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CO₂ Forward

Key Takeaways from
South Asia's Premier Durable CDR Summit

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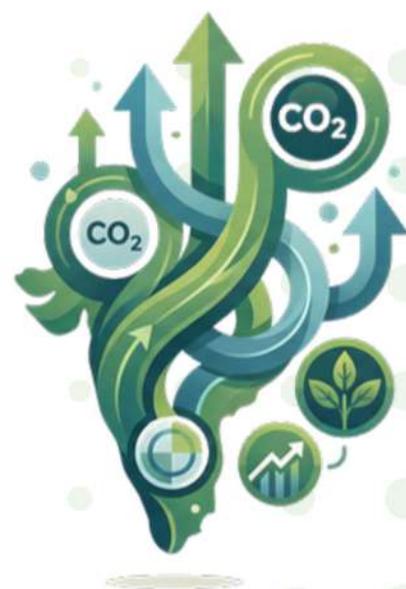


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Background

India is uniquely positioned to emerge as a major supply-side hub for high-integrity durable carbon removal. With its abundant natural resources, robust scientific and entrepreneurial base, and rising climate ambition, the country can generate high-quality, low-cost durable carbon dioxide removal (CDR) credits that deliver not only global mitigation value but also domestic resilience and livelihood co-benefits. India has the potential to contribute an estimated 10 to 30 percent of the world's durable CDR requirements by mid-century.

CO₂ Forward 2025, hosted by the Carbon Removal India Alliance (CRIA) and supported by The Nand and Jeet Khemka Foundation, was a step toward that effort. Building on the success of Carbon Reset 2024, the summit marked a strategic pivot from foundational dialogue to implementation, with a focus on developing a national strategy for durable carbon removal. The convening was a major success, with speakers and participants from 5-6 overseas countries in addition to India.

For the first time, it brought together senior representatives from three Government of India ministries and institutions, including the Ministry of Environment, Forests, and Climate Change (MoEFCC), the Department of Science and Technology (DST), and the Indian Council of Agricultural Research (ICAR); leading academic institutions such as IIT Bombay, IIT Kanpur, and UCLA; leading think tanks such as CEEW and TERI; as well as international experts, financiers, researchers, innovators, and civil society. Participation from stakeholders across Europe, the USA, Asia, and Latin America underscored India's growing centrality in the global CDR conversation.

Executive Summary

CO₂ Forward 2025 witnessed strong participation, high-quality dialogue, and clear momentum toward building a credible, inclusive, and scalable CDR ecosystem in India. The convening focused not only on what durable CDR technologies can achieve, but on how India can build the scientific, institutional and market foundations required to scale them with integrity.

Across seven sessions, participants returned to the idea of India as a future engine for global durable CDR.

India’s Structural Advantage	<p>India combines large-scale agricultural systems, surplus biomass, extensive basalt formations, long coastlines, favourable climatic conditions and cost economics, along with a deep pool of scientific and engineering talent. Together, these advantages position the country to lead globally in durable CDR, if supported by coordinated policy, finance, and market signals.</p>
Co-benefits-led Approach	<p>CDR in India must be co-benefits-led, embedding carbon removal within strong development priorities rather than treating it as a standalone climate intervention.</p>
Market Integrity and Trust	<p>Market integrity, robust MRV systems, and harmonised standards are foundational to building trust, enabling demand, and supporting long-term scale.</p>
Capital Mobilisation	<p>Unlocking capital will require innovative financing models, including outcome-based funding, blended finance, corporate participation, and catalytic public and philanthropic support.</p>
International Cooperation	<p>International cooperation through Article 6 mechanisms, domestic compliance markets, voluntary markets, and South-South leadership will be critical in shaping the global durable CDR agenda.</p>

The world has entered the 1.5°C overshoot risk zone, and India faces severe climate risks despite lower-than-average emissions per person. Durable CDR, therefore, emerged as a strategic pillar for national resilience, rural livelihoods, clean air and long-term climate planning. CO₂ Forward 2025 underscored that with deliberate action today, India can help shape the rules, norms and standards of the global CDR market tomorrow.

India as a Global Hotspot for CDR: Towards a National CDR Policy Roadmap

“We need ideas, imagination, and innovation. India has all three.”

- Ms Leena Nandan
(Former Secretary, MoEF&CC)



(L - R): Prof Vikram Vishal, Ms. Leena Nandan, Mr. Asitava Sen

The opening plenary set the strategic tone for CO₂ Forward 2025, positioning India as a potential global supply-side leader in high-integrity durable carbon removal. Speakers stressed that CDR is no longer a future consideration but a scientific and policy necessity, given the scale of residual emissions and the rapidly narrowing window to remain within temperature targets.

