



Deploying CDR at scale and speed in Spain

Roadmap

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A collaboration between

carbon

gap

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Disclaimer

This document was developed to propose a roadmap for the implementation of various Carbon Dioxide Removal (CDR) pathways in Spain. The Roadmap is based on the findings and analysis presented in the Background Report on Spain's potential for the deployment of CDR methods and the results of the stakeholder engagement performed through a series of interviews and a one-day workshop, held in Madrid on 22 October 2025, addressing the main barriers and enablers for CDR deployment in Spain. This Roadmap presents an action plan which can be used as a reading material for policymakers and stakeholders involved in CDR development in Spain. Global Factor and Carbon Gap accept no liability as a result of this roadmap and its contents being used, including any action or decision taken as a result of such use. The views presented in this roadmap do not necessarily represent the views of the participants, as the materials collected from the workshop have been consolidated and further developed by Global Factor and Carbon Gap.

Acknowledgments

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Stakeholder type	Stakeholder name
Public entities	IHOBE
	Universidad Politécnica de Madrid (UPM)
	UniOvi
Academy and research centres	TECNALIA
Private companies	Fundación Repsol
	Enagás
	Agreena
	Carbon 2 Nature (C2N)
	Sylvestris
Business / industrial associations	Grupo Para el Crecimiento Verde

Table of contents

Disclaimer	2
Acknowledgments.....	2
Table of contents	3
List of abbreviations.....	4
Executive summary	5
1. Introduction	8
2. Realistic CDR pathways for Spain.....	9
3. Enablers and barriers for developing CDR in Spain	11
4. Actions required to accelerate deployment of CDR in Spain.....	13
5. Mobilising finance for the CDR transition	18
6. Conclusions.....	21



List of abbreviations

AEAT	Spanish Tax Agency
BECCS	Bioenergy with Carbon Capture and Storage
CAP	Common Agricultural Policy
CAPEX	Capital Expenditure
CCS	Carbon Capture and Storage
CDR	Carbon Dioxide Removal
CDTI	Centre for the Development of Industrial Technology
CfD	Contracts for Difference
CO ₂	Carbon Dioxide
CRCF	Carbon Removal Certification Framework
CRRA	Carbon Removal Readiness Assessment
DACCS	Direct Air Carbon Capture and Storage
EIB	European Investment Bank
ERW	Enhanced Rock Weathering
EU	European Union
EU ETS	European Union Emissions Trading System
ERDF	European Regional Development Fund
FSC	Forest Stewardship Council
IDAE	Institute for Energy Diversification and Saving
LIC	Innovation Line
MtCO ₂	Million Tonnes of Carbon Dioxide
MITECO	Ministry for the Ecological Transition and the Demographic Challenge
MRV	Monitoring, Reporting, and Verification
NBS	Nature-Based Solutions
OAE	Ocean Alkalinity Enhancement
OECC	Spanish Office for Climate Change
PEFC	Program for Endorsement of Forest Certification
PIDI	Industrial Research and Development Project
SMEs	Small and Medium-sized Enterprises
TRL	Technology Readiness Level

Executive summary

This roadmap outlines key actions to accelerate the deployment of carbon dioxide removal (CDR) in Spain, aiming to unlock the country's full carbon removal potential by its 2050 carbon neutrality target. The roadmap builds on the Carbon Removal Readiness Assessment (CRRRA) report for Spain and its core findings:

1. The realistic CDR potential in Spain shows that CDR could make a meaningful contribution to Spain's climate targets;
2. Geological storage capacity is the critical bottleneck for DACCS and BECCS in Spain;
3. Without early action on storage and governance, Spain risks not only significant delays in deploying industrial CDR, but also the possibility of excluding itself from the technology entirely.;
4. Most CDR methods are possible in Spain;
5. Spain is expected to increase its carbon-sequestration capacity through greater forest cover and more sustainable agricultural practices;
6. Spain's climate framework faces uneven implementation and a lack of incentives, coordination, and public awareness.

Building on the key messages from the background report and stakeholder insights (collected through semi-structured interviews and a national CDR workshop held in October 2025), this roadmap proposes the following strategic approach for Spanish society:



Develop a national CDR strategy with a transparent, predictable regulatory framework aligned to European dynamics, building investor trust. In the interim, introduce temporary regulations, pilot schemes, and a CDR stakeholder platform to raise awareness and communicate progress. Establish a CDR forum, hosted by the OECC, to engage decision-makers and private sector stakeholders, ensuring knowledge exchange and strategic input.



Conduct a sectoral public consultation to integrate CDR into diverse sectoral needs, while prioritising CO₂ transport and storage infrastructure through a one-stop permitting system, public-private partnerships, and regional hubs.



Implement incentives and a national funding programme to scale the CDR sector, integrating them into the national strategy by 2028 with simplified procedures, and accelerating CRCF implementation through coordinated action between national and regional authorities. This could be supported by a task force.



Establish a national communication and engagement strategy by 2026 that combines civil society workshops, media and educational outreach, inclusive dialogue with local communities, clear messaging through existing platforms, and communication of co-benefits such as job creation and regional development.



Mobilise finance for CDR by reconfiguring existing regional, national, and EU instruments - introducing dedicated funding lines, fiscal incentives, and risk-reduction mechanisms - to accelerate deployment, attract private capital, and align Spain with European climate goals.

An indicative timeline for the key activities is provided in Figure 1.

Spain should treat CDR as a matter of climate security and industrial strategy, not a distant or optional undertaking. If geological storage, CO₂ transport infrastructure, and the rules to permit, monitor, and govern projects are not set in motion this decade, the country risks being structurally unable to deploy highly permanent CDR (notably DACCS and BECCS) at the scale required. CO₂ storage is the critical bottleneck, and robust MRV and accounting frameworks are essential to unlock investment and build public trust. Failing to establish these foundations now would create delays and capability gaps that may be costly - and potentially irreversible - given Spain's high exposure to climate impacts.

