Carbon Accounting Lexicon

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Additionality: A proposed activity is additional if a financial incentive or policy intervention is deemed to be the cause of the activity. The occurrence of additionality is determined by assessing whether a proposed activity is distinct from its baseline, which is to say that the GHG reductions occurred because of the incentive provided by the carbon credit revenue.[1]

Allocation: Under an emissions trading scheme, a covered entity's emissions permits comprise its allocation. Permits to emit can initially either be given away for free, usually under a 'grandfathering' approach based on past emissions in a base year or an 'updating' approach based on the more recent emissions. The alternative is to auction permits in an initial market offering.[2]

Baseline: A prediction of the quantified amount of an input to or output from an activity resulting from the expected future behavior of the actors proposing, and affected by, the proposed activity in the absence of one or more policy interventions, holding all other factors constant (*ceteris paribus*). The conditions of a baseline are described in a baseline scenario.[3]

Business as Usual: A "business-as-usual" scenario assumes that future development trends follow those of the past and no changes in policies will take place. The term "business as usual scenario" is used interchangeably with "baseline scenario," "reference scenario," and "no policy scenario."[4] Business as usual scenarios are compared to mitigation scenarios that are constructed to meet different goals for greenhouse gas (GHG) emissions, atmospheric concentrations, or temperature change.

Cap and Trade: A regulatory approach used to control pollution by setting a firm cap on allowed emissions while employing market mechanisms to achieve emissions reductions while driving costs down. In a cap-and-trade program, a limit, or cap is put on the amount of greenhouse gases that can be emitted.[5]

Carbon credit/offset: A tradable, non-tangible instrument representing a unit of carbon dioxide-equivalent (CO2e) – typically one tonne - that is reduced, avoided or sequestered by a project and is certified/verified to a recognized carbon accounting standard.[6]

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[1] http://ghginstitute.org/wp-content/uploads/2015/04/AdditionalityPaper_Part-1ver3FINAL.pdf
[2] Permits to emit can initially either be given away for free, usually under a 'grandfathering' approach based on past emissions in a base year or an 'updating' approach based on the more recent emissions. The alternative is to auction permits in an initial market offering.
[3] http://ghginstitute.org/wp-content/uploads/2015/04/AdditionalityPaper_Part-1ver3FINAL.pdf
[4] http://www.ipcc.ch/ipccreports/tar/wg3/index.php?idp=286
[5] https://www.arb.ca.gov/html/gloss.htm
[6] http://www.icroa.org/resources/Secretariat/icroa_cobp_tech_specs-final.pdf

Carbon Dioxide Equivalent (CO2e): The emissions of a gas, by weight, multiplied by its "global warming potential."[7]

Carbon Offset Standard: The accounting processes, including project design, project, validation, performance monitoring, reporting and verification developed by an independent, qualified entity to measure the amount of carbon dioxide equivalents that will not be released into the atmosphere as a result of a specific carbon project's activity.[8]

Carbon Taxes: A surcharge on the carbon content of oil, coal, and gas that discourages the use of fossil fuels and aims to reduce carbon dioxide emissions.[9]

Compliance Market: Compliance markets are the result of government regulation to reduce greenhouse gas emissions and allow regulated entities to obtain and surrender emissions permits (allowances) or offsets in order to meet predetermined regulatory targets.[10]

Emissions Cap: A mandated restraint in a scheduled timeframe that puts a "ceiling" on the total amount of anthropogenic greenhouse gas emissions that can be released into the atmosphere. This can be measured as gross emissions or as net emissions (emissions minus gases that are sequestered).[11]

Emissions Trading: A market mechanism that allows emitters (countries, companies or facilities) to buy emissions from or sell emissions to other emitters. Emissions trading is expected to bring down the costs of meeting emission targets by allowing those who can achieve reductions less expensively to sell excess reductions (e.g., reductions in excess of those required under some regulation) to those for whom achieving reductions is more costly.[12]

GHG Destruction: With respect to landfills and manure management, methane destruction refers to the combustion of methane in any on-site or off-site combustion technology, such as flaring and thermal oxidation; combustion for use in on-site energy or heat production technologies; methane that is conveyed through pipelines (including natural gas pipelines) for off-site combustion; and methane that is collected for any other on-site or off-site use as a fuel.[13] With respect to fluorinated gases, destruction refers to the use of a thermal incinerator or catalytic oxidizer.[14]

Global Warming Potential (GWP): A system of multipliers devised to enable warming effects of different gases to be compared. The cumulative warming effect, over a specified time period, of an emission of a mass unit of CO2 is assigned the value of 1. Effects of emissions of a mass unit of non-CO2 greenhouse gases are estimated as multiples. For example, over the next 100 years, a gram of methane (CH4) in the atmosphere is currently estimated as having 23 times the warming effect as a gram of carbon dioxide; methane's 100-year GWP is thus 23. Estimates of GWP vary depending on

