduced without a fully defined business model, feasibility studies, or established financial instruments to ensure cost recovery, it marks an important step forward for accelerating CCS deployment in the EU. By creating a clear demand signal, it encourages investment in CO₂ infrastructure that might not have progressed otherwise. Nonetheless, successful implementation will require greater clarity on cost recovery mechanisms, regulatory conditions, and long-term viability to support industry commitment.

The delegated regulation defines who must contribute but leaves enforcement and penalties to individual Member States, potentially resulting in inconsistent implementation and legal uncertainty for cross-border operators. In Romania's case, the lack of precedent and administrative readiness in this area could **further delay the development of a clear and predictable compliance environment**. Without guidance on proportionality, timelines, or acceptable justifications for delays, companies may struggle to assess their risk exposure and investment timelines, potentially discouraging timely engagement in CO₂ storage development.

The environmental and safety aspects of CCS storage in the EU are governed by three key directives. First, the CCS Directive establishes the core framework. Second, the Environmental Liability Directiveⁱⁱ addresses environmental damage from CO₂ storage, excluding climate impacts covered under the EU ETS. Third, the Environmental Impact Assessment Directiveⁱⁱⁱ ensures thorough ex-ante evaluation, public consultation, and regulatory oversight for CCS projects.

At national level, the Romanian Energy Strategy outlines two possible scenarios available to the economic operators concerned, in line with NZIA's provisions^{iv}:

- **Scenario 1:** Invest in the development of their own CO₂ storage projects;
- **Scenario 2:** Enter into agreements with existing storage project developers or third-party investors (mainly from other countries) to meet their storage target.

¹ Operational CO₂ injection capacity contribution obligation by 2030 (in thousand tonnes per annum) – OMV PETROM SA – 5880

² Operational CO₂ injection capacity contribution obligation by 2030 (in thousand tonnes per annum) – S.N.G.N ROMGAZ S.A. – 4120

³ Operational CO₂ injection capacity contribution obligation by 2030 (in thousand tonnes per annum) – Black Sea Oil & Gas S.A. – 250

Also, Romania has embedded the EU climate and CM objectives into its planning instruments, including:

- **The Long-Term Strategy (LTS)^v**, developed under Regulation (EU) 2018/1999, sets a target for climate neutrality by 2050 and includes CCUS as a solution for reducing industrial emissions. The LTS includes a quantified target to capture 50% of mineral industry emissions by 2050, although it does not provide full implementation pathways for CO₂ transport and storage infrastructure.
- The updated version of Romania's **National Energy and Climate Plan (NECP) for 2025-2030^{vi}** places **CCUS** at the core of the country's strategy to reduce CO₂ emissions from energy-intensive and hard-to-abate sectors such as **cement and mineral processing**, as well as the **oil and gas sector**. The Plan introduces two key policy measures: **PAM6** and **PAM9**, which collectively provide a structured pathway for integrating CCUS into Romania's climate and industrial policies. **PAM6** aims to support the widespread adoption of CCUS across high-emitting industries, with a particular focus on the **mineral sector**, including **cement production**, where the goal is to capture **at least 50% of emissions by 2050**. CCUS will also be applied across other hard-to-abate sectors to significantly reduce national greenhouse gas emissions.

Key elements of PAM6 include:

- **Assessment of geological storage potential**, including the identification and prospecting of CO₂ storage sites and small-scale pilot projects, supported by national and EU funds;
- Development of a **comprehensive National Carbon Management Strategy by 2025**, aligning CCUS with related strategies such as hydrogen, and detailing:
 - National storage capacity;
 - Projected CO₂ injection volumes through 2030 and 2050;
 - Transport infrastructure needs;
 - Financing mechanisms and funding access pathways;
- Establishment of a **regulatory framework and new legislation**, fully aligned with European objectives and the **EU Net-Zero Industry Act (NZIA)**, to:
 - Declare CCUS projects as being of strategic national interest;
 - Implement **simplified permitting** procedures;
- Preparation of **feasibility studies** for co-financing, focused on **onshore storage** and identifying **industrial CCUS hubs**;
- **Funding opportunities** from sources such as the **EU ETS**, the **Innovation Fund** and the **Modernisation Fund**, aiming to secure support from public-private partnerships like the European Energy Efficiency Fund^{vii} to enable fast-track access to resources for CO₂ capture, transport, use, and storage projects through **2025**;

- Strengthening **institutional capacity** to manage funding, monitor projects, and engage in **European and international knowledge exchange**;
- Launching a **public awareness programme** to inform citizens and stakeholders about the necessity, benefits, and economic potential of CCUS, including cross-border dimensions.

A target to **secure CO₂ transport infrastructure and co-finance at least three CCUS projects by 2027**, backed by **€750 million in public funding**.

Complementing PAM6, **PAM9** introduces a **binding national obligation** for **oil and gas operators** to **inject and store CO₂ by 2030**, in line with the proposed **EU Net-Zero Industry Act (NZIA)**. This measure is designed to ensure that fossil fuel producers⁴ directly contribute to meeting Romania's and the EU's decarbonisation targets.

PAM9 reinforces the strategic directions of PAM6, with a focus on:

- Mandating compliance with **EU-level CO₂ injection requirements**;
- Integrating CO₂ storage into long-term planning for oil and gas fields;
- Ensuring alignment with the future **National Carbon Management Strategy**, including geological assessments, transport development, and funding schemes;
- Establishing a clear regulatory framework to support industry compliance and simplify project authorisation;
- Encouraging collaboration with European and international partners to ensure effective monitoring, transparency, and knowledge sharing.

While PAM6 and PAM9 present a solid policy framework for advancing CCUS in Romania, their effective implementation faces significant hurdles. That is because the revised NECP is not directly legally binding for operators or institutions in the way a normative act would be, but it is binding for Romania in its relationship with the European Commission and provides guidance in further shaping national policies.

Although the NECP states that 44.1% of investments from the Recovery and Resilience Facility (RRF) will support the green transition, including industrial decarbonisation, none of this funding is specifically allocated to CCS.^{viii} Although in theory Romania might appear ready for CCS implementation, **the misalignment between stakeholders** and a **shortage of qualified personnel and technical expertise** within the responsible ministries have stalled progress. **As of now, Romania has neither a completed National Carbon Management Strategy nor a draft in development**, placing its NECP targets for CCUS at

⁴ OMV Petrom, Romgaz, and Black Sea Oil & Gas

risk. Moreover, Romania has not yet designated a lead ministry responsible for NZIA implementation, a critical step, given the scale and financial requirements of CCS projects, which call for coordination at ministerial and government level rather than through a technical authority alone.

- **The Energy Strategy of Romania 2025-2035, with a 2050 perspective^{ix}** highlights CCUS as a central technology for industrial decarbonisation and negative emissions. It calls for an integrated national pilot project and future collaboration with private and international partners, but does not yet define a clear roadmap for financial instruments or infrastructure rollout. The strategy nevertheless provides for investments in coal-fired power plants, which raises concerns about the long-term viability and coherence of such measures. Investing in CCS for coal-fired power plants no longer has economic, strategic, or environmental justification. These plants are expected to be phased out within the next decade, making the high costs of implementing CCS on ageing infrastructure economically unjustifiable. The only potential rationale would be political or socio-economic, but even in this respect this would be a short-sighted policy.
- **Industrial Strategy of Romania (2023–2027)** makes only an indirect reference to CCS and CCU through the Modernisation Fund. However, this mention remains narrowly framed within a financial support mechanism rather than integrated into a broader strategic vision. The document does not outline a comprehensive framework for CM as part of Romania's long-term industrial transformation. This limited approach indicates that industrial decarbonisation is still conceptualised primarily in terms of energy efficiency improvements, without recognising the structural role that CCS and CCU could play in decarbonising hard-to-abate industrial sectors.

Institutional coordination on climate action in Romania is formally led by the Interministerial Committee on Climate Change (ICCC), established in 2022 through Government Decision 563/2022. The ICCC is responsible for analysing and monitoring national and sectoral climate policies, ensuring alignment with EU objectives, and setting annual priorities for the energy transition. To fulfil its mandate, the ICCC oversees several thematic Working Groups, including one dedicated to CCUS and another focusing on the implementation of the Net-Zero Industry Act (NZIA). The creation of these working groups marks a significant step toward more structured coordination between ministries, agencies, and industrial stakeholders CM issues. They serve as essential platforms for dialogue, information exchange, and for identifying regulatory and technical gaps in CO₂ transport and storage infrastructure. However, their effectiveness is currently limited by inconsistent participation from decision-makers and the absence of formal mechanisms to ensure continuity and follow-up. Given that the ICCC and its working groups were established under the National Recovery and Resilience Plan (PNRR), there is a risk that their activity may lose momentum once the PNRR implementation period ends. To prevent this, it is

mandatory that these structures are institutionalised through a permanent mandate and transparent operating procedures. Their consolidation would safeguard the institutional memory built so far and provide the sustained coordination mechanism needed to drive Romania's long-term industrial decarbonisation agenda.

The CCUS Working Group (WG) includes representatives at both strategic and technical levels from relevant institutions. Its primary focus areas are updating Romania's legislative framework for CO₂ storage, addressing barriers linked to industrial emissions, and funding mechanisms. In addition, the WG has emphasised the need for a coordinated government communication strategy to enhance public understanding and acceptance of CCUS technologies.

The NZIA WG discussions have highlighted the legislative steps undertaken so far by the Government and other competent institutions to strengthen the legal and institutional framework for the geological storage of CO₂, according to NZIA Regulatory Act.

