

MU Guide

Introduction to Greenhouse Gas Markets and Cap-and-Trade

Most production processes create by-products as well as the intended product. Some of these by-products have value (e.g., distiller dried grains, a by-product of ethanol production, have value as a livestock feed); others are considered waste and entail an expense for their disposal. Frequently the least expensive way to dispose of by-products has been to release them into the environment. Examples include the emissions of sulfur and particulate matter into the air when burning coal to create electricity and the introduction of chemicals into rivers through sewer systems.

Pollution abatement

When a by-product is found to have a negative consequence in the environment, it is considered a pollutant (sometimes called in economic terms a negative externality, a production cost that producers pass on to society). Reducing the amount of the pollutant is deemed necessary to improve or preserve environmental quality. When the government decides to reduce the quantity of pollutant released into the environment they have several different tools from which to choose.

Historically, the pollution prevention tool that has been most often used is performance standards achieved through advances in technology. An example of performance standards is the government-mandated automotive fuel efficiency standards that were initiated in the 1970s and are still being increased.

A second pollution-prevention tool has been the imposition of pollution taxes. The government imposes a per-unit-of-pollution tax on companies and other entities that release pollutants into the environment. Because this tax increases the cost of providing goods and services, the taxed business has incentive to reduce its level of pollution. At the time that the tax is imposed, the level of reduction of pollution is uncer-

tain, but theoretically a reduction should occur. Part of the justification of the tax is that it will provide revenue to assist in cleaning up the environment. An example of a pollution tax is the per-kilowatt-hour tax that the city of Boulder, Colorado, imposes on electricity use because of its related greenhouse gas emissions.

A third, more recent, pollution-prevention tool is emissions trading through a so-called cap-and-trade system. Under a cap-and-trade system, the government imposes a cap on the amount of pollutant that is allowed to be released and then either gives or auctions off the right to emit the pollutant through a market where polluters trade their allowances in the hope of reducing the cost of complying with the regulation. In the United States, a cap-and-trade system was successfully implemented in the 1990s to combat acid rain by decreasing the amount of sulfur dioxide released when burning coal to generate electricity.

This publication introduces the principles of greenhouse gas (GHG) cap-and-trade systems used as a way of decreasing greenhouse gas emissions. It provides a basic introduction to cap-and-trade policies and discusses current markets for emissions trading of GHGs. It specifically addresses the potential agricultural involvement in a carbon dioxide cap-and-trade system.

Emissions trading

The idea behind a cap-and-trade system is that pollution reductions will occur at the least possible cost because polluters can choose how to reduce their level of emissions. If it is cheaper for them to institute activities or build facilities that reduce their emissions, they will do that. But if it is cheaper for them to pay some other company to reduce its emissions, then they can use those reductions to satisfy the government mandate for reduced emissions. Government regulations specify the acceptable level of emissions; the market determines the most efficient way of obtaining that level.

This discussion of cap-and-trade centers on the participants in the GHG market. By understanding different participants, we can begin to understand the potential impact that a cap-and-trade system can

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have on agriculture. The participants discussed are (1) government, (2) sources of capped GHG emissions, (3) entities that are able to provide offsets for capped emissions, (4) other interested parties and (5) the market. Each of the following sections illustrates the range of options that have been chosen by different governments in trying to reduce GHG emissions.

A summary of terms used within a cap-and-trade system should help with the discussion. The government determines what the total allowable emissions for the region are and usually requires certain sources to reduce their emissions by a certain amount in order to meet the goal. In this way, each polluting entity is given an “allowance.” If any entity emits less than its allowance, it generates “surplus allowances” or “credits” that can be sold to other entities that want them, usually because they are not able to emit less than their allowances. Certain entities that are not subject to a GHG cap create “offsets” by engaging in activities that either destroy or sequester GHG or that generate energy without emitting any GHG. These offsets can be traded like credits to entities that want them. Both offsets and credits are usually measured in metric tons of “CO₂ equivalent” (CO₂ Eq. or CO₂e). Carbon dioxide is not the only greenhouse gas emitted, but all others are translated into their global warming potential relative to CO₂ before trading on the exchange. A CO₂ Eq. is the 100-year global warming potential of various GHGs as established by the Intergovernmental Panel on Climate Change (IPCC).

