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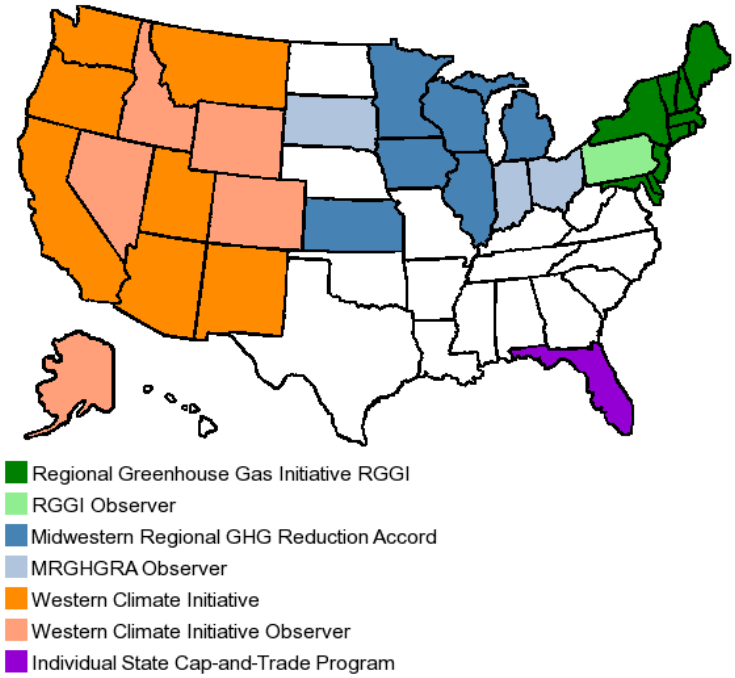
Selling Environmental Services – Trading Carbon Offset Credits from Range and Forest Lands.

S.H. Sharrow, Professor, Department of Rangeland Resources, Oregon State University

Global climate change and the need to reduce emissions of greenhouse gasses (GHG) are almost daily fare in news media these days. Under their obligations as signatories of the Kyoto Treaty, The European Union Countries (EUC) initiated an ambitious carbon dioxide (CO_2) emissions control program in 2005, aimed at reducing total GHG emissions to about 5% over 1990 levels during 2008-2012. China, India, and the U.S., which are large CO2 emitting countries, did not commit to the Kyoto Protocol. However, 169 countries have embraced the Protocol guidelines and many individual U.S. States and Canadian Provinces have begun to take action. The Western Climate Initiative (WCI), which includes Arizona, British Columbia, California, Manitoba, Montana, New Mexico, Oregon, Québec, Utah, and Washington (http://westernclimateinitiative.org/Index.cfm), has committed to its own GHG control program, rather than wait for the U.S. or Canadian governments to establish national standards for GHC emissions. The WCI states have recently agreed to reduce GHG emissions to 90% of 1990 levels by 2020.

GHG Regulation Organizations (Source: Pew Center on Global Climate Change)



In Oregon, this goal was officially accepted under House Bill 3543 that was signed by Governor Kulongoski in 2007. For Oregon, the WCI goals are actually an extension of existing GHG emissions legislation going back to 1997. Under this existing program, all new fuel burning power plants are required to reduce their GHG emissions by 15% below the US national standard for modern low emissions plants of similar type. The mandated reductions are accomplished by “carbon

offsets", including both carbon removed from the air by carbon sequestration and by reduction of CO_2 emitted by other off site sources. Most of these mitigation projects were conducted through The Climate Trust, which has so far invested approximately $8.8 million to offset 2.6 million tons of CO_2.

In addition to WCI, the Midwest Regional Greenhouse Reduction Accord (Iowa, Illinois, Kansas, Minnesota, Michigan, and Wisconsin) and the Regional Greenhouse Gas Initiative (RGGI), which includes Northeastern and Mid-Atlantic States (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont) are pursuing their own GHC reduction programs. In fact, the RGGI has recently established a cap-and-trade system and begun to issue and trade in carbon credits. Florida has recently (June 2008) enacted state legislation enabling establishment of a GHC cap-and trade system that may be operational in 2010. It seems unlikely that national governments will remain aloof for much longer while states and provinces pursue a patchwork of individual policies which have implications for national prestige and interstate business and commerce. So, regardless of the merits of arguments favoring or opposing taking action to reduce GHG emissions, the momentum is clearly favoring establishing some form of coherent national GHG control program in the United States and Canada. It seems likely that any federal programs will override local GHG programs (under the principle of federal preeminence), and that it will draw heavily on experiences from the existing EUC program and from local programs such as the Western Climate Initiative and Regional Greenhouse Gas Initiative.