Delayed action also increases the likelihood of dependence on cross-border removals and infrastructure designed and controlled by others, with consequences for competitiveness, bargaining power, and national control over price, standards, and supply. In short, enabling CDR domestically and on time is key to safeguarding Spain's climate credibility, economic sovereignty, and long-term transition resilience.

Box 1 - Establishing the Foundations for CDR Policy Development in Spain

A key early challenge for Spain is the **limited institutional awareness and technical understanding of CDR** across ministries, agencies, and regional authorities. This creates a risk that policy development stalls or becomes fragmented. To mitigate this, Spain should introduce a **CDR Policy Starter Kit** - a light, practical package designed to build a shared baseline of knowledge and provide simple tools for early action.

The starter kit would offer: (i) clear, accessible definitions of CDR and its role in Spain's climate goals; (ii) a short overview of priority CDR pathways relevant to Spain; (iii) a basic MRV template aligned with emerging EU rules; and (iv) simple checklists and guidance for identifying credible earlystage projects. Rather than prescribing detailed policy design, the kit equips officials with the minimum common understanding needed to engage confidently with stakeholders and begin shaping Spain's longterm approach.

To reinforce this foundation, Spain should pursue a small set of **low regret, capacity building steps** over the next year: a public consultation on CDR definitions and MRV principles; creation of a basic national registry for removals; and support for a handful of demonstration projects that help institutions learn by doing. These actions build familiarity, reduce uncertainty, and prepare the ground for more comprehensive policy development later in the decade - without assuming high initial buy in or technical readiness.

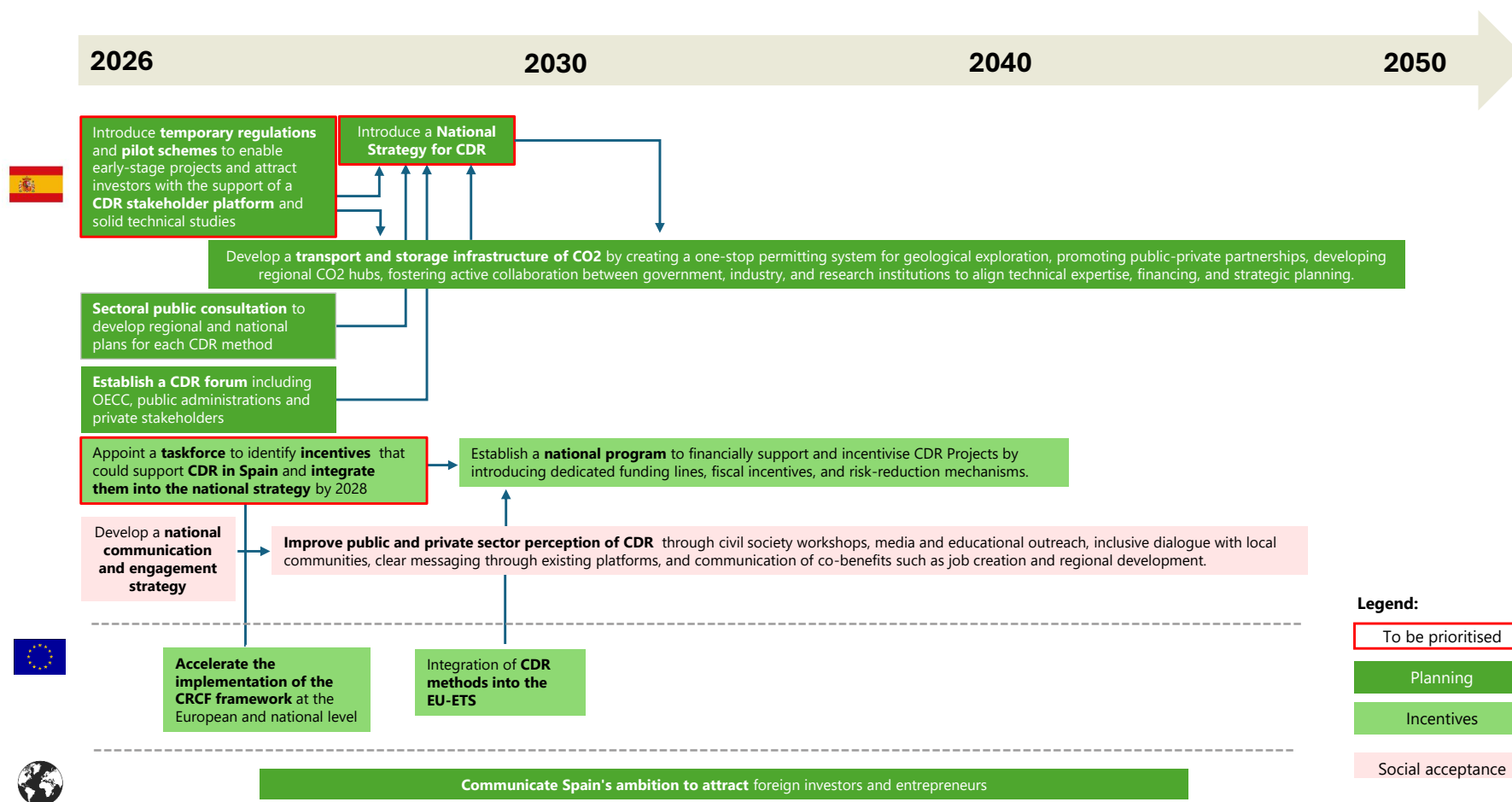


Figure 1. Overview of the measures proposed in the roadmap for the deployment of CDR in Spain across the national, European, and global levels. Most of the activities should be conducted in parallel and iteratively. Key actions to prioritise are introducing temporary regulations and pilot schemes to enable CDR projects and identifying incentives that could support CDR in Spain. These are essential to develop a credible CDR national strategy. Detailed descriptions of the activities are in section 4.

1. Introduction

This CDR Roadmap - developed by the project team with input from key Spanish stakeholders - outlines priority actions to overcome barriers and accelerate the systematic deployment of carbon dioxide removal (CDR) in Spain. It is part of the Carbon Removal Readiness Assessment (CRRA) project, a broader initiative led by Carbon Gap to evaluate the real-world deployability of various CDR methods across multiple countries, primarily in the EU.