Government

This section refers to the Safe Climate Act of 2009. President Obama has endorsed this bill in principle, and as of mid-June 2009 it is progressing through the U.S. House of Representatives. Though it is not currently law and will undoubtedly change from its current form, it is discussed here as the most likely U.S. government program to address GHG emissions.

Several levels of government are involved in GHG emissions regulation. Some local governments (e.g., Boulder, Colorado, and Fargo, North Dakota) or state governments (e.g., Illinois) have voluntarily agreed to subject themselves to a cap on GHG emissions associated with conducting city and state government activities. Several states in the northeastern United States joined together to form the Regional Greenhouse Gas Initiative, which has instituted a cap-and-trade system on electric companies. The European Union has instituted a cap-and-trade system on major GHG emission sources in accordance with an international treaty called the Kyoto Protocol.

The above list of government actions reveals that different levels of government can be involved in the reduction of GHG emissions. However, since the envi-

ronmental hazard of concern is *global* climate change, success requires that most, if not all, of the governments of the world collaborate to reduce GHG emissions.

The Kyoto Protocol is an international treaty developed in 1997 with the goal of reducing GHG emissions. The protocol calls for developed nations to cut their GHG emissions relative to a 1990 baseline. Developing nations are not called upon to reduce their GHG emissions. The United States is the only major industrial nation that has not ratified the Kyoto Protocol. Two major objections to the Kyoto protocol that have prevented the U.S. Senate from ratifying it are (1) it would impose significant costs on the U.S. economy, and (2) it would not work, because major polluting countries (specifically China and India) are not limited in their emissions. A corollary concern is that countries not subject to a cap can produce goods less expensively than those that operate under the cap; therefore, agreeing to the Kyoto Protocol would affect trade and employment in the United States.

The Kyoto Protocol calls for the United States to reduce its emissions by 7 percent from its 1990 levels. The EU is to reduce emissions by 8 percent from their 1990 levels. The Safe Climate Act of 2009 is proposing that emissions be reduced to 17 percent of 2005 levels by the year 2050. The table below shows the intermediate target emissions and how they relate to the 1990 emissions. If the Safe Climate Act of 2009 becomes law, the United States will comply with the Kyoto Protocol in the year 2020.

Year standard to be met	Safe Climate Act of 2009	
	Emissions as a percent of 2005 level	Emissions as a percent of 1990 level
2012	97%	113%
2020	80%	93%
2030	58%	67%
2050	17%	20%

Should the U.S. government decide to regulate GHG emissions, it must make the following decisions that will be crucial to the operation of the program: (1) what will be the target reductions and by what year will they be reached; (2) which entities will have a cap, or limit, on the amount of GHG they can emit; (3) how will they allocate the permitted quantity of GHG emissions; (4) which entities will be allowed to provide GHG credits or offsets; (5) what limits are placed on offset providers; and (6) where will the market be conducted? Intense lobbying will occur to make sure that these questions and others are answered in ways that benefit the particular interest group lobbying the government.

Sources of capped GHG emissions

When a government decides to regulate pollution, it determines what type and size of polluting entity will

be subject to the regulations. Though there are several sources of GHG emissions, the Regional Greenhouse Gas Initiative (RGGI and other markets are discussed below) decided to regulate only electric power plants; the European Union Emission Trading System (EU ETS) regulates power generation and energy-intensive manufacturing. The U.S. Environmental Protection Agency (EPA) released a proposed GHG *reporting* rule in 2009 in which they indicated that the regulations would cover entities that emit more than 25,000 metric tons of CO₂ Eq. annually. (Note that this is a reporting mandate, not an emissions cap). Polluting entities discharging less than 25,000 tons of CO₂ Eq. annually are not subject to the reporting regulation. The decision of which entity to regulate often comes down to some type of cost-benefit decision, such as which polluters emit enough pollutants to warrant the cost of reducing the pollution and of enforcing the regulation.

The EPA has historical estimates of the amount of GHG emissions produced by various sectors. Published EPA inventories indicate key categories as sources that have significant levels of emissions or whose emissions are trending upward. Figure 1 shows the key categories and emission levels in 2006. This information provides insight into which sources are likely to be subject to an emissions cap.

