What is Carbon Cap and Trade? A Primer for Economic Developers

International Economic Development Council

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INTERNATIONAL
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What?

Spurred by the desire for greater energy security, climate change mitigation, long-term energy affordability, and the transition to a clean energy economy we are starting to see the federal government, Congress, the international community and the global business community move towards putting a price on carbon. In the U.S., this now means that a cap and trade system for managing the emission of carbon dioxide into the atmosphere is on the frontlines of proposed regional and national energy policy. As such, this cap and trade primer is intended to introduce those working in economic development to the basic components of a carbon cap and trade program, as well as to explore how local economies could prepare for - as well as plug in and benefit from - a cap and trade policy on the national level.

Why?

While IEDC does not specifically promote a cap and trade policy, we recognize that this is an important emerging issue that those in the economic development and allied professions need to be aware of and understand. Further, the Kerry-Boxer Clean Energy Jobs and American Power Act (the follow-up to the House-passed American Clean Energy and Security Act) is presently going through review in the U.S. Senate. This movement has been catalyzed by multiple regional cap and trade efforts, namely the Regional Greenhouse Gas Initiative (RGGI) in the Northeast, the first mandatory, market-based effort in the United States to reduce greenhouse gas (GHG) emissions. Further, the Western Climate Initiative (WCI) and the Midwest Greenhouse Gas Reduction Accord (MGGRA) are in initial steps of development as well.

A vision of a clean energy economy is not unique to the U.S., it is a global phenomenon. This primer comes at a timely moment as the United Nations Climate Conference will take place in Copenhagen, Denmark, during mid-December 2009, and will bring together key nations with the goal of reaching an agreement to replace the soon-to-expire Kyoto Protocol. While national and global agreements are in the process of being hashed out, it seems that in the future there will be some type of carbon pricing. In addition to cap and trade legislation, we are also seeing the EPA regulatory environment begin to change, as well as market forces driving changes to adapt to a world increasingly conscious of carbon.

The EPA recently announced that it will advance rules under the Clean Air Act to regulate greenhouse gas emissions from stationary sources – specifically, facilities that emit over 25,000 tons of GHGs per year (as opposed to the previous rule that regulated any facility that emitted over 250 tons per year). This includes regulating the 14,000 largest emitters, which account for

75 percent of GHG emissions in the U.S. The rule specifies that the emitters will have to minimize their emissions by implementing 'best available control technologies.' The next step will include a drafting period and public comment. The new rules could go into effect as early as 2011 if climate change legislation has not already passed by Congress by then. Further, the Securities and Exchange Commission recently moved to allow for disclosure of financial risks related to environmental and social issues, such as climate change, on a case by case basis.

In addition to government response, there has been a large upsurge in the call to climate action by global business leadership, and the shift to a lower carbon economy is also changing how business is done. For example, according to McKinsey Quarterly, the $45 billion private-equity purchase of the energy utility TXU hinged on the insistence of the buyer that TXU reduce its plan to build several new coal-powered plants, and instead make investments in clean coal, energy efficiency and renewable energy.[1] Further, we now see numerous large corporations forging commitments with each other around the purpose of creating a business-led response to climate change. Consortia of major businesses – such as Business for Innovative Climate and Energy Policy (BICEP), which includes such corporations as Starbucks, Sun Microsystems, Levi Strauss, Nike and Timberland, and the United States Climate Action Partnership (USCAP), which includes members such as Caterpillar, Alcoa, and Dow Chemical Company - function under the notion that a proactive business response to climate change will create more economic opportunities than risks for the U.S. economy.

This carbon cap and trade primer for economic development is only a first step. Through a grant from The Energy Foundation, IEDC will release a full report that will explore what a cap and trade system means for broad economic development potential during the first quarter of 2010. [2] The report will examine issues, opportunities, threats and challenges relating to the economic development potential in specific case study states.

I. What is Carbon Cap and Trade?

Carbon cap and trade is a market-based approach to limiting carbon emissions. Rather than purely regulating carbon emitters, cap and trade puts a price on carbon emissions and creates a trade-based market that provides emitters and users an incentive to reduce their emissions over a specified period of time. Overall, the government's role would be to set up the parameters and management of the program and allow the market to drive the program. The idea is to design a program that is profitable and has incentives for investing in clean energy and provides resources as part of the transition to do so.

