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GIGATONNE BY 2030 CAMPAIGN BY CEM CCUS & MI CDR

Carbon Management Glossary

This document lists key carbon management terms and their definitions specified in various publications and/or by several relevant organisations. The purpose of this glossary is to improve communication and mutual understanding related to carbon management. The document is not intended to be all-inclusive or prescriptive. The listed definitions should not be viewed as "official" or "preferred".

The objective of the "Gigatonne by 2030" campaign is to highlight the need to drive carbon management technologies to gigatonne scale by 2030. This necessitates swift action from both governments and industry. The campaign includes both carbon capture, utilisation and storage (CCUS) and novel or technology-based carbon dioxide removals (CDR). The campaign does not cover conventional or nature-based carbon removal solutions.

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Glossary table

#	Term	Definition
1	Aquifer	A geological formation that is sufficiently permeable and porous to contain and allow flow of water (either saline or non-saline). In CCS, saline aquifers may be suitable for geological storage of CO_2
2	Biochar	A stable solid, rich in carbon that is made from organic waste material or biomass that is partially combusted in the presence of limited oxygen. Biochar may provide long-term CO_2 storage, potentially offering carbon dioxide removal.
3	Bioenergy with Carbon Capture and Storage (BECCS)	The process of extracting bioenergy from biomass, through processes such as combustion, fermentation, pyrolysis and conversion, and capturing and storing the CO_2. Since biomass contains CO_2 drawn from the atmosphere, BECCS may offer carbon dioxide removal if life cycle emissions are favourable.
4	Biomass	Plant (or animal) material that contains stored carbon, and can be used as fuel. Examples include wood and wood processing wastes, agricultural crops and residues, and organic waste. When this biomass is used to produce energy, the carbon is (typically) released during combustion and returned to the atmosphere, making modern bioenergy a (renewable and) low-emissions fuel.
5	Biomass Carbon Removal and Storage (BiCRS)	Plants and algae produce biomass via photosynthesis, which removes CO_2 from the atmosphere. The biomass can then be stored underground or durably in long-lived products to prevent its release back into the atmosphere.
6	Carbon credit	A carbon credit represents a reduction or removal of one tonne of CO_2e that can be sold or traded, usually in voluntary or compliance carbon markets.
7	Carbon dioxide (CO_2)	A colorless, odorless, naturally occurring gas made up of two oxygen atoms and one carbon atom. A by-product of fossil fuel combustion and biomass burning, it is also emitted from land use changes and other industrial processes. It is the principal anthropogenic greenhouse gas that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured, thus having a Global Warming Potential of 1.
8	Carbon (Dioxide) Capture and Storage (CCS)	Process including the separation and removal of CO_2 from the atmosphere, fuel combustion, industrial processes, or similar; its potential transport; and its permanent storage via methods such as storage in geological formations or mineralization.
9	Carbon Capture and Use/Utilization (CCU)	A process in which carbon dioxide (CO_2) is captured and the carbon then used in a product. The climate effect of CCU depends on the product lifetime, the product it displaces, and the CO2 source (fossil, biomass or atmosphere).
10	Carbon Capture, Use/Utilization, and Storage (CCUS)	Process including the separation and removal of CO_2 from the atmosphere, fuel combustion, industrial processes, or similar; its potential transport; and either its use as a resource to create valuable products or its permanent storage via methods such as in geological formations or via mineralization.
11	Carbon dioxide leakage	Unintended release of CO_2 out of a pre-defined containment. Containments can include both surface containers (e.g. compressors, pipelines or storage tanks on trucks, trains or ships) and subsurface containments (e.g. geological storage complex). Not to be confused with carbon leakage (in economics), which is the effect of carbon costs that cause companies or investors to move hydrocarbon production or other operations to jurisdictions with lower costs. The result is that emissions are not reduced; they are just emitted in a different location.
12	Carbon Dioxide Removal (CDR)	Activities that deliberately remove CO_2 from the atmosphere and durably store it in natural carbon reservoirs (e.g. rock formations, soils, plants, oceans), or in long-lived products.