However, Romania continues to face a significant capacity gap in understanding and applying CCS as a strategic solution for decarbonising hard-to-abate industrial sectors, as recent policy documents often misplace its purpose. A case in point is the **2025-2028 Government Programme**, which considers CO₂ storage in coal mines. This is a concept of questionable feasibility that raises concerns regarding environmental responsibility, energy efficiency, and the misdirection of CCS toward legacy fossil fuel assets rather than sectors where emissions are truly unavoidable. This misalignment underscores a deeper issue: CCS is still not being treated as a forward-looking tool for long-term industrial decarbonisation.

At the regional (**county**) level, **Just Transition Strategies**, such as the one developed for **Mureş County**, also include CCUS as a potential solution for industrial decarbonisation and emissions reduction. However, as with national-level initiatives, implementation remains at a very early stage, with most references being broadly aligned to the national NECP framework rather than presenting region-specific action plans or concrete measures.

1.2 Legislative Framework

Romania's legal foundation for CCS is primarily based on the transposition of **Directive 2009/31/EC** of the European Parliament and Council, which sets the framework for the **environmentally safe storage of CO₂** to mitigate climate change. Over time, the national framework has evolved through several legislative acts, aiming to align with the EU's changing regulatory landscape and to support the development of a functional and integrated CCS infrastructure.

Fundamental Legislation

- The main transposition instrument is Emergency Ordinance (EO) **No. 64/2011**, approved through **Law No. 114/2013**, which establishes the legal basis for CO₂ geological storage in line with the CCS Directive. It also clarifies how to manage overlaps with hydrocarbon exploration or production, ensuring legal predictability during licence periods.

Recent Developments – EO 139/2024

- The most recent amendment to this framework, **EO No. 139/2024**, was adopted after interinstitutional consultations. The update responds to the evolving EU policy environment and reflects Romania's recognition of the need to create enabling conditions for carbon storage and transport infrastructure. It also addresses the country's current gap across the full CCS value chain
 1. Clarifies and expands existing regulations for geological CO₂ storage and transport;
 2. Introduces **new legal definitions** for storage perimeters and types of permits required;
 3. Simplifies permitting procedures for CO₂ storage in existing depleted hydrocarbon fields and ensures transparency and predictability for third-party access to both transport networks and storage sites, striking a balance between protecting early investors and enabling future market entrants;
 4. Regulates access to **geological data** and outlines the responsibilities of the **ANRMPSG**;
 5. Establishes **criminal penalties** for the unauthorised operation of CO₂ storage sites;
 6. Includes ANRE as competent authority for transport and the requirements for new secondary legislation to be adopted.

Ongoing Legislative Developments

- According to ANRMPSG, secondary legislation, regulating CO₂ storage is currently under development to complement and complete the existing framework, adapted to Romania's historical context and its specific geological, industrial, and infrastructural conditions.
- This forthcoming legislation is expected to further support the implementation of industrial carbon management projects by addressing remaining regulatory gaps and ensuring alignment with EU best practices and technical standards. It will also facilitate access to EU funding mechanisms and promote cross-border collaboration opportunities.
- The updated legal framework marks a significant step forward in aligning Romania's national legislation with EU climate and industrial policy goals. However, practical implementation remains a challenge.

1.3 Market conditions

In 2006, the **EU GeoCapacity** project conducted a detailed inventory of CO₂ storage locations within the European Union, focusing on countries that had not been included in previous projects, such as Romania. The storage potential in deep saline aquifers was estimated using theoretical models based on reservoir thickness and porosity. The analysis revealed that Romania holds one of the highest estimated CO₂ storage capacities among Central and Eastern European countries. However, this represents a **theoretical capacity**, calculated using broad geological assumptions. As detailed site-specific studies progress and the understanding of reservoir properties improves (e.g., porosity, permeability, faults, pressure limits), the initial estimates often become more conservative. This leads to a **reduction in the usable storage capacity** to reflect technical feasibility and safety constraints. The country has an estimated **7,500 Mt** of storage capacity in **deep saline aquifers** and **1,500 Mt** of potential storage in **depleted hydrocarbon fields**. However, **no viable capacity** has been identified in **coal fields**, as conditions are geologically unsuitable.^x It is important to note that this storage capacity remains theoretical and requires further assessment, including pilot tests and detailed geological analyses, to validate its technical and economic feasibility.

Five years later, Romania proposed its first integrated CCS demonstration project, named **Getica (2011)**. The project, based in the Oltenia region, was aimed at demonstrating the full CCS value chain. The first stage involved CO₂ capture from coal-fired electricity production at the lignite-fired Turceni power plant, carried out by Complexul Energetic Turceni SA. The captured CO₂ would then be transported via pipeline transport over 40-50 km, managed by SNTGN Transgaz. Finally, storage would take place in onshore saline aquifers at a depth of around 800 meters, operated by SNGN Romgaz. The project was designed to capture up to 1.5 Mt CO₂/year and was developed with support from technical partners such as the Institute for Energy Studies and Design (ISPE) and the National Institute for Marine Geology and Geoecology (GeoEcoMar).^{xi}

The project was suspended in 2012 due to the lack of renewed government support. Political instability and the aftermath of the 2008 financial crisis contributed to this decision, halting the initiative's progress.

Despite these setbacks, research in the field of CCS and CCUS has continued in Romania with European funding support. **The ECO-Base project (2017-2020)** assessed the potential for CCUS through CO₂-EOR (Enhanced Oil Recovery using CO₂), mapping CO₂ sources and potential storage sites in Romania and Turkey. **ALIGN-CCUS (2017-2020)** supported the implementation of CCUS in six European countries, including Romania, with a focus on the Oltenia region. **The Strategy CCUS Project (2019-2022)** concluded that CO₂-EOR technology has high implementation potential in the Galați region, while the Rex CO₂ project

(2019-2022) developed tools for evaluating the reuse of hydrocarbon fields and wells, such as the depleted gas field at Salonta in Oltenia^{xii}.

An analysis conducted by the Ministry of Energy for the updated NECP concluded that the implementation of a full-chain CCS project (capture, transport, and storage) would require **six to seven years**. In addition, Romania would need to **capture approximately 62 MtCO₂/year**, of which at least **26 Mt** should come from the metallurgical industry and the production of cement and lime. The estimated transport capacity via pipelines is around **16 Mt/year**, while **geological storage could reach at least 9 Mt/year**^{xiii}.

Despite these challenges, strategic modelling provides insight into where CCS is expected to play a significant role. According to EPG's *Pathways Explorer* scenarios (updated in December 2024), over 85% of carbon capture in Romania is projected to occur in the cement and lime industries. These sectors are among the most difficult to decarbonise due to their process-related emissions, making them prime candidates for CCS deployment. The scenario referenced is the one that achieves net zero emissions by 2050 and meets the interim climate targets set for 2030.^{xiv}

Table 1: **Pathway Explorer Scenario**

Carbon capture by material MtCO ₂ e	2030	2035	2040	2045	2050
Cement	0.74	1.69	2.57	3.10	3.62
Lime	0.26	0.53	0.75	0.89	1.04

1.4 Public Perception

A survey, conducted on a sample of 1,000 respondents covering both urban and rural areas, indicates that public awareness of CM in Romania remains low but go with a clear willingness to learn. This combination of limited knowledge and high curiosity reflects an early, formative stage of public perception, one shaped more by information gaps than by resistance. Trust emerges as the central determinant of acceptance, with respondents showing greater confidence in scientists and civil society organisations than in government or industry actors. Overall, attitudes can be described as cautiously open: most respondents adopt a “wait-and-see” position, expressing conditional support if CM is implemented transparently, safely, and with tangible local benefits. However, a latent *Not In My Backyard* tendency persists, particularly when projects are perceived as physically close to communities.

The situation at Boțești, Argeș County, in 2023, illustrates these dynamics and highlighted several critical vulnerabilities. When plans for a CO₂ storage facility were revealed, media outlets framed the project in alarmist terms – “OMV wants to bury Romania in toxic emissions” – and local opposition was quickly mobilised.^{xv}

The **misinformation and emotional narratives** dominated the public discourse, with claims that CCS is untested, unsafe, or "not done anywhere else in the world," despite the existence of successful onshore storage sites globally. Second, **a lack of transparency and early engagement** allowed fear and distrust to spread unchecked. Residents received technical information only at a late stage in the process, leading many to feel that key decisions had already been made without their input. This contributed to a sense of exclusion and distrust. Third, **institutional silence or communication inconsistency** allowed media speculation to fill the void. No central authority stepped in to provide clear, accessible information to counter misinformation.

The lack of credible, fact-based communication has created fertile ground for public backlash. In this specific case, the local opposition was shaped not only by safety and environmental concerns, but also by political narratives framing the project as favouring foreign corporate interests over tangible benefits for the community. At the same time, project stakeholders failed to communicate the full value of CCS. Most communication focused on its climate dimension – the role of CCS in reducing emissions from hard-to-abate sectors and supporting Romania's Fit for 55 targets. Its economic potential was largely overlooked, even though CCS could represent a new industrial opportunity. Going forward, it will be essential to develop clear strategies for risk assessment, public consultation, and transparent communication to build societal trust and improve acceptance of CCS projects.

Although the Interministerial Committee on Climate Change recognised in 2024 the importance of public communication and called for a government-level CCS communication plan, these efforts remain largely declarative, with no substantive public engagement strategy or national awareness campaign implemented to date.

2 Contextual Understanding

2.1 Identification of Stakeholders

Ensuring the long-term viability and impact of carbon management (CM) initiatives requires the coordinated involvement of diverse stakeholders at national, regional and local levels. Such initiatives reflect a complex governance challenge that demands inclusive and well-aligned actions. Meaningful stakeholder engagement across all sectors of society is essential to overcoming institutional and socio-economic barriers, ultimately positioning these technologies as a cornerstone of Romania's decarbonisation pathway.

