



Submission on behalf of the Environment Institute of New Zealand and Australia (EIANZ): *Enhancing Carbon Sequestration Strategies in Aotearoa New Zealand's Emissions Reduction Plan*

About EIANZ

The Environment Institute of Australia and New Zealand (**EIANZ**) is Australasia's leading body for environmental professionals. We represent members from a diverse range of technical professions including scientists, policy makers, engineers, lawyers and economists. Our members are at the forefront of issues such as biodiversity, climate change and nature positive.

This submission has been developed by the Institute's Climate Change Special Interest Section and endorsed by the Board.

Summary

- Aotearoa New Zealand has a strategic opportunity to strengthen the proposed Emissions Reduction Plan (**ERP**) by diversifying our sequestration methods, adopting international best practices, and engaging with global carbon markets.
- New Zealand can leverage these developments by participating in international carbon markets, integrating advanced carbon dioxide removal (**CDR**) technologies, and collaborating on research initiatives.
- New Zealand can enhance our sequestration efforts, attract global investment, and maintain export competitiveness in an increasingly low-carbon global economy by adopting best practices from international leaders.
- A comprehensive approach will not only support New Zealand's climate goals but also unlock significant economic opportunities.

Key Recommendations

1. **Broaden the Sequestration Focus:** New Zealand's current emissions reduction strategy emphasises a narrow biological sequestration (plantation forestry and afforestation) but lacks the integration of other biological and engineered methods (such as soil carbon, blue carbon, direct air capture and geological storage). Sole reliance on pine plantations risks short-term carbon storage, biodiversity loss, and socio-economic conflicts. A more balanced portfolio of biological and engineered solutions is needed to deliver stable, long-term carbon outcomes.
2. **Develop Sequestration Standards and Taxonomies:** Aligning with international markets through standardised taxonomies and robust Measurement Reporting and Verification (**MRV**) systems is critical. If New Zealand lags behind in setting such

standards, the carbon credits issued may be devalued, reducing export competitiveness. New Zealand can proactively participate in shaping global guidelines, to align them with our strengths and needs.

3. **Promote Innovation and Technology Development:** Public-private partnerships and targeted investments are essential for advancing diverse sequestration technologies. Integrating advanced carbon removal methods into the Emissions Trading Scheme ensures resilience and global market access. Without such integration, New Zealand risks missing out on innovation, economic growth, and long-term climate goals.
4. **Integrate Sequestration into Policy Frameworks:** Separate targets for emissions reductions and carbon removal in sector categories should be established, to prevent an overreliance on sequestration as a substitute for direct emissions cuts. Clear distinctions ensure that sequestration efforts are focused on hard-to-abate sectors, enhancing the integrity and effectiveness of the ERP and nationally determined contribution (NDC) strategies.
5. **Enhance International Collaboration and Market Integration:** International cooperation on sequestration technologies and markets offers access to advanced solutions, global finance, and enhanced export competitiveness. Participation in initiatives like the EU's Carbon Removal Certification Framework and the US's Inflation Reduction Act helps position New Zealand as a leader in sustainable carbon management.

Introduction

Our submission considers the importance of integrating both emission reductions and CDR into climate strategies for Aotearoa New Zealand.

The Intergovernmental Panel on Climate Change (the **IPCC**) long-term analysis finds that CDR is essential to efforts to limit global warming to 1.5°C, alongside deep emissions reduction (decarbonisation of energy and global economies). Even with significant reductions in greenhouse gas emissions, the remaining emissions will require substantial removals to achieve net-zero and, eventually, net-negative emissions by 2100. The IPCC estimates that between 5 to 16 gigatons of CO₂ per year need to be removed by 2050 to meet these goals for a safely and justly managed transition.

