

#5 CCUS/CDR MRV IN ACTION: CHALLENGES, OPPORTUNITIES, AND IMPLEMENTATION STRATEGIES



MODERATOR

Jasmin Kemper

TECHNICAL PROGRAMME ADVISOR
IEAGHG

Jasmin is the Technical Programme Advisor at the IEA Greenhouse Gas R&D Programme (IEAGHG), ensuring the scientific quality and integrity of the programme. She joined the Capture & Integrated Systems team in 2011. Jasmin has managed technical studies on CO₂ dehydration, pipeline transportation, accounting for GHG emissions from CCUS, BECCS/Bio-CCS, DACCS, MRV, and CCS clusters. Her other work areas include IEAGHG's network on solid looping technologies, sustainability issues, LCA, non-CO₂ GHGs, CO₂ utilisation and AI in CCUS.

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Thor Solnes

HEAD OF GEOSCIENCE & MANAGEMENT
CONSULTANT
NORTHERN LIGHTS JV

Thor Solnes is MRV & Performance Manager at Northern Lights, leading the development of the Monitoring, Reporting and Verification (MRV) plan. He has previously held strategic, commercial and technical roles in oil & gas majors on the NCS before joining Northern Lights in 2022, initially working with strategic analysis and towards EU funding programs. He holds an MSc in Marine Engineering from the Norwegian University of Science and Technology (NTNU).

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Northern Lights

norlights.com



Dr. Gerard Ostheimer

HEAD OF SECRETARIAT

**CLEAN ENERGY MINISTERIAL BIOFUTURE
INDUSTRY COUNCIL**

Dr. Ostheimer currently serves as the Head of Secretariat for Clean Energy Ministerial Biofuture Industry Council that is the mechanism for Bio-Based Industries to engage with high-level international processes, including the G7, G20, and Clean Energy Ministerial. Members of the Council collaborate with countries and the International Energy Agency to strengthen the evidence base for the production and use of sustainable bio-based Fuels, Chemicals, and Materials.



Biogenic CO2 & CCUS

CCUS/CDR MRV in Action

Gerard Ostheimer

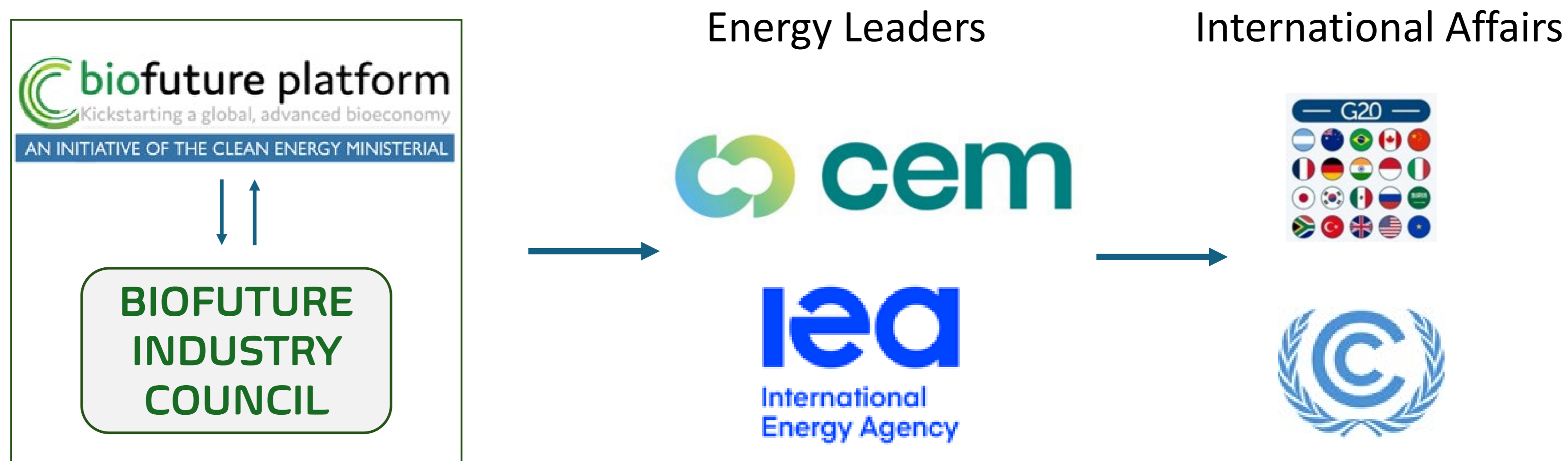
Biofuture Industry Council

05 March 2026

Biofuture Industry Council Mission & Description

MISSION

The **Biofuture Industry Council** enables bio-based industries to engage and support multi-stakeholder, international efforts (e.g., G20, UNFCCC, Global Biofuels Alliance) to increase the evidence-base for the sustainable production and use of biomass as a feedstock for sustainable fuels, chemicals and materials, and their role in (1) increasing energy security, (2) improving rural livelihoods and well-being, and (3) reducing GHG emissions from hard-to-abate sectors.



Biofuture Platform Countries and Partners

Member Countries

Argentina

Finland

Japan

South Africa

Australia

France

Morocco

United Kingdom

Brazil

Hungary

Mozambique

United States

Canada

Kenya

Netherlands

Uruguay

China

India

Paraguay

Egypt

Indonesia

Philippines

Denmark

Italy

Portugal

Supporting Organizations



Food and Agriculture
Organization of the
United Nations



IRENA

International Renewable Energy Agency



SUSTAINABLE ENERGY
FOR ALL



UNITED NATIONS
UNCTAD



UNITED NATIONS
INDUSTRIAL DEVELOPMENT
ORGANIZATION

BFIC Advisory Board Members - 2025



Bio-based products must be certified sustainable and CI-scored

- Biofuel sustainability certification is an ongoing point of international dialog, but there are accepted certification schemes for bio-based fuels.
- For example, ICAO leads a vigorous international exchange on sustainability certification. Accepted schemes are ISCC, RSB, and ClassNK SCS.
- Different requirements between North America, Brazil, and the EU cause friction and market fragmentation.