Romania has clarified – through EO 64/2011^{xvi}, amended by EO 139/2024^{xvii} – the authorities responsible for overseeing the safe and effective deployment of CCS technologies, such as:

- **The National Regulatory Authority for Mining, Petroleum and Geological Storage of Carbon Dioxide (ANRMPSG):** Regulates geological CO₂ storage, **establishes the areas where geological storage is permitted**, oversees site selection, issues exploration licences and storage permits, and ensures safe storage operations.
- **The National Regulatory Authority for Energy (ANRE):** Regulates CO₂ transport infrastructure, develops technical standards and transport tariffs, and oversees economic operators managing CO₂ transport networks;
- **The National Agency for Environment and Protected Areas (ANMAP):** ensures compliance with EU environmental regulations, requires regular emissions reporting, and approves monitoring plans and updates;
- **The National Environmental Guard (GNM):** conducts inspections of storage complexes and publicly reports inspection outcomes;
- **The Ministry of Environment, Waters and Forests (MMAF):** Responsible for reporting in accordance with Directive 2009/31/EC (with ANRMPSG) and overseeing environmental protection;
- **The Ministry of Economy, Digitalisation, Entrepreneurship and Tourism:** Proposes support schemes for CCS technology development and ensures compliance with national and EU state-aid regulations. It has a coordinating role in the CCUS strategy and in the implementation of the NZIA.

Complementing these bodies, although not explicitly mentioned in the transposition of the CCS Directive, the **Ministry of Energy** and the **Ministry of European Projects and Investments (MIPE)** hold roles as relevant stakeholders in the evolving framework of carbon management policies and project implementation, with influence on the direction, scale, and success of such initiatives, particularly regarding the possible financing of projects through the instruments they manage.

At the regional and local level, the current carbon management-related legislation in Romania does not assign any responsibilities to local or regional authorities. City Halls, Local and County Councils, as well as Regional Development Agencies are not mentioned in the existing regulatory framework.

Beyond the defined roles of public authorities, successful implementation requires the engagement of other key stakeholders connected to the regulatory and policy framework. As shown in Table 2, industrial operators in hard-to-abate sectors face rising ETS costs, competitiveness losses, and potential downsizing without access to CCS, underscoring the urgent need for clear policies and fair transition measures to protect jobs and regional economies. Oil and gas operators such as OMV Petrom, Romgaz, and BSOG also have a critical role to play, as the NZIA identifies storage development as a key component of Europe's industrial decarbonisation strategy. While TRANSGAZ S.A. and CONPET S.A. have not been formally designated as CO₂ transport operators, their expertise in oil and gas

transmission positions them as likely candidates to develop and operate future CO₂ transport infrastructure,

Table 2: **Industrial Stakeholders**

Category	Companies	Notes
CO₂ Emitters	Cement and Lime: SC Holcim Romania SA HeidelbergMaterials România SA ROMCIM S.A. Carmeuse Holding SRL CELCO SA	Hard-to-abate industrial emitters & potential candidates for CO ₂ capture technologies
	Chemicals: SC Azomureș SA Chimcomplex SA	Chimcomplex may also act as a CO ₂ user for chemical synthesis
	Refineries: S.C. OMV PETROM S.A. Rompotrol Rafinare S.A. Petrotel-LUKOIL S.A.	High-concentration emission sources from a hard-to-abate sector
Transport Operators	TRANSGAZ S.A. CONPET SA	Potential developers and operators of CO ₂ pipeline infrastructure, based on existing oil & gas experience
CO₂ Users	Chimcomplex SA, greenhouse operators, sugar producers, e-fuel producers	Relevant to the CO ₂ utilisation component of the CCU/CCUS chain
Storage Operators	S.C. OMV PETROM S.A. S.N.G.N. ROMGAZ S.A. Black Sea Oil & Gas (BSOG)	Operators identified in line with NZIA provisions

Alongside these major players, various business and industry associations, also listed in **Table 3**, play a substantial role in representing the collective interests of companies within the sector.

Table 3: **Business and Industry Associations**

Association	Who They Represent
Confederația Patronală Concordia Concordia Employers' Confederation	Various industries including energy, transport, manufacturing
Federația Patronală a Energiei Energy Employers' Federation	Major energy companies, specifically oil and gas
Patronatul din industria cimentului și altor produse minerale pentru construcții din România (CIROM) Employers' Association of the Cement and Other Mineral Construction Products Industry in Romania	Cement, lime and construction materials producers

Association	Who They Represent
Confederația Patronală din Industria României (CONPIROM) <i>Employers' Confederation of the Romanian Industry</i>	Broad industrial sectors
Federația patronală din industria materialelor de construcții (PATROMAT) <i>Employers' Federation of the Construction Materials Industry</i>	Construction materials producers
Patronatul Producătorilor de Agregate Minerale din România (PPAM) <i>Employers' Association of Mineral Aggregates Producers in Romania</i>	Mineral aggregate producers
Asociația Companiilor Chimice din România (ROMCHIMICA) <i>Romanian Chemical Companies Association</i>	Chemical industry representatives

While industrial operators – including those in the oil and gas sector – bear the burden of compliance with tightening climate regulations, the implications extend further to the workforce sustaining these sectors. **Labour unions** representing employees in high-emission industries are relevant stakeholders in the transition.

The main labour unions include:

- *Federation of Free and Independent Trade Unions in Oil and Energy* (Federația Sindicatelor Libere și Independente Petrol Energie – F.S.L.I. Petrol-Energie)
- *Gas Romania Trade Union Federation* (Federația Sindicatelor „Gaz România”)
- *Lazăr Edeleanu National Trade Union Federation of the Chemical and Petrochemical Industry* (Federația Națională a Sindicatelor din Chimie-Petrochimie “Lazăr Edeleanu”)

As shown in **Table 4**, the level of engagement across Romania’s carbon management landscape varies widely among stakeholder groups, especially when it comes to CCS. The analysis of **stakeholder engagement level** has been carried out by EPG, in line with the national legislation.

Table 4: **Engagement Level of Stakeholders**

Stakeholder Group	Engagement Level	Description / Notes
Local and Regional Authorities		
City Halls, Local and County Councils, Regional Development	None	Currently under-engaged in their operations, as regulatory frameworks remain unclear. However, there is potential to influence strategic planning and

Stakeholder Group	Engagement Level	Description / Notes
Agencies, Regional Chambers of Commerce		regional economic development, and CM has the capacity to support regional and local socio-economic development if integrated into policy and planning.
National Authorities		
Ministry of Environment, Waters and Forests (MMAF)	Moderate	Engagement is mainly administrative, focused on compliance and documentation review rather than proactive policy development. CM aligns with their mandate but has not yet become a central policy priority.
Ministry of Energy	Moderate	I Institutional ambition exists, but enforcement and dedicated capacity building in CM remain limited. Governance fragmentation across ministries adds uncertainty and slows coordinated decision-making.
Ministry of European Projects and Investments	Low	The current fragmentation of funding (as not all funds are managed by MIPE) contributes to the lack of a strategic and integrated approach to CM. The absence of interinstitutional coordination limits MIPE's ability to actively support the development of CM.
Ministry of Economy, Digitalisation, Entrepreneurship and Tourism	Low to Moderate	Played a lead role in the Getica CCS pilot project in 2010, marking early involvement in CO ₂ capture and storage. Currently, CM is not a core priority in national strategic documents under the Ministry's responsibilities. Lack of technical capacity and specialised expertise in carbon management. Coordination on CCS is fragmented, with minimal executive involvement from the Ministry of Economy.
Chancellery of the Prime Minister	High	Coordinates the national CCUS Working Group, serving as a central convening body. However, lacks formal enforcement mechanisms and has limited administrative capacity to ensure follow-through on commitments and interinstitutional coordination.
Main Regulatory Authority: ANRMPSG	High	Holds legal and technical authority over CO ₂ storage site permitting, regulation, and long-term monitoring.

Stakeholder Group	Engagement Level	Description / Notes
		Actively engaged in the development and implementation of the regulatory framework for CM in relation to geological storage.
Other Authorities: ANRE, ANMAP, GNM	Low to Moderate	Permitting of CO₂ transport infrastructure Oversight of MRV systems Regulatory enforcement and environmental compliance However, their roles in CM are not yet clearly defined or prioritised within internal institutional regulations. Limited capacity and unclear coordination mechanisms hinder their proactive engagement in CM development.
Industrial Stakeholders		
Industry	Moderate to High	Includes oil and gas operators with NZIA obligations, major emitters (e.g., cement, steel, refining, chemicals), potential investors in CO₂ capture infrastructure and transport & storage operators. Directly impacted by CM policies, emissions regulations, and carbon pricing mechanisms. Engagement varies by sector and company, depending on: • Perceived regulatory clarity; • Access to funding and incentives; • Relevance and feasibility of CM technologies for the sector's core activities. Current involvement in CM is uneven and often constrained by lack of coordination, technical guidance, or financial predictability.
Business & Industry Associations	Moderate	Represent key industrial stakeholders and have the capacity to: • Shape public discourse around CM; • Influence policy and regulation through advocacy, lobbying, and consultation processes; • Engagement in CM varies but is increasing in highlighting industry needs and risks. Current limitations include fragmentation across sectors, leading to inconsistent messaging.

Stakeholder Group	Engagement Level	Description / Notes
		Opportunity to play a stronger role in aligning business interests with national CM strategy and ensuring smoother policy implementation. While some associations, such as CIROM, FPE and Concordia have started to engage in CM-related discussions, the level and focus of involvement often reflect the specific priorities of their member companies.
Labour Unions	Low	Have minimal direct involvement in CM policy design or implementation. Not currently engaged in institutional discussions related to CM or CCS deployment. Key areas of interest include: • Job creation potential in emerging CM industries; • Ensuring fair labour conditions and protections in carbon-intensive sectors undergoing transformation. Potential role in advocating for a just transition framework that incorporates CM into broader labour and social policies.
Civil Society		
Academia and Research Institutes	Moderate	Contribute technical expertise and scientific analysis on CCS. Often participate in research consortia, feasibility studies, and technical assessments that inform policy design. Lack formal institutional authority in CM governance or decision-making processes. Opportunity to strengthen impact through closer collaboration with public institutions and industry on CM project development and implementation. Engagement is visible in institutions with relevant experience and ongoing activities (e.g., GeoEcoMar, UBB, Politehnica București). Other universities (e.g., University of Petroleum and Gas in Ploiești, University of Bucharest, University of Petroșani) have strong potential, though not yet fully integrated, possibly due to limited acknowledgement.