Methodology

The roadmap builds on extensive background research into Spain's CDR potential, as presented in the accompanying Background Report, in the consultations carried out with stakeholders during July and August 2025, and on an interactive workshop organised in Madrid in October 2025.

- **Stakeholder interviews:** 23 semi-structured stakeholder interviews explored the feasibility of deploying CDR methods at scale in Spain, covering topics such as policy environment for CDR, current knowledge base, technical readiness, resource availability, and barriers to implementation. The aim was to understand the potential, challenges, and necessary actions to facilitate the adoption of CDR methods, including evaluating existing policies and incentives. Insights on these interviews are detailed in section 6.2 C of the background report.
- **Citizen panel:** As part of the social geography assessment, a citizen panel was held in September 2025 in Madrid to explore the general public's perception of technological and natural solutions that promote CDR. The panel was attended by 37 people, representing a wide diversity in terms of age, gender, academic background, professional experience and geographical origin.
- **Stakeholder workshop:** A 2-hour workshop brought together 10 stakeholders to discuss large-scale CDR deployment in Spain, thereby laying the groundwork for the roadmap. The aim was to assist decision-makers in understanding the feasibility of different CDR methods and identify necessary steps for implementation for the next 5-10 years. The workshop began with an initial session focused on presenting the report and the results obtained on Spain's carbon absorption potential. This was followed by a question-and-answer session addressing the information presented. The third part consisted of group work divided into three subgroups, in which proposals were identified and collected to address four challenges: policy and regulation, financial incentives, social geography, and research and knowledge needs. Finally, a joint discussion was held in which each subgroup presented its proposed measures, and participants discussed which actors should be responsible for implementing them, the level of difficulty involved, and the target year for their implementation.

This roadmap serves as a starting point for collaborative efforts to reduce the barriers and strengthen the enabling factors associated with CDR deployment in Spain. It invites all key Spanish stakeholders to jointly refine the role of CDR within the national carbon neutrality pathway and to co-develop practical next steps to unlock the benefits of CDR solutions. While not all systemic challenges can be resolved here, the roadmap focuses on actionable measures that can catalyse early CDR deployment especially with stakeholders who have interest in scaling CDR in Spain.



2. Realistic CDR pathways for Spain

To assess Spain's realistic carbon dioxide removal potential, this study outlines three scenarios for 2050: a Conservative scenario reflecting the status quo with no additional effort made to deploy CDR; a Reference scenario aligned with climate targets currently in law; and an Ambitious scenario assuming additional measures allowing to go beyond (or faster) existing climate targets. Figure 2 illustrates the total potentials of each scenario including the natural sinks.

In the **Conservative scenario**, Spain would reach an annual CDR potential of **17 MtCO₂** in 2050, which, together with 9 MtCO₂ from the natural sink (forests, soils and wetlands), would allow a total removal of **26 MtCO₂**. As shown in Figure 2, most of the potential comes from cropland management (9 MtCO₂/year) and pasture management (4 MtCO₂/year). Afforestation/reforestation contribute 2 MtCO₂/year, while biochar adds 1 MtCO₂/year. Improved forest management is considered negligible due to ineffective practices, agroforestry remains at a minimal level, and BECCS, DACCS and OAE are excluded due to lack of storage capacity or social acceptance.

In the **Reference scenario**, Spain would reach an annual CDR potential of **52 MtCO₂** in 2050, which, together with 14 MtCO₂ from the natural sink, would allow a total removal of **66 MtCO₂**. The main CDR methods are cropland management, which removes 12 MtCO₂/year, and improved forest management certifications such as PEFC and FSC. These are followed by BECCS with combustion, contributing 8 MtCO₂, pasture management, adding 6 MtCO₂, and BECCS via anaerobic digestion, which adds 5 MtCO₂. Afforestation and reforestation contribute around 4 MtCO₂/year, based on the assumption that the target of reforesting 0.6 Mha set by the Spanish Forestry Strategy is fully achieved. Agroforestry, biochar, and electrochemical DACCS each contribute 2 MtCO₂, while low-temperature DACCS adds 1 MtCO₂/year.

In the **Ambitious scenario**, Spain would reach an annual CDR potential of **69 MtCO₂** in 2050, which, together with the 32 MtCO₂ from the natural sink, would allow the removal of around **100 MtCO₂**. The main contributions come from cropland management (13 MtCO₂/year), improved forest management (12 MtCO₂/year, 30% more than in the reference scenario), and BECCS with combustion