India’s basalt-rich geology, extensive agricultural land, surplus biomass and strong scientific institutions were highlighted as core advantages for scaling durable CDR. These assets enable pathways such as biochar, enhanced rock weathering, marine-based CDR and direct air capture to be deployed at lower cost and with stronger co-benefits than in many other regions.

The discussion emphasised that CDR in India must be framed not only as a climate mitigation tool but as a development intervention. Biochar and ERW were discussed in relation to soil health, water retention, crop yields and methane reductions, alongside broader economic benefits including decentralised livelihoods, rural value chains and job creation. Speakers underscored the urgency of durable removals, noting that nature-based solutions alone cannot deliver the scale or permanence required to manage long-term atmospheric CO₂.

From a policy and governance perspective, the session pointed to emerging momentum, including the inclusion of biochar in India’s Carbon Credit Trading Scheme and growing engagement from NITI Aayog, the Department of Science and Technology and progressive state governments.

Climate justice featured prominently, with emphasis on India’s low historical emissions and high climate vulnerability. The session concluded with a call for India to proactively shape policy frameworks, standards and institutions so that the sector grows with integrity and aligns with national priorities.

Key Takeaways

- India’s natural resources and scientific capacity position it as a leading global supplier of durable CDR.
- CDR pathways can deliver significant agricultural, climate, livelihood and resilience co-benefits.
- Strong early policy signals suggest the foundations of a national CDR roadmap are beginning to form.
- Policy and institutional design will determine long term credibility and scale.

Trust, Transparency and Tons: Ensuring Market Integrity in CDR

“The speed of science lags the speed of markets; credible MRV helps us close that gap.”

- Dr. Soora Naresh Kumar
 (Head & Principal Scientist, ICAR-IARI)

Discussions explored how technology can strengthen MRV through sensor-based monitoring, AI-driven analytics, automation and continuous data collection. Field trials were emphasised as critical for grounding models in real-world conditions and ensuring scientific evidence keeps pace with market activity.

Participants also noted a clear shift within government institutions, with growing international attention on CDR and engagement from bodies such as NITI Aayog catalysing deeper involvement across key agencies.

Concerns around greenwashing and selective disclosure were addressed, with transparency and independent validation highlighted as critical safeguards.

The session reinforced that India is still early in building MRV systems for durable CDR, making collaboration across researchers, government agencies and project developers especially important.

The session examined how trust can be built in an emerging and technically complex CDR market, with participants underscoring monitoring, reporting and verification (MRV) as the foundation of integrity. Because carbon removal occurs in open systems and cannot be directly observed, robust measurement and transparent reporting are essential for building confidence among markets and policymakers.

Key Takeaways

- MRV is the core building block of trust in carbon removal markets.
- Technology can significantly improve accuracy, transparency and cost efficiency.
- Government institutions are in an active learning phase, with growing openness to engineered CDR.
- Real world field data is essential to align science with market expectations.
- Collaboration across institutions is needed to build credible national MRV systems.



(L - R): Dr. Anjali Jayakumar, Dr. S Naresh Kumar, Dr. Neelima Alam, Dr. Indra Shekhar Sen

Tapping the Global Carbon Markets

The third session examined the global demand landscape for carbon removal and its implications for India's role in international markets. Participants highlighted the stark gap between current CDR supply, which remains in the tens of millions of tonnes, and annual global emissions that exceed 40 billion tonnes, underscoring the need for rapid scale and stronger demand signals.

Voluntary carbon markets were recognised for enabling important early commitments, but were considered insufficient to deliver durable removals at scale. Discussions emphasised the importance of compliance markets, policy-led demand and clearer international frameworks to provide long-term certainty.

The gap between global commitments and delivered durable removals, with only 2.7 percent delivered to date, was flagged as a credibility challenge that must be addressed through enabling supply-side policies, infrastructure and robust MRV.

Given India's low historical emissions and high vulnerability to climate impacts, and the slower pace at which the Global North is assuming greater responsibility, participants noted a unique opportunity for India and similar countries to shape the agenda.

India's engagement under Article 6 was discussed as a strategic opportunity to influence global norms while ensuring that international market participation supports domestic development and climate priorities.

Speakers also stressed that CDR must be embedded within existing government programmes, such as soil health and agricultural schemes, rather than relying solely on markets.