The designation of which sources will be capped is a political decision that is likely to include a cost-benefit analysis. For example, the EPA has indicated that manure management (key category 16 in Figure 1) needs to report its emissions annually but that enteric fermentation (methane production during animal digestion; key category 7 in Figure 1) does not. Enteric fermentation is a larger source of emissions

than manure management, but the cost of reporting emissions on livestock enteric fermentation is more problematic than the cost of reporting emissions on livestock manure management.

It is likely that the only cap that can be easily applied to agriculture is on manure management. Manure management is more easily capped than other agricultural sources of GHG because it is a point source of pollution, meaning that it is easy to locate the exact source of emissions. Both direct and indirect emissions resulting from application of nitrogen fertilizers are nonpoint sources of pollution. Nonpoint sources are more difficult to regulate than point sources. Though each pound of fertilizer applied to cropland has the potential to be a pollutant, not every pound actually becomes a pollutant. Release of GHGs from fertilizers is dependent on factors such as weather and growing conditions after the fertilizer is applied. A more likely way to reduce fertilizer emissions is to limit the GHG emissions from fertilizer manufacturers. Any costs they incur to reduce GHG emissions would be added to the cost farmers pay for the fertilizers.

Offset providers

In most cap-and-trade scenarios, all entities that are subject to a cap on their emissions are also allowed to sell credits — any emissions that are below their allowance. Some entities that are not subject to a cap are permitted by the government to provide offsets for the market. Usually, the quantity of credits supplied by uncapped entities is limited to a percentage of the total allowable emissions. For example, the RGGI limits the use of such credits to 3.3 percent of the allowance of the regulated electric companies.

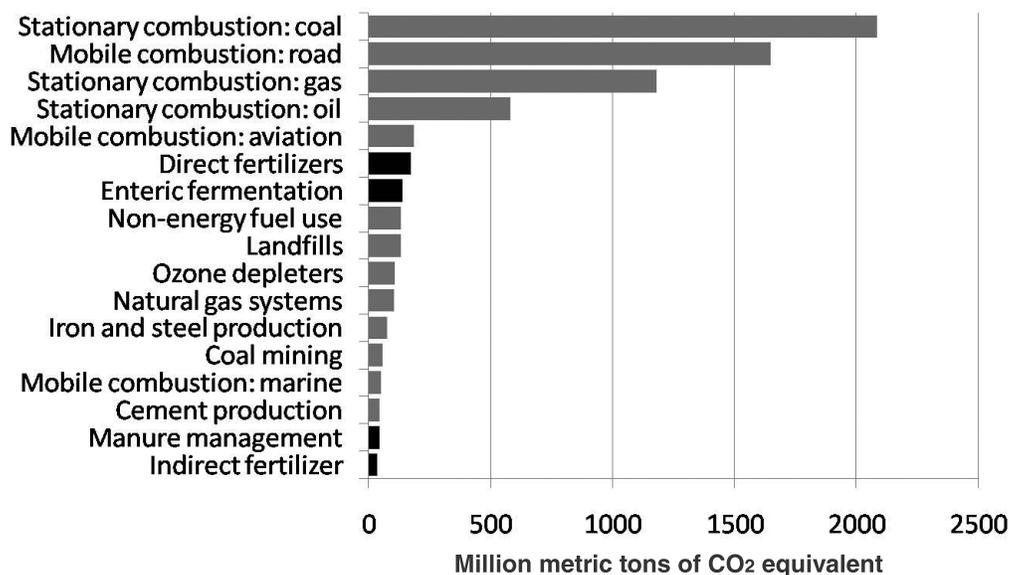


Figure 1. The U.S. Environmental Protection Agency listed 17 categories of greenhouse gas emissions in 2007. Agricultural emissions (black bars 6, 7, 16 and 17) totaled an estimated 391 million metric tons of CO₂ equivalent in 2007.

Source: U.S. Environmental Protection Agency. 2009. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007*.

Many nonpolluting entities, such as wind and solar electric power generators, are allowed to supply credits to the market. The rationale behind their involvement is that the more electricity generated from sources that emit no CO₂, the less electricity will be demanded from other sources and therefore a reduction of CO₂ occurs. Electricity from wind and solar electric power generation frequently is more expensive than electricity generated by combusting hydrocarbons. By allowing the wind and solar generators to sell carbon credits, they are able to offset some costs and become more competitive with other sources of electricity.