Market-based Carbon Treading in Europe

The current EUC program was phased in during 2005-2008. The philosophical approach was to employ a market-based system to encourage present large emitters to be aggressive and innovative in reducing their GHG output, while allowing for sensible economic decisions that did not unduly impact businesses and national economies. It builds upon the widely perceived success of using a cap-and-trade system to deal with sulfur emissions that were contributing to acid rain in the United States. It was anticipated that trial-and-error would be required to make the system work in Europe; hence the 3-year phase in period before compliance with Kyoto obligations begins in 2009. The basic mechanism in a cap-and-trade system is to decide how much pollution is acceptable and to issue warrants for that much output (the "cap"). These "credits" may be issued directly to current emitters, or may be auctioned off to the highest bidder (the "trade"). Emitters who have credits beyond their output may sell them, while emitters wishing to have output beyond their assigned credits must either purchase the needed extra credits or "mitigate" their extra output. Mitigation may take the form of either recapturing carbon once it has been released into the air (carbon sequestration) or by reducing the emissions of other sources. So, for example, a natural gas burning power plant may mitigate extra CO_2 release by securing carbon credits from sponsoring afforestation projects that store carbon in new forests or by replacing old inefficient heating systems in local public schools with newer high energy efficiency systems that burn less fuel. Under the Kyoto Protocol, emitters do not have to mitigate their pollution locally. For example, a power plant in Britain may offset its CO_2 emissions by replanting forest in Costa Rica. There is potentially a world-wide trade in carbon mitigation credits.

The trick in actually making a cap-and-trade system work is to manipulate supply-and-demand so that the value of carbon credits is sufficient to encourage action to reduce emissions where feasible, but not so high that it disrupts local economies. In Europe, this is believed to be about 10-20 Euros per credit (a ton of CO_2). The goal of regulators is to issue the correct number of credits so that the auction price of credits falls within this desired range. This has proved difficult to do. The initial offering of credits to existing emitters in 2005 was much too generous, driving the price of a credit down to less than half a Euro. Since then, the number of total credits issued directly to emitters has tightened up, and carbon credits are currently trading in Europe for over 30 Euros. There also needs to be a balance drawn between the proportion of regulator-issued credits given directly to emitters vs. credits auctioned off to the highest bidder. Auctioning off all credits risks having unacceptably high costs to current emitters and their customers, while giving credits directly to emitters is providing them a very valuable commodity asset.

The Western Climate Initiative

The Western Climate Initiative is currently forming its GHG reduction approach. It has been fairly open it's discussion of how CO_2 emissions may be regulated. What has emerged is a strong preference for a cap-and-trade system, similar to the EUC system, with about 90% of credits initially issued directly to current large emitters and 10% sold at open auction. This system is intended to be operational within 3 years. Although no target prices for carbon credits have been announced, it is likely that $10 - $20 will be favored. Many discussions about future carbon credit prices in the U.S. use a price of $10 per credit for planning purposes.

The Regional Greenhouse Gas Initiative

A company, Regional Greenhouse Gas Initiative Inc has been formed to register and verify CO_2 allowances and trades under commitments made by RGGI member states. It also monitors CO_2 trading markets, oversees auction of RGGI emission allowance credits and provides technical assistance to RGGI member states. The intent is for the RGGI member states to function as a single GHG market, allowing free transfer of emission allowances and offset credits within its regulatory area. It is currently focused on CO_2 emissions from power plants, seeking to first hold emissions at their current (2009) levels, then gradually reduce them by 10% by 2019 (http://www.rggi.org/home). This goal will be achieved through the application of an auction based cap-and-trade system to distribute emission allowances. It appears that all regulator issued pollution credits will be auctioned off rather than assigned to current emitters. The first two auctions were held in late 2008. Approximately 44 million tons of CO_2 allowance credits sold for an average of $3.29 per credit.