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[7] https://www.c2es.org/science-impacts/basics/glossary
[8] http://www.icroa.org/resources/Pictures/Voluntary%20Offsetting-Government-Engagement-White-Paper,%20November%202014.pdf
[9] https://www.c2es.org/science-impacts/basics/glossary
[10] http://www.forest-trends.org/documents/files/doc_5591.pdf
[11] Ibid.
[12] Ibid.
[13] https://www.law.cornell.edu/cfr/text/40/98.6
[14] https://www.law.cornell.edu/cfr/text/40/98.128

the time-scale considered (e.g., 20-, 50-, or 100-year GWP), because the effects of some GHGs are more persistent than others.[15]

Incentive-based Regulation: A regulation that uses the economic behavior of firms and households to attain desired environmental goals. Incentive-based programs involve taxes on emissions or tradable emission permits. The primary strength of incentive-based regulation is the flexibility it provides the polluter to find the least costly way to reduce emissions.[16]

Insetting: The process by which a company incentivizes Scope 3 GHG emissions reductions with their own value chain for the benefit of suppliers and the security of the supply chain.

Life Cycle Analysis (LCA): a technique used to assess a product's environmental footprint from its inception to endpoint. In order to provide a comprehensive view of a product environmental impact, LCA considers all stages of a product lifecycle as independent processes and allows for an estimation of a product's cumulative impacts by considering stages that are usually omitted in product analyses, such as raw material extraction and transportation.[17]

Leakage: A scenario in which a reduction in greenhouse gas (GHG) emissions directly or indirectly causes an increase in GHG emissions elsewhere, partially or entirely offsetting the initial effort. Leaked emissions are displaced rather than mitigated or sequestered.

Metric tonne of CO2: A metric tonne of carbon dioxide. Please note that a metric tonne is equivalent to 2,204.6lbs. The "long ton", a term generally used in Britain, is equivalent to 2,240lbs and the "short ton" is generally used in the USA and is equivalent to 2,000 lbs. Emissions under the "scopes" must be reported in metric tonnes of CO2e: CO2e stands for carbon dioxide equivalent. A metric tonne of CO2-e means one metric tonne of carbon dioxide or an amount of any of the other GHGs with an equivalent global warming potential.[18]

Offsetting: The practice of compensating for greenhouse gas emissions by retiring carbon credits.[19]

Permanence: The continued storage of sequestered carbon over timeframes that are meaningful in the context of mitigating climate change.[20] Permanence is the principle that offsets must remove the carbon dioxide or equivalent emissions from the atmosphere, and that the emissions are not simply being delayed.[21]

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[15] https://www.c2es.org/science-impacts/basics/glossary
[16] Ibid.
[17]https://nepis.epa.gov/Exe/ZyNET.exe/P1000L86.txt?ZyActionD=ZyDocument&Client=EPA&Index=2006%20Thru%202010&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C06THRU10%5CTXT%5C00000002%5CP1000L86.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=9&slide
[18] https://www.cdp.net/Documents/Guidance/2012/Technical/glossary-of-terms.pdf
[19] http://www.icroa.org/resources/Documents/icroa_cobp_tech_specs_2017.pdf
[20] http://www.c-agg.org/wp-content/uploads/C-AGG-Guiding-Principles-changes-re-feedback-from-July-2017-meeting.docx
[21] https://www.cbd.int/financial/2017docs/carbonmarket2017.pdf

Protocol: GHG protocols define the rules and procedures concerning accounting, **monitoring, reporting, verification, and certification** to determine project eligibility, additionality, baseline, and project emissions for a particular project type. The terms "protocol" and "methodology" are often used interchangeably.[22]

Registry: A registry is an entity that manages a database of carbon credits and their transactions, where each credit has a unique identifier. Registries track ownership of carbon credits and allow retirement (cancellation) of carbon credits when they are sold to offset an equivalent amount of greenhouse gas emissions.[23]

Resilience: The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions.[24]

Retire: To permanently remove carbon credits from circulation through the use of a 3rd party registry.[25]

Scope 1 GHG emissions: Direct GHG emissions which occur from sources that are owned or controlled by the company, for example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.; emissions from chemical production in owned or controlled process equipment.[26]

Scope 2 GHG emissions: These emissions do not physically occur from within the organization's reporting boundary and are therefore "indirect" emissions. Scope 2 emissions are caused by the organization's consumption of electricity, heat, cooling or steam brought into its reporting boundary. This category is often called "purchased electricity" because it represents the most common source of Scope 2 emissions.