Stakeholder Group	Engagement Level	Description / Notes
Environmental NGOs	Low	Often actively advocate for: - Environmental protection and ecosystem safeguards; - Public access to information and participation in decision-making processes; Opportunity to expand their role through structured engagement in CM governance, especially around transparency, equity, and environmental integrity.

2.2 Role Clarification

As shown in Table 4, local and regional authorities do not have clearly defined responsibilities in this area, hence establishing a national legal framework to assign roles would significantly improve institutional coordination. Currently, the absence of formalised responsibilities, particularly at the local and regional levels, creates gaps in coordination, delays in permitting, and risks for community acceptance. At the **local level**, unclear mandates limit proactive community engagement and integration of CM into land-use planning and local policy objectives. At the **regional level**, the lack of structured involvement reduces the opportunity to embed CM into broader regional development strategies, potentially missing economic and social co-benefits.

On the other hand, national regulators, particularly those directly tasked with overseeing CCS, tend to be more active, given their responsibilities under EU and national legislation. Industrial players, business associations, and research institutions tend to be more engaged. In contrast, labour unions and environmental NGOs are involved to a lesser extent, with their engagement depending on how closely CM aligns with their specific missions or concerns. Altogether, this mix of involvement reflects the complex nature of CM in Romania, and points to the need for better coordination, clearer communication, and capacity building across all sectors to ensure that policies are implemented effectively and technologies such as CCS can move forward.

Table 5: **Summary of Functional Differentiation**

Level	Main Function in CM Initiatives
Local	- No formal legal role in CM planning, permitting, or oversight. - Minimal involvement in CM discussions or project development. - Limited awareness and capacity on CM topics.
Regional	- No clearly defined mandate in CM strategy or infrastructure coordination. - Not actively involved in shaping regional approaches to CM. - Limited coordination with national authorities on CM topics.

National	• Holds legal and regulatory responsibilities for CM (e.g., permitting, funding access, EU alignment). • Leads strategic planning, inter-ministerial coordination, and compliance with EU legislation (NZIA, Directive 2009/31/EC).
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Particular attention should be paid to the **national authorities designated under EO 64/2011, as amended by EO139/2024**, as well as other institutions with regulatory, compliance, and reporting functions. Understanding their legal mandates, past involvement, and institutional capacity is crucial for designing a robust carbon management and CCS framework. For example, the **Geological Carbon Dioxide Storage Unit** within Romania's **ANRMPSG** was established to implement **Directive 2009/31/EC** (the CCS Directive) and plays a key role in overseeing the storage of CO₂. Detailing these responsibilities will support the development of **transparent, accountable, and efficient governance structures** aligned with EU requirements and Romania's decarbonisation ambitions.

ANRMPSG^{xviii} is the primary regulatory body for carbon management in Romania, through its role in overseeing **the entire lifecycle of geological carbon storage**.^{xix} Its technical responsibilities extend beyond those outlined in Government Decision no. 64/2011 and include the following:

- Regulates, authorises, and monitors CO₂ geological storage;
- Ensures safe, long-term CO₂ storage to reduce greenhouse gas emissions;
- Approves procedures and regulations to ensure safe and efficient CO₂ storage;
- Manages the selection process for exploration rights;
- Maintains the national registry of geological CO₂ storage sites;
- Evaluates the suitability of storage site and storage capacity in selected areas across Romania;
- Ensures technical and environmental compliance;
- Monitors compliance with legal provisions throughout the operational, closure, and post-closure phases of storage sites.

While **ANRMPSG** plays a central role in the technical implementation and regulatory oversight of CCS under clearly defined legal mandates, ministries operate at a broader policy level. Their responsibilities span regulatory, strategic, and financial aspects of national climate and energy policy. Their cross-sectoral mandate and political authority place them in a unique position to steer potential and coordinate CM across different institutions and policy domains, linking energy, industry, environment, and finance. However, this role remains **only partially assumed in practice**, revealing a notable capacity gap.

Ministries have not yet developed the internal structures, dedicated expertise, or coordination mechanisms needed to proactively guide CM implementation. Strategic

alignment with EU initiatives like the NZIA or the inclusion of CCS in national energy and climate planning has often been reactive rather than forward-looking. Moreover, limited institutional ownership has resulted in fragmented policy signals, lack of clarity for investors, and missed opportunities to integrate CM into broader economic and industrial transformation agendas.

The Ministry of Environment, Waters and Forests is the primary national authority responsible for climate and environmental matters, tasked with developing and enforcing strategies and regulations to reduce carbon emissions and address climate change impacts. In the context of CM, its core role is to ensure that environmental safeguards are upheld and that no risks arise that could harm ecosystems or public health. Moreover, the Ministry's involvement has so far been **primarily administrative**, with a focus on reviewing documentation and ensuring regulatory compliance, rather than actively shaping forward-looking policies or facilitating the early development of carbon management projects. While CCS is referenced in Romania's Long-Term Strategy (LTS) for 2050, this inclusion has not yet translated into concrete policy action or institutional follow-up. This limited engagement creates uncertainty for project developers and contributes to slower decision-making. To become an enabler of CM, the Ministry must strengthen its technical expertise and take a more active role in coordinating with other relevant institutions.

The Ministry of Energy is another key stakeholder, with responsibilities related to shaping the national energy mix, infrastructure investment, and energy transition planning. It also administers the Modernisation Fund, which includes CCS incentives. However, significant gaps remain in the Ministry's approach. As indicated above, the Ministry's current approach largely focuses on advocating CCS for coal-fired power and categorising CCS under the Modernisation Fund's energy efficiency programme, despite CCS not being an energy efficiency measure. This reflects a misalignment with best practices and a lack of strategic direction.

The Ministry of Economy, Digitalisation, Entrepreneurship and Tourism's role is to contribute to CM initiatives through proposals and management of financial support for CCS development. The Ministry has demonstrated its commitment to addressing carbon emissions by launching the 2010 Action Plan for implementing a Demo Project on CCS in Romania (prior to the Getica Project),^{xx} followed by a national call for CCS project proposals, as well as supporting through financial and institutional means the GETICA CCS project and the feasibility study on CCS.^{xxi} In spite of these early efforts, as well as its role in accordance with EO 64/2011 and subsequent amendments, the Ministry's current engagement appears limited and lacks continuity because of a shortage of technical expertise and lack of leadership for CM.

The Ministry of European Projects and Investments, through the Sustainable Development Programme 2021-2027, manages a broad portfolio of EU funding that

includes infrastructure, industrial modernisation, and support for a green and competitive economy. These funding lines clearly allow to direct resources toward carbon management (CM) initiatives, especially in hard-to-abate sectors and regional industrial hubs. However, the Ministry has so far not capitalised on this potential. Unlike regulatory bodies, MEPI's role is primarily financial, yet it has **not embedded CM or CCS as explicit funding priorities** in programme design or evaluation criteria. This reflects a gap not in technical expertise, but in strategic alignment, specifically, connecting funding instruments with emerging EU policy signals such as the NZIA, the Innovation Fund, and the ETS reform.

Moreover, its coordination with line ministries remains weak, limiting the integration of CM within broader national decarbonisation planning. As a result, while the Ministry has the tools to act as a financial catalyst for CM deployment, it has yet to assume that role fully. Doing so would require not just interministerial collaboration, but a deliberate effort to **prioritise CM within funding frameworks**, guiding applicants and project pipelines toward technologies with long-term climate impact.

The Chancellery of the Prime Minister holds a substantial role of strategic coordination, monitoring, and evaluation of public policies. The Chancellery facilitates collaboration between different ministries, ensuring strategic alignment across sectors, with a key role of interinstitutional coordination. Thereby, its responsibility is connected to developing a unified approach for CM, through the CCUS and NZIA Working Groups^{xxii}.

The regional authorities (County Councils, Regional Development Agencies, and Chambers of Commerce) and local authorities (Local Councils and City Halls) could bring significant value to carbon management efforts from a socio-economic perspective. This includes shaping strategic planning, integrating carbon management into local and regional development programs, raising awareness in vulnerable communities, and advancing private sector engagement through innovation and investment. However, their involvement is currently hindered by the fact that their roles in carbon management are not legally regulated or clearly defined in any existing legislation. This regulatory gap limits their ability to act decisively and coordinate effectively, despite their inherent potential to contribute meaningfully to carbon management in Romania.

Stakeholder involvement in the CM landscape is shaped not only by their individual capacities, but also by the nature of their collaboration and interactions. However, this remains largely theoretical, as coordination between ministries, agencies, and public institutions is limited in practice, with no concrete CM initiatives having materialised yet. Although expert engagement occurs through structures such as the CCUS and NZIA Working Groups under the ICCC these efforts have only been translated into symbolic actions, such as Romania's accession to the Carbon Management Challenge at COP28, structured dialogue with carbon-intensive industries, and commitments to boost coordination for access to Innovation Fund financing^{xxiii}.