ICAO

INTERNATIONAL CIVIL AVIATION ORGANIZATION

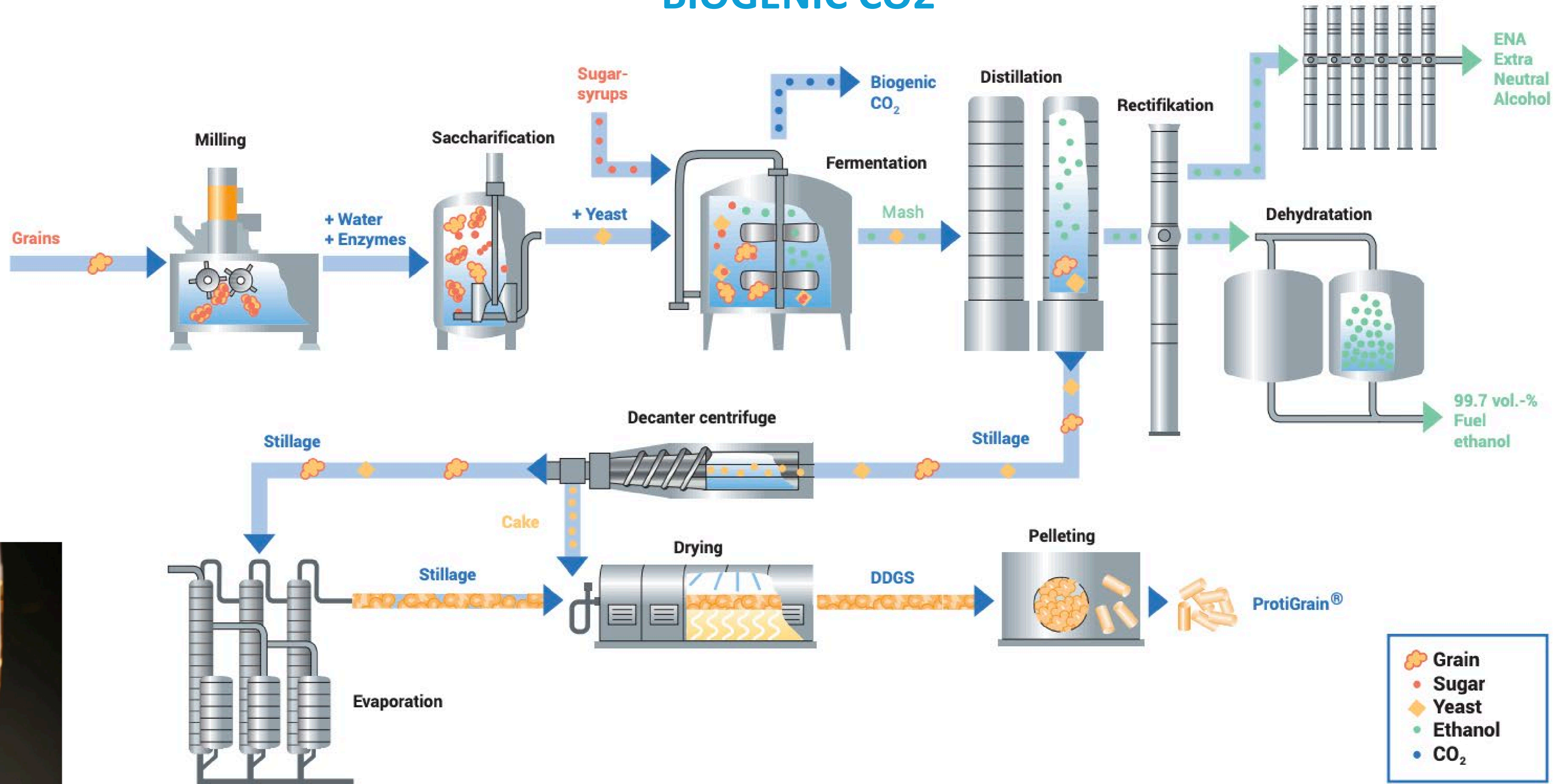
ICAO document

CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes

Name of the Sustainability Certification Scheme	Date of approval	Website	Scope of approval
International Sustainability and Carbon Certification (ISCC)	16 Jun. 2023	https://www.iscc-system.org/about/sustainable-aviation-fuels/corsia/	Certification of CORSIA Sustainable Aviation Fuels economic operators covered by Chapters 1 and 2 of the ICAO document “CORSIA Sustainability Criteria for CORSIA eligible fuels”
Roundtable on Sustainable Biomaterials (RSB)	16 Jun. 2023	https://rsb.org/rsb-corsia-certification/	Certification of CORSIA Sustainable Aviation Fuels economic operators covered by Chapters 1 and 2 of the ICAO document “CORSIA Sustainability Criteria for CORSIA eligible fuels”
ClassNK SCS	28 Oct. 2024	https://www.classnk.or.jp/hp/en/authentication/scs/index.html	Certification of CORSIA Sustainable Aviation Fuels economic operators covered by Chapter 2 of the ICAO document “CORSIA Sustainability Criteria for CORSIA eligible fuels”

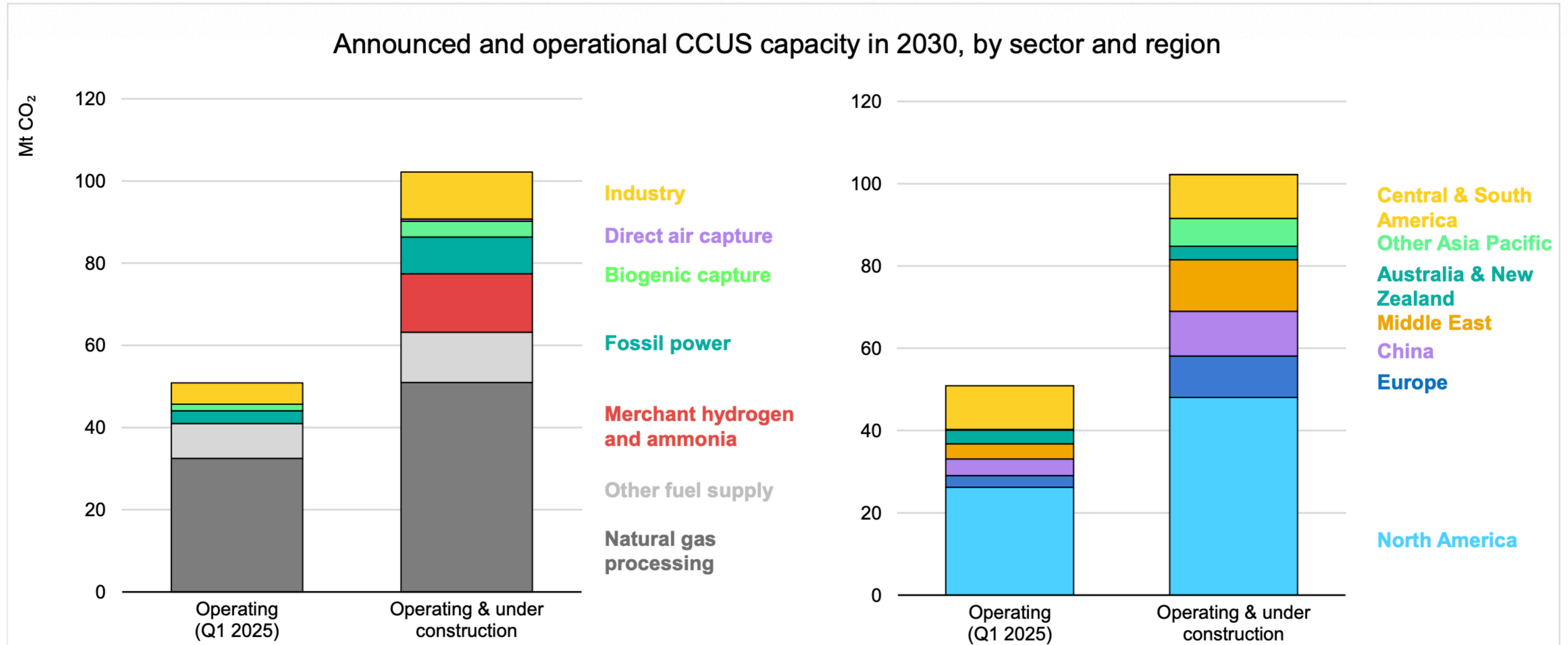
Yeast Fermentation of Sugars Produces CO₂

