

Carbon Trading Glossary¹

Activity Based Carbon Contracts – contracts that are based on predictive models or methods of measurement that simulate carbon offsets accomplished through specific management practices that reduce emissions or sequester carbon. For example, it is estimated that farmers engaged in NoTill/Direct Seeding or Strip Till sequester conservatively 0.5 Tons of CO₂ per acre per year by engaging in these practices.

Additionality – one of the criteria that is used to measure quality and eligibility of a project or practice to qualify as an emissions offset. Additionality is the industry term for going beyond “business as usual” (BAU), i.e. to qualify as an offset, the emissions reductions from projects or practices must be additional to what would exist if the project or practices were not carried out.

Aggregator – an entity that serves as the administrative representative to pool the efforts of offset project owners for one or multiple offset-generating projects or practices.

Cap-and-trade – term for legislation that deals with capping allowed emissions and allowing a trading scheme to meet emission caps. Under a "capped-uncapped" system (like that currently in place among EU nations) greenhouse gas emissions from the major energy sectors are limited or capped, while those in other sectors, most notably land use sectors including agriculture and forestry, are not capped. In such a market, the energy (emitter) sector becomes the principle buyer, or demander, of carbon credits. Uncapped sectors (including agriculture and others who can generate emissions offset projects) become a supplier of greenhouse gas offsets, or carbon credits, for purchase by entities seeking to meet or comply with their caps. Until there is a cap on emissions, emitters only reason to purchase carbon credits is to appear environmentally responsible on a voluntary basis. The market value that emitters are willing to pay for carbon in the US has been in the \$1-4/Ton range, while values in other parts of the world where emission caps are driving value have resulted in carbon trading in the ranges of \$10-30/ton of CO₂.

Carbon Offset – offsetting is a term associated with avoiding a carbon emission in one location by implementing an emissions reduction project (or practice) in another location. A carbon offset is the net reduction in carbon emissions resulting from the avoidance of a tonne of CO₂ (*CDM Gold Standard*). A carbon offset could also arise from practices that sequester carbon.

Carbon Sequestration – this is the net process of storing carbon in a carbon sink. Sinks can include terrestrial (soil, trees), oceanic, atmospheric, and geologic. For example, terrestrial sequestration could result when carbon fixed in trees through afforestation, or plants and soil root masses as a result of NoTill practices results in photosynthesis exceeding carbon dioxide release through plant aspiration.

CCX – Chicago Climate Exchange is the U. S. first public greenhouse gas registry, reduction and trading system. Members make a legally but binding commitment to reduce GHG emissions. By the end of Phase I (December, 2006) all members were to have reduced emissions 4% below a baseline period of 1998-2001. Phase II, which extends the CCX reduction program through 2010, requires all members to reduce GHG emissions 6% below the baseline.

CDM – The **Clean Development Mechanism (CDM)** is an arrangement under the [Kyoto Protocol](#) allowing industrialized countries with a [greenhouse gas](#) reduction commitment to invest in emission reducing projects in developing countries as an alternative to what is generally considered more costly emission reductions in their own countries. In theory, the CDM allows for a drastic reduction of costs for the industrialized countries, while achieving the same amount of emission reductions as without the CDM. The CDM is supervised by the CDM Executive Board (CDM EB) and is under the guidance of the Conference of the Parties (COP/MOP) of the [United Nations Framework Convention on Climate Change](#) (UNFCCC). (*wikipedia.org*)

CO₂ Equivalent – see definition for **MTCO_{2e}**

¹ This glossary was prepared for the Ag Coalition for Carbon Trading to assist producers and policymakers in understanding Carbon Trading terminology. Definitions have been synopsisized from numerous technical papers, websites and the author's own knowledge. Additions and enhancements to this list are welcomed. For updates go to Downloadable Files at: www.wittmanconsulting.com

C-Lock Model – measurement model that uses CENTURY analytical model to quantify amount of emissions reduction/carbon sequestration based on specific micro-climates, rotations, soil types and management practices. This measurement is gaining increased attention to quantify amounts of carbon offsets marketed under performance-based carbon contracts.