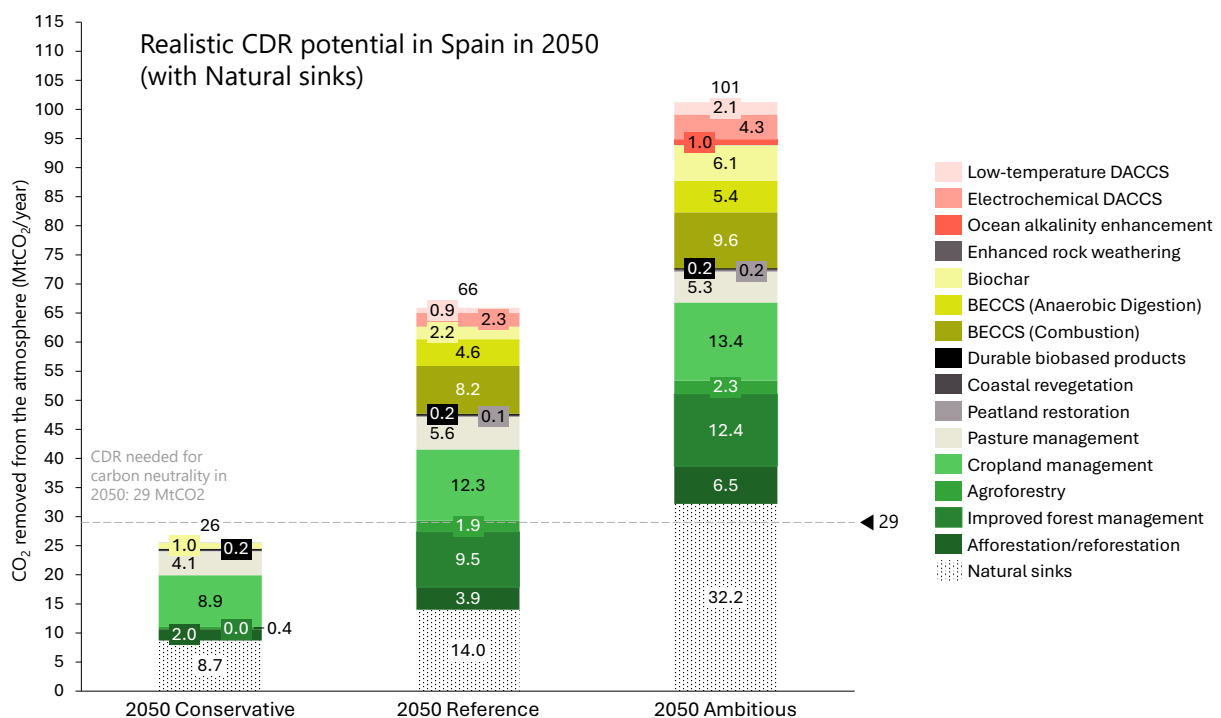


Figure 2. Realistic CDR potential in 2050 across Conservative, Reference and Ambitious scenarios, with natural sinks.

(10 MtCO₂). Afforestation/reforestation adds 7 MtCO₂/year, biochar contributes 6 MtCO₂/year, pasture management 5 MtCO₂/year, and BECCS with anaerobic digestion 5 MtCO₂. Electrochemical DACCS contributes 4 MtCO₂, low-temperature DACCS 2 MtCO₂, and agroforestry adds 2 MtCO₂/year. Methods such as peatland restoration, coastal revegetation, seagrass restoration, or ocean alkalinity enhancement have very limited potential, and technologies like high-temperature DACCS are not considered viable before 2050.

A more detailed description of the scenarios and the assumptions used to develop them is available in the Background report.



3. Enablers and barriers for developing CDR in Spain

The development of CDR in Spain is still in its early stages, characterised by uneven levels of technological and methodological maturity across different approaches. Nature-based solutions have made notable progress, while industrial and emerging technologies are still largely underdeveloped. With abundant natural resources and strong technological capabilities, Spain is the European country with the greatest potential for CDR development (NEGEM, 2023; Pozo et al. 2020). However, the absence of a coherent national strategy continues to hinder coordinated progress and large-scale deployment.

3.1 Enablers

Enabler	CDR methods it applies to
Consolidated scientific and technical base: Spain has a solid research ecosystem, with research centres and universities advancing knowledge in fields such as bioenergy, geology, afforestation and carbon capture. This interdisciplinary network underpins the development and expansion of various CDR methods and could achieve far greater impact with greater institutional and financial support.	• Afforestation/reforestation, improved forest management, agroforestry, cropland management and pasture management, peatland restoration, coastal revegetation; • BECCS (Combustion / Anaerobic Digestion), biochar; • DACCS, geological storage (Hontomin), enhanced rock weathering (ERW).
Existing climate and mitigation policies: the Climate Change Law, the National Energy and Climate Plan (PNIEC), and the regional mitigation and adaptation strategies provide a regulatory framework upon which the integration of CDR measures can be built.	• Afforestation/reforestation, improved forest management, agroforestry, cropland management and pasture management, peatland restoration, coastal revegetation.
Natural resources: Spain has extensive forest and agricultural areas, mineral resources suitable for enhanced rock weathering, and regions suitable for reforestation, improved forest management or cropland management and pasture management. These conditions position the country as an ideal candidate for natural and hybrid CDR solutions.	• Afforestation/reforestation, improved forest management, agroforestry, cropland management and pasture management, peatland restoration, coastal revegetation; • BECCS (due to biomass availability), biochar; • Geological storage, enhanced rock weathering.
Existing industrial synergies: Emission-intensive sectors (cement, steel, chemical and energy) can act as drivers of CDR by leveraging industrial infrastructures for CO ₂ storage or mineralisation. Initiatives led by organisations such as SIDEREX, FEAF, ENAGAS and Minersa demonstrate a growing interest in hybridising industrial and natural solutions. Additionally, water treatment and desalination infrastructure can expand synergies and create new opportunities to integrate CDR into existing systems.	• BECCS (Combustion / Anaerobic Digestion), Biochar; • DACCS, geological storage, enhanced rock weathering (ERW), ocean alkalinity enhancement (OAE).
Private sector participation: Large private-sector companies provide corporate investment especially to reforestation. This initial dynamism within the private sector could become a catalyst for a domestic market for carbon removals, especially if appropriate incentives and tax benefits are established.	• Afforestation/reforestation, agroforestry, cropland management; • BECCS, biochar (when used on soil), durable biobased products; • Geological storage.
Favourable European framework: The European Carbon Removal Certification Framework (CRCF) and the reforms of the Common Agricultural Policy (CAP) constitute key instruments to legitimise and finance CDR initiatives. The potential integration of these activities into the European carbon markets (EU ETS) would open new investment opportunities.	• Afforestation/reforestation, improved forest management, agroforestry, cropland management and pasture management, peatland restoration, coastal revegetation; • BECCS (as in relevant EU legislation), biochar; • DACCS (as in CRCF), geological storage, enhanced rock weathering (ERW).

Table 1. Enablers for CDR implementation in Spain and the methods impacted.

3. 2 Barriers

The barriers are grouped into four categories corresponding to planning, governance, incentives, and social acceptability.