“India can lead South–South collaboration and leadership pushing South–North collaboration to strengthen market access and finance”

- Noah Deich
 (Stripe Climate Fellow;
 Co-Founder, Carbon180)



(L - R): Noah Deich, R R Rashmi, Aman Malik

Key Takeaways

- Current carbon markets are far from the scale required for climate goals.
- Voluntary markets alone cannot deliver long term demand certainty.
- Policy drivers and compliance markets will be critical for scale.
- India can influence global norms by aligning market participation with national priorities.

Corporate Demand Signals: The Role of CDR in Climate Portfolios

The session examined the role corporates can play in accelerating durable carbon removal. While awareness of CDR is increasing, procurement remains limited and uneven.

Participants noted that the current durable CDR market is roughly USD 10bn globally, while achieving 10Gt of removals to neutralise residual emissions will require hundreds of billions to trillions of dollars in annual investment.

Uncertainty around durability, MRV quality, cost and additionality was highlighted as a key factor slowing corporate action.

Discussions emphasised the importance of clear evaluation frameworks and internal capacity building within companies. Durable removals were positioned as a long-term tool for managing residual emissions rather than a substitute for mitigation.

Early corporate buyers were recognised as critical for sending demand signals, supporting project viability and helping technologies move down the cost curve.

Indian corporates were encouraged to view durable CDR as a strategic opportunity aligned with global supply chains, operations and climate leadership.

India's advantages were highlighted as lower project costs, strong sustainable development co-benefits and deep technical talent.

“MRV sits at the centre of trust, verification and quantification.”

- Dr. Neelima Alam
 (Associate Head, CEST Division, DST, Government of India)



(L - R) : Tom Mills, K Kartick, Indradeep Das, Thomas Bellec

Key Takeaways

- Corporate interest in durable CDR is growing but remains cautious.
- Clear frameworks are needed to evaluate quality and durability.
- Early buyers play a catalytic role in shaping markets.
- Indian corporates can help anchor demand and signal India's leadership.

Unlocking Capital for Durable CDR

Financing emerged as a central constraint on scaling durable carbon removal. Speakers noted that early-stage CDR technologies face high upfront costs, long development timelines and uncertain near-term revenues, making them difficult to finance through conventional models.

The central insight was that value creation, not capital availability, is the binding constraint. CDR solutions must demonstrate tangible productivity gains, especially for farmers, and integrate into existing market and policy structures.

Discussions focused on the need for blended finance, outcome-based bonds, catalytic philanthropy and risk sharing mechanisms. Durable CDR was repeatedly described as a public good, requiring coordinated public and private investment.

Strong MRV systems, life cycle analyses, predictable policy signals and clear project pipelines were identified as prerequisites for unlocking larger pools of capital.

“Biochar gave 15-20% higher yields in our pilot on chili fields in UP - that’s the language governments understand.”

- Ajith Radhakrishnan
 (Senior Specialist, World Bank Group;
 Country Coordinator, 2030 WRG)

Key Takeaways

- Durable CDR requires patient and risk tolerant capital.
- Outcome-based and blended finance are critical enablers.
- Investor confidence depends on MRV strength and policy clarity.
- Building credible pipelines is key to mobilising capital.



(L - R): Dr. Joerg Wiese, Aakash Shah, Ajith Radhakrishnan, Dr. Alexander Fisher, Aaran Patel

Technology Showcase: Scaling ERW in India

“How do we trust what we cannot see? We build the science that makes it visible.”

- Dr. Indra Sekhar Sen
(Assistant Professor, IIT Kanpur)

The ERW showcase highlighted why India is well positioned to lead in rock-based carbon removal. Speakers discussed India’s extensive basalt formations, optimal climatic conditions, large agricultural footprint and strong research networks as enablers of scalable deployment.

Beyond carbon removal, ERW was framed as an agricultural intervention with tangible co-benefits. Improved soil pH, enhanced nutrient availability, increased yields, and reduced input costs were highlighted as factors that can drive farmer adoption and strengthen resilience. At the same time, the session underscored the importance of robust measurement, including soil sampling, modelling and sensor supported monitoring.

The discussion reinforced ERW’s potential as a pathway that aligns climate mitigation with agricultural development and the potential of India in leading global ERW deployment.

Key Takeaways

- India has exceptional geological, climatic and agricultural conditions for ERW.
- ERW offers strong co-benefits that support farmer outcomes.
- Precision MRV is essential for credibility and scale.
- Agricultural integration strengthens long term adoption.



(L - R): Prof. David Manning, Shantanu Agarwal

Exploring mCDR and Coastal Resilience

The final session of the day focused on marine carbon dioxide removal and its relevance for India's coastal regions. Discussions covered a range of marine CDR approaches and the importance of careful experimentation given ecological sensitivities.