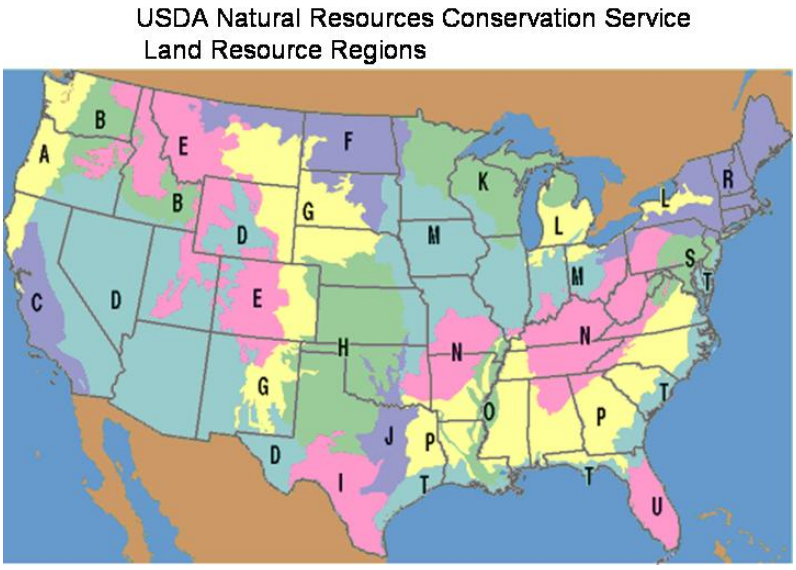
The Nuts and Bolts of Selling Carbon Offset Credits

The market price of carbon credits is set by supply and demand. The total credits within a regulatory jurisdiction include those issued by the regulator along with "mitigation" offset credits created by projects that either capture and sequester GHG or that reduce GHG production in the first place. Demand for credits to satisfy regulatory requirements in North America is currently relatively low. There is some voluntary demand for carbon

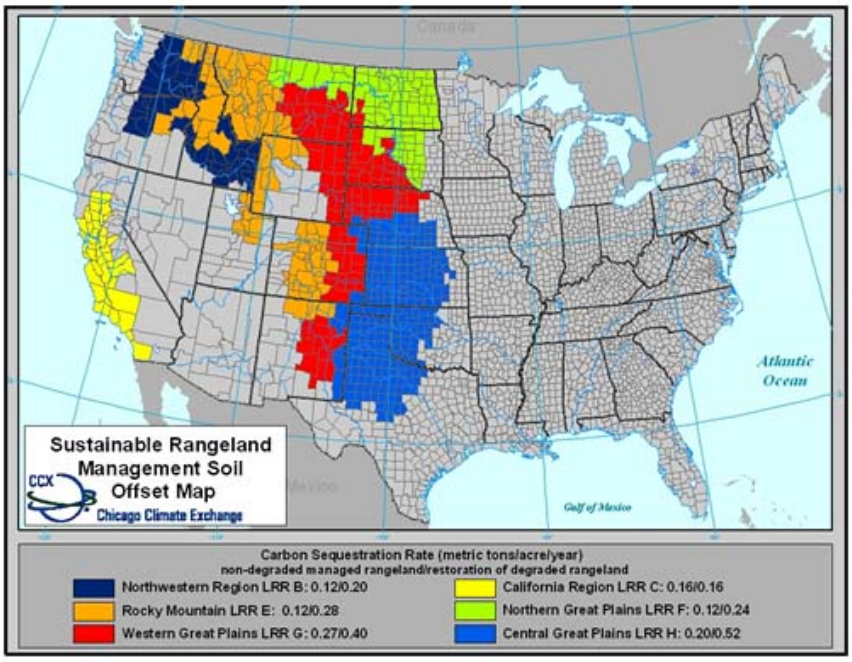
offsets by individuals, organizations, or businesses who want to reduce their "carbon footprint". These small consumers of carbon credits provide opportunities to develop niche markets for small carbon contracts at prices higher than open market prices. The ecobusinesslinks website (http://www.ecobusinesslinks.com) lists over a dozen companies that sell carbon offset credits either to companies or directly to the public. Prices charged range from $3 to $33 per ton of CO_2. Some discussion on the internet was ridiculing the prospect of the present unregulated U.S. markets potentially having unverified small transactions of credits sold on EBay. There has been concern that carbon trades in the U.S. should conform to some explicitly stated standard. In the U.S. the most likely standards would be those set by the Department of Energy for carbon accounting in power plants and the trading policies of the Chicago Climate Exchange (CCX). In order for a legitimate carbon sequestration credit to be sold, the seller should be able to assure the buyer that the specified amount of CO_2 has been removed from the atmosphere and that it will remain immobilized for the specified length of time. The published trading policies of the CCX (http://www.chicagoclimateexchange.com/content.jsf?id=781) provide a standard-of-the-industry reference that could easily be adopted by individuals offering sequestered carbon credits directly for sale. So, the prospect of someone selling the credits for afforesting 10 acres of land on EBay may not be so farfetched.