BIOGENIC CO₂



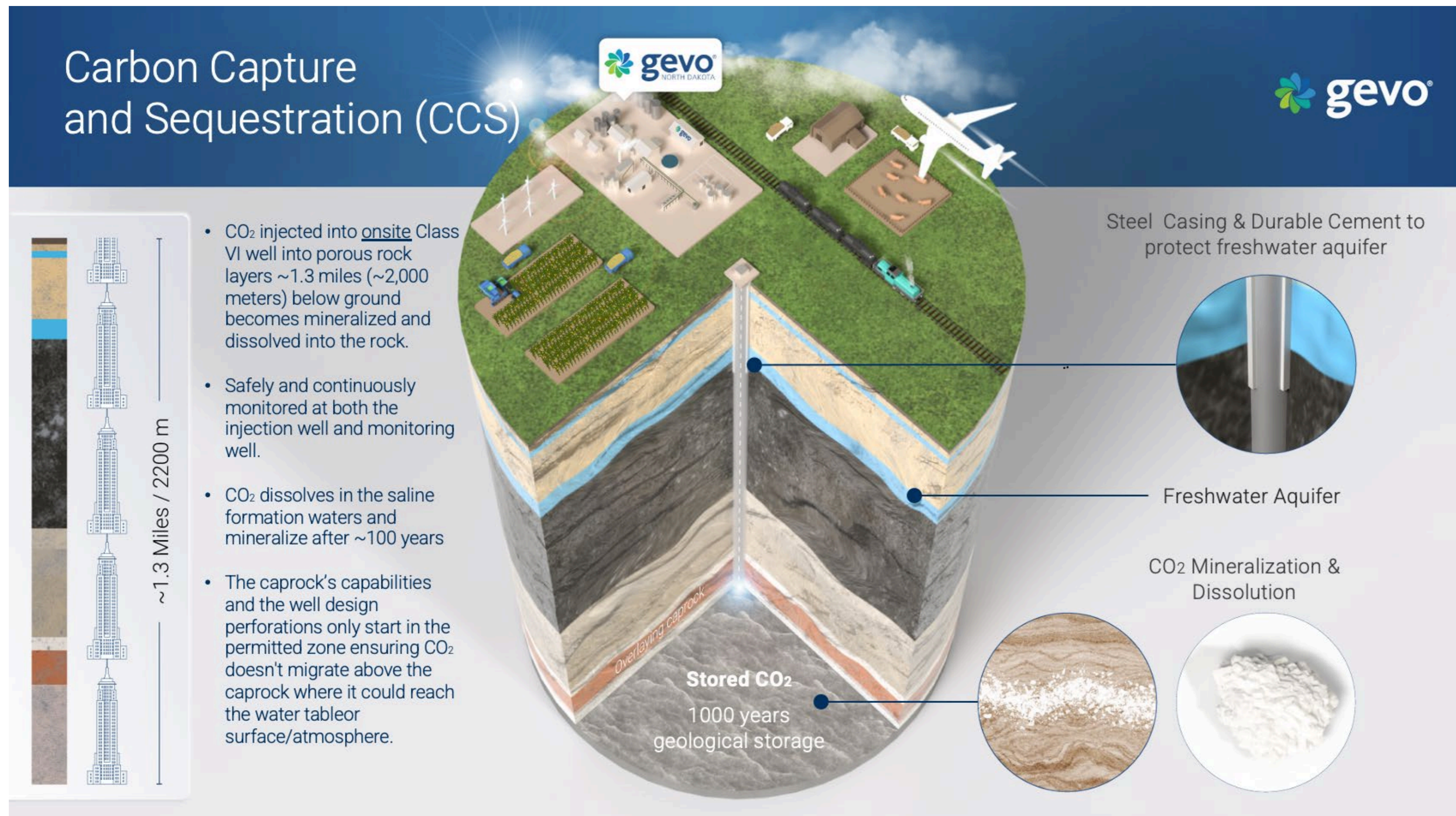
Biogenic CO2 capture is happening and expected to grow

The CCUS project pipeline is diversifying but not set in stone



Announcements show a diversification of applications but more investment is needed outside of historical sectors. Regional deployment may stay concentrated unless rapid developments in key markets shift the landscape

GEVO has marketed 500,000 tonnes of Carbon Credits

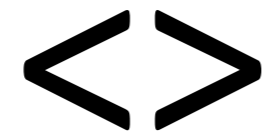


- Coupling CCS to a corn alcohol-to-jet pathway can reduce the CI from 70 gCO₂/MJ to 40 gCO₂/MJ.
- ATJ w/ CCS is not yet recognized by ICAO CORSIA

Verity Carbon Services enables Sustainability Certification



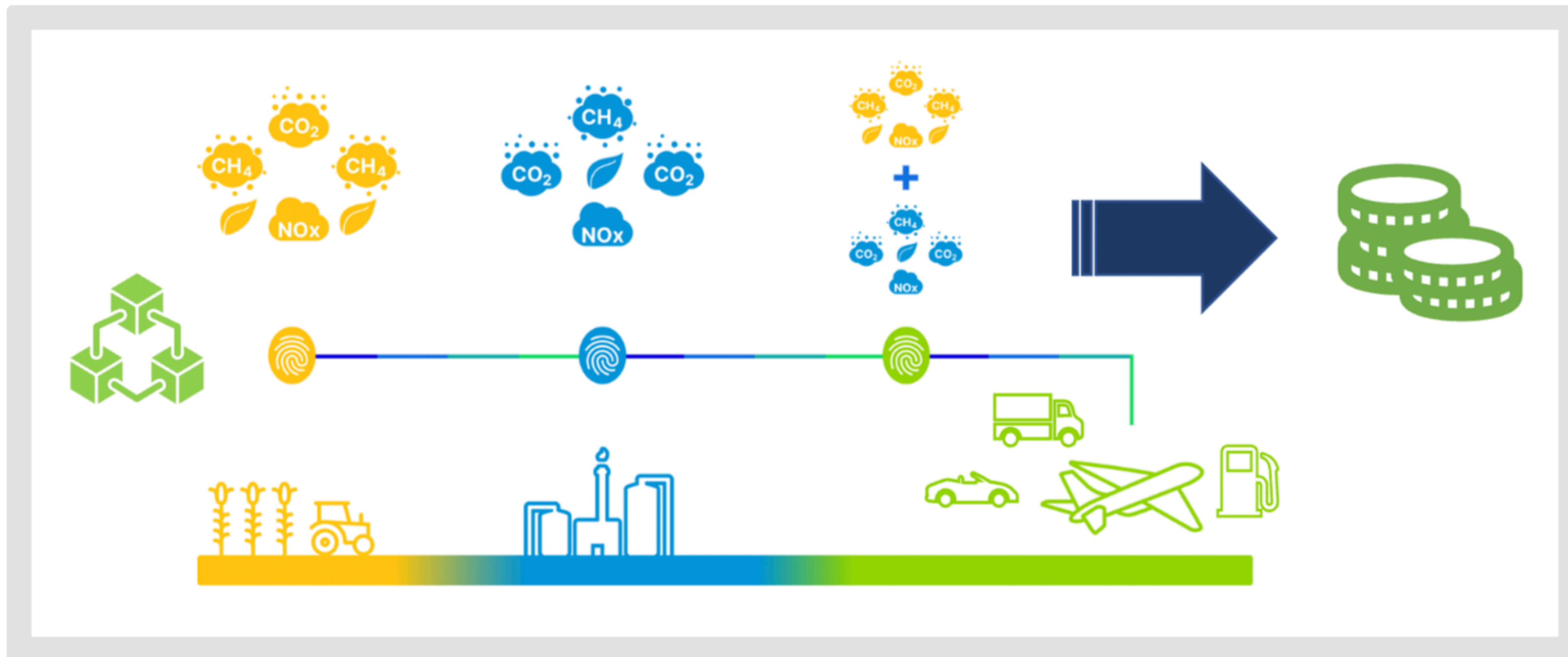
VERITYTM



RSB[®]

How Does Verity Create Value?