Speakers stressed that mCDR is still in an early, experimental phase and must proceed cautiously with strong MRV, development of ecological baselines, creation of governance frameworks, and coordination with local communities

Panelists highlighted India's long coastline and diverse coastal ecosystems as an opportunity to contribute meaningfully to global learning in marine CDR. At the same time, strong emphasis was placed on environmental safeguards, transparent monitoring and community engagement to ensure responsible deployment.

The potential for marine CDR to intersect with coastal resilience and adaptation goals was also explored.

The session concluded with a call to pilot early, learn quickly and build governance frameworks alongside technological development. Speakers also spoke to the need for national-scale assessments of marine biomass, targeted ecological studies, and adaptive MRV frameworks to responsibly explore mCDR pathways.

“With CDR, the co-benefits are the core benefits.”

- Asitava Sen
 (CEO, CRIA)

Key Takeaways

- mCDR presents opportunities for long duration removal and coastal resilience.
- Environmental monitoring and safeguards are non-negotiable.
- Community engagement is critical for responsible deployment.
- Early pilots can accelerate learning and confidence.



(L - R): Hisham Mundol, Arnav Mariwala, Gaurav Sant, Aaran Patel

Cross-Cutting Themes



India's Leadership Potential

India's natural assets and scientific talent create strong conditions for global CDR leadership.



Climate Justice Opportunity

India faces high climate vulnerability despite low emissions, making CDR a tool for resilience and equitable development.



Partnerships and Systems Thinking

A coordinated ecosystem of government, research, industry and communities is essential.



MRV as the Foundation of Credibility

Reliable monitoring, reporting and verification are essential for trust and investment.



Co-Benefits as Core Benefits

CDR has potential to strengthen soil health, productivity, livelihoods, clean air, jobs and coastal resilience.



Financing and Market Confidence

Durable CDR needs catalytic finance and blended models.



Demand Creation and Policy Signals

Corporate and policy led demand will determine growth.



Responsible Scaling

Environmental safeguards and community partnership must remain central.



Closing Note

CO₂ Forward 2025 showed strong momentum and shared purpose. It demonstrated that India is no longer on the sidelines of the global carbon removal conversation – it is increasingly at its centre. India has both the opportunity and responsibility to build a high-integrity CDR sector that advances global mitigation and supports national development.

CRIA's role in convening government, science, finance, philanthropy, and industry was widely acknowledged, reinforcing its position as a key catalyst for ecosystem-building. The road ahead is long – but the momentum coming out of CO₂ Forward 2025 makes one thing clear: with investments in policy, science, trust and collaboration, India can shape the future of carbon removal and climate resilience.



ANNEXURE

List of Speakers

Aakash Shah, Partner, Peak Sustainability Ventures

Aaran Patel, Executive Director, Climate, The Nand and Jeet Khemka Foundation

Ajith Radhakrishnan, Senior Specialist, World Bank Group; Country Coordinator, 2030 Water Resources Group (2030 WRG)

Dr. Alexander Fisher, Project Director, Climate Action Program (CAP), International Climate Initiative (IKI) Interface (IFP), GIZ India

Dr. Aman Malik, Programme Lead, Council on Energy, Environment and Water (CEEW)

Dr. Anjali Jayakumar, Lecturer in Chemical Engineering, School of Engineering, Newcastle University

Arnav Mariwala, Founder, MariTide

Asitava Sen, Co-Founder and Chief Executive Officer, Carbon Removal India Alliance (CRIA)

Prof. David Manning, Professor of Soil Science, Newcastle University; Founding Member, UK Biochar Research Centre (UKBRC)

Prof. Gaurav Sant, Pritzker Professor of Sustainability, UCLA Henry Samueli School of Engineering

Genevieve Ding, Executive Director and Head of APAC Sustainability, JPMorgan Chase

Hisham Mundol, Chief Advisor, Environmental Defense Fund

Indradeep Das, General Manager, Carbon Markets, ReNew

Dr. Indra Sekhar Sen, Assistant Professor, Earth Sciences, Indian Institute of Technology Kanpur

Dr. Joerg Wiese, Chief Executive Officer, Kuehne Climate Center

K. Kartick, Head, NextGen CDR Facility

Ms. Leena Nandan, Former Secretary, Ministry of Environment, Forest and Climate Change (MoEF&CC)

Dr. Neelima Alam, Associate Head, Climate Energy and Sustainable Technology (CEST) Division, Department of Science and Technology, Government of India