On the operational side, effective deployment of CCS infrastructure requires collaboration across the entire value chain, between capture, transport, and storage operators, which is still underdeveloped. In Romania's case, the responsibility for developing CO₂ storage, in accordance with NZIA, lies primarily with the country's two largest hydrocarbon producers, OMV Petrom and Romgaz.^{xxiv} This involves substantial capital investments and long-term commitments, which may limit their willingness and capacity to engage with other stakeholders. In fact, Romgaz's feedback on the CCS Delegated Act emphasised that *"considering the absence of a CO₂ transportation infrastructure and the high costs for such developments, the CCS integrated value chain will be massively discouraged."*^{xxv} For its part, OMV Petrom emphasised that contributions under the NZIA should remain voluntary, as the current situation presents considerable challenges both in terms of technical feasibility and competitiveness for obliged entities.^{xxvi} This sends a clear signal that the current policy and infrastructure landscape is not yet fit for purpose. For the future of CCUS in Romania, progress will remain limited unless the state steps in to coordinate across the value chain, de-risk early investments, and define clear, enforceable roles for all actors involved. If these gaps are not addressed, CCUS risks stalling at the pilot stage, despite Romania's theoretical storage potential.

3 Resource Availability

3.1 Financial, Human and Knowledge Resources

The successful implementation of CM initiatives in Romania depends on the availability of financial resources and skilled human capital. In 2023, the cement industry employed approximately 2,997 jobs, lime production accounted for 204, and the fertiliser and nitrogen products manufacturing sector employed around 960 people.^{xxvii}

In Romania, CCS is increasingly becoming a field of academic and industrial interest, particularly in the context of national decarbonisation efforts and EU climate targets. Research in this field has been ongoing for many years, supported by a strong academic and institutional foundation. Academic institutions, research centres, and collaborative projects are playing a relevant role in building the knowledge base, advancing technology readiness, and raising awareness about the importance of CCS as a viable climate mitigation tool.

One notable example is Babeş-Bolyai University of Cluj-Napoca, an important institution in CCS technology development, ranked 7th worldwide for its contributions in this area.^{xxviii} In collaboration with Politehnica University of Bucharest and GeoEcoMar Institute, they participated in the CO₂-HyBrid project (2020-2023), developing hybrid technologies for capturing CO₂ from industrial emissions with variable gas concentrations. Moreover, the

project offered a **cost-effective approach**, aiming for capture costs of 15-25 €/tCO₂, substantially below the current global range of 20-90 €/tCO₂.

Beyond capture technologies, Romania's academic sector is also contributing to the **risk governance and monitoring** side of CCS through the **RamonCO project**.^{xxix} Building on the modelling framework from the DigiMon project, RamonCO focuses on full-field scale application and risk-based assessment of CO₂ storage. It incorporates technical, economic, societal, and environmental considerations into a unified decision-support framework, essential for gaining public trust and ensuring regulatory compliance in CCS deployment.

In this regard, the involvement of leading academic and research institutions highlights a strong commitment to advancing CCS knowledge through applied research, innovation, and interdisciplinary collaboration. These projects are not only advancing the technical development of CCS technologies in Romania but are also playing an important role in raising awareness and building the national knowledge base necessary for transitioning to a low-carbon economy. The collaborative dynamic between academic and research institutions reflects a shared commitment to long-term capacity building. Their intention is laying the groundwork for the creation of dedicated master's programmes in CCS and related fields, planned for launch in the medium to long term within Romania's technical universities.

Romania has access to several EU-level funding mechanisms that can significantly support the development of CCS technologies and broader carbon management initiatives. However, the effective use of these instruments depends on the country's ability to secure national co-financing, establish coordinated and mature project pipelines, and ensure regulatory coherence.

Moreover, in the absence of a dedicated national funding mechanism for CCS, as seen in other European countries,⁵ Romania could consider the **Modernisation Fund**, which is designed to support the transformation and decarbonisation of energy systems in 10 lower-income EU Member States, including Romania. The fund is structured around several Key Programmes, one of the most relevant to Romania's Industrial Strategy being Key Programme 7: Energy Efficiency in Industrial Installations Included in the EU ETS. This programme offers targeted financial support for both the acquisition and deployment of carbon capture, utilisation, and storage (CCU/CCS) technologies, as well as for the modernisation of industrial installations to meet Best Available Techniques (BAT) standards. Eligible sectors include **steel, cement, oil and gas, power generation**, and other **energy-intensive or high-emission industries**, all of which are covered under the EU Emissions Trading System (EU ETS).^{xxx} While this mechanism offers a pathway for implementation, the **new agreement signed on 3 June 2025** between the European Commission and the

⁵ Denmark, Norway, Netherlands, Sweden

European Investment Bank (EIB)^{xxx} under the Innovation Fund presents an equally important opportunity, particularly for early-stage project development. The agreement extends free Project Development Assistance (PDA) even to projects that have not yet been applied to the Innovation Fund. With the number of supported projects increasing from 62 to 250 and the budget rising from €24 million to €90 million, Romania's industrial actors can access valuable technical expertise and EU-level resources to mature project proposals. Despite these opportunities, Romania is **absent from key EU CCS infrastructure frameworks**, such as the **Projects of Common Interest (PCI)** and **Projects of Mutual Interest (PMI)** under the **Connecting Europe Facility for Energy (CEF Energy)**. This is concerning, given the country's substantial geological storage potential, among the largest in Southeast Europe, and the presence of major emitters in steel, cement, and power generation. Compounding this gap, Romania is the only country in the region that has not yet secured funding from the EU Innovation Fund for CCS-related projects.

This reflects deeper structural challenges, as Romania continues to face difficulties in developing strong project proposals, managing complex permitting procedures, and ensuring effective coordination between key institutions. Its exclusion highlights the urgent need for targeted technical assistance and national-level leadership to build institutional capacity and align with EU-wide CCS priorities in a more strategic and coherent manner. The **Innovation Fund's PDA scheme**,^{xxxii} with its low entry barriers and increased geographical equity criteria, provides a timely opportunity to begin addressing this gap.

In addition, Romania could benefit from establishing dedicated national financial instruments such as subsidies, tax exemptions, and public-private partnerships to complement EU-level support and stimulate CCS deployment. In line with Article 10(3) of Directive 2003/87/EC, revenues from EU ETS allowance auctions could also be channelled to support environmentally safe CO₂ capture and geological storage, further strengthening access to both EU and national funding for CCS projects.

3.2 Technical Resources

In Romania, the deployment of CO₂ capture technology is constrained by technical and structural limitations. One of the challenges is the high energy demand associated with capture processes, especially in post-combustion systems. This poses a serious barrier given that Central and Eastern Europe already faces some of the highest industrial energy prices in the EU.^{xxxiii} This makes the additional energy required for the capture units a significant economic obstacle. Thus, there is a strong need to invest in research and innovation on developing more energy-efficient CO₂ separation technologies^{xxxiv} to reduce future operational costs and increase viability of prospective projects.

Despite the barriers faced by Romania in deploying CO₂ capture technologies, promising initiatives demonstrate that progress is possible. A notable example is OMV Petrom's participation in the European ConsenCUS project since May 2021, which explores

innovative carbon capture and utilisation technologies. In June 2024, OMV Petrom began testing a pilot facility at the Petrobrazi refinery that captures CO₂ emissions and converts them into potassium formate, a valuable chemical product. This facility achieves over 90% capture efficiency, proving that effective CCU can be implemented in Romania. This exemplifies how collaboration and scientific innovation can overcome barriers, signalling a viable path forward for CCS /CCUS development in Romania.^{xxxv}

On the same note, the development of an integrated CO₂ transport system in Romania faces three major challenges:

- High upfront costs and regulatory barriers;
- Lack of stakeholder coordination;
- Limited commitment from major CO₂ emitters.

Despite these challenges, Romania already has a foundation to build on. While it currently lacks a dedicated CO₂ transport infrastructure, the country benefits from considerable latent capacity in its existing natural gas and crude oil pipeline networks, managed respectively by Transgaz and Conpet. However, it is important to mention that repurposing pipelines for CO₂ transport, especially over long distances, comes with significant technical limitations. A 2024 review on infrastructure reuse highlights that impurities in the CO₂ stream, particularly water, can alter fluid behaviour and lead to internal corrosion of steel pipelines. This makes such networks suitable primarily for short-distance or temporary use, unless substantial retrofitting and corrosion mitigation measures are applied.^{xxxvi}

- **Transgaz**, Romania's national natural gas transmission operator, oversees nearly **14,000 km of pipeline**, currently operating below 63 bar. While the company has shown interest in low-carbon transition strategies, particularly through potential involvement in the European Hydrogen Backbone, it has made **no formal commitments to CO₂ transport**. Notably, Transgaz was nominated as the CO₂ transporter for the now-defunct Getica CCS project in 2011, demonstrating prior institutional experience.

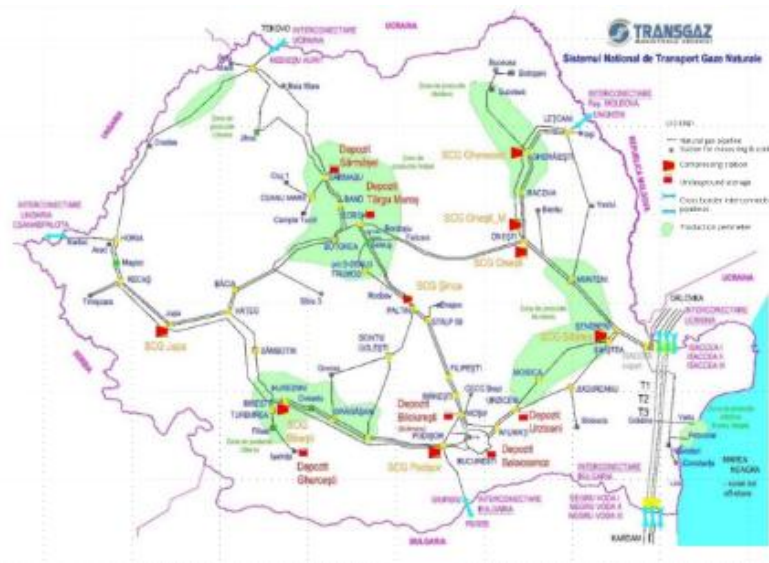


Figure 1: Map of the National Natural Gas Transmission System operator and cross-border interconnection points

Source: Transgaz [PDSNT 2024-2033](#)

- **Conpet**, the national crude oil transport operator, manages a network of over **2,800 km**, with significant unused or underutilised segments. Like Transgaz, however, it has not yet indicated any strategic interest in repurposing infrastructure for CO₂ transport. Nevertheless, its network remains a viable candidate for future conversion, particularly in regions with dense industrial emissions. Further assessments would be required to determine whether existing pipelines could be repurposed or if only the transport corridors would be viable for future CO₂ infrastructure.