CERC - Carbon emission reduction credit. Standard unit of carbon offset.

COMETvr Model – publicly accessible on-line measurement tool developed through USDA-NRCS to quantify amount of carbon sequestered based on rotations and management practices.

Direct Seeding - Term used to describe a system of establishing a crop that minimizes the amount of soil disturbance and maximizes efforts to retain the integrity of residue on the soil surface. The term "Direct Seed" is used interchangeably with the terms Zero Till and NoTill throughout the world. (see **NoTill** for additional definition)

DOEs – Designated Operational Entities are firms that have been accredited by the United Nations as competent project evaluators. They validate project design and control projects to insure that carbon emission reduction is actually achieved (see <http://unfccc.int/DOE/index.html>)

Emissions Reductions-Tillage Based – reductions in GHG emissions that result from reducing tillage.

Emissions Reductions-Fossil Fuel Consumption Based – reductions in GHG emissions that result from practices such as NoTill/Direct seeding that require reduced levels of fossil fuel to produce a crop. For example, if NoTill requires 4 gallons less fossil fuel/acre/year, total emissions reduced equal 22.38# CO₂/gal saved, or 90# (.045T) less CO₂ emitted/acre/year

EU-ETS – abbreviation for European Union-Emissions Trading Scheme. The EU-ETS is the oversight entity under which pilot-project based carbon trading is being conducted in European Union signatories seeking to comply with the Kyoto Protocol. The pilot project period began in 2003 and will go through 2007. The official period for Kyoto emissions reduction measurement is set for 2008-2012. EU-ETS is the largest GHG emissions cap and trade system in the world, involving multiple countries and sectors. Under this Scheme, electrical and industrial installations must obtain a CO₂ permit, monitor emissions, and ensure emissions do not exceed the European Union Emissions Allowances (EUAs) that each holds. The system is patterned after the U. S. sulfur dioxide emissions cap and trade program which has been highly successful in reducing SO₂ emissions.

EUA – European Union Emission Allowance

Geologic Sequestration – Sequestration that is achieved by pumping CO₂ into subterranean permanent reservoirs such as basalt formations and deep wells. Geologic sequestration is considered to be a more permanent form of GHG offset and has significant potential for longer term sequestration, but it is very costly to implement compared to terrestrial sequestration alternatives.

GHG – abbreviation for Green House Gases; "greenhouse effect" refers to the temperature regulation effect that certain atmospheric gases have on the earth. Temperature-regulating gases, called "greenhouse gases" or GHGs, form a blanket around the earth that traps heat from the sun within the earth's atmosphere, keeping the planet warm and habitable. "Global warming," or climate change, can occur when the blanket of GHGs gets thicker. Climate models from the Intergovernmental Panel on Climate Change, as well as models from other scientific bodies, indicate that global concentrations of GHGs have been rising steadily over the past 100 years. As atmospheric concentrations of GHGs increase, the greenhouse blanket gets thicker. This causes heat to be trapped in the lower layers of the atmosphere and may cause global average temperatures to rise (source: CCX FAQs).

Common green house gases include CO₂, Nitrous Oxide (NO₂) Chlorofluorocarbons (CFCs), and methane (CH₄). Global warming impacts of each of these gases differ significantly. CO₂, the most common GHG, is assigned an index value = 1. Index values for CH₄ = 21; NO₂ = 310; HFCs = 150; PFCs = 6500.