In IPCC scenarios that aim to limit warming to 1.5°C, net-zero CO₂ emissions must be reached around the early 2050s, followed by net-negative emissions. The degree of reliance on CDR depends on how rapidly emissions are reduced beforehand. Scenarios with delayed reductions will require larger amounts of carbon removal later in the century.¹ The predicted range of known and future carbon removal approaches will be diverse, ranging from nature-based solutions like reforestation to more technologically advanced methods like direct air capture and geological storage. These technologies will need to be scaled significantly to meet the required targets.²

¹ The Aotearoa Circle, [Agriculture Sector Climate Change Scenarios and Adaptation Roadmap](#), 2023.

² IPCC, [Carbon Dioxide Removal Factsheet](#), 2022.

ClimateWorks Foundation, [‘The science community says carbon dioxide removal is now essential to limit warming to 1.5° C along with deep decarbonization’](#), ClimateWorks Foundation, 2023.

CarbonBrief, [‘Analysis: What the new IPCC report says about how to limit warming to 1.5C or 2C’](#), CarbonBrief, 2022.

Internationally, there has been rapid growth in policy and financial support for sequestration technologies. Key initiatives include the European Union’s Carbon Removal Certification Framework, Canada’s tax incentives for carbon capture, and the US’s substantial investments under the Inflation Reduction Act, which in the last year have provided corporate tax credits for carbon sequestration.

Private-sector efforts, such as Microsoft’s US\$1 billion Climate Innovation Fund and Xprize Foundation’s US\$100 million Carbon Removal Prize, further demonstrate the global shift towards scaling sequestration technologies. These initiatives underscore the critical need for robust governance, market alignment, and cross-border collaboration in developing durable carbon removal solutions.

The following submission highlights key findings from a comparative analysis between the Australian Climate Change Authority’s *Reduce, Remove, and Store* report³ and New Zealand’s proposed Second ERP⁴. It also includes a brief analysis of international progress on carbon dioxide sequestration, underscoring the opportunity for enhanced carbon management in achieving New Zealand’s climate goals.

The submission acknowledges and supports in general the Climate Change Commission (CCC) recommendations with respect to the ERP proposal.

Recommendation 1 – Expand Sequestration Focus

New Zealand’s proposed ERP currently focuses on biological sequestration through pine forests and native reforestation. Though these methods are essential, the ERP lacks the comprehensive scope necessary for long-term carbon neutrality. In contrast, Australia’s report highlights the importance of incorporating engineered carbon removal technologies like direct air capture and geological storage.

Expanding New Zealand’s focus to include a broader and balanced portfolio of both biological and engineered methods would significantly enhance the effectiveness of the ERP.

Relying primarily on pine trees for carbon sequestration in New Zealand carries several risks, especially if this approach is not balanced with a carefully designed portfolio of other sequestration strategies. Highlighted risks include:

1. Failure to Meet Long-Term Climate Targets

Through relying solely on a single sequestration method of pine forests and afforestation, under the proposed ERP New Zealand is unlikely to make sufficient reductions for meeting our NDC or long-term net-zero targets. As climate change accelerates, these biological systems will face increasing threats, making them less reliable over time.

2. Short-Term Carbon Storage

Pine plantations provide for a fast carbon uptake, but in the context of a 50 – 100-year solution, these plantations provide primarily short- to medium-term storage. As pine forests mature and reach their carbon saturation point, their ability to sequester additional carbon diminishes.

³ Australian Government Climate Change Authority, [Reduce, remove and store: The role of carbon sequestration in accelerating Australia’s decarbonisation](#), Climate Change Authority, 2023.

Over time, if not carefully managed, the carbon stored can be re-released due to harvesting, disease, or natural disturbances like fire.⁵

3. Biodiversity Loss and Ecosystem Impacts

Large-scale monoculture pine plantations can negatively impact biodiversity. Pines are non-native species, and their widespread use can reduce habitat diversity, leading to declines in native flora and fauna. This loss of biodiversity can also disrupt ecosystem services such as water regulation and soil health.⁶

4. Land Use Conflicts

The rapid uptake pine plantations for carbon sequestration has created land-use conflicts, particularly with agricultural production and Indigenous land management practices. This is especially concerning for communities that rely on versatile land use to support livelihoods, food security, and cultural values.⁷

5. Economic Risks

The ERP's narrow focus on pine plantations could lead to overreliance on carbon credits from a single sequestration source, which carries economic risks if market conditions change or if the value of these credits declines due to policy shifts. Diversifying carbon sequestration methods helps spread these risks and makes the overall strategy more resilient.