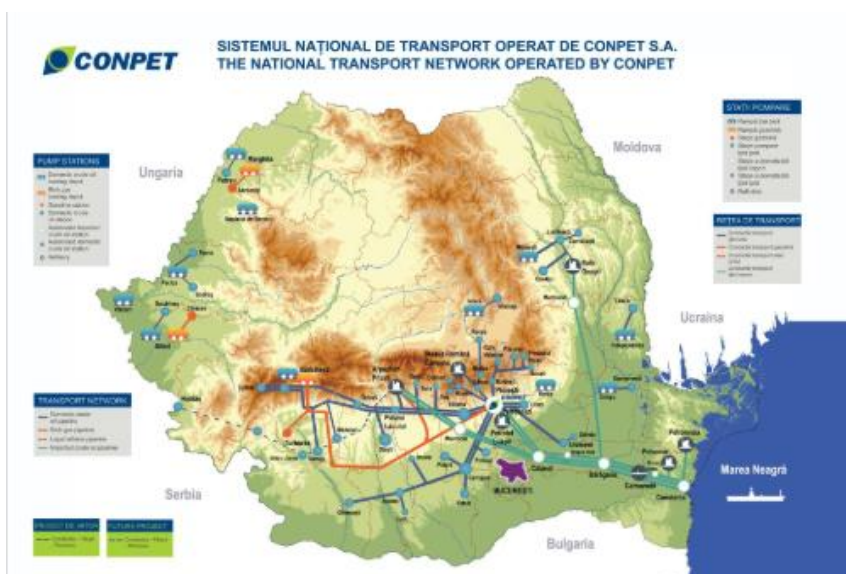


Figure 2: Map of the National Crude Oil Transmission operator

Source: [Conpet official webpage](#)

In the **absence of formal commitments** from either pipeline operator, Romania may need to consider the **establishment of a dedicated CO₂ transport entity**. Such an entity could take the form of a **joint venture** between industrial emitters, storage site holders, and infrastructure operators. This approach would enable the pooling of technical expertise, financial resources, and regulatory support, while accelerating the build-out of national and cross-border CO₂ transport infrastructure.

When it comes specifically to CO₂ storage, Romania has made progress by updating its legislation, designating relevant authorities, as well as publishing preliminary mapping of potential CO₂ storage sites via ANRMPSG, in line with NZIA provisions. However, these developments have not been properly communicated, and it remains unclear to what extent operators and other stakeholders are aware of the existence of this information.

Although Romgaz and OMV Petrom are legally obliged under NZIA to store captured CO₂, the lack of clearly identified and developed storage options in the country, including adequate transport infrastructure, will likely compel these companies to purchase storage capacity abroad to fulfil their obligations.

Against this background, leveraging technically suitable segments of existing oil and gas infrastructure emerges as a viable and potentially cost-effective approach to **partially** accelerate CO₂ storage deployment. The REX-CO₂ project^{xxxvii} approach not only reduces costs associated with building new infrastructure but also capitalises on existing assets to speed up implementation. However, legacy issues such as poorly sealed, small and shallow wells from the communist-era oil and gas exploitation complicate identifying viable depleted reservoirs.

Regarding the utilisation stage of the CCU/CCUS value chain, the market for CO₂ use remains largely absent. Even facilities that capture CO₂ for their own chemical processes have major difficulties in finding buyers for the captured amount. As a result, a significant part of the captured CO₂ end up vented into the atmosphere. The lack of a functioning market and adequate infrastructure for transportation and distribution seriously limits the possibilities for CO₂ utilisation in Romanian industries. This underlines the urgent need to develop a legal, economic and technical framework to support CO₂ valorisation and to encourage investments in efficient capture and use technologies.

4 Analysis

This section focuses on identifying gaps relevant to Romanian CM initiatives emphasising strategic alignment and assessing regulatory compliance to ensure the efforts are effectively contributing to climate goals and targets. By identifying areas lacking focus, this analysis contributes to a more supportive environment for CM initiatives.

4.1 Evaluation of Objectives

	Objective	National	Regional	Local
Political Landscape	<i>Ambitions and commitments towards climate targets and the role of CCS</i>	Aligned with EU targets (2050 net-zero), CCS included in LTS and NECP	Reflected in the Mureș Just Transition Strategy; high-level inclusion	Not defined in local planning; low integration
	<i>Evaluation of CM/CCS for national climate strategy/ CM/CCS strategy</i>	CCS is mentioned in the Romania's NECP and LTS	Referenced in regional planning (Oltenia, Mureș) as a decarbonisation tool	Minimal understanding of CCS role in local development
Legislative Framework	<i>Status of implementation of legislation and regulation governing CM and CCS</i>	Partially implemented; CCS Directive transposed, updated in 2024 (EO139/2024)	Dependent on national law	No local authority mandates or roles defined
Market Conditions/ financial support	<i>Support instruments for CM/CCS</i>	No dedicated national funding scheme yet; RRF not used for CCS ⁶	No regional funding tools specific to CCS	No local authority mandates or roles defined
	<i>Market development for CM/CCS</i>	Early pilot projects (Getica discontinued)	No regional CCS markets or project consortia in place	Pilot project at OMV Petrobrazi
	<i>Barriers to market entry for companies developing CM/CCS projects</i>	High upfront costs; Regulatory complexity; Lack of clear policy frameworks; Infrastructure gaps; Limited access to funding; Risk-sharing mechanisms missing	The absence of regional CO ₂ transport and storage infrastructure, or even the planning for such systems, means that potential emitters have no clear route to participate in a functional CCS market.	The absence of local CO ₂ transport and storage infrastructure, or even the planning for such systems, means that potential emitters have no clear route to participate in a

⁶ The NECP does mention state funding for CCUS, but nothing has been opened yet.

	Objective	National	Regional	Local
			A lack of awareness campaigns or public consultation frameworks leaves communities unprepared for CCS development. This heightens the risk of resistance and undermines the social licence to operate.	functional CCS market. A lack of awareness campaigns or public consultation frameworks leaves communities unprepared for CCS development. This heightens the risk of resistance and undermines the social licence to operate.
Public Participation	<i>Existing public understanding of CCS</i>	Limited understanding – limited targeted engagement campaigns	No concrete public outreach initiatives have been implemented to date	Absence of awareness-raising activities has resulted in minimal public knowledge on CCS
	<i>Current public attitudes towards CCS initiatives</i>	Mixed attitudes; limited engagement; mostly reactive	Mixed attitudes; limited engagement; mostly reactive	Boțești: strong resistance caused by misinformation and public mistrust
	<i>Activities towards public participation</i>	ICCC proposed Communication future actions in 2024, no implementation so far	Referenced in planning documents (NECP PAM 6); limited implementation capacity	No structured public engagement efforts
Role clarity	<i>Clear roles and responsibilities</i>	EO 64/2011 and its amendment EO 139/2024 formally assign roles to national authorities, yet no institution has assumed clear ownership of CM, resulting in fragmented responsibilities and limited strategic direction.	No legal framework for regional authorities	No clear roles and responsibilities are defined, as implementation follows national regulations and regional strategies.
	<i>Conflicts in stakeholder interaction</i>	Institutional conflicts and overlapping mandates have led to coordination breakdowns, with multiple ministries deflecting responsibility for developing a national CM	Not applicable at this stage, but potential conflicts could emerge depending on national dynamics.	Stakeholder interaction is currently limited due to the early stage of development.

	Objective	National	Regional	Local
		strategy, resulting in policy stagnation and unclear leadership.		
Financial, Human and Knowledge Resources	Availability of financial resources for CM/CCS projects	No dedicated national CCS fund; EU support exists (Innovation Fund etc.)	Aligned with national programmes; access to Just Transition funds	Dependent on national/regional allocations
	Availability of human resource capacity for CM/CCS	Romania's existing workforce in hard-to-abate industries offers reskilling potential for CCS, though expertise remains underdeveloped.	Connected to national level	Connected to national level
	Availability and use of Knowledge resources for CM/CCS implementation	Research institutes, such as GeoEcoMar led CCS technology development through a feasibility study as part of CO ₂ -HyBrid project.	No standalone regional entities; CCS knowledge capacity depends on localised academic expertise.	Academic institutions such as Politehnica University of Bucharest, University of Oil and Gas in Ploiesti and The University of Mines in Petrosani and Babeş-Bolyai University of Cluj-Napoca, could serve as a technical hub for applied research.
	Barriers to resource availability	Despite growing academic expertise and research efforts, Romania faces gaps in skilled workforce, technical capacity, and coordinated national funding, which hinder the deployment of CCS projects.	Not applicable at this stage due to early development and reliance on national-level coordination	Not applicable at this stage due to early development and reliance on national-level coordination
Technical Resources	Available CCS technologies	No dedicated large-scale CCS technologies deployed	No independent CCS technology is available as it is dependent on national capacities.	Only pilot/demonstration projects exist (e.g., OMV Petrom's ConsenCUS facility) which provided relevant operational experience and technical expertise.