Barrier	CDR methods it applies to
Planning barriers: Absence of a national strategy for CO₂ management, both for capture and geological storage. The procedure for granting exploration permits is very slow, which delays the development phase of storage projects. In practice, companies face administrative procedures that can last for several years and sequential approval processes involving multiple authorities, generating uncertainty and discouraging investment. As of today, Spain has no operational storage sites nor CO₂ transport infrastructure. Existing national and regional plans present vague targets, focused mainly on nature-based solutions (NBS) without quantifiable objectives. Increasing competition for natural resources (land, water, electricity) among strategic sectors such as energy, agriculture and industry limits the operational space for new CDR initiatives.	• Afforestation/reforestation, improved forest management, agroforestry, cropland and pasture management, peatland restoration, coastal revegetation; • BECCS, biochar; • DACCS, OAE, CO₂ storage at the national level.
Governance barriers: Lack of effective coordination between public administrations, regional governments and the private sector, leading to fragmented efforts, duplication, and “wait and see” attitudes. Political and legal uncertainty that reduces investment appeal of CDR methods that are not yet in the political agenda. Risk of reversals in nature-based methods is insufficiently accounted for due to the absence of robust monitoring, reporting and verification (MRV) systems. Early-stage and largely unregulated use of CDR credits, lacking traceability frameworks and quality control.	• Afforestation/reforestation, improved forest management, agroforestry, cropland and pasture management, peatland restoration, coastal revegetation; • BECCS, biochar, durable biobased products; • DACCS, OAE, CO₂ storage at the national level, enhanced rock weathering (ERW).
Incentives and financing barriers: Lack of specific economic mechanisms to promote carbon removal activities, such as grants, tax deductions or verifiable carbon credits. Limited public and private investment in CDR technologies (such as DACCS, BECCS or geological storage) due to the absence of market signals and supporting policies. Absence of green financing frameworks tailored to carbon removal projects, hindering investment attraction and the implementation of pilot projects.	• Improved forest management, agroforestry, peatland restoration, coastal revegetation, seagrass restoration; • BECCS, biochar; • DACCS, enhanced rock weathering (ERW), OAE, CO₂ storage at the national level.
Social acceptability and communication: Lack of public awareness on CDR methods, their potential benefits and limitations. Distrust toward CDR methods (DACCS, BECCS, etc.) and geological storage due to lack of public information and unfamiliarity with the technologies, creating a barrier to the deployment of large-scale infrastructure. Limited transparency in the use of public funds and in the criteria for selecting carbon removal projects further reduce public confidence and undermine the social legitimacy of CDR.	• BECCS; • DACCS, OAE, geological storage.

Table 2. Barriers for CDR implementation in Spain and the methods impacted.

4. Actions required to accelerate deployment of CDR in Spain

Spain has strong potential to advance carbon removal, supported by its scientific ecosystem, climate policy experience, industrial capacity for carbon capture and storage, and the European framework. Yet structural barriers persist: no clear national strategy, weak coordination, limited incentives, and low public acceptance. Broad consensus from the participatory process highlighted the urgency to act - especially between 2026 and 2035 - to ensure these technologies mature in time. In this context, it will be essential to implement a series of measures to accelerate the deployment of CDR in Spain and strive to achieve climate neutrality by 2050. These measures were partially identified during the workshop and then complemented by the project team. As illustrated in Figure 1, articulating governance across multiple levels - national, European, and international - is essential to ensure that Spain's efforts are integrated rather than isolated, thereby safeguarding the country's competitiveness. The following sections provide a detailed explanation and discussion of the proposed measures.

4.1 Planning

4.1.1 Develop a National Strategy for CDR

Spain lacks a clear national strategy for the deployment of CDR methods. Existing plans place excessive emphasis on nature-based solutions without measurable targets or clearly defined objectives. Furthermore, planning relies heavily on changes in EU regulations, leading to repeated revisions and continuous delays. The absence of a national strategy creates regulatory uncertainty, limits private investment, and hinders both technological development and the territorial planning needed for a safe and sustainable deployment of CDR methods.

Recommendations:

- Develop a National Strategy for CDR that establishes an independent planning pathway for Spain, decoupled from the EU's regulatory pace.
- Set clear and measurable targets for nature-based methods.
- Incorporate novel CDR methods into planning, with a focus on promoting DACCS and BECCS-based approaches to meet climate goals.
- Make sure solid technical studies are available to support the development of the national strategy.

Developing a national strategy for CDR will provide regulatory clarity, reduce investment risk, and accelerate the deployment of CDR projects. It will help Spain keep pace with other European countries, establish a solid regulatory foundation, and strengthen cooperation among actors, enabling more informed and stable decision-making.

Readiness: Medium. Spain faces no structural barriers to advancing a national CDR strategy, but readiness remains medium due to limited awareness and interest. Current efforts are highly dependent on new EU directives; to move forward, the government must build sufficient administrative capacity and develop an autonomous national approach. This should begin with aligning interests across sectors and administrations to create momentum and ensure effective implementation.

4.1.2 Introduce temporary regulations and pilot schemes to enable early-stage CDR projects

The implementation of CDR methods must begin as soon as possible. To help lay the groundwork for the creation of the National Strategy mentioned in 4.1.1, the first step could be the introduction of temporary regulations and pilot schemes to stimulate the development of demonstration projects and attract investors.

Recommendations:

- CDR stakeholders should create a platform that brings together different actors in the sector to raise awareness on CDR and put pressure on the Government to create the national strategy. This platform could be inspired by the PTECO₂ initiative. CDR stakeholders should also formulate which temporary regulations would be most useful/needed to support the emergence of pilot projects in Spain.
- Once a direction of travel is agreed, issue an official policy statement or guidance document outlining this direction (long-term vision), which can then serve as the basis for the adoption of interim regulations.

Introducing temporary regulations and pilot schemes to enable early-stage projects while the full National Strategy is finalised and provide some initial regulatory clarity will reduce investment risk and accelerate the deployment of CDR projects. Arguably, early-stage CDR projects will also strengthen cooperation among stakeholders, enabling more informed and stable decision-making down the line.