Value creation through proprietary digital MRV platform and full carbon accounting for tax, compliance and voluntary incentives



Carbon Services

Regulatory Analysis and Strategy Development

Life Cycle Analysis

Compliance Management / Audit Readiness

Verity Tracking MRV

Digital Measure / Reporting / Verification

Digital Assets – Carbon Accounting

Upstream and Downstream Supply Chain

Carbon Marketing

Utilization and Retirement Services

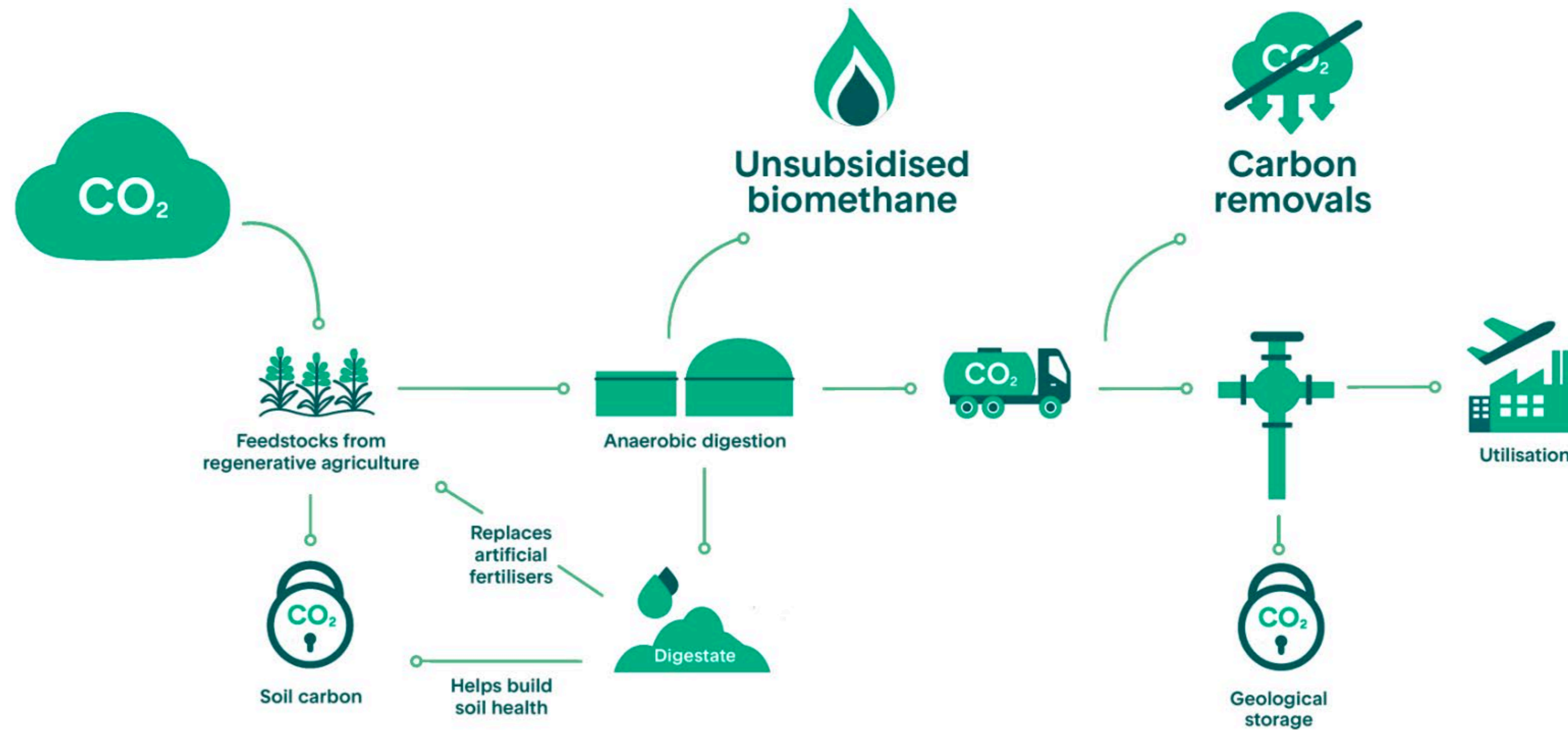
Scope 1,2,3 – Trading / Marketing

Voluntary, Compliance, and Tax

Biomethane production is a source of pure CO₂ streams



Project Carbon Harvest



Every year, each new plant could:

✓ Sequester **>4,000t** carbon in soil

✓ Avoid **30,000t** CO₂ emissions

✓ Remove **20,000t** atmospheric CO₂

Building Blocks for a vigorous EU bio-CO₂ market

1. Demand enablers

- Clear EU **regulatory framework**
 - Precise definitions and scope
 - Accounting flexibility
 - The right **incentives** to increase demand

2. Market enablers

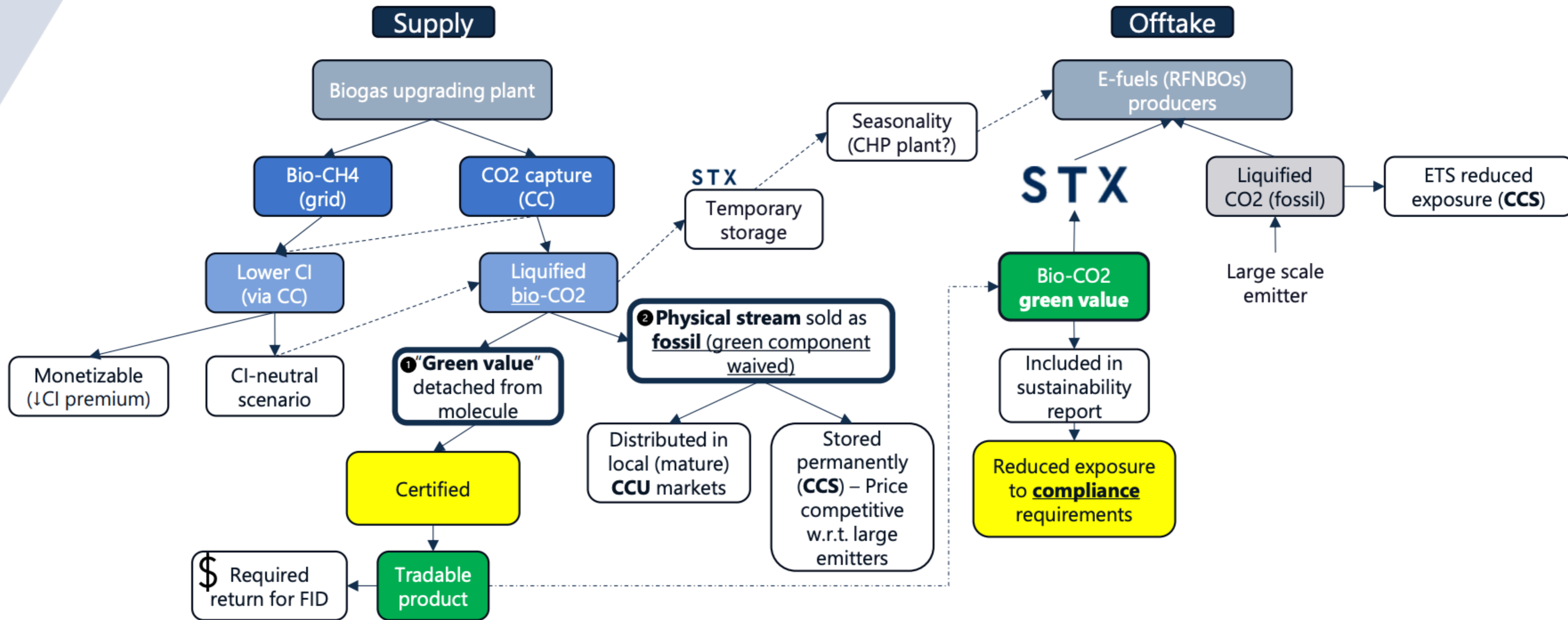
- **Certification:** common methodologies across applications with a mass balancing system (where applicable) and/or “**book & claim**” infrastructures.