	Objective	National	Regional	Local
	<i>Availability of infrastructure for CCS</i>	No dedicated CCS infrastructure exists yet, with potential to repurpose some oil/gas pipelines for future CO ₂ transport on short segments.	No independent infrastructure exists; the potential for regional industrial clusters to share CCS infrastructure has not yet been mapped.	Potential for local industrial clusters exists but remains largely unexplored; dependent on national coordination.
	<i>Availability of storage facilities</i>	Theoretical storage potential mapped by EU GeoCapacity and ANRMPSG (onshore/offshore).	The storage mapping applies to regional assessments.	Local storage potential is identifiable through the mapping, but without detailed local accuracy.
	<i>Data collection and management systems</i>	Initial development by ANRMPSG, but still in early phases	Implementation dependent on national frameworks	Fully reliant on national/regional infrastructure
<i>Ready for CCS implementation</i>		<i>started</i>	<i>Not yet started</i>	<i>Not relevant</i>

4.2 Strategic Alignment

In Romania, while there is growing recognition of the importance of CCS for decarbonising hard to abate industry, the strategic alignment between national CM initiatives and European-level climate goals remains partial and underdeveloped. ANRMPSG, the authority responsible for CCS, is in the process of strengthening its institutional capacities, analysing existing geological data, and coordinating with relevant actors from both the public and private sectors.

The analysis of Romania's political landscape, particularly through the updated **National Energy and Climate Plan (NECP) 2025-2030**, the **Long-Term Strategy (LTS)**, and the **Energy Strategy 2025-2035**, shows that CM is acknowledged as a strategic decarbonisation tool. CCS is explicitly mentioned in sectors such as cement and oil & gas, and public funding commitments of €750 million by 2027 have been announced for CCUS-related measures. However, a closer look reveals that these strategies often lack the depth and operational detail required for effective implementation:

- **Implementation plans are vague**, with limited information on timelines, sectoral roadmaps, or measurable targets beyond general acknowledgments.
- There is **no integrated national CCS strategy** outlining how CO₂ will be captured, transported, and permanently stored within a coherent infrastructure system.

- Lifecycle emissions, permanence, and climate integrity of CCS and CCU applications are **not consistently addressed**, which risks undermining climate outcomes and public trust.

Stakeholder consultations and institutional feedback consistently highlight key strategic omissions:

- **No clear vision for integrating CCS in Romania's broader industrial transition**, especially in coordination with EU policies such as the Net Zero Industry Act and the Industrial Carbon Management Strategy.
- **A missed opportunity to link more strategically CCS with upskilling efforts in the Just Transition Plans (JTP)** at the regional level, particularly in industrialised counties like Gorj or Mureş. Although CCS is mentioned in the Mureş JTP, the reference is limited and does not fully explore its potential as a driver for workforce development.
- **Absence of a national CO₂ transport and storage roadmap**, limiting project feasibility and excluding Romania from cross-border infrastructure initiatives like the Projects of Common Interest (PCI).

In addition, Romania's CM policy planning is not well aligned with available funding opportunities. Although EU funding sources such as the **Innovation Fund**, and **CEF Energy** are available to support CCS, **Romania has so far not allocated any funds to this area**. This reflects a **missed opportunity** to finance early-stage deployment, reduce investment risk, and stimulate private sector engagement.

Table 6: **Summary of key gaps and needed actions**

Issue Area	Status (as of 2025)	Needed Action
CO ₂ transport legislation	Partially developed – legal definitions introduced via EO 139/2024, but no full framework or technical norms in place	Finalise secondary legislation (ANRE & ANRMPSG) on network access, tariffs, and licensing.
Storage permitting	Procedurally clarified , but no permits granted yet	Finalise the ongoing update of the permitting procedure; ensure institutional readiness for future applications; support potential operators in bringing projects to the maturity required for storage permit applications.
Institutional capacity	Still fragmented and under-resourced	Strengthen technical capacity and coordination across ANRMPSG, ANRE, and ICC and line ministries.
Financial de-risking	Absent – no dedicated national CCS support mechanism	Introduce public co-financing tools, risk guarantees, and support schemes.

Public participation	Weak – limited procedures and transparency	Develop specific CCUS public engagement guidelines, beyond standard environmental permitting processes, to address public concerns around CO ₂ transport, storage, and long-term monitoring.
EU Directive compliance	Improved , but gaps remain in enforcement and CO ₂ transport	Strengthen enforcement of existing provisions, close regulatory gaps for cross-border CO ₂ transport, and prepare for the implementation of NZIA requirements and forthcoming measures under the EU Industrial Carbon Management Strategy.

4.3 Regulatory and Compliance Assessment

As Romania moves toward achieving its net-zero targets in alignment with EU climate goals, CCS is gaining recognition as a critical tool for decarbonising hard-to-abate sectors. While the legal foundation for CCS has been partially established through the transposition of Directive 2009/31/EC into national legislation, most recently updated by Government Decision (EO) 139/2024, the overall regulatory and compliance framework is to be further developed. Institutional responsibilities are fragmented, financial and safety requirements are only partially defined, and enforcement mechanisms remain largely untested due to the absence of operational transport and storage sites.

This section provides a structured assessment of Romania's CCS compliance status across key areas, including permitting, environmental safeguards, public participation, liability, and institutional coordination. The analysis identifies critical gaps that must be addressed to enable large-scale deployment of CCS technologies and ensure alignment with EU regulatory standards.

Table 7: **Regulatory and compliance assessment**

Compliance area	Requirement	Status in Romania	Observations / Gaps
Legal transposition	Transpose Directive 2009/31/EC into national law	Fully transposed via EO 64/2011, updated through EO 139/2024	Legal foundation exists, but enforcement remains limited and fragmented.
Storage permitting	Define rules for site selection, permitting, and operation	ANRMPSG responsible for permitting	Framework exists but has not yet been tested with an operational project.
Environmental compliance	Ensure EIA, biodiversity, and water protection standards are met	Partially addressed; CCS not yet fully integrated into EIA/SEA frameworks	Weak enforcement capacity; integration with

Compliance area	Requirement	Status in Romania	Observations / Gaps
			Natura 2000 ⁷ and WFD ⁸ not clearly operational
Public participation	Conduct public consultation (Aarhus Convention, EIA Directive)	Referenced in NECP but with minimal implementation	No structured public engagement on CCS to date
Monitoring, Reporting & Verification (MRV)	Ensure long-term site monitoring and leakage prevention	Basic provisions exist; MRV frameworks underdeveloped.	No standardised MRV methodology adopted nationally
Health & safety compliance	Follow industrial safety standards, risk mitigation, emergency preparedness	General industrial safety laws apply.	No CCS-specific safety regulations or emergency planning protocols
Liability & financial security	Require operators to provide financial guarantees for long-term monitoring and closure	Legally required, but untested due to lack of operational storage	No examples of financial instruments being approved yet.
Infrastructure & transport regulation	Permit and regulate CO ₂ transport	No dedicated national strategy for CO ₂ transport infrastructure	Transport regulation is in the very early stages.

4.4 Geographical impact mapping

Several counties in Romania stand out for their strategic importance in CM, owing to the convergence of industrial activity, storage potential, and geographic positioning:

- **Argeş** has significant CM potential, offering both CO₂ storage capacity and emissions from cement and lime production, such as Holcim Câmpulung and Carmeuse Valea Mare-Prăvăţ.
- **Dâmboviţa**, located near key industrial hubs, hosts substantial cement and lime industries, including Heidelberg Materials Fieni and Carmeuse Fieni.

⁷ Romania has over **500 Natura 2000 sites**, covering **more than 23%** of its territory. Any CCS project (e.g., in areas like Oltenia or Mureş) must consider **overlap or proximity** to these sites to avoid legal and environmental compliance issues.

⁸ Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy

- **Prahova** holds substantial underground storage potential due to its oil-rich subsurface and concentrates three out of Romania's four oil refineries: Petrobrazi Ploiești, Petrotel Ploiești, Vega Ploiești.
- **Constanța** presents promising offshore storage opportunities in the Black Sea and features a concentration of large emitters, such as refineries and cement plants, including CRH Medgidia (ROMCIM), CELCO Corbu and Petromidia Năvodari (Rompetro).
- **Mureș**, identified as a Just Transition region, includes significant storage capacity and key CO₂ sources in the fertiliser industry represented by Azomureș.

It is worth noting that the counties of **Argeș**, **Dâmbovița**, and **Prahova** are in each other's proximity, making them well-suited for the development of a regional CCS hub, especially given their dense industrial footprint. This geographic closeness facilitates coordination across sites and the potential for shared CO₂ transport and storage infrastructure. Meanwhile, **Constanța County** offers strategic advantages for future CO₂ shipping, hosting key commercial ports such as **Constanța**, **Midia**, and **Mangalia**, along with a concentration of large emitters including **CRH Medgidia (ROMCIM)**, **CELCO Corbu**, and **Petromidia Năvodari (Rompetro)**. However, despite this potential, there is currently no CO₂ transport or storage infrastructure in place, neither in Constanța nor in the other counties, highlighting a major implementation gap.

To underscore the alignment between emission-intensive industrial zones and geological formations suitable for CO₂ storage, these five counties have been explicitly marked on the map below. Their inclusion illustrates the spatial convergence between CO₂ sources and Romania's most viable storage regions.