Readiness: Medium. Spain is in a sufficiently good position to initiate a national debate on CDR, and start introducing provisional regulations, which would support the development of a National Strategy for CDR.

4.1.3 Develop a transport and storage infrastructure of CO₂

Currently, Spain lacks a dedicated infrastructure for transporting and storing captured CO₂, which is a critical barrier to CO₂ management. Without pipelines, shipping terminals, and certified storage sites, projects remain isolated and economically unviable.

Recommendations:

- Create a one-stop permitting system to reduce delays and uncertainty for investors in geological exploration.
- Promote public-private partnerships to accelerate infrastructure deployment.
- Develop regional CO₂ hubs that connect multiple sources to shared transport and storage facilities.
- Foster active collaboration between government, industry, and research institutions to align technical expertise, financing, and strategic planning, thereby prioritising CO₂ transport and storage infrastructure as a core element of the national strategy.

A robust CO₂ transport and storage network will enable large-scale deployment of CO₂ management, reduce costs through shared infrastructure and provide certainty for private investment. Simplifying administrative procedures will also drive significant development of geological CO₂ storage capacity across the country.

Readiness: Low. Current plans show limited ambition, with no independent national strategy for CO₂ transport and storage. Administrative fragmentation and lack of dedicated funding hinder progress.

4.1.4 Sectoral public consultation to develop specific regional and national plans for each CDR method

An important barrier to an effective CDR strategy is the absence of sector-specific planning. Without structured public consultation, policymakers lack a clear understanding of the current state of each sector and region, which hinders the design of coherent and accessible national plans. Addressing this gap requires sectoral public consultation to ensure strategies are grounded in real conditions and tailored to the diverse needs of agriculture, forestry, industry, and other key areas.

Recommendations:

- Consult with relevant stakeholders across key sectors and regions, such as agricultural producers, land managers, and industrial operators across the cement, steel and chemical industry.
- Foster cooperation between regional governments and stakeholders by establishing working groups and regular coordination spaces to align priorities and share best practices for CDR deployment.
- Systematically assess and document consultation outcomes by collecting and structuring information from the consultation to map the maturity, barriers, ongoing projects and readiness of each CDR method across sectors and regions.

The results of a sectoral public consultation would provide policymakers with a clearer understanding of the current landscape for each CDR method, identifying strengths and addressing weaknesses, allowing for the definition of realistic and actionable targets.

Readiness: Medium–High. Spain has the necessary means to carry out a consultation. Furthermore, stakeholders are likely to be highly interested in participating, viewing the process as a valuable opportunity to advance their respective sectors.

4.1.5 Improve communication with the OECC and coordination between public administrations and the private sector

There is currently a significant lack of communication between the private sector and the Spanish Office for Climate Change (OECC). The private sector remains unaware of the agency's intentions, which in turn hinders companies' ability to plan long-term.

Recommendation:

- Establish a CDR forum, hosted by the OECC, bringing together decision-makers and national private sector stakeholders to keep stakeholders informed of upcoming changes and to gather technical knowledge and strategic input to support the development of the national CDR strategy.

Improved coordination will lead to more coherent public policies, faster development of national strategies, and more agile deployment of CDR projects, offering greater certainty and predictability for private sector investment.

Readiness: High. The conditions for communication are well in place, and the focus now should be on establishing and activating the communication itself.

4.2 Incentives

4.2.1 Implementation of economic incentives and public and private investments

As an emerging sector, CDR requires economic incentives to reduce investment risk, lower technology costs, and stimulate early demand. These may take the form of subsidies, carbon credits, or tax deductions, for example. Combined with public and private investment, these incentives are essential to improve the financial viability of CO₂ removal projects and accelerate the deployment of CDR methods. However, such mechanisms are not yet in place in Spain.

Recommendations:

- Appoint a task force to assess which incentives would be best suited to support the emerging CDR sector in Spain. This work could build on the findings of the CRRA report.
- Commit to integrating these incentives into the national strategy by 2028, while also striving to simplify administrative procedures and bring some of the incentives to life earlier (provisional regulations).
- Accelerate the implementation of the European CRCF framework, ensuring that measures are jointly designed and executed by the national government and regional authorities to guarantee coherence and effective delivery.

Effective economic incentives and investments would underpin the development of a coherent national CDR strategy and ensure CDR can scale in Spain. Political stability, administrative coordination across government levels, and proactive management of pressure from other sectors seeking similar fiscal benefits will be important enabling factors.

Readiness: Medium. Spain has prior experience in applying tax incentives, such as those for R&D, and this approach would likely be supported at the EU level.

4.2.2 National programme to financially support and incentivise CDR Projects

As an operational continuation of the incentive framework defined in section 4.2.1, a national programme to financially support and incentivise CDR projects should be established to ensure the effective and coordinated implementation of the economic instruments agreed and embedded in the national strategy. The programme should be led by the Ministry for the Ecological Transition and the Demographic Challenge (MITECO), in coordination with the Ministry of Finance and the Autonomous Communities. It should focus on the practical delivery of the incentives previously defined.

Recommendations:

- Translate the incentives agreed in section 4.2.1 into an operational programme, defining eligible CDR project types, support levels and prioritisation criteria.
- Launch dedicated calls for CDR projects, with clear procedures for evaluation, selection and allocation of funds.
- Designate a management unit responsible for administering the programme, monitoring funded projects and ensuring compliance with MRV requirements.

This programme would allow Spain to move from incentive design to effective implementation, enabling the real deployment of CDR projects across the country.

Readiness: Medium-low. Spain has strategic frameworks and administrative capacity, but lacks CDR-specific regulation, dedicated financial instruments, and technical capabilities, requiring foundational steps before implementation. The National programme to financially support and incentivise CDR Projects' rollout depends on prior agreement of the incentives outlined in section 4.2.1, alongside political alignment, a basic regulatory framework, and clearly identified funding sources.

4.3 Social acceptance

4.3.1 Develop a national communication and engagement strategy

The results on the social geography analysis of the background report outlined that there is public mistrust toward novel CDR methods such as BECCS, DACS, or OAE, and a generally favourable perception of nature-based CDR methods - although often without a clear understanding of their actual benefits. This highlights the significant room for improvement in CDR awareness in Spain.