Afforestation projects are another nonpolluting source of carbon offsets that are occasionally permitted to supply credits to polluting entities needing credits. As trees grow they sequester, or permanently store, carbon that was in the atmosphere. Because trees take carbon out of the air, this is viewed as a negative emission and this amount can be sold to those who must reduce their emissions.

Another, more controversial, source of credits is polluting entities that are not subject to the cap. Because it is unclear which sources will be subject to the cap, it is unknown ahead of time which sources will be permitted to sell credits. But the RGGI provides an example of landfill and manure management being allowed to supply offsets. Landfills and manure storage structures emit methane, a GHG. Since the RGGI caps only electric power plants, landfills and manure sources are not subject to a cap. However, landfills and manure sources that are able to capture their methane emissions and prevent them from entering the environment are allowed to provide a credit that the electric power plants can use should they need credits to meet their cap.

Credits can also come from entities operating outside the border of the country. Because the U.S. government does not have the authority to regulate GHG emissions in other countries, by definition, all GHG sources outside the United States are not subject to a cap. However, CO₂ is a global pollutant so it really does not matter where the reductions occur. Any reductions in emissions anywhere on the globe have the same impact as reductions that occur within the border of the limiting country. The European Union Emissions Trading System (EU ETS) provides an example of a government that caps emissions within its jurisdiction and permits credits from GHG reduction outside of its jurisdiction. The rationale behind this is that many lesser-developed countries are not subject to the caps associated with the Kyoto Protocol. One way of helping other countries to develop clean energy is to allow them to provide credits into the trading system of countries subject to a cap.

In order for an offset to contribute to the goal of reducing GHG in the environment, it must be (1) permanent, (2) additional, (3) verifiable and (4) enforce-

able. *Permanent* means that the GHGs sequestered or destroyed are not later released into the environment. *Additional* means that the GHG reductions from the offset project would not have occurred if the cap-and-trade system had not encouraged it. *Verifiable* offsets are those that can be measured or can be shown with a high degree of confidence to offset GHG emissions. *Enforceable* means that suppliers of the offsets is legally liable if they fail to deliver the offsets.

Other interested parties

Several entities not subject to a cap or able to supply offsets are also interested in GHG cap-and-trade systems. The most obvious interested parties are environmental advocates who believe that GHGs are a significant environmental hazard. They will lobby for what they believe to be the most efficient system with little concern for the cost to those entities that are required to reduce emissions. Should a cap-and-trade system be created, environmentalists also have the opportunity to purchase emission allowances and credits in an effort to bring emissions down lower than the government has dictated. Several projects allow people to buy carbon credits now for the emissions they incur when traveling by air or heating their home.

Another interested party is liquidity providers, frequently financial institutions. As with any market, there is a need for financing trades and there are businesses that seek to profit from those trades. Within existing GHG markets, there is a group of businesses that provide liquidity to the market by buying and selling credits solely for the purpose of trading them. These businesses never actually use the credits because they are not subject to any cap on GHG emissions.

As agriculture participates in providing offsets, it will become an enterprise that is likely to be insured. Insurance companies might be interested to the extent that carbon sequestration becomes an insurable activity. Undoubtedly this would happen in forest projects, where there is a risk that forest fire could destroy years of accumulated carbon.

Other, less obvious interested parties are those who are indirectly affected by a cap-and-trade system. If significant government resources are devoted to GHG reductions, then fewer resources are available for other programs. For example, developing countries that receive extensive U.S. aid might be opposed to the U.S. government channeling its resources away from medical or nutritional aid to GHG reductions.

The market

The following summary of several existing GHG markets illustrates how the market might develop if the United States institutes a mandatory cap-and-trade system. A summary of key points is found in Table 1.

Chicago Climate Exchange

Trading on the Chicago Climate Exchange (CCX) is based on a voluntary cap-and-trade system for GHGs emitted in North America. As with all markets, there are “buyers” and “sellers,” or trading entities with different objectives. In the CCX, there are six membership categories. Members and associate members are businesses that agree to reduce their direct or indirect GHG emissions, or both. Offset providers and offset aggregators manage projects or aggregate many projects that sequester, destroy or reduce GHG emissions. Liquidity providers and exchange participants are entities that trade for some purpose other than meeting a reductions target or providing an offset.

Though participation in the market by members, associate members, offset providers and offset aggregators is voluntary, their involvement becomes legally binding when they agree to participate. Emitting members must meet GHG emission reduction targets each year. Offsetting members must provide the offsets they have agreed to deliver.