Carbon cap and trade works by setting a limit (the cap) on the amount of carbon that can be released each year by large industrial emitters. Over time, the cap becomes stricter in order to reach the ultimate goal of reducing carbon emissions. Each type of emitter would have a specific

[1] Nick Hoffman and James Twining, "Profiting from the low carbon economy," McKinsey Quarterly, August 2009, http://www.mckinseyquarterly.com/Profiting_from_the_ low_ carbon_ economy_2412 (Accessed September 3, 2009).

[2] Please note that any formal cap and trade system will likely include greenhouse gases in addition to carbon. However, for the purposes of this document and the ease of our readers, we are focusing on carbon as it has been the largest identified greenhouse gas.

limit set each year for how many tons of CO2 they are allowed to emit. These limits are referred to as allowances, which would be managed through permits. Each emitter would have to hold one allowance (permit) for every ton of CO2 that they emit. Emitters who are able to reduce their emissions more easily than others would be able to sell their leftover permits to emitters that cannot as easily or quickly reduce their CO2 to meet their emission requirements.

The idea is that the emitters who are able to adapt to meet their emissions requirements are rewarded by profiting from the sales of their leftover allowances. Those who are more challenged would receive the time and flexibility needed to reach the same goals while still maintaining the cap each year. Over time, the allowances are expected to go up in price, as less and less carbon is allowed to be emitted into the atmosphere.

Further, resources that the federal government would receive from selling the permits could provide a revenue stream for funding long-term energy technology development projects, retrofitting dated infrastructure, implementing municipal energy efficiency projects, etc.

a. Putting a Price on Carbon - A Carbon Cap and Trade Program versus a Carbon Tax

There has been great debate over whether the most efficient, market-based way to lower carbon emissions is through a carbon tax or the aforementioned cap and trade system. While both a cap and trade program and a carbon tax are market-based mechanisms, the role of the market is inversed in each case. A carbon tax would work by the U.S. government setting a tax price on carbon emissions, and the market would follow to determine how carbon usage would decrease, stay the same, or increase. In a cap and trade system, the price is determined by the market and the U.S. government sets and regulates the amount of carbon that can be emitted.

The Obama administration has come out clearly in favor of a cap and trade mechanism. Further, on June 26, 2009, the U.S. House of Representatives passed the American Clean Energy and Security Act of 2009 (ACES, H.R. 2454). The bill, also referred to as the Waxman-Markey (W-M) comprehensive energy bill, would establish an economy-wide cap-and-trade program for the reduction of greenhouse gas (GHG) emissions. The bill now sits on the front lines of the U.S. Senate floor with the debate continuing under the Kerry-Boxer Clean Energy Jobs and American Power Act. As such, an exploration of the carbon tax, versus a cap and trade approach, is worthy for the purposes of educating the readers of this primer.

The tables below outline the pros and cons of each strategy.

Pros of Cap and Trade	Pros of a Tax
Would provide greater confidence that carbon emissions will be reduced over the short and long term, per the set cap.	The flexibility of a carbon tax has the potential to lower carbon emissions more than a cap and trade system.
Would provide investment certainty for businesses and industries in development of energy efficiency technology, green collar jobs, etc.	A carbon tax could more directly favor consumer choice and benefits.
The private sector determines how to meet the cap limit, and as such is incentivized to respond to the carbon cap in a way that spurs innovation and leads to new potential new markets.	A carbon tax would require fewer moving pieces than a cap and trade policy and as such would be clearer and more transparent.
Enables the emitters to choose which technologies to employ to reduce pollution, thereby freeing the government from choosing winning or losing technologies.[3]	A carbon tax would offer a simpler system to develop and administer.
Secondary effects will open new business opportunities (e.g., through offsets) in which all levels of the economy can participate.	A carbon tax would be easier to enforce and regulate.

[3] Joel Kurtzman, "The Low-Carbon Diet: How the Market Can Curb Climate Change," *Foreign Affairs*. August 25, 2009, http://www.milkeninstitute.org/publications/publications.taf?function=detail&ID=38801211&cat=Arts (Accessed September 10, 2009).