6. Social and Cultural Considerations

Expanding pine monocultures at the expense of other land uses can erode social and cultural values, particularly for Indigenous communities. Māori landowners, for example, have expressed concerns over the conversion of culturally significant lands into monoculture plantations that offer little in terms of community or environmental benefits.⁸

7. Long-Term Carbon Stability

Pine plantations are vulnerable to disturbances like cyclones, wildfires, pests, and diseases, which are becoming more frequent and severe with climate change. Such disturbances can release stored carbon back into the atmosphere, undermining long-term carbon sequestration goals. Engineered solutions like biochar and geological storage offer more durable and stable carbon storage options over millennia.⁹

While pine trees play a role in New Zealand's carbon sequestration strategy, relying too heavily on them without integrating a diverse portfolio of approaches exposes the country to ecological, economic, and social risks. A broader strategy incorporating a mix of biological, engineered, and hybrid solutions – tailored to regional contexts – would provide greater resilience and ensure more stable long-term carbon outcomes. For an effective

⁵ McKinsey & Company, '[Now the IPCC has recognized that carbon removals are critical to addressing climate change, it's time to act](#)', McKinsey, 2022.

⁶ ClimateWorks, 'The science community says carbon dioxide removal is now essential'.

⁷ McKinsey, 'Now the IPCC has recognized that carbon removals are critical to addressing climate change, it's time to act'.

CarbonBrief, 'Analysis'.

⁸ CarbonBrief, 'Analysis'.

⁹ McKinsey, 'Now the IPCC has recognized that carbon removals are critical to addressing climate change, it's time to act'.

CarbonBrief, 'Analysis'.

decarbonisation pathway, it is essential for New Zealand to consider a balanced mix of sequestration methods that go beyond pine plantations.

Recommendation 2: Develop Sequestration Standards and Taxonomies

The Australian strategy outlines the need for a standardised taxonomy to guide sequestration efforts. Developing similar standards in New Zealand would enhance the credibility and effectiveness of carbon sequestration initiatives, aligning them with international markets and ensuring robust measurement and verification processes.

If New Zealand relies on other countries to lead the development of a science-based sequestration taxonomy and international guidelines, several risks could arise for trade agreements and exports:

1. Reduced Global Competitiveness

Countries leading the development of sequestration standards and guidelines will shape the global carbon markets and set the benchmarks. If New Zealand lags in this area, nationally issued sequestration credits might be perceived as lower quality or less credible, potentially limiting access to premium international markets. This would undermine New Zealand's ability to export high value, verified carbon credits and related technologies.

2. Trade Barriers and Compliance Issues

International trade increasingly considers environmental criteria, especially in regions like the European Union, where imports are subject to stringent carbon and environmental standards. If New Zealand does not align with globally recognised standards, future exports may face new tariffs or regulatory barriers. Countries with stronger carbon accounting and verification practices could gain preferential access to trade agreements, leaving New Zealand at a disadvantage.

3. Loss of Leadership in Emerging Markets

New Zealand's agricultural and forestry sectors, which are key export industries, are uniquely positioned to benefit from leading in sequestration strategies. By deferring to other countries in setting MRV standards, New Zealand risks missing out on establishing ourselves as a leader in sustainable agriculture and forestry. This would not only diminish potential export revenue but also reduce our influence in shaping global standards that align with New Zealand's unique environmental and cultural identity.

4. Reputational Risks and Market Perception

Countries taking the lead in establishing recognised, credible sequestration standards will enjoy reputational benefits in global markets. If New Zealand is seen as a follower rather than a leader, we risk losing the opportunity to brand our products as sustainably produced, which is increasingly important for gaining consumer trust in key export markets.