Gold Standard – The term “Gold Standard” has been used in global markets as well as in the U. S. The **Gold Standard** based in Basel, Switzerland, is a foundation, a project development method, and a credit label. Endorsed by 42 non-governmental organizations (NGOs) worldwide, it offers a quality label to CDM/JI and voluntary GHG offset projects. It issues credits in the voluntary market but only covers renewable energy and energy efficiency projects; it does not get involved in carbon sequestration projects (i.e. agriculture and forestry). Gold Standard is not a verifier. (*see www.cdmgoldstandard.org*)

Not to be confused with the Swiss program described above, in the U. S. the **Gold Standard** is a manual that was been developed by Duke University. It establishes protocols for measuring or quantifying offsets generated by changing land uses and practices.

Humus – Humus is a key component in the soil profile that stores water, holds soil particles together and provides a healthy environment for microorganisms to aid in nutrient exchange and plant growth. Organic Matter is not all humus. Humus takes thousands of years to build in the soil through decomposition of soil residues. Humus has a carbon:nitrogen ratio of 10:1. For example, wheat straw has an 80:1 ratio, and when it breaks down in the soil, it converts to organic matter at a 30:1 C:N ratio. Understanding humus and organic matter dynamics is critical to understanding CO₂ release and sequestration as well as nutrient release and replenishment strategies dictated by intensive versus reduced tillage cropping systems. Understanding these dynamics is also important in understanding nitrogen requirements associated with building carbon in the soil profile.

IPCC – International Panel on Climate Change (*expand*)

King Formula – In 2002 D. M. King developed a “universal carbon sequestration credit scoring equation” in the King Paper that described an alternative standard for scoring the amount and quality of carbon sequestered in a particular project. It takes into consideration the following factors: Basic Project Parameters (level of carbon sequestered prior to the project; after the project has had full effect; and number of years project will have full effect), risk adjustment parameters (baseline, project, durability, leakage), and time adjustment parameters (time discount, length of trade accounting period).

Kyoto Protocol – The Kyoto protocol resulted from the United Nations Framework Convention on Climate Change held in Kyoto, Japan in December of 1997. It proposed a process for establishing quantitative, enforceable limits on the emission of greenhouse gases to the Earth’s atmosphere. It also contained negotiated commitments by 38 developed countries and countries in transition to reduce emissions 7% below 1990 baseline levels for the period 2008-2012. The protocol called for reductions in fossil fuel consumption by improving the efficiency of energy use and by developing renewable source of energy and identifying sinks and increasing rates of carbon sequestration. The protocol prescribed that countries could remove GHG CO₂ from the atmosphere into living plants, sequester carbon in the terrestrial biosphere, and use the sequestered carbon to offset some of the greenhouse gas emissions from other sources. The protocol provided for an emissions trading process where an emitting country could meet emissions requirement in part by trading with another country performing an emissions reduction activity, but the protocol was silent on eligibility of carbon sequestration projects to offset emissions-reductions requirements.

Leakage – a term used to describe the emission of CO₂ as a result of the production cycle. Forestry and agriculture emit CO₂ in the process of growing trees and agricultural crops through their use of fertilizers, equipment, power, fire (prescribed and wildfire), and vegetative decomposition.

Low Carbon Fuels – fuels made from renewable sources. (See renewable fuels).

MMV – abbreviation for the carbon contract administration processes known as Measurement, Monitoring and Verification. MMV can result in significant cost outlays to administer carbon contracts related to terrestrial sequestration (NoTill, grazing/CRP, reforestation/Aforestation, etc.). MMV costs can exceed the market value of the carbon offsets, if sellers are forced to measure, monitor and verify actual field results of their management activity to create the offsets. For this reason, sellers of terrestrial-based carbon offsets have continued to support development and refinement of predictive modeling systems such as C-Lock and COMET whose goals are to accurately duplicate the results that would be found from actual field measurements.

MTCO_{2e} – Metric Tonne Carbon Dioxide Equivalent; equates to 2204.62 pounds of CO₂. This is a standard measure of amount of CO₂ emissions reduced or sequestered. Carbon is not the same as Carbon Dioxide. Sequestering 3.67 tons of CO₂ is equivalent to sequester one ton of carbon.