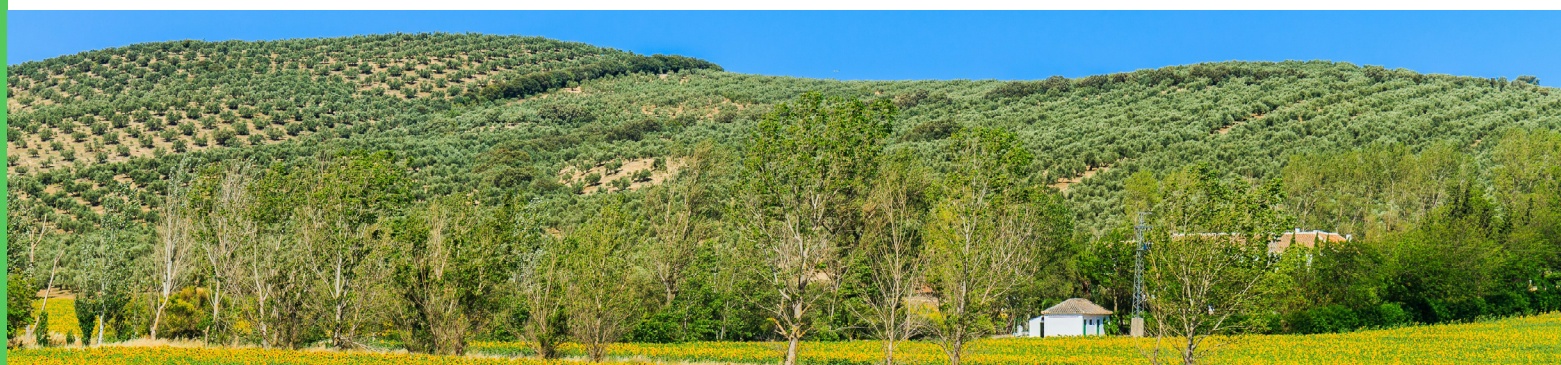
Recommendation:

Establish a national communication and engagement strategy in 2026 that includes:

- Consultative workshops with civil society, combined with a media and social media campaign covering CDR.
- Engagement of educational institutions in higher education to train the workforce needed in the next ten years.
- Ensure inclusive dialogue with local communities and landowners near storage sites and potential CDR deployments areas.
- Translate technical complexity into clear and accessible messages and promote the use of existing environmental education platforms.
- Highlight co-benefits: communicate not only the importance of implementing CDR methods, but also their potential to create jobs and foster regional development.

Effective communication, led by a coalition of key stakeholders and with active participation from the government, will help build public trust, reduce resistance, and facilitate the deployment of CDR technologies and CO₂ storage solutions, creating a more supportive social environment for decarbonisation.

Readiness: High. Spain has communication capacities, educational structures, and public and private actors prepared to launch information and engagement campaigns. The government and key stakeholders should lead, while media and educational institutions play vital roles in informing, shaping messages, and advancing environmental education across Spanish society.



5. Mobilising finance for the CDR transition

A clear gap persists between the technological maturity of many CDR methods and their large-scale deployment, largely due to the lack of tailored support frameworks. To bridge this, we must move beyond a knowledge-focused approach and enter an operational phase where CDR is embedded in energy, climate, industry, and agricultural policies. Public authorities need coherent, actionable tools to drive implementation.

Building on the preceding analysis, the following proposals translate identified support mechanisms into concrete measures. Differentiated by implementation level, they integrate CDR into existing regional, national, and EU schemes - or adapt them where needed. These proposals aim to serve as a practical guide for decision-making, mobilise public and private finance, and accelerate CDR's contribution to Spain's and the EU's climate goals.

5.1 Integration at the regional level (Autonomous Communities)

5.1.1 Reorientation of regional energy and decarbonisation programmes

It is proposed that the Autonomous Communities introduce a dedicated "CDR and Technological Sinks" line within their calls for industrial energy efficiency, process decarbonisation, and energy transition and climate innovation. This line would explicitly support CDR methods - whether industrial or nature based - alongside storage solutions such as biogenic storage, mineralisation, and soil-based approaches. It would also cover auxiliary infrastructure for pre-treatment, compression, and local CO₂ transport, as well as pilot projects and first commercial installations at TRL 6–8, ensuring that regional programmes actively drive the deployment of carbon removal technologies.

Mechanisms:

- Non-repayable grants covering 30–60% of Capital Expenditure (CAPEX), aligned with European Regional Development Fund (ERDF) aid intensities.
- Low-interest regional loans managed by regional financial institutions.
- Priority and simplified permitting procedures for CDR projects.

5.1.2 Carbon farming and bio-CDR at the regional scale

In regions with established experience in carbon farming, such as Andalusia, Catalonia, and Murcia, it is proposed to create dedicated CDR sub-programmes within regional agri-environmental schemes, aligned with the Common Agricultural Policy (CAP). These programmes would finance practices that deliver certifiable removals, ensuring they can later be integrated into the European CRCF framework and contribute directly to broader climate objectives.

Mechanisms:

- Payments per hectare linked to verified removals.
- Additional bonuses for participation in pilot MRV schemes.
- Co-financing of certification and monitoring costs.

5.2 Integration at the national level

5.2.1 Creation of a National CDR Line within the IDAE and CDTI

a) IDAE — Industrial investment and decarbonisation programmes: it is proposed that the IDAE (Institute for Energy Diversification and Saving) incorporates a dedicated “CO₂ Removal Technologies” line within its industrial decarbonisation and energy efficiency programmes. This would support the installation of CDR technologies in industrial processes and shared CO₂ capture and conditioning infrastructure.