5. Increased Vulnerability to External Policies

External MRV standards can make New Zealand vulnerable to policy changes in other countries, where standards might not align with national land-use practices, cultural values, or economic needs. For instance, if international guidelines prioritise certain types of sequestration methods that are less suitable for New Zealand's ecosystems or land-use goals, then we could be pressured to adopt practices that are suboptimal for local use, thereby compromising trade and export competitiveness.

New Zealand has a strategic interest in taking an active role in shaping international sequestration standards and guidelines. Doing so would allow us to align global practices with our own strengths and needs, while also safeguarding our trade competitiveness and access to premium markets. Proactive leadership in this area could position New Zealand as a global leader in sustainable land management, which would have positive flow-on effects for our trade and export industries.

Recommendation 3: Incentivise Innovation and Technology Development

Australia's plan highlights the role of public-private partnerships and targeted investments in driving technological advancements. New Zealand should similarly prioritise incentives for innovation in carbon removal technologies wider in scope than the highly publicised but narrowly focused [Agri-Zero](#) initiative, particularly in scalable and durable solutions that can complement biological sequestration efforts.

If New Zealand fails to invest and enhance public-private partnerships (targeted investments in MRV methodologies and technological advancements) and the inclusion of diverse sequestration types in the Emissions Trading Scheme (ETS), several negative consequences are predicted:

1. Missed Opportunities for Innovation and Economic Growth

Public-private partnerships and targeted investments are key to accelerating the development and scaling of advanced carbon sequestration technologies, such as blue carbon, direct air capture, biochar, and geological storage. Without these investments, New Zealand risks falling behind in innovation, missing out on emerging markets, and losing potential revenue from high-quality carbon credits that could be traded internationally.

2. Reduced Credibility and Global Market Access

International markets are increasingly valuing high-integrity carbon credits that are based on scientifically robust and diversified sequestration methods. By not investing in technological advancements and credible MRV systems, New Zealand could see locally issued carbon credits devalued on the global stage, limiting access to high-value markets and reducing export opportunities.

4. Fallout from Failure to Meet Long-Term Climate Targets

Without a strategic push towards biological, engineered and hybrid sequestration solutions, New Zealand could struggle to meet climate commitments for the NDC, creating a financial burden for taxpayers and communities. New Zealand needs to consider enabling policy settings in the ERP and legislation which encourage technological innovation, financial investment and communication leading to public support.

5. Loss of Economic and Social Co-benefits

Public-private partnerships can unlock co-benefits such as job creation, regional development, and community engagement. Failing to support these collaborations could mean missed opportunities to enhance social resilience, particularly in rural and Māori communities that could benefit from new economic activities related to carbon sequestration.

6. Vulnerability to Policy and Market Shifts

New Zealand's limited involvement in cutting-edge sequestration technologies leaves us vulnerable to shifts in international policies and carbon markets. New Zealand also risks being

sidelined, unable to meet future compliance requirements or participate in emerging market opportunities, as and when global standards evolve with stricter MRV protocols and include technologically advanced carbon removal solutions

For New Zealand to maintain a leadership role in climate action and secure our position in global carbon markets, it is essential to invest in public-private partnerships, diversify sequestration options, and support the inclusion of a complex of biological, engineered and hybrid sequestration solutions within the ETS. A broader, spatially and outcome focused ETS will not only enhance market resilience but also ensure that New Zealand remains competitive in the evolving global landscape of carbon markets.

Recommendation 4: Integrate Sequestration into Policy and Compliance Frameworks

Australia's approach integrates sequestration into national decarbonisation plans with clear distinctions between emissions reduction and carbon removals by sectors. Establishing separate targets in New Zealand for these categories would prevent sequestration from being used to offset emissions reductions and instead focus on addressing hard-to-abate sectors like agriculture and transport.