The Chicago Climate Exchange

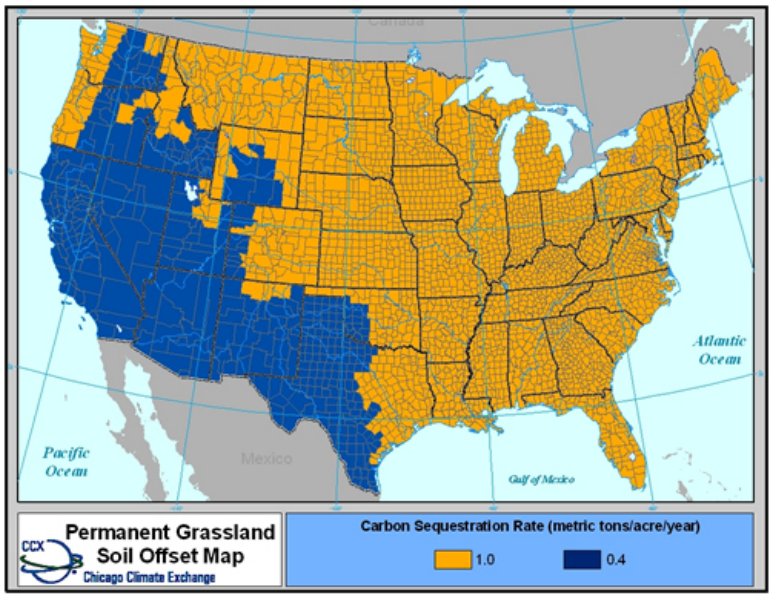
The Chicago Climate Exchange is the preeminent established broker for selling large carbon credit contracts in the United States. Its entry into carbon trading follows years of successfully trading sulfur dioxide and nitrogen pollution contracts. What is actually traded are credits representing one ton of the pollutant. For carbon credits, this is one ton of CO_2 gas. Carbon dioxide contains 27% carbon and 73% oxygen, so one ton of carbon sequestered is equal to approximately 3.67 tons of CO_2 (3.67 carbon credits). The CCX acts as the final broker between those having extra credits for sale and buyers desiring to acquire additional credits. It sells large diversified contracts at auction to the highest bidder. These contracts often include credits from a variety of sources. The minimum amount of CO_2 that they will trade is 5 units and their actual contracts sold to buyers are at least 10,000 units. Small amounts of carbon credits must be accumulated and offered together as a single contract to the CCX. This is the job of "aggregators" such as members of The National Carbon Offset Coalition (http://www.ncoc.us/). The CCX signs a contract with the aggregator who then signs contracts with landowners or other producers of carbon credits. Aggregators may be



commercial firms (which typically charge 10-15% of the transaction), or existing local organizations such as small woodlot owners organizations, soil conservation districts, production credit associations, farmer cooperatives, etc. Contracts with aggregators typically commit land to specific practices for specified amounts of time. It is important to remember that landowners contract with aggregators NOT with the CCX. Tradable management practices, the rate at which carbon is assumed to be sequestered, and the length of contracts all vary with climate, soils, and the type of system being offered. Typically, permanent grassland contracts are for at least 5 years, rangeland contracts are for 5-10 years, and forest contracts are for 15+ years. The rate at which carbon accumulates (credits/acre/year) in permanent grasslands and rangelands are estimated from computer models based upon soil and climate data within NRCS Land Resource Regions.