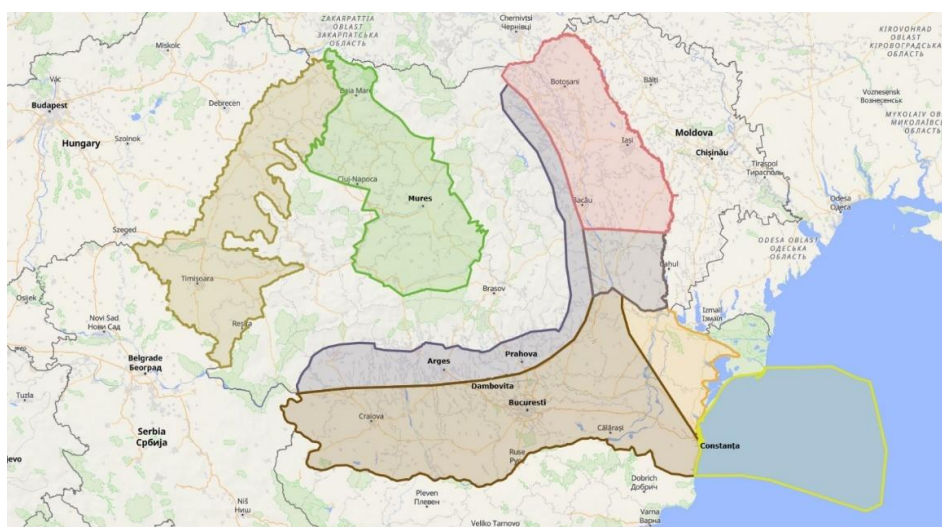


Figure 3: **Potential Storage Locations**

Source: <https://maphub.net/ccs-ro>

The map shows areas designated for preliminary CO₂ storage assessment, based on a combination of geological data, past hydrocarbon exploitation, and regional emission potential. These zones are not confirmed storage sites but rather areas where exploration and evaluation can begin, in line with EU directives and Romanian legal requirements. The eight morpho structural units shown (in different colours) were selected due to their longstanding hydrocarbon history, which has left behind valuable geological datasets and favourable reservoir characteristics such as porosity, depth, and sealing capacity.

For more clarity, the table below presents a structured summary on the same five counties, detailing key elements such as CO₂ sources, storage capacity, infrastructure availability, and stakeholder activity. This snapshot supports the geographical impact mapping by linking emission-intensive industrial regions with nearby geological formations assessed for CO₂ storage. It offers a practical lens to evaluate where CCS could be most effectively implemented, and where additional measures, such as infrastructure investment or regulatory support, may be necessary. Together with the spatial data presented on the map, the table provides a foundation for prioritising regional action and aligning national decarbonisation efforts with local capacities and needs.

Table 8: **Summary of Mapped Regions**

	Argeş	Dâmbovița	Prahova	Constanța	Mureş
<i>CM/CCS industries (e.g. cement industry, waste incineration, chemical industry)</i>	Major emitters in cement and lime production	Cement and lime industries	Hosts three of Romania's four refineries	Major emitters including a refinery and cement plants	Key fertiliser industry emitter
<i>Local demand (e.g. hydrogen production)</i>	No significant local demand is acknowledged at this stage.	No significant local demand is acknowledged at this stage.	Refineries in Ploiești require hydrogen but lean toward renewable hydrogen, reducing CCS relevance in local demand. ^{xxxviii}	Strong potential for renewable hydrogen (e.g. Dobrogea Hydrogen Valley ^{xxxix}), but CCS is not a current focus in this regard.	A potential acquisition of Azomureş by Romgaz may increase the likelihood of a blue ammonia pathway, given the new gas extraction by the company in the Black Sea and its CO ₂ storage target under NZIA. ^{xi}

	Argeş	Dâmbovița	Prahova	Constanța	Mureș
<i>Storage capacity (see Figure 4)</i>	Aquifers and hydrocarbon fields	Aquifers and hydrocarbon fields	Aquifers and hydrocarbon fields	Offshore hydrocarbon fields, offshore saline aquifers	Hydrocarbon fields and in the proximity of aquifers
<i>Availability of infrastructure</i>	No designated infrastructure available	No designated infrastructure available	No designated infrastructure available	No designated infrastructure available	No designated infrastructure available
<i>Stakeholder interest (e.g. project developers, industry)</i>	OMV Petrom and Heidelberg Cement expressed their interest in Argeş through their plans to store CO ₂ in Boțești as part of the RoDECADE project, aiming for an EU Innovation Fund application (ultimately unsuccessful). ^{xli}	Heidelberg Cement has submitted a CCS project for financing through the Modernisation Fund for the Fieni plant. ^{xlii}	In June 2024, OMV Petrom started testing an innovative carbon capture and utilisation plant at the Petrobrazi refinery for 4 months, as part of ConsenCUS project. ^{xliii}	Offshore storage has been considered due to its substantial capacity.	In its plan to achieve carbon neutrality, Azomures is proposing to store CO ₂ emissions in depleted gas fields. ^{xliv}
<i>Public perception</i>	Local communities near the proposed storage sites in Boțești have expressed concerns.	No coherent public opinion appears to exist.	No public perception has been developed so far.	No public perception has been developed so far.	No public perception has been developed so far.

5 Transfer of Findings

The successful implementation of CCS in Romania hinges on addressing critical challenges that arise at each phase of the project lifecycle, from planning through to closure. These barriers, as reflected in the project development chain, are deeply interwoven with Romania's current regulatory, institutional, and public engagement landscape. Below is an integrated overview of these obstacles, contextual findings, and corresponding mitigation strategies.

5.1 Transfer Findings to project chain

• Planning phase – institutional limitations

At the planning stage, Romania faces institutional fragmentation and limited inter-ministerial coordination. Key entities such as the ICCC and the CCUS Working Group lack sustained operational momentum. The absence of a dedicated national CCS strategy leaves stakeholders without a unified vision or clear roadmap for coordinated action.

Mitigation measures: Strengthening institutional capacity is essential. Romania should also establish a national CCS roadmap that fosters cross-sector alignment, providing a strategic anchor for policy, investment, and implementation.

• Construction phase – Regulatory delays

Romania has updated its permitting framework, but the new procedures remain untested. Further implementing norms and interinstitutional coordination are still needed to make the permitting process fully functional and predictable for CCS project developers. To date, no permits for CCS projects have been granted, and important questions remain about access to infrastructure and the clarity of licensing pathways.

Mitigation measures: The government must prioritise the finalisation of secondary legislation on CO₂ storage and transport, including tariff structures, access rules, and licensing. Testing the permitting process through pilot projects will help identify gaps and streamline future project timelines.

• Operation phase – Lack of public engagement

Public opposition poses a serious risk to CCS deployment. The Boțești case in Argeș County serves as a clear example: strong local resistance emerged due to insufficient information and delayed engagement. Despite a proposal from the ICCC in 2024 to launch a national CCS awareness campaign, no such campaign has materialised.

Mitigation measures: Romania must develop and implement a comprehensive public communication strategy, with transparency and community participation at its core. Early integration of public engagement into permitting and consultation processes is essential to building trust and avoiding future opposition.

• Financial constraints

The long-term viability of CCS in Romania is undermined by a lack of a national funding mechanism and persistent market uncertainties. Oil and gas producers face compliance obligations under the NZIA but lack business models that ensure cost recovery and long-term liability coverage.

Mitigation Measures: The government should develop co-financing instruments, introduce de-risking tools, and provide regulatory clarity regarding post-closure responsibilities and

liability management. This will increase investor confidence and create a more stable financial environment for CCS projects.

- **Monitoring phase – Technical uncertainties**

Romania's estimated CO₂ storage potential remains theoretical, as it is based primarily on modelling rather than validated through pilot testing or in-situ analysis. Furthermore, the country lacks any operational CCS facilities, limiting its ability to develop monitoring protocols or build regulatory confidence.

Mitigation Measures: Romania should fund geological pilot projects to validate storage formations and test monitoring technologies. In parallel, building national monitoring capacity and accessing EU funding mechanisms – such as the Innovation Fund or Project Development Assistance (PDA) – will be vital for derisking and knowledge development.

- **Closure phase**

Romania currently lacks clear and detailed regulatory procedures governing the closure and post-closure stages of CO₂ storage sites. Although the national framework transposes Directive 2009/31/EC through EO 64/2011 and Law 114/2013, and more recently through Government Decision 139/2024, these instruments provide only a general legal foundation. Specific provisions defining the closure phase, long-term monitoring requirements, and the transfer of liability from operators to the state are still missing.

The newly established ANRMPSG is formally designated as the competent authority for CO₂ storage. However, its operational procedures for site closure and post-closure supervision are under development.

Mitigation Measures: Romania should develop a dedicated post-closure regulatory framework aligned with EU best practices and the CCS Directive.

6 Conclusions

The development of CM in Romania continues to face structural and institutional barriers. The primary obstacle remains the limited political understanding of CM and the absence of a strong and consistent political mandate to support its integration into national climate and energy strategies. This lack of political commitment has led to fragmented policy priorities and the absence of a coherent national framework guiding long-term CM deployment.

Institutional coordination and administrative capacity represent additional systemic challenges. Although the ICCC and its CCUS/NZIA Working Groups have created an important platform for cross-ministerial dialogue, their long-term effectiveness depends on being embedded within a stable and permanent institutional structure. Persistent administrative weaknesses such as staff shortages, limited technical expertise, and the absence of dedicated CM units within relevant ministries, continue to hinder policy

implementation, restrict access to funding opportunities, and weaken cooperation with industry stakeholders.

From an infrastructure perspective, the integrated capture–transport–storage chain remains at an early stage of development. The potential reuse of existing oil and gas infrastructure presents an opportunity, but requires comprehensive technical assessments addressing issues such as impurities, corrosion, and pressure conditions to ensure safety and viability.

Public perception remains another critical dimension. Findings from the national survey indicate low general awareness but a growing curiosity and conditional openness toward CM, primarily influenced by perceptions of transparency, safety, and local socio-economic benefits. Nonetheless, “Not In My Backyard” attitudes persist, particularly regarding projects perceived as being located near residential communities. The Boțești case exemplifies how insufficient transparency and limited early stakeholder engagement can amplify local opposition and the spread of misinformation.

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