New Zealand faces several risks if we do not fully integrate diverse sequestration approaches into our ERP as the national decarbonisation strategy with clear distinctions between emissions reduction and carbon removal. Risks include:

1. Inaccurate Carbon Accounting and Market Misalignment

A transparent carbon accounting framework is crucial for meeting international climate commitments and maintaining credibility in global carbon markets. Without clearly distinguishing between emissions reductions and carbon removal in national plans, New Zealand risks overestimating our progress toward the NDC and broader climate goals. This misalignment could also make it difficult for New Zealand to comply with evolving international standards, particularly as global trade agreements increasingly demand rigorous distinctions between these categories for determination of embedded Scope 3 emissions and reductions.¹⁰

2. Overreliance on Sequestration as a Substitute for Emission Reduction

Without specific targets and separation of reduction and removal strategies, there is a risk that New Zealand might excessively rely on carbon sequestration (via pine plantations) as an alternative to cutting emissions directly. According to the IPCC, this could lead to delayed action in decarbonising critical sectors such as transport and energy, ultimately making it more difficult to meet net-zero targets. Overreliance on a single biological sequestration, such as forestry, can introduce significant vulnerabilities due to the risks of cyclones, fires, pests, and other natural disturbances.¹¹

¹⁰ McKinsey, 'Now the IPCC has recognized that carbon removals are critical to addressing climate change, it's time to act'.

CarbonBrief, 'Analysis'.

¹¹ ClimateWorks Foundation, 'The science community says carbon dioxide removal is now essential to limit warming to 1.5° C along with deep decarbonization'.

CarbonBrief, 'Analysis'.

3. Neglect of Hard-to-Abate Sectors:

In establishing distinct targets for emissions reductions and carbon removal, New Zealand policymakers can direct sequestration efforts towards truly hard-to-abate sectors like agriculture, transport and heavy industry. The IPCC emphasises the need to focus carbon removal efforts on sectors where mitigation is either technologically or economically challenging, ensuring that more easily reducible emissions are addressed directly rather than offset through carbon credits.¹²

New Zealand has an opportunity to strengthen the ERP by targeting the sequestration and reduction focus for each individual sector, developing rigorous MRV standards, incentivising technological innovation, and integrating international best practices.

Developing a comprehensive approach and engaging with global carbon markets will present opportunities for New Zealand and unlocking economic benefits including:

1. Enhanced Focus on Systemic Emissions Reduction

Establishing distinct targets ensures that the primary emphasis remains on reducing emissions through cleaner energy, efficiency improvements, and other systemic changes. Carbon removal is then strategically applied to address only residual emissions that cannot be mitigated with existing technology or as a direct source.¹³

2. Efficient Resource Allocation and Technological Innovation

Distinct targets encourage more efficient allocation of resources. Carbon removal technologies, such as direct air capture and bioenergy with carbon capture and storage (**BECCS**), are better suited to long-term storage of hard-to-abate emissions. Separating targets also drives innovation in decarbonisation methods across various sectors, encouraging research and development tailored to specific challenges.¹⁴

3. Avoiding Moral Hazard and Promoting Accountability:

A lack of clear distinctions or drivers for sectors means there is a risk that entities may use sequestration credits to delay necessary emissions reductions, leading to a moral hazard where climate goals are undermined. Separate targets ensure that carbon removal complements direct emission cuts rather than replacing them. This approach is critical for maintaining the integrity of New Zealand's climate strategy.¹⁵

We recommend that to effectively reach the NDC and ERP climate goals, the ERP will need to include diverse sequestration methods and emissions reduction targets, with clear distinctions

¹² IPCC, Carbon Dioxide Removal Factsheet.

CarbonBrief, 'Analysis'.

¹³ ClimateWorks Foundation, 'The science community says carbon dioxide removal is now essential to limit warming to 1.5° C along with deep decarbonization'.

CarbonBrief, 'Analysis'.

¹⁴ IPCC, Carbon Dioxide Removal Factsheet.

CarbonBrief, 'Analysis'.

ClimateWorks Foundation, 'The science community says carbon dioxide removal is now essential to limit warming to 1.5° C along with deep decarbonization'.

¹⁵ McKinsey, 'Now the IPCC has recognized that carbon removals are critical to addressing climate change, it's time to act'.