Mechanisms:

- Grants covering 25–50% of CAPEX;
- Long-term IDAE loans with extended grace periods;
- Additional support for connection to transport and storage hubs.

b) CDTI — From R&D to deployment (TRL 6–9): it is proposed that the CDTI (Centre for the Development of Industrial Technology) evolves its existing schemes – such as LIC, Misiones, and PIDI – into a dedicated window for scaling and commercial demonstration of CDR methods. This window would target projects at TRL 6–9, with a clear emphasis on real industrial integration and on driving down the cost per tonne of CO₂ removed, ensuring that innovation translates into practical, market-ready solutions.

Mechanisms:

- Co-investment schemes (grant + loan).
- Technology vouchers for CDR-developing SMEs.
- Performance-based rewards linked to technological milestones (€/tCO₂ removed).

5.2.2 Use- and results-based incentives: fiscal and market framework

a) Tax credits for CO₂ removed: a Corporate Income Tax could include transferable tax credits per tonne of certified CO₂ removed, and enhanced deductions for investments in CDR methods. These incentives could be administered by a national carbon removal registry, or the Spanish Tax Agency (AEAT), with technical certification delegated to MITECO/IDAE.

b) Contracts for Difference (CfD) for CDR: a national CfD auction programme under the management of MITECO could be established. Through this mechanism, the State would guarantee a minimum price for every tonne of CO₂ removed, ensuring that projects are shielded from market volatility. Where actual costs exceed market prices, payments would bridge the gap, providing the financial stability needed for operators to plan and invest with confidence.

A national CfD auction programme is crucial for reducing revenue risk and creating a predictable environment that can attract private capital. By lowering uncertainty and improving returns, it paves the way for commercial projects to scale, transforming carbon removal from isolated initiatives into a robust market capable of contributing meaningfully to national climate objectives.

5.3 Integration at the European level

5.3.1 Strategic reorientation of existing European funds

a) Innovation Fund: a dedicated CDR window could be established to support and scale CDR projects. Within this framework, priority would be given to initiatives that deliver permanent net removals, backed by rigorous MRV.

b) LIFE and Horizon Europe: LIFE programme should concentrate on supporting replicable demonstration projects, while also strengthening governance around monitoring, reporting, and verification. By fostering initiatives that can be scaled and repeated, LIFE would help ensure that successful approaches to carbon removal are widely adopted and trusted.

In parallel, through Horizon Europe, there could be a focus on reducing costs, advancing standardisation, and developing certification frameworks for CDR methods. This emphasis would accelerate the transition from research to market-ready solutions, providing the technical and regulatory foundations needed to integrate carbon removal into Europe's broader climate strategy.

Long-term infrastructure and financing

a) CEF Energy: it is proposed to prioritise CO₂ transport and storage infrastructure linked to CDR projects. At the same time, Spanish regional hubs should be integrated into trans-European networks, ensuring both national capacity and alignment with broader European efforts.

b) European Investment Bank (EIB): it is proposed that the EIB establish preferential financing lines dedicated to CDR projects certified under the CRCF framework. By coupling this support with public guarantees, the EIB would help lower the cost of capital, creating a more attractive environment for investment and accelerating the deployment of carbon removal solutions across Europe.

In conclusion, the effective mobilisation of financing for CDR technologies does not require inventing new instruments from scratch, but rather decisively reconfiguring existing ones by introducing explicit funding lines, results-based incentives, and risk-reduction mechanisms. The integration framework proposed above provides a roadmap aligned with current policy instruments, enabling policymakers to activate CDR deployment while positioning companies based in Spain at the forefront of the transition towards climate neutrality by 2050.

6. Conclusions

To unlock Spain's full CDR potential and achieve carbon neutrality by 2050, this roadmap outlined the following recommendations:



Define a clear national strategy to guide the development of CDR methods, supported by a transparent, predictable regulatory framework aligned with European dynamics, capable of building trust among investors and stakeholders;



While the national strategy is being created, **introduce provisional regulations and pilot schemes to enable early-stage CDR projects**, as well as a stakeholder platform to raise CDR awareness, and communicate agreed direction through public updates;



Develop a transport and storage infrastructure of CO₂ by establishing a one-stop permitting system for geological exploration, fostering public-private partnerships, and developing regional CO₂ hubs;



Conduct a sectoral public consultation on CDR to identify effective synergies to integrate CDR into the diverse needs of each relevant sector;



Establish a CDR forum, hosted by the OECC, **bringing together decision-makers and national private sector stakeholders** to keep stakeholders informed of upcoming changes and to gather technical knowledge and strategic input to support the development of the national CDR strategy;



Appoint a task force to identify suitable incentives for Spain's emerging CDR sector, integrate them into the national strategy by 2028 with simplified procedures, and accelerate CRCF implementation through coordinated action between national and regional authorities;



Establish a National Communication and Engagement Strategy by 2026 that combines civil society workshops, media and educational outreach, inclusive dialogue with local communities, clear messaging through existing platforms, and communication of co-benefits such as job creation and regional development.

The success of this transition will depend on the country's ability to coordinate its different levels of governance, anticipate regulatory changes, and consistently implement its climate policies across the territory. This roadmap offers a realistic, participatory, and structured framework to move in that direction, but its implementation will require sustained political commitment, public-private collaboration, and effective resource allocation.



ABOUT

Carbon Gap

Carbon Gap was established to be Europe's first philanthropically funded environmental advocacy organisation, focusing exclusively on CDR. The mission is to ensure that Europe becomes a leader in developing and deploying CDR solutions at scale in a safe and equitable manner to preserve a stable climate. Carbon Gap is coordinating the delivery of the project that has produced this report.

www.carbongap.org

Global Factor

Global Factor is an international firm specialising in innovative and sustainable solutions in climate change, energy, green growth, climate finance, and carbon markets. With over 20 years of experience, 1,400+ projects in 44 countries, and a multidisciplinary team of 70+ experts, the company combines technical, policy, and financial expertise. It supports governments and the private sector in designing and implementing decarbonization strategies, NDCs, and climate finance frameworks. Trusted by leading international institutions such as the World Bank, ADB, IDB, and the EU, Global Factor delivers impactful, context-specific solutions worldwide.

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