3. Structural enablers

- Enable delivery to the highest-value use, not just the nearest site (logistics constraints)
- Support **integration and synergies** with biomethane, e-fuels, and other markets

Example: Currently, captured biogenic CO₂ via CCU does not reduce the end-product's footprint, thus removing the incentive for biomethane producers to pursue CCU under RED

“Book & claim” schemes unlock value and reduce logistic burdens

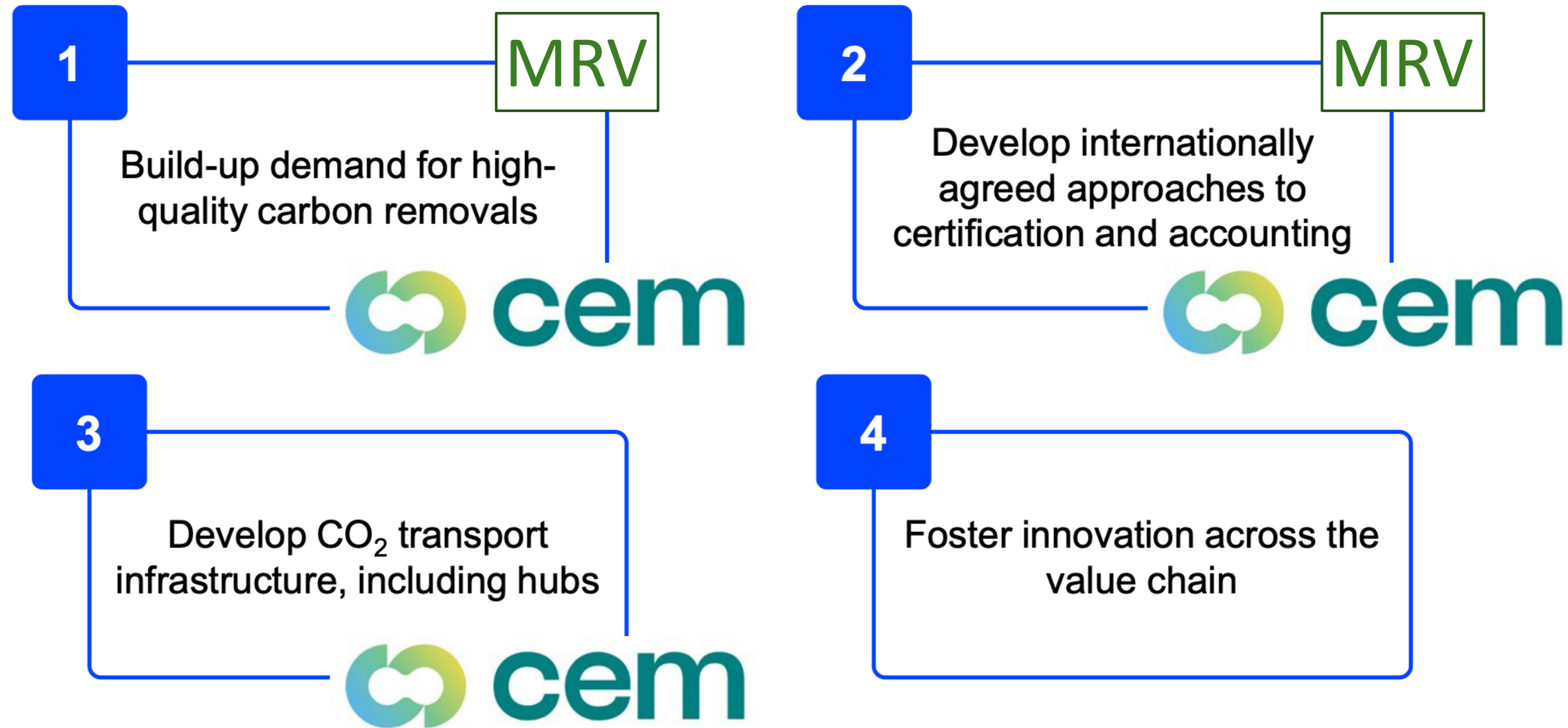


Summary of intended structure

1. Possibility for companies to **detach “green value” of bio-CO₂** by placing it into a certificate (verified independently)
2. “Green value” sold over to companies exposed to CO₂ sustainability requirements (**compliance vs voluntary**)
3. Ongoing efforts to **test this value proposition** with verifiers (compliance) and with end-buyers (compliance/voluntary)
4. Significant opportunity in **RFNBOs trade dimension**

Confidence in MRV is necessary to valorize Biogenic CO₂

Four priorities to boost bio-CO₂ capture



Objectives of the CEM Future Fuels Community

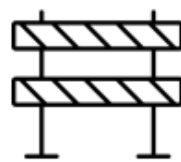
Three Key Objectives for the CEM Future Fuels Community



1. Build an international, multi-sector community to complement and strengthen efforts to accelerate sustainable fuels across all technology pathways.



2. Amplify the impact and insights of individual CEM workstreams and the broader community of key partner organisations through ongoing collaboration and dialogue



3. Support CEM members' ambitions on sustainable fuels, including implementation of the Belem Pledge, by removing barriers to sustainable fuels deployment

2025 Secretariat

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Claude Loréa

FOUNDER AND PRINCIPAL
CL4CHANGE

Claude Loréa is a global sustainability and policy professional with over 30 years of European and international experience in innovation, net zero transition, sustainability & advocacy in process/high emitting industries especially the cement industry.

She spent years shaping and steering decarbonisation through major industry associations, advising sectors and driving collective transition efforts. Claude has now moved into an advisory role as the CEO and founder of the boutique consultancy CL4Change.

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MRV for Environmental Attribute Certificates: Ensuring Integrity Beyond the Physical Flow

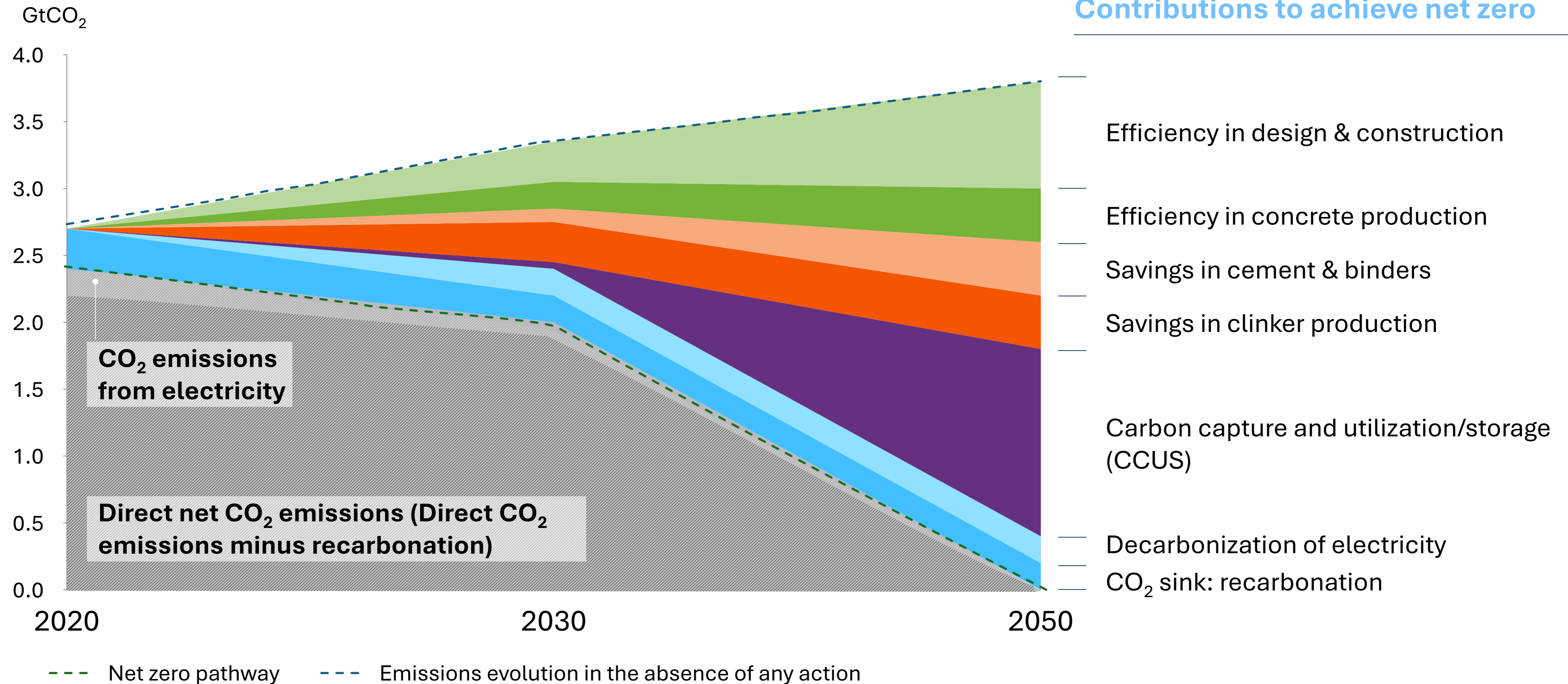
Claude Lorea, CL4Change
Special Advisor to the GCCA