The CCX targeted reduction is for emissions to be 6 percent below their baseline, defined as their average annual emissions from 1998 to 2002 or the single year of 2000, by the year 2010. Because involvement is voluntary, the allowances cost the emitting members nothing. They must decrease their emissions without having to pay for the privilege of emitting anything below the baseline. In mandatory markets such as RGGI and EU ETS, emitting entities must acquire their allowances either by purchasing them or by the government distributing them for free.

Members who exceed their emissions reduction target in any single year can bank the excess reductions, called surplus allowances or credits, they achieved for use at a later time or can sell their credits to members who need them to meet their obligation. Members who do not meet their emissions reduction schedule must purchase credits or offsets.

Trading of allowances is done with a contract, called a carbon financial instrument (CFI), which represents 100 metric tons of CO₂ Eq. Of particular interest to agriculture is methane, which the Intergovernmental Panel on Climate Change (IPCC) has determined to have 21 times the global warming potential of CO₂ and therefore has a CO₂ Eq. of 21, and nitrous oxide (associated with fertilizers), which has a CO₂ Eq. of 310. The CCX assigns methane a CO₂ Eq. of 18.25 rather than its IPCC estimate of 21. This discounting of the value of methane, from 21 times that of CO₂ to 18.25 times that value, is a way of recognizing the uncertain quantity and quality of GHG reductions provided by offset providers.

Contracts are assigned a vintage corresponding to the year in which the reduction in GHG occurred. Vintages facilitate trading by allowing businesses to carry forward credits from a previous year and use it as an

offset in a future year. Contracts with earlier vintages can be used to meet later year obligations but cannot be used to satisfy obligations incurred in a previous year. For example, a 2008 vintage contract can be used to satisfy a 2009 obligation but cannot be used to satisfy a 2007 obligation.

Each contract is traded in an open market. Contracts of different vintages can have different prices depending on the supply and demand for each particular vintage. If an entity needing an offset thinks that the price of future offsets is going to be higher than they are today, that entity can purchase offsets for future obligations.

Market information is provided in a form similar to other commodity trades. Daily trading volume and high, low and closing prices for CFIs of various vintages are reported on the CCX Web site (*chicagoclimatex.com*) in chart and tabular form. As of mid-June 2009, the price of CFIs has varied from \$.71/metric ton of CO₂ Eq. (February 2004 trade on a 2005 vintage contract) to \$7.40/metric ton of CO₂ Eq. (May 2008 trade on all vintages).

Of particular importance to agricultural businesses that desire to participate in the market is the role of aggregators. Aggregators are businesses that assemble many small providers of carbon offsets, then register, manage and sell those offsets on the market. Most agricultural businesses that can provide offsets provide too few to actually market them on the CCX themselves. Additionally, The CCX requires that all traders be registered. Individuals can't just enter the market at any time by themselves. In addition to providing access to the market for greenhouse gas reductions, aggregators comply with the rules for providing offsets.

The CCX requires that a certain percentage of offset projects be verified by independent, third-party verifiers. Aggregators hire verifiers to select a sample of projects and investigate their compliance with the contracts. This verification activity provides assurance, or integrity, that the GHG credits being registered do in fact exist — that the market is truly reducing the amount of GHGs released into the environment.

When a GHG-emitting source voluntarily reduces emissions before the start of mandatory emissions reductions, they may accrue what are called “early action credits.” When mandatory reductions are enforced, a polluter could use these credits to meet its cap or to sell to other emitters trying to meet their caps. An example of an early action credit is when the CCX allows farmers who planted cropland to grass after 1999 to receive credit for the carbon sequestered before actually signing on to provide credits.

Regional Greenhouse Gas Initiative

The Regional Greenhouse Gas Initiative (RGGI) is another market-based effort to reduce GHG emissions in the 10 northeastern and mid-Atlantic states of Con-

necticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont. RGGI, unlike the CCX, establishes a *mandatory* cap but the cap is only on electric power plants.

The RGGI target is to reduce CO₂ emissions from electricity generation to 10 percent below their 2009 emissions by the year 2018. Each state distributes allowances to electric companies in their state, up to the cap in effect for that particular year. A significant portion (100% in some states) of the allowances are distributed through an auction in which the electric companies bid on allowances that they think they need or would like to control.