NoTill – Term used to describe a system of establishing a crop that minimizes the amount of soil disturbance required and maximizes efforts to retain the integrity of residue on the soil surface. The term “NoTill” is used interchangeably with the terms Zero Till and Direct Seeding throughout the world. NRCS Conservation Practice Standard 329 includes a combined definition for NoTill/Strip Till/Direct Seed as follows: “Managing the amount, orientation and distribution of crop and other plant residue on the soil surface year round while limiting soil-disturbing activities to only those necessary to place nutrients, condition residue and plant crops.”

NAPs – National Allocation Plans, a feature of the Kyoto Protocol (*expand*)

NCEP – National Commission on Energy Policy

Offset Provider – an owner of an offset project that either registers a project directly on a tradable exchange or offers the offset project for trading through an aggregator.

Permanence – a criteria that is used to measure quality and eligibility of a project or practice to qualify as an emissions offset; this criteria measures whether the offset is temporary or permanent in nature. (*expand*)

Performance Based Contracts - contracts that are based on actual performance achieved as measured by actual field testing or measurement models that determine actual amounts of carbon offsets accomplished through specific management practices that reduce emissions or sequester carbon. For example, farmers engaged in NoTill/Direct Seeding or Strip Till in highly productive farming regions with high rainfall and residue intensive crop rotations might sequester 1.0 Tons of CO₂ per acre per year as a direct result of engaging in these cropping system practices. Whereas a farm in a low rainfall area with light, sandy soils, low organic matter, and limited viability of alternative rotation crops may only sequester 0.25 Tons of CO₂ per acre per year from the same practices.

Registry – advocates for developing audited approaches to carbon trading are endorsing registration of carbon credit sales or emissions offset sales so buyers and sellers. EcoRegistry (ERT) is one example.

Renewable Fuels - fuels manufactured from renewable sources such as wind, water, and grain stocks. Two common replacements for fossil fuel are ethanol and biodiesel. Energy provided from renewable sources displaces the need for fossil fuel consumption, reduces GHG emissions and has a positive effect on global climate change.

Renewable Fuels Standard (RFS) - Under the Energy Policy Act of 2005, EPA is responsible for promulgating regulations to ensure that gasoline sold in the United States contains a minimum volume of renewable fuel. A national Renewable Fuel Program (also known as the Renewable Fuel Standard Program, or RFS Program) will increase the volume of renewable fuel required to be blended into gasoline, starting with 4.0 billion gallons in calendar year 2006 and nearly doubling to 7.5 billion gallons by 2012. The RFS program proposed by EPA was developed in collaboration with refiners, renewable fuel producers, and many other stakeholders. *Source: US EPA website*

RGGI – Regional Greenhouse Gas Initiative involves seven Northeast states (Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York and Vermont) whose goal is to reduce CO₂ emissions from power plants. Maryland passed legislation that requires it to join RGGI by June 2007. RGGI participants proposed a cap-and-trade program that uses emissions credits or allowances to limit the total amount of CO₂ emissions. Caps begin in 2009 and remain until 2015, after which a 10 percent reduction is targeted by 2019. If RGGI's goals are attained they project to decrease emissions 35% by 2020 compared top projected emissions without a program. A MOU was completed in 2005, and regulations for implementation of the protocol were announced August 15, 2006.

RMU - a term coined in the early days of carbon trading that was used to describe the quantity of carbon sequestered. This term has been superseded by terms such as XSOs and CERCs.

SCI – Soil Condition Index is a term developed by NRCS to indicate the impact of a farm’s cropping system practices on soil quality. The index is calculated as part of the RUSLE II model developed by NRCS and considers tillage, rotations, soil types, climate impacts, slope considerations, and other factors. It is used as a scoring mechanism for many conservation and cost share programs within USDA. For example, a farm cannot qualify for the CSP (Conservation Security Program) without a positive SCI. SCI is an important term to understand and track as demand for renewable fuel alternatives looks at alternatives such as stover as a biofuel feedstock. To insure a sustainable soil quality level, research will be needed to determine how much stover can be removed without deteriorating soil quality.