April 15, 2026

Global cement and concrete industry has committed to producing net zero concrete by 2050 setting out a pathway to address its CO₂ emissions

GCCA Net Zero Pathway

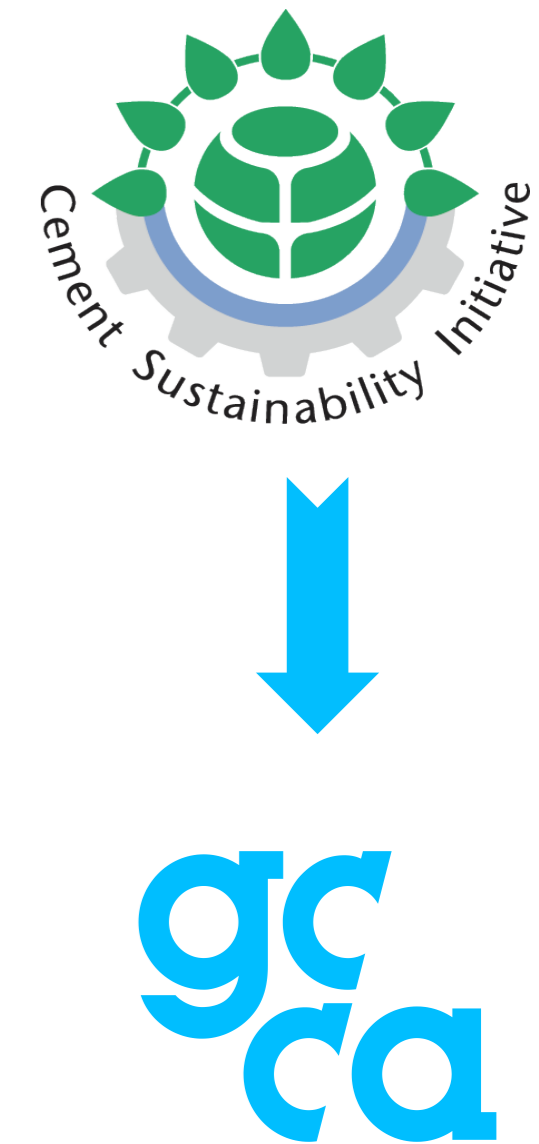
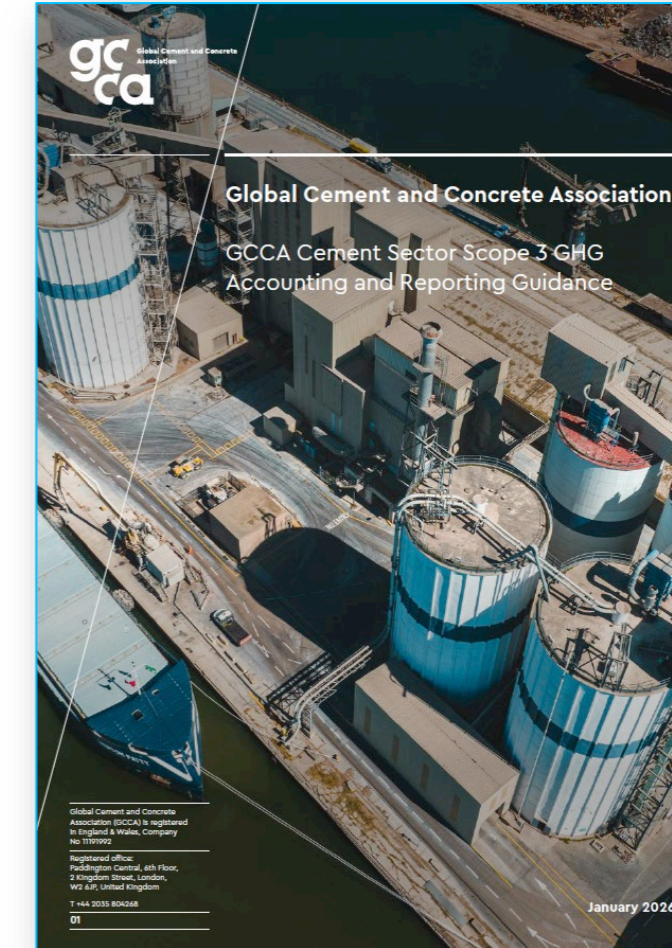
Contributions to achieve net zero



Building on 20+ years sector experience with MRV

GCCA tools

- GCCA CO₂ Protocol
- GCCA Scope 3 GHG Accounting Guidance
- GCCA EPD Tool
- GCCA Low Carbon Rating Scheme



Environmental Data Sheet | Self-declaration
Self-declaration based on Environdec c-PCR-003 Concrete and concrete elements (EN 16757)
C30/35 mlx 1

Core environmental impact indicators		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-tot	kg CO ₂ eq.	2.69E2 *	1.05E1	1.65E1	0E0	-	-	-	-	-	-	8.99E0	8.96E0	0E0	1.32E1	0E0
GWP-GHG	kg CO ₂ eq.	2.72E2	1.05E1	1.66E1	0E0	-	-	-	-	-	-	8.99E0	8.96E0	0E0	1.32E1	0E0
GWP-fos	kg CO ₂ eq.	2.72E2	1.05E1	1.66E1	0E0	-	-	-	-	-	-	8.99E0	8.95E0	0E0	1.32E1	0E0
GWP-bio	kg CO ₂ eq.	8.08E-2	4.26E-3	6.7E-3	0E0	-	-	-	-	-	-	1.6E-3	6.96E-3	0E0	8.71E-3	0E0
GWP-luc	kg CO ₂ eq.	4.06E-2	3.68E-3	4.65E-3	0E0	-	-	-	-	-	-	1.13E-3	5.34E-3	0E0	7.08E-3	0E0
ODP	kg CFC 11 eq.	8.45E-6	2.08E-6	1.75E-6	0E0	-	-	-	-	-	-	1.62E-6	1.54E-6	0E0	4.3E-6	0E0
AP	mol H+ eq.	9.14E-1	3.47E-2	1.05E-1	0E0	-	-	-	-	-	-	9.42E-2	4.18E-2	0E0	1.26E-1	0E0
EP-fw	kg P eq.	2.97E-2	8.1E-4	2.08E-3	0E0	-	-	-	-	-	-	4.02E-4	1.23E-3	0E0	1.54E-3	0E0
EP-mar	kg N eq.	2.01E-3	7.06E-5	6.98E-4	0E0	-	-	-	-	-	-	3.34E-5	9.06E-5	0E0	1.46E-4	0E0
EP-ter	mol N eq.	2.24E0	7.7E-2	3.84E-1	0E0	-	-	-	-	-	-	4.44E-1	1.17E-1	0E0	4.52E-1	0E0
POCP	kg NMVOC eq.	5.6E-1	3.13E-2	1.05E-1	0E0	-	-	-	-	-	-	1.22E-1	3.85E-2	0E0	1.33E-1	0E0
ADPE	kg Sb eq.	1.22E-4	2.03E-5	1.06E-5	0E0	-	-	-	-	-	-	2.66E-6	1.62E-5	0E0	1.44E-5	0E0
ADPF	Mj, net calorific value	1.07E3	1.72E2	1.65E2	0E0	-	-	-	-	-	-	1.3E2	1.37E2	0E0	3.67E2	0E0
WDP	m ³ world eq. deprived	1.53E2	1.27E0	3.01E0	0E0	-	-	-	-	-	-	7.67E-1	1.19E0	0E0	1.77E1	0E0

* The Indicated value (gross value) includes the CO₂ emissions from the incineration of waste. The net value (excluding the emissions from the incineration of fossil waste) is 2.41E2 kg CO₂-eq. It should be noted that this applies to GWP indicators only and is ignored for other indicators where gross is applied by default.