ClimateWorks Foundation, 'The science community says carbon dioxide removal is now essential to limit warming to 1.5° C along with deep decarbonization'.

between emissions reductions and carbon removal for each sector. Through establishing separate targets, New Zealand can prevent the misuse of sequestration credits, ensure resources are allocated efficiently, and align with global best practices. This strategic approach not only safeguards New Zealand's credibility but also reinforces our commitment to responsible climate action and a stable reductions pathway.

This approach is consistent with findings from the IPCC, global carbon accounting principles, and international climate policy reports, which highlight the critical need for separating emissions reductions from carbon removal efforts in national strategies.¹⁶

Recommendation 5: Enhance International Collaboration and Market Integration

International recognition of sequestration's importance has led to significant financial and policy support globally. Initiatives such as the EU's Carbon Removal Certification Framework, the US's Inflation Reduction Act, and Japan and Singapore's focus on carbon storage have created a robust international framework that New Zealand can leverage. Collaborative efforts with countries like Australia and participation in global markets would allow New Zealand to maximise sequestration potential while driving innovation and economic growth.

Enhanced international collaboration and market integration for emission reduction and removal finance and technology can bring several benefits to New Zealand including:

1. Access to Advanced Technologies and Expertise

Collaboration with global leaders in carbon removal technology can provide New Zealand with access to new and improvement to existing solutions, such as direct air capture, BECCS, and advanced MRV. Integrating these technologies into New Zealand's ERP can significantly improve the country's ability to meet our NDC and climate targets. For instance, the European Union's Carbon Removal Certification Framework and the United States' investments under the Inflation Reduction Act have already set the stage for large-scale deployment of carbon removal technologies.¹⁷

2. Leveraging Global Finance for Climate Projects:

Participation in international carbon markets and finance mechanisms can attract substantial investment into New Zealand's climate projects. By aligning with international standards and being proactive in market integration, New Zealand can tap into global funding streams aimed at supporting high-integrity carbon removal initiatives. Initiatives such as the Green Climate

¹⁶ McKinsey, 'Now the IPCC has recognized that carbon removals are critical to addressing climate change, it's time to act'.

ClimateWorks Foundation, 'The science community says carbon dioxide removal is now essential to limit warming to 1.5° C along with deep decarbonization'.

¹⁷ McKinsey, 'Now the IPCC has recognized that carbon removals are critical to addressing climate change, it's time to act'.

ClimateWorks Foundation, 'The science community says carbon dioxide removal is now essential to limit warming to 1.5° C along with deep decarbonization'.

Fund and private-sector funds like Microsoft’s Climate Innovation Fund highlight the financial opportunities available to countries that demonstrate leadership in climate solutions.¹⁸

3. Strengthening Export Competitiveness

As international markets increasingly demand environmentally sustainable products (Carbon Border Adjustment Mechanisms and Free Trade Agreements), integrating with global carbon markets enhances New Zealand’s export competitiveness. Aligning with internationally recognised carbon standards and MRV certifications will help ensure that New Zealand’s agricultural, forestry, and industrial products can access premium global markets where consumers and regulators prioritise low-carbon and sustainably sourced goods.¹⁹

4. Mitigating Risks Through Diversification

Global collaboration can allow New Zealand to diversify carbon reduction and removal approaches by integrating technologies and methodologies from various international markets. New Zealand needs to reduce the risk from relying on two biological sequestration methods (plantation forestry and native afforestation), which are vulnerable to disturbances like cyclones, fires and pests. A diversification into a wider portfolio of sequestration options enhances the resilience of New Zealand’s carbon strategy and ensures sustained progress toward the climate goals in the ERP even in the face of environmental challenges.²⁰

5. Building Strategic Alliances and Influence

Taking an active role in international climate initiatives will position New Zealand as a thought leader and allow influence on global standards and policies. By collaborating with other countries, New Zealand can advocate for frameworks that align with the unique environmental and socio-economic conditions locally and nationally, ensuring that international guidelines do not disadvantage our sectors or regions.²¹

6. Co-Benefits for Local Communities

International market integration can bring socio-economic benefits to local communities, especially rural and Māori-led communities and initiatives. In accessing international finance for projects like regenerative agriculture, sustainable forestry, and biodiversity conservation, local communities and regions can create jobs, enhance regional development, and promote inclusive growth while achieving climate objectives which contribute to the ERP and NDC.²²

New Zealand can unlock technological advancements, attract global finance, and strengthen its position in the global economy by enhancing international collaboration and market

¹⁸ ClimateWorks Foundation, ‘The science community says carbon dioxide removal is now essential to limit warming to 1.5° C along with deep decarbonization’. CarbonBrief, ‘Analysis’.