Offset allowances from nonregulated entities can be used by an electric company to meet its cap. The RGGI allows the electric company to use offset allowances for 3.3 percent of its cap (10% under certain price situations). Offsets are permitted from the following agricultural projects: methane reduction, capture or destruction from manure management and carbon sequestration by afforestation. The RGGI does not permit offsets from soil carbon sequestration, as does the CCX. Offset projects must take place in the 10 states of the RGGI except under special agreement.

The RGGI stresses “additionality” when accepting offset projects. Additionality means that the GHG reductions from the offset project would not have occurred if the RGGI cap-and-trade system did not encourage it. Additionality seeks to have real and verifiable emissions reductions. Soil carbon sequestration, an offset allowed by the CCX, does not normally meet strict criteria for additionality.

The RGGI auctions allowances quarterly. Data from the three auctions of 2009 allowances performed before April 2009 show a range of prices from \$3.07 to \$3.51 per ton of CO₂.

European Union Emission Trading System and European Climate Exchange

The European Union instituted a mandatory cap of greenhouse gas emissions on power generation and energy-intensive manufacturing in 2005 and proposes to cap aviation emissions beginning in 2011 or 2012. Their target is to reduce these emissions 20 percent below 1990 levels by 2020. Through the cap-and-trade mechanism, they expect that the quantity of emissions from regulated entities will be 21 percent below 2005 levels by 2020 — short of their 20 percent of 1990 levels by 2020. They have other goals such as improved energy efficiency and increased use of renewable energy that will help them meet their overall targets.

The EU currently is only limiting CO₂ emissions rather than a range of GHG emissions as most U.S. markets trade. Furthermore, the EU trades are not based on calendar years but rather a period of years (the first period was 2005 through 2007) in order to smooth

emission irregularities that might occur because of severe weather.

Those entities that are subject to a cap on emissions can trade emission allowances and credits through the European Climate Exchange (ECX). As of mid-June 2009, the price of European Union Allowances (EUAs) has varied from 8.20 euros/metric ton of CO₂ equivalent (February 2009 trade on a December 2009 settlement contract) to 37.78 euro/metric ton of CO₂ equivalent (January 2008 trade on December 2014 settlement contract). In U.S. dollars, this range is from \$10.50 to \$55.54 per metric ton.

EU trading allows no domestic offset providers but rather Clean Development Mechanism and Joint Implementation projects. These projects are approved GHG mitigation projects in developing countries. They allow EU entities to invest in low-carbon technology in developing countries and receive credits for those reductions.

When Europe instituted a GHG cap-and-trade system, it gave away most of the emission allowances and allowed individual nations to auction off a portion of their allowances to emitting entities within their borders. Many analysts believe that too many of the allowances were freely distributed to emission sources and that this negatively affected the trading portion of the program. The Safe Climate Act of 2009 proposes the auction of most of the emissions allowances.

Developing regional initiatives

The Western Climate Initiative (WCI) is an effort to investigate cooperative ways to reduce GHG emissions through a regional cap-and-trade system composed of the seven western U.S. states of Arizona, California, Montana, New Mexico, Oregon, Utah and Washington and the four Canadian provinces of British Columbia, Manitoba, Ontario and Quebec. Their goal is to reduce GHG emissions to 15 percent below 2005 levels by 2020. According to their 2009–2010 Work Plan, they hope to fully implement a program by 2015.

Their Work Plan indicates that the eventual reductions will be mandatory and cover 90 percent of the GHG emissions in the cooperating states and provinces. They are expecting to cap the emissions of many different sources — from electricity generation to mining to pulp and paper manufacturing to gas combustion.

They are anticipating the use of offsets in their cap-and-trade system but have not yet determined the specifics. Their current proposal is that no more than 49 percent of the reductions can occur through offsets.

Of particular importance to agriculture, the WCI (1) is not anticipating any caps on agricultural production activities such as livestock waste, (2) is open to the idea of permitting offsets from soil sequestration, manure management, anaerobic digestion, rangeland management and afforestation, reforestation and forest management.

Table 1. Summary of carbon trading systems.