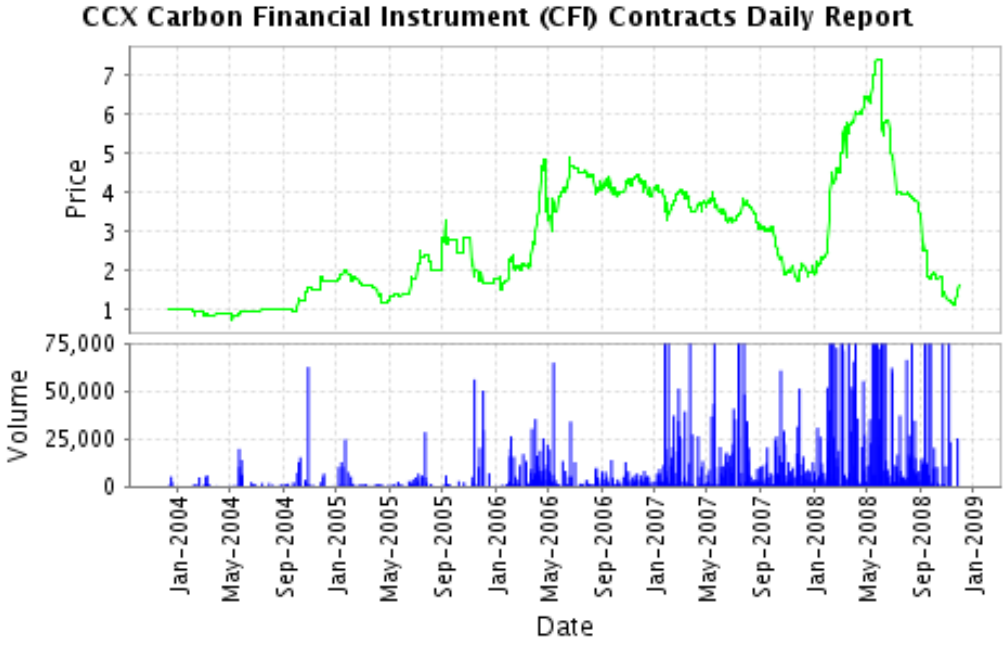
Most western rangelands are eligible for carbon trading. A notable exception is region D, which lacks sufficient data to support the estimation models. There are two CCX carbon sequestration rates for rangeland, one for degraded land and one for non-degraded land. The degraded land has a higher assumed carbon acquisition rate because its carbon depleted state makes it a "half empty glass" that can be readily refilled while the non-degraded site is a "full glass" that is less able to accept additional carbon (see DoctorRange - *Carbon Farming – the Global Carbon Cycle*). In most cases, sequestration rate estimates are conservative (a bit low) to ensure that the amount of traded carbon is indeed stored on site. It is possible to establish other sequestration rates with CCX if adequate data is presented to



satisfy their board of expert advisors. Conversion of cropland back into permanent grassland may also accrue saleable carbon credits.

Several options exist for producing forest-based carbon credits from either planting new forest stands or for conservation management of existing stands. For details about the specific requirements and protocols for each program visit the National Carbon Offset Coalition website (http://www.ncoc.us/).

At the end of each contract year, a CCX certified verifier establishes that the agreed upon contract practices have been followed. The CCX then releases 80% of the contract carbon credits, which are then sold at open auction and the proceeds distributed. The other 20% of the carbon credits are held as reserve in case of future carbon leakage (by landowners who fail to follow agreed practices), drought, or other contingencies. If these credits are not needed to cover shortfalls, they are released and sold following final verification at the end of the contract. If at any point the 20% credit reserve is depleted, the CCX may cancel the entire contract. So, it is probably important for landowners participating in large contracts to understand who they are aggregated with.