¹⁹ IPCC, Carbon Dioxide Removal Factsheet.

ClimateWorks Foundation, ‘The science community says carbon dioxide removal is now essential to limit warming to 1.5° C along with deep decarbonization’.

²⁰ McKinsey, ‘Now the IPCC has recognized that carbon removals are critical to addressing climate change, it’s time to act’. CarbonBrief, ‘Analysis’.

²¹ IPCC, Carbon Dioxide Removal Factsheet.

²² McKinsey, ‘Now the IPCC has recognized that carbon removals are critical to addressing climate change, it’s time to act’.

ClimateWorks Foundation, ‘The science community says carbon dioxide removal is now essential to limit warming to 1.5° C along with deep decarbonization’.

integration. These benefits, combined with strategic diversification and leadership in international climate dialogues, will be instrumental in helping New Zealand achieve the emissions reduction and removal targets for 2030 and beyond while fostering economic resilience and social equity.

International Progress on Carbon Dioxide Sequestration

Recent international progress in carbon dioxide sequestration and emissions reductions highlight both technological advancements and the increasing importance of global cooperation. A few examples include:

1. Expansion of Carbon Capture Facilities

In 2023, several large-scale carbon capture and storage (CCS) projects were commissioned globally, adding significant capture capacity. Notable examples include the new facilities in the United States, such as the Heirloom and Global Thermostat projects, which focus on direct air capture (DAC) technology. China also launched several large-scale CCS projects aimed at capturing emissions from industrial sources, including petrochemical facilities. Despite these advancements, the capacity is still far below the requirements set out in global net-zero scenarios.²³

2. Innovation in Carbon Dioxide Removal (CDR)

Novel CDR methods, including biochar production and ocean-based (Blue Carbon) sequestration, are gaining momentum, although conventional methods like soil carbon and afforestation still dominate. Recent reports indicate that while CDR currently removes about 2 billion tonnes of CO₂ annually, it remains insufficient compared to the 40 billion tonnes of annual emissions. Scaling up these solutions requires significant policy support and technological innovation.²⁴

3. International Market Integration

Global carbon markets are increasingly integrating CDR technologies into trading systems. These markets, including voluntary carbon markets and compliance mechanisms, are vital for financing projects that are otherwise not economically viable at current carbon prices. The successful implementation of such mechanisms depends heavily on robust monitoring, reporting, and verification (MRV) protocols, which continue to evolve.²⁵

In summary, by embracing international progress and collaboration, New Zealand can not only improve our carbon sequestration capabilities but also strengthen our position in global trade and climate leadership.

²³ International Energy Agency, '[Carbon Capture, Utilisation and Storage](#)', IEA.

United Nations Environment Programme (UNEP), '[Carbon Dioxide Capture and Storage](#)', UNEP.

²⁴ CarbonBrief, '[Nine key takeaways about the 'state of CO₂ removal' in 2024](#)', CarbonBrief, 2024.

A Michaelowa, M Honegger, M Poralla, M Winkler, S Dalfrume and A Nayak, '[International carbon markets for carbon dioxide removal](#)', *PLOS Climate*, 2023, 2(5), e0000118.

²⁵ Q Ren, S Wei, J Du and P Wu, '[Research progress and perspectives on carbon capture, utilization, and storage \(CCUS\) technologies in China and the USA: a bibliometric analysis](#)', *Environmental Science and Pollution Research*, 2023, 30.

A Michaelowa et al., 'International carbon markets'.