Market	Target	Offset providers	Regulated entities	Offset limitation	Early action credits allowed	Historical price range of credits	GHG monitored	Years in a accounting period	Allowance allocated by auction or free
CCX	6% below 2000 by 2010	Landfills, coal mines and manure management; soil and rangeland carbon; afforestation; renewable energy; ozone depleting substance destruction.	Voluntary program covering any entity that directly or indirectly emits GHG.	None	Yes	\$.71 to \$741/metric ton	CO ₂ , CH ₄ , N ₂ O, fluorocarbons	1	Free
RGGI	10% below 2009 by 2018	Landfills and manure management; afforestation; reduction in emissions of sulfur hexafluoride; and reductions in CO ₂ emissions from the building sector; prefer offset providers within the RGGI region.	Electric power plants	3.3% of allowances (10% under certain conditions)	No	\$3.07 to \$3.51 per ton	CO ₂	1	Free and auction
EU ETS	20% below 1990 by 2020	GHG mitigation projects in developing countries	Power generation, and energy-intensive manufacturing	None discovered	None discovered	\$10.50 to \$55.54/metric ton	CO ₂	3	Free and auction
WCI	15% below 2005 by 2020	Undetermined, but considering soil sequestration, manure management, anaerobic digestion, rangeland management and afforestation, reforestation and forest management.	90% of GHG emissions (specific emitters not given)	No more than 49% of allowances	Proposed	NA	CO ₂ , CH ₄	1	None discovered
Safe Climate Act of 2009	20% below 2005 by 2020	Reduced deforestation in developing countries; Domestic projects to be determined by the EPA	Defined as economy wide (include many different sources)	2 billion tons annually	None discovered	NA	CO ₂ , CH ₄ , N ₂ O, fluorocarbons	1	Auction

Another regional initiative is the Midwestern Greenhouse Gas Reduction Accord. It was signed by nine U.S. governors (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Ohio, South Dakota and Wisconsin) and two Canadian premiers (Manitoba and Ontario) in November 2007. In the accord the governors and premiers resolved to create a GHG emissions reduction program in their states and provinces. Their plan is to institute caps on GHG emissions from multiple sources, allow trading of allowances, recognize early action credits and position themselves for interaction and integration into future federal programs.

Summary

Because CO₂ is a global pollutant, it should not matter where reductions occur. This means that cross-country trading should yield the same GHG reduction as in-country trading at the lowest price. A company that can lower its emissions at the lowest price will supply the credits regardless of where they save GHG emissions and where other companies buying their credits emit GHGs. With such trading, price differences between markets such as the CCX and ECX should be minimal.

A quick look at the price of CO₂ Eq. in the United States (ranging from \$.71 to \$7.41/metric ton on the CCX) and the price in the EU (ranging of \$10.50 to \$55.54/metric ton on the ECX) reveals the importance of the decisions made on the cap-and-trade system. Mandatory caps, as in the EU ETS, will raise the price of carbon. Limiting the supply of offsets, as the EU ETS does, will also exert upward pressure on the price of carbon. Both the CCX and EU ETS provide most (or all) of their allowances to emitting entities for free. This is likely to exert downward pressure on the price of carbon. U.S. plans to auction off all the allowances would most likely increase the price of carbon.

Agriculture is interested in participating in a cap-and-trade system as an offset provider. Both the U.S. EPA Annual Inventory of Greenhouse Gas Emissions and the IPCC Fourth Assessment Report suggest that agriculture has tremendous potential to mitigate GHG emissions. However, many environmentalists do not think that current agricultural offsets meet the standards of being additional, measurable, permanent and verifiable. The difference in opinion means that agriculture's participation in a cap-and-trade system depends on the political process by which future GHG legislation is enacted.

For further information

American Clean Energy and Security Act of 2009. This bill contains the provisions of what has been referred to in this guide as the Safe Climate Act of 2009.

Chicago Climate Exchange (CCX)
Web site: chicagoclimateexchange.com

European Climate Exchange (ECX)
Web site: www.exc.eu

European Union Emission Trading System (EU ETS)
Web site: ec.europa.eu/environment/climat/emission/index_en.htm

IPCC Fourth Assessment Report
Web site: www.ipcc.ch/ipccreports/ar4-wg3.htm

Regional Greenhouse Gas Initiative (RGGI)
Web site: rggi.org/home

U.S. EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks
Web site: epa.gov/climatechange/emissions/usinventoryreport.html

Western Climate Initiative (WCI)
Web site: westernclimateinitiative.org