Core environmental impact indicators: **GWP-tot** (Global Warming Potential total) • **GWP-GHG** (Global Warming Potential total - Greenhouse Gas) • **GWP-fos** (Global Warming Potential fossil fuels) • **GWP-bio** (Global Warming Potential biogenic) • **GWP-luc** (Global Warming Potential land use and land use change) • **ODP** (Depletion potential of the stratospheric ozone layer) • **AP** (Acidification potential, Accumulated Exceedance) • **EP-fw** (Eutrophication potential, fraction of nutrients reaching freshwater end compartment) • **EP-mar** (Eutrophication potential, fraction of nutrients reaching marine end compartment) • **EP-ter** (Eutrophication potential, Accumulated Exceedance) • **POCP** (Formation potential of tropospheric ozone) • **ADPE** (Abiotic depletion potential for non-fossil resources) • **ADPF** (Abiotic depletion potential for fossil resources potential) • **WDP** (Water (user) deprivation potential, deprivation-weighted water consumption)

Global Cement and Concrete Association

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ABOUT US ABOUT CEMENT AND CONCRETE NET ZERO INNOVATION ESG NEWS AND EVENTS POLICIES AND RESOURCES

LOW CARBON RATING

Cement & Concrete

Home / GCCA Global Low Carbon Ratings for Cement and Concrete

GCCA Global Low Carbon Ratings for Cement and Concrete

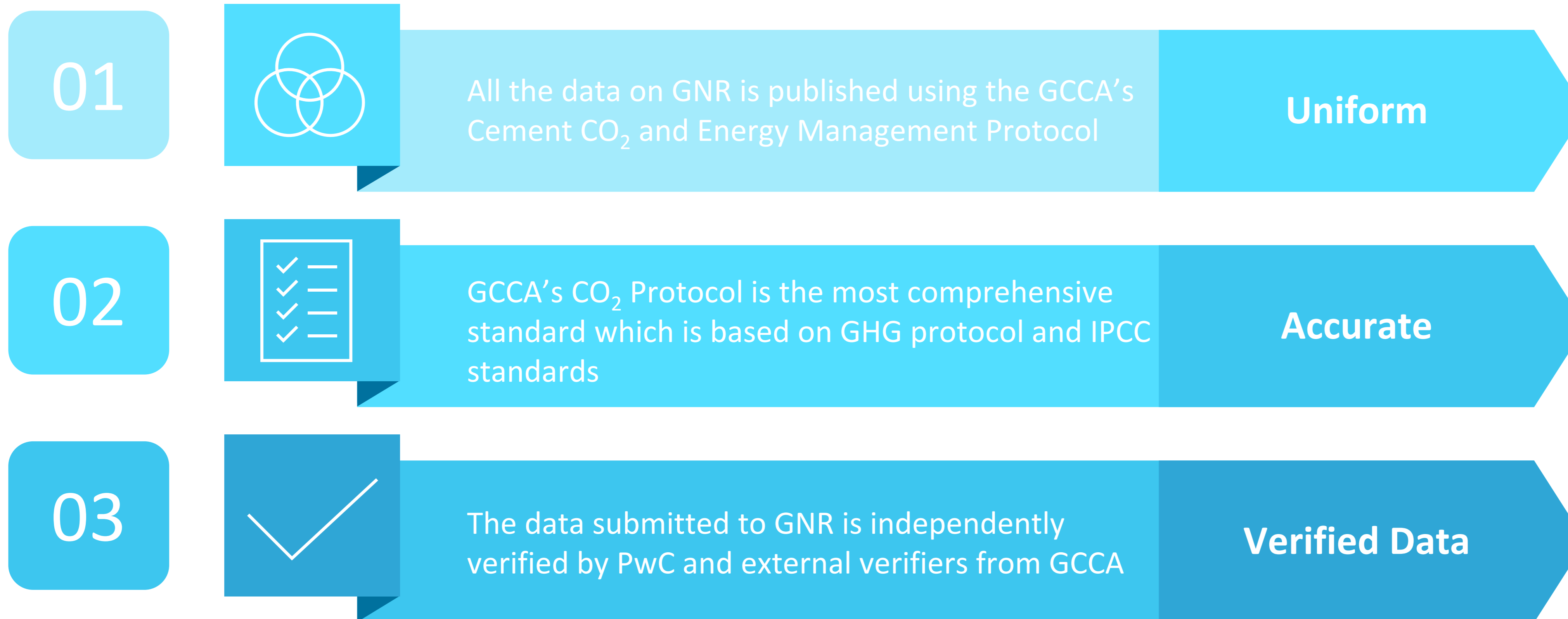
Introduction

The Global Cement and Concrete Association (GCCA) has developed a standardised low carbon rating system for cement and concrete to support reporting, procurement and comparison of products. This system ensures transparency in low-carbon procurement and supports global efforts toward net-zero emissions by 2050.

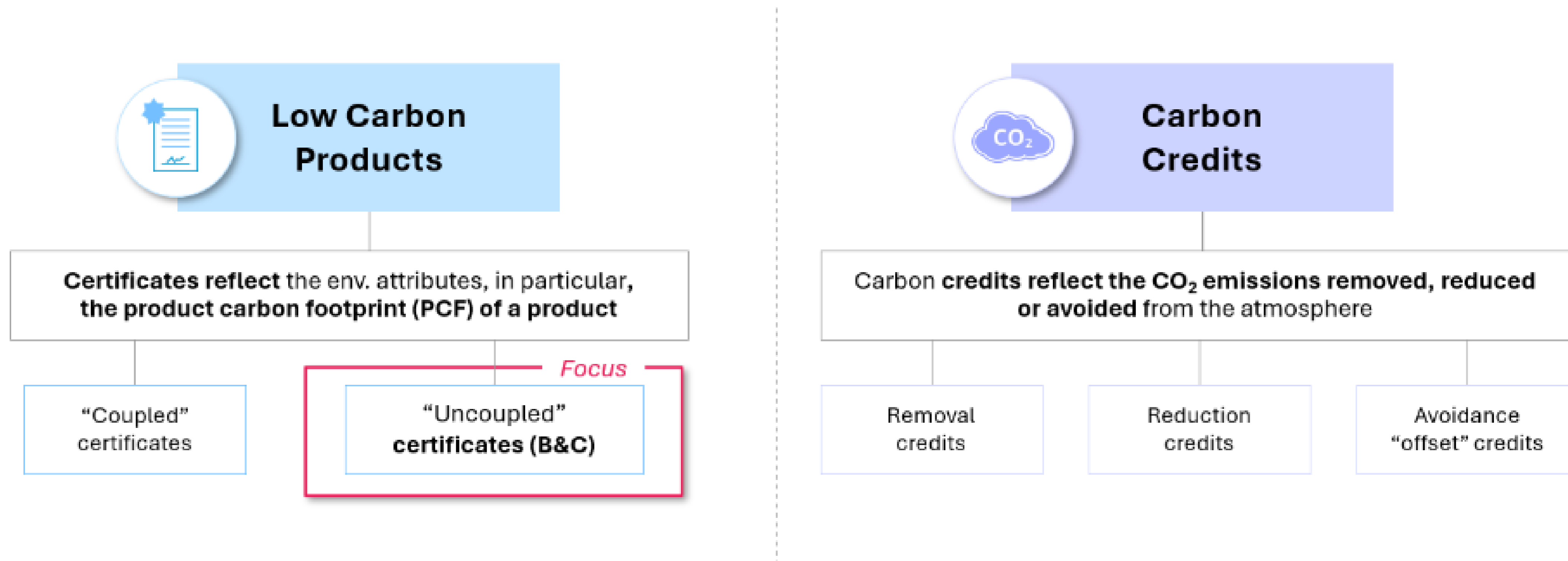
The GCCA GNR 2.0 – Global MRV for the Sector

GCCA in Numbers (GNR) is one of the most reliable sources for the cement and concrete sector.