Noah Deich, Stripe Climate Fellow; Co-Founder and Senior Advisor, Carbon180

R. R. Rashmi, Distinguished Fellow, The Energy and Resources Institute (TERI)

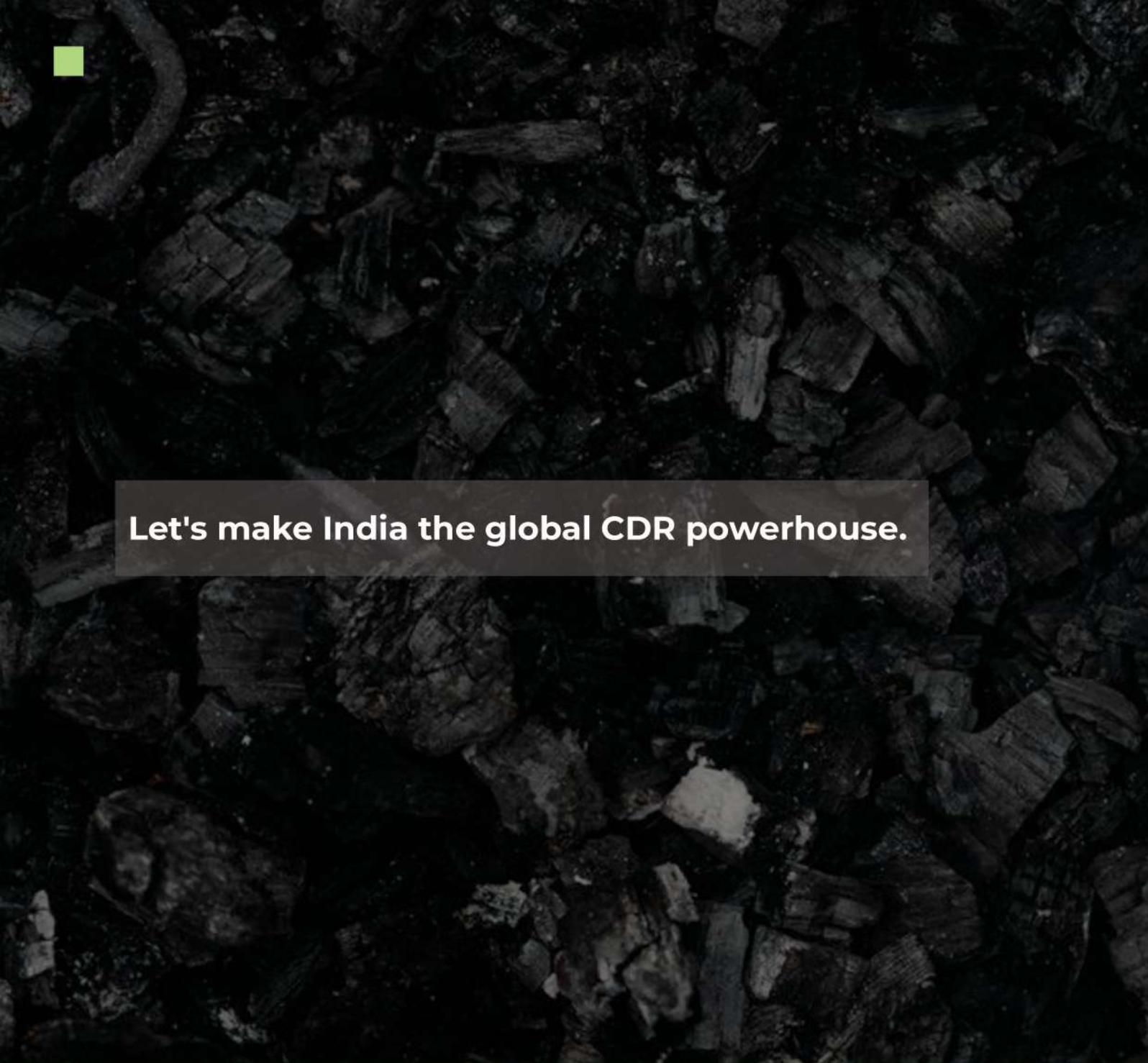
Shantanu Agarwal, Founder, Mati Carbon

Dr. S. Naresh Kumar, Head and Principal Scientist, Centre for Environment Science and Climate Resilient Agriculture, Indian Agricultural Research Institute (ICAR-IARI)

Thomas Bellec, Head of Market Development (Global), ClimeFi

Tom Mills, Stripe Climate Fellow; Advisor, Carbon Gap

Prof. Vikram Vishal, Professor, Department of Earth Sciences, Indian Institute of Technology Bombay



Let's make India the global CDR powerhouse.

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