Right now (December 2008), carbon credits are selling on CCX for about $1.60 per ton. It is generally agreed that these prices are probably low because of the lack of any large regulatory mandate to control GHG in the U.S. The prices spiked earlier in 2008 in anticipation of possible future regulatory action in the U.S. federal or state systems. It is interesting to note that the CCX has never had prices as high as $10 per credit. It is hard to really judge supply and demand because there are many potential sources of credits besides carbon sequestration projects. Perhaps the easiest way to understand the competing sources of credits is to look at the projects that the Climate Trust has used as carbon offsets under the now well established Oregon GHG control program (.http://www.climatetrust.org/offset_projects.php). The average price invested by the

Climate Trust was about $3.40 per ton of CO_2 offset. Carbon sequestration was only a minor portion of the total program, which seemed to favor projects that had social goals beyond just GHG reductions. Although getting a lot of media attention, vegetation based carbon sequestration projects such agroforestry accounted for only about 1% of mitigation projects conducted under the Kyoto Protocol last year. This is dwarfed by other competing projects such as waste management (3%), land fill gas (6%), and energy efficiency (14% of all projects). Under RGGI rules, valid carbon offset projects include agricultural or landfill methane recapture, reduction or avoidance of CO_2 produced by combustion, and increased end use energy efficiency in the building sector as well as afforestation and other vegetation based options. Carbon sequestration must be cost effective for both the buyer and the seller if it is to compete in the free market place with these other mitigation options. This likely sets an upper limit on what credits can be sold for.

Under current prices, a rancher selling improved management credits for 1000 acres of good condition rangeland in central Oregon could expect to net about $138/year. This is calculated as follows –

CCX carbon sequestration rate = 0.12 credits/acre/year
Aggregator fee is 10% of sales
CCX fee is 5% of sales
CCX reserves 20% of contract
Ranches receives 85% of (80% of .12) = .0816 credits/year

At the current price of $1.60/credit, that is $0.13/acre/year or $130 for the whole 1000 acres… which is not a lot of money at current market price. The 20% of contract carbon

credits held in reserve by CCX as a contingency account will be sold and distributed at the end of the contract if they are not needed to meet shortfalls or leakage. For a 5-year contract, that could amount to a year's carbon sequestration, or $0.19/acre of contracted land. So adding this into the yearly payments, net receipts would average $137.60/year total for the 1000 acres. At $10 per credit, this number rises to $860/year, or $0.86/acre/year. For poor condition rangeland, at current prices, contracts would pay a little over twice this figure.

One interesting aspect of carbon trading through the CCX is that they will allow trading of carbon credits that were accrued in past years. Since CCX began trading credits in 1999, they will consider accepting backdated credits to 1999, provided the records are available from the landowner to substantiate the condition of the land and the contracted management package being in place. It is also possible to sell credits for leased land provided that the land owner signs the contract committing the land.

Auctioning off carbon credits may well be the simplest part of the carbon trading business. Accounting for credits, that is, detailing how much sequestered carbon there is, where it is, and how long it will stay there, is technically difficult. Forest projects are relatively easy to monitor because the carbon stored in standing vegetation can be directly seen and measured. In rangelands, grasslands, and croplands, however, most of the organic matter is stored in the soil. Semi-arid forests and rangelands are also notorious for being highly variable from place to place, and from year to year. The same stand of vegetation is often a net sink for carbon in wet years and a net source of carbon release in dry years. This variability is dealt with in carbon trading by taking a "big picture" approach designed to average over this variability. That is one reason that contracts typically cover large areas and multiple years, The CCX contingency hold-back is also designed to provide a cushion of unsold credits that can be drawn against during drought years.

As pointed out in *Carbon Farming – the Global Carbon Cycle*, most carbon sequestration in rangeland ecosystems will likely be as soil organic matter. Soil organic matter is important in maintaining soil structure and fertility. So, to a large extent, promoting soil carbon sequestration is also promoting increased ecosystem productivity and stability. It is unclear if carbon offset prices in the near future will encourage very many small land owners to change their management practices just to claim the carbon credits. However, the prospect of carbon credit sales may prove to be a nice "sweetener" for people considering conservation plantings, rangeland improvements, afforestation, long rotation forestry, stream side enhancement, or other carbon enhancing projects for their other benefits.