A "well-oiled" data engine to monitor the sector's performance towards Net Zero



Credits vs Certificates | Certificates convert product carbon footprints into market value, enabling and de-risking deep decarbonization investments



Chain of Custody mechanisms enable **financing of the green transition beyond local markets** — a crucial step to **support industry players** particularly in the early stages of CCS adoption



Make decarb technologies investable across the value chain

To scale deep decarb technologies, it is key to make them buyable – revenue streams can help to share the financial burden across the value chain



Strengthen & de-risk business cases for net-zero investments

In absence of stronger regulation, business cases must be reinforced through levers such as demand aggregation or certification schemes



Enables supply where local demand falls short

By matching dispersed buyers with available supply, financial actors help build scale for low-carbon cement in otherwise hard-to-reach markets



Unlocks a revenue stream for first wave of deep decarb investments

Up-front certificate purchases could transfer early-stage cash to producers, lowering capital cost and speeding deployment of carbon-capture projects

A challenging industry context

- Incremental measures will soon hit their limits and breakthrough deep decarbonization tech becomes essential but present an economic challenge
- This highlights the urgency to develop mechanisms that help the economics to improve its feasibility

GCCA set out clear objectives for its Book & Claim system, building it around 5 foundational principles



Deep decarbonization catalyzation

Strengthen the **business case for breakthrough tech** and **maximize industry participation**, accelerating early deployment of deep decarbonization levers



Technology agnostic

Remain open and flexible to integrate **any technology that supports the system's deep decarbonization goal**



Transparency & traceability

Secure credibility through transparency, traceability, and **strict verification and measurement** processes



Standard-setter acceptance

Unlock scale by aligning with recognized standards and securing **endorsement from key standard-setters**



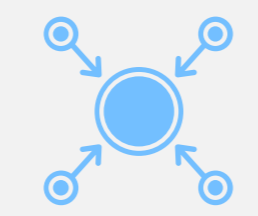
Demand alignment

Build market participation and trust with a system **designed around real buyer needs**



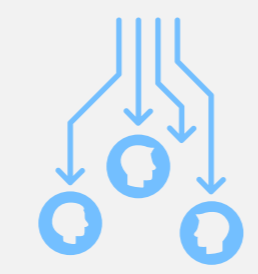
Transparency & traceability

Ensure every certificate is visible, verifiable, and auditable through strong safeguards that prevent double counting and greenwashing



Centralized registry as backbone

A secure digital platform tracks every certificate from issuance to retirement ensuring full visibility and trust



Independent third-party verification

Auditors validate emissions data and mass balance before issuance giving buyers confidence that certificates reflect real verified reductions



Prohibit double counting

Certificates are permanently retired after use and cannot be resold or duplicated maintaining the integrity of claims



Transparent reporting builds trust

Each claim is traceable to its production batch and open reporting keeps the system credible and resistant to greenwashing



Standard-setter acceptance

Design for credibility and recognition by leading frameworks and regulators, ensuring certificates hold value in corporate and policy reporting



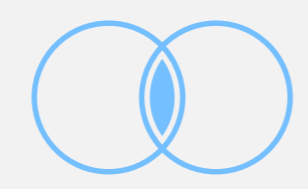
Alignment with carbon accounting standards

Applies carbon accounting based on real product emissions fully consistent with Scope 3 and product-based reporting



Active engagement with standard setters

Aim to align with major standards building a unified market mechanism that strengthens confidence and drives investment in low carbon products



Consistency to avoid fragmentation

A single global rulebook and verification model will prevent a patchwork of competing systems, offering uniform integrity and interoperability across markets



Ready for regulation and procurement rules

Built with traceability, auditability, and disclosure features to facilitate alignment with forthcoming public-procurement criteria and emerging regulatory frameworks

Why GCCA | Unified sector-driven solution guaranteeing integrity and technical rigor



Technical complexity demands expertise

- Cement processes are **highly technical**; embedding industry know-how keeps **Book & Claim mechanisms** anchored in industrial reality
- Geographical **production complexities** vary, requiring **global and neutral purview**



Robust Chain of Custody requires sector standards

- Fragmented value-chain create **traceability issues in tracking carbon attributes**, demanding a supplier-driven unified and transparent methodology
- **Sector governance** delivers uniform **data standards** and audit trails, shutting the door to green-washing claims



GCCA as sector reference point

- **GCCA covers c.70 %** of global cement output (excl. China), giving **critical mass** to scheme from day one
- **Open scheme** welcoming innovation and new technologies (e.g., novel chemistries), creating the **broadest possible scheme** to avoid fragmented initiatives and simplifies buyer adoption
- **Reference** partner for **key global stakeholders** (e.g., UN, WEF, GHGP, Race to Zero...)



Global Cement and Concrete
Association





Dr. Abbie Mabey

CARBON MARKETS AND VERIFICATION LEAD

44.01

Dr. Abbie Mabey is the Carbon Markets and Verification Lead at 44.01, where she focuses on carbon market strategy, verification, and methodology development to support the scale up of high integrity carbon removal. She brings a scientific background, with a PhD in Ocean & Earth Science from the University of Southampton, and experience spanning carbon market integrity and climate due diligence from her prior work as a Carbon Ratings Scientist at BeZero Carbon.



MMRV for In-Situ CO₂ Mineralisation

For more information, please contact Abbie Mabey at abbie@4401.earth.



PANEL SESSION



Jasmin Kemper,
Moderator



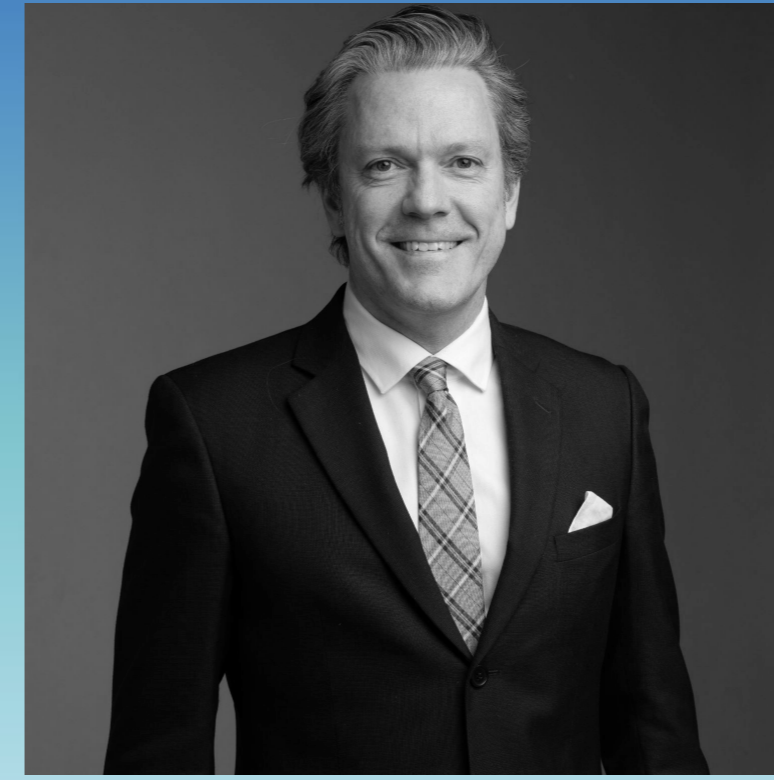
Dr. Abbie Mabey,
44.01



Claude Loréa,
CL4Change



Dr. Gerard Ostheimer,
Clean Energy Ministerial Biofuture
Industry Council



Thor Solnes,
Northern Lights

KNOWLEDGE 20
SHARING 26
CCS & CDR Summit

15:30-16:00 BREAK