#	Term	Definition
		These activities can be nature-based or technological-based approaches, or a combination of the two (i.e. a hybrid approach).
13	Carbon Management Technologies (CMTs)	The term 'Carbon Management Technologies' (CMT) encompasses activities that capture, utilize or store CO_2, or that help connect those activities. It includes: - Carbon Capture, Utilization, and Storage (CCUS) emissions mitigation technologies; and, - Technology-based Carbon Dioxide Removal (CDR) approaches (like Direct Air Capture to Carbon Storage (DACCS) and Biomass Carbon Removal and Storage (BiCRS)). Nature-based or conventional CDR approaches are also important, such as afforestation or wetland restoration, but are not included in this definition.
14	Carbon mineralization	Carbon mineralization technologies mimic and accelerate natural rock weathering or hydrothermal processes in which CO_2-reactive minerals in rocks (or alkaline waste material) react with CO_2 from the atmosphere or a concentrated CO_2 source to produce carbonate minerals that are either stored in the soil and/or ocean (e.g., ocean alkalinity enhancement), long-lived products (e.g., ex-situ carbon mineralization) or underground in mafic- or ultramafic formations (e.g., in-situ carbon mineralisation). 'Enhanced rock weathering' and 'enhanced weathering' are used synonymously.
15	Carbon neutral	A term used at sub-global scales to describe products and services, companies, events and sub-national regions (e.g. cities) with net zero emissions.
16	CCS-ready	New large-scale, stationary carbon dioxide (CO_2) point sources intended to be retrofitted with Carbon Dioxide Capture and Storage (CCS) could be designed and located to be 'CCS-ready' by reserving space for the capture installation, designing the unit for optimal performance when capture is added, and siting the plant to enable access to storage locations.
17	Circular Carbon Economy (CCE)	The circular carbon economy builds on the principles of circular economy and applies them to managing carbon emissions: to reduce the carbon that must be managed in the first place, to reuse carbon as an input to create feedstocks and fuels, to recycle carbon through the natural carbon cycle with bioenergy, and, unique to circular carbon economy, to remove excess carbon and store it.
18	Cluster	See 'hub'
19	Conventional CDR	CDR methods that are well established, already deployed at scale and widely reported by countries as part of land use, land-use change and forestry (LULUCF) activities. Often also referred to as 'Nature-based CDR'. The methods included in this group are afforestation/reforestation; agroforestry; forest management; soil carbon sequestration in croplands and grasslands; peatland and coastal wetland restoration; and sequestration in durable wood products.
20	Deployment	Activities with the objective to achieve large-scale operation and commercialisation of technologies, as opposed to activity intending to improve innovation or technological development through R&D.
21	Direct Air Capture (DAC)	Any technology or technological process that captures CO_2 from ambient air. When paired with carbon storage strategies, sometimes referred to as direct air carbon capture and storage.
22	Direct Air Carbon Capture and Storage (DACCS)	Direct Air Capture coupled with permanent storage of the captured CO2 in geological formations or long-lived products.
23	Durability	The capacity to store carbon over time without releasing it back to the atmosphere. Carbon pools with characteristic storage timescales on the order of several decades or more may prove sufficiently durable for CDR. These include trees, wetlands, soils, biochar, durable wood products (e.g. timber for construction), mineral products (e.g. aggregates), marine sediments, ocean bicarbonate, depleted fossil fuel reservoirs, saline aquifers and mineral rock formations.

#	Term	Definition
24	Enhanced hydrocarbon recovery	An umbrella term to refer to enhanced oil recovery (EOR) and enhanced gas recovery (EGR). EOR and EGR may be used following primary (conventional) extraction of oil and gas from a reservoir. EOR and EGR involve the injection of supercritical CO_2 (i.e. high temperature and pressure CO_2 that has properties of both a gas and liquid) into hydrocarbon reservoirs for the purpose of increasing the amount of oil or gas recovered beyond primary (conventional) extraction. As CO_2 may be permanently stored in the reservoir, the resulting oil and gas may have a lower carbon intensity than in conventional extraction.
25	Enhanced water recovery	A process of injecting CO_2 into deep saline aquifers for CO2 storage with enhanced saline water/brine recovery.
26	Enhanced (rock) weathering	See 'Carbon mineralization'
27	Engineered CDR	See 'Novel CDR'
28	Ex-situ carbon mineralization	A process where minerals are mined, transferred to an industrial facility, reacted with carbon dioxide and processed.
29	Geological storage	Long-term containment of CO_2 in subsurface geological formations, such as saline aquifers or depleted oil and gas reservoirs, or un-minable coal seams or shales. Also includes permanent mineral storage of CO_2 in subsurface geology such as mafic and ultramafic formations.
30	Gigatonne	One billion tonnes = 1 000 000 000 tonnes.
31	Global warming potential (GWP)	A measure of how much heat a greenhouse gas traps in the atmosphere over a specific time period, relative to carbon dioxide.
32	Greenhouse gas (GHG)	Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, which absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, by the atmosphere itself, and by clouds. This property causes the greenhouse effect. Water vapor (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), and ozone (O_3) are the primary greenhouse gases in the Earth's atmosphere. Moreover, there are a number of entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances. CO_2 is the primary GHG emitted by human activities.
33	Greenhouse gas removals (GGRs)	Removal of greenhouse gases from the atmosphere either by technological or natural processes. See also 'Carbon Dioxide Removal'.
34	Hub	A CCUS hub is a grouping of CO_2 emitters that are able to utilise common carbon capture, transport and/or storage infrastructure. A hub can also include installations and terminals for CO_2 transportation, as well as temporary storage facilities.
35	In-situ carbon mineralization	In-situ carbon mineralization is the process whereby carbon dioxide (CO_2) injected into subsurface geological formations reacts with reactive minerals (such as silicates, oxides, and ultramafic minerals) in the host rock to form stable carbonate minerals, thereby permanently storing CO_2. This process can occur naturally or be enhanced through engineered interventions.
36	Marine Carbon Dioxide Removal (mCDR)	Anthropogenic enhancement of biological or geochemical sinks (e.g., alkalinity enhancement, blue carbon, ocean fertilization) that result in the removal and storage of atmospheric CO_2 in ocean reservoirs.
37	Monitoring, Reporting and Verification (MRV)	In the context of carbon management, process whereby achieved emission avoidance, reductions and removals are measured, reported and verified to ensure the accuracy of reporting data and to allow stakeholders, including emitting facilities, to track changes in emissions and emissions reduction over time.