Sinks – Places where carbon is stored or sequestered such as in soil (as measured as Soil Organic Matter), in plant material (such as trees), oceans, and deep geologic formations.

SOC – Soil Organic Carbon is a key measurement indicator of soil quality, normally state as % of Soil Organic Matter (SOM). It is normally obtained by taking soil samples and indicates the % of soil carbon in a specific layer of soil (i.e. 2.0% SOM in top 6 inches of soil profile). This indicator is important both as to quantity as well as relatively where it is concentrated in the soil profile. The most active area for plant growth and nutrient exchange is the top 4-6”; consequently that is why soil organic matter testing usually focuses on measurements in this layer.

STIR – Soil Tillage Intensity Rating is a term developed by NRCS to assess the impact that tillage operations have on soil quality and residue retention on the soil surface. It is used as a scoring mechanism for conservation program participation eligibility and cost sharing. It considers frequency of tillage, depth, speed, width, and how these variables impact erosive tendencies and soil degradation. The lower the STIR, the higher a farm scores.

Stover – a term used to describe residue or biomass above the soil surface. Stover can refer to corn, wheat, switchgrass or other straw, and is often used to refer to harvestable biomass available for pasturing or removal as a feedstock. Feedstocks removed have traditionally been used for animal feed, and more recently are being studied as a source of raw material for producing cellulosic ethanol.

Strip Till - Term used to describe a system of establishing a crop that minimizes the amount of soil disturbance and maximizes efforts to retain the integrity of residue on the soil surface. Strip Till differs from NoTill/Direct Seed. It normally involves a fall tillage operation that clears residue in the target seed zone, places soil in a ridge to aid in drying and soil warmth to facilitate seeding at a later date, and may or may not include a fertilizer placement. A second operation at seeding time places seed (and usually additional fertilizer) in the ridged seed zone, usually with the aid of Precision Farming technology (see **NoTill** for additional definition).

Terrestrial Sequestration – sequestration that is associated with capturing and storing carbon in plant and soil structures. Terrestrial sequestration is commonly achieved through such practices as NoTill/Strip Till/Direct Seeding, grassland seeding, forestation and afforestation.

UNFCCC - United Nations Framework Convention on Climate Change (see www.unfccc.int.org)

USVRGGP – U. S. Voluntary Reporting of Greenhouse Gases Program (see definition of 1605 (B) for further detail.)

VERs – Verified Emission Reduction; a standard measure of emission reductions in the EU market.

XSO – unit of carbon offset traded on CCX.

Zero Till - Term used to describe a system of establishing a crop that minimizes the amount of soil disturbance and maximizes efforts to retain the integrity of residue on the soil surface. The term “NoTill” is used interchangeably with the terms, Zero Till and Direct Seeding throughout the world. (see **NoTill** for additional definition)

1605 (B) – a provision of the Energy Policy Act of 1992 that established the U. S. Voluntary Reporting of Greenhouse Gases Program (USVRGGP). This act provided a means for organizations and individuals who have reduced emissions to record their accomplishments.

329b – NRCS Conservation Practice Standard for NoTill/Direct Seed/Strip Till. It is used to outline minimum practices to be maintained to be considered as adhering to this cropping system practice. The 329b standard is used within NRCS to qualify producers for eligibility for a number of conservation programs and cost shares, and it is also used by some aggregators as a reference in identifying required protocols to qualify for emissions offsets contracts. There is some danger in using references to a government program as opposed to defining the actual nature of practices to be maintained. The 329b standard is periodically updated by NRCS and its content may actually place a carbon contract out of compliance if modified after the carbon trading contract is executed.