Scope 3 GHG emissions: An organization's indirect emissions other than those covered in Scope 2. They are from sources that are not owned or controlled by an organization, but which occur as a result of its activities. Some examples of scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services.[27]

Sequestration: The provision of long-term storage of carbon in the terrestrial biosphere, underground, or the oceans so that the buildup of CO2 (the principle greenhouse gas) concentration in the atmosphere will reduce or slow.[28]

Validation: The project development stage that follows the Project Design Document. Validation is the approval of carbon offset projects during planning stages. To achieve validation, projects must submit information on project 27 Appendices State of the Voluntary Carbon Markets 2017 design

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[22] http://www.co2offsetresearch.org/policy/StandardsPrograms.html
[23] http://www.icroa.org/resources/Pictures/Voluntary%20Offsetting-Government-Engagement-White-Paper,%20November%202014.pdf
[24] https://www.ipcc.ch/pdf/special-reports/srex/SREX-Annex_Glossary.pdf
[25] http://www.icroa.org/resources/Documents/icroa_cobp_tech_specs_2017.pdf
[26]http://ghgprotocol.org/sites/default/files/ghgp/standards/ghg-protocol-revised.pdf
[27] Ibid.
[28] Lal, R., R.F. Follett, B.A. Stewart, J.M Kimble. 2007. Soil carbon sequestration to mitigate climate change and advance food security. Soil Sci. 172: 943–956

for third-party approval. Project design information generally includes baseline scenarios, monitoring plans, and methodologies for calculating emissions reductions.[29]

Verification: The project development stage that follows validation. Verification may take place up to several years after validation. It refers to the process of verifying emissions reductions generated by an offset project to a particular standard, which quantifies actual emissions reductions to ensure that the appropriate number of offsets are issued to the project.[30]

Voluntary Carbon Market: Voluntary carbon markets refer to the collective voluntary transactions tracked worldwide. There is no centralized single marketplace for voluntary transactions but rather many discrete transactions and, in some cases, country or program-related markets.[31]

Models & Databases Used to Quantify Carbon

Agricultural Policy Environmental eXtender (APEX): APEX was constructed to evaluate various land management strategies considering sustainability, erosion (wind, sheet, and channel), economics, water supply and quality, soil quality, plant competition, weather, and pests.[32]

DeNitrification-DeComposition Model (DNDC): Is a computer simulation model of carbon and nitrogen biogeochemistry in agro-ecosystems. The model can be used for predicting crop growth, soil temperature and moisture regimes, soil carbon dynamics, nitrogen leaching, and emissions of trace gases including nitrous oxide (N2O), nitric oxide (NO), dinitrogen (N2), ammonia (NH3), methane (CH4) and carbon dioxide (CO2).[33]

Revised Universal Soil Loss Equation (RUSLE2): Erosion prediction technologies, which are referred to as erosion models, are widely used to estimate rates of soil erosion caused by rainfall and associated overland flow.[34]

Soil Survey Geographic Database (SSURGO): The SSURGO database contains information about soil as collected by the National Cooperative Soil Survey over the course of a century. The information can be displayed in tables or as maps and is available for most areas in the United States and the Territories, Commonwealths, and Island Nations served by the USDA-NRCS.[35]

Soil Tillage Intensity Rating (STIR): is an index used to evaluate the kind, severity and number of ground disturbing passes on soil quality. This is an important index because soil quality is the capacity of a soil to perform functions critical to its intended use.[36]

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[29] http://www.forest-trends.org/documents/files/doc_5591.pdf
[30] Ibid.
[31] Ibid.
[32] https://www.climatehubs.usda.gov/hubs/northern-plains/tools/agricultural-policy-environmental-extender-model-apex
[33] https://www.dndc.sr.unh.edu/
[34] https://www.ars.usda.gov/southeast-area/oxford-ms/national-sedimentation-laboratory/watershed-physical-processes-research/docs/revised-universal-soil-loss-equation-rusle-welcome-to-rusle-1-and-rusle-2/
[35] https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcs142p2_053627
[36] https://efotg.sc.egov.usda.gov/references/public/WI/Soil_Tillage_Intensity_Rating-(2017-06).pdf

Greenhouse Gases

Below is a table of the most common greenhouse gases, their anthropogenic sources, contribution to total emissions, US emissions, and US agricultural emissions, as well as their atmospheric lifetimes and global warming potentials.

Greenhouse Gas[37]	**Chemical Formula**	**Anthropogenic Sources**[38]
Carbon dioxide	CO_2	Fossil-fuel combustion, land use conversion, cement production
Methane	CH_4	Fossil fuels, enteric fermentation, rice paddies, waste dumps
Nitrous oxide	N_2O	Fertilizer, industrial processes
Hydrofluorocarbons	HFC-23, HFC-32, HFC-125, HFC-134a, HFC-143a, HFC-152a, HFC-227ea, HFC-236fa, HFC-4310mee	refrigerants, aerosol propellants, foam blowing agents, solvents, and fire retardants
Perfluorocarbons		aluminum production, manufacturing of semiconductors
Nitrogen trifluoride	NF_3	manufacturing of semiconductors, new generation solar panels, flat-screen television sets, touch-sensitive screens, electronic processors
Sulfur hexafluoride	SF_6	magnesium processing and semiconductor manufacturing, as well as a tracer gas for leak detection, electrical transmission equipment, including circuit breakers

[37] https://www.epa.gov/sites/production/files/2017-02/documents/2017_complete_report.pdf
[38] https://www.c2es.org/facts-figures/main-ghgs