#	Term	Definition
38	Mineral carbonation	See 'carbon mineralization'.
39	Nature-based solutions or nature-based CDR	See 'conventional CDR'
40	Negative Emission Technologies (NETs)	Technological solutions that durably remove CO_2 from the earth's atmosphere. In some cases, Carbon Dioxide Removal (CDR) technologies is used synonymously.
41	(Net) Negative Emissions	Conditions where annual rates of greenhouse gas removal are greater than residual greenhouse gas emissions.
42	Net-Zero Emissions	Condition in which anthropogenic greenhouse gas (GHG) emissions are balanced by anthropogenic GHG emissions removals over a specified period. The quantification of net zero GHG emissions depends on the metric chosen to compare emissions and removals of different gases, as well as the time horizon chosen for that metric.
43	Novel CDR	Engineered or technological solutions that deliberately remove CO2 from the atmosphere and durably store it in natural carbon reservoirs (e.g., geological, terrestrial, or ocean), or in long-lived products. Also referred to as 'Technology-based CDR'. Novel CDR includes, but is not limited to, Bioenergy with Carbon Capture and Storage (BECCS), Biomass Carbon Removal and Storage (BiCRS, including e.g. biochar), Direct Air Carbon Capture and Storage (DACCS), carbon mineralization and marine CDR technologies.
44	Ocean alkalinity enhancement (OAE)	An approach to marine carbon dioxide removal (mCDR) that involves adding alkalinity to seawater to enhance the ocean's natural carbon sink. Adding alkalinity to the ocean removes CO_2 from the atmosphere through a series of reactions that convert dissolved CO_2 into bicarbonate and carbonate molecules, which in turn causes the ocean to draw down CO_2 from the atmosphere to restore equilibrium.
45	Permanence	See 'durability'
46	Reservoir	A subsurface body of rock with sufficient porosity and permeability to store and transmit fluids. May also refer to the storage of carbon dioxide in waterbodies, such as the ocean.
47	Residual emissions	Remaining gross emissions when net-zero, and subsequently, net-negative, emissions are reached. Can apply to both net zero CO2 and net zero GHG emissions, from local to global scales and at company or sector level. To reach net-zero emissions, the amount of CDR must equal the amount of residual emissions over a given period. To reach net-negative emissions, the amount of CDR must exceed residual emissions.
48	Soil carbon sequestration	Occurs through direct and indirect fixation of atmospheric CO_2. Direct soil carbon sequestration occurs by inorganic chemical reactions that convert CO_2 into soil inorganic carbon compounds such as calcium and magnesium carbonates. Direct plant carbon sequestration occurs as plants photosynthesize atmospheric CO_2 into plant biomass. Subsequently, some of this plant biomass is indirectly sequestered as soil organic carbon (SOC) during decomposition processes. Worldwide, SOC in the top 1 meter of soil comprises about 3/4 of the earth's terrestrial carbon.
49	Technology-based CDR	See 'Novel CDR'.

Sources

- Canada Carbon Management Strategy (2023), https://natural-resources.canada.ca/sites/nrcan/files/energy/pdf/NRCan_CCMS_EN.pdf
- IPCC Glossary of Terms https://apps.ipcc.ch/glossary/
- ISO Standard 27917:2017 (2017), https://www.iso.org/standard/72969.html
- State of CDR, 2nd edition (2024), https://www.stateofcdr.org/edition-2-resources-1
- Saudi Arabia's Greenhouse Gas Crediting & Offsetting Mechanism: https://gcom.cdmdna.gov.sa/Downloads/KSA-GCOM-GUIDELINE.pdf
- KAPSARC CCE guide, https://www.cceguide.org/guide/
- National Academies of Sciences, Engineering, and Medicine. (2019). Chapter 6: Carbon Mineralization of CO_2, https://nap.nationalacademies.org/read/25259/chapter/1#xiii
- World Bank, Carbon Crediting A Results-based Approach to Mobilizing Additional Climate Financing (2025), https://openknowledge.worldbank.org/server/api/core/bitstreams/ae205ad4-e801-4ddf-9c64-34d0091092e8/content