Cons of Cap and Trade[4]	Cons of a Carbon Tax
Complex to develop and administer. Would demand high level of transparency in order to be successful.	Carbon emitters and taxpayers may simply choose to pay the tax, rather than reducing their respective emissions and usage.
The transitional impacts would present regional disparities (would have a greater impact on energy-intensive regions).	While it discourages carbon emissions, it does not rapidly encourage the development of alternative energy infrastructure.[5]
Could be vulnerable to speculation and derailment.	Taxing could slow down economic activity across the board, whereas cap and trade slows old sectors while stimulating new ones. [6]
Offsets can be difficult to verify and track over time.	Loopholes and provisions could exempt key polluting industries, thus negating the net effect of lowering overall carbon emissions nationwide.
Businesses may seek to design the system to their individual or industry advantage.	A tax can be politically unfavorable.
Price volatility of carbon permits could be a disincentive to investors.	

[4] Gregg Easterbrook, Carter F. Bales and Rick Duke, "The Debate Zone: Carbon Tax vs. Cap and Trade," What Matters, February 28, 2009, http://whatmatters.mckinseydigital.com/ the _debate _zone/carbon-tax-vs-cap-and-trade#a (Accessed August 20, 2009).

[5] Joel Kurtzman, "The Low-Carbon Diet: How the Market Can Curb Climate Change," *Foreign Affairs*, August 25, 2009, http://www.milkeninstitute.org/publications/publications.taf?function=detail&ID=38801211&cat=Arts (Accessed September 10, 2009).

[6] Ibid

II. How Does a Cap and Trade Program Work?

a. Allowances in a Cap and Trade Program

An allowance is defined as a fixed amount of carbon that emitters are allowed to output in a given amount of time. One allowance is generally defined as one ton of carbon dioxide (CO2). Allowances can be auctioned for a certain price, given away for free or a combination of both of these. If they are free, it will need to be decided if allocations should be based on: historic emissions levels, current emission levels, and/or a specific environmental standard/benchmark. If allowances are auctioned, then the policy needs to set and regulate how the revenues will be used. For example, they could be used for funding R&D of clean energy technologies, funding smart growth and transportation projects, strengthening energy efficiency opportunities, etc.

The key to a healthy and successful cap and trade program will lie in the government's ability to accurately project the appropriate amount of allowances so as to effectively meet the cap while still creating economic advantages.[7] There are several strategies being considered, including:

1) Grandfathering, or granting allocations based on historical emissions, allows energy-intensive emitters to receive free allowances as a form of transition assistance, giving emitters time to adapt to new regulations.[8] Free allowances may help to protect consumers from higher utility costs.

2) Auctioned allowances hold the economic benefit of facilitating a natural discovery of the market price for the allowances.[9] They also create revenues that could help in supporting the transition to a lower-carbon economy across different types of stakeholders, for example, by:

- Compensating end users
- Transition assistance to vulnerable industries
- Funding R&D and deployment of clean energy technologies
- Funding energy efficiency deployment and research (municipal, retrofits, etc.)
- Green job training
- Investment in public transit, bike/pedestrian infrastructure
- Rebates for energy efficient goods (e.g., cars)
- Direct rebates back to low and moderate income households

3) A hybrid of the two aforementioned approaches would involve gradually increasing the number of allowances that are auctioned over time, enabling free allowances to be seen as a

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[7] Joel Kurtzman, "The Low-Carbon Diet: How the Market Can Curb Climate Change," *Foreign Affairs*, August 25, 2009, http://www.milkeninstitute.org/publications/publications.taf?function=detail&ID=38801211&cat=Arts (Accessed September 10, 2009).

[8] Pew Center on Global Climate Change, "Greenhouse Gas Emmissions Allowance Allocation," Congressional Policy Brief, Fall 2008.

[9] Ibid

transition strategy rather than a permanent giveaway. This approach also would produce increasing revenue that could be used to move clean energy deployment forward.

Exactly how allowance revenues are spent depends on how the cap and trade program disperses the revenues to individual states and how the states choose to spend them. RGGI, for example, requires that 25 percent of each state's allowance value go to initiatives such as energy efficiency, clean technology development and deployment, and ratepayer rebates.[10]

b. Offsets in a Cap and Trade Program

Offsets are carbon saving mechanisms that are outside of the carbon cap that can be counted towards an emitter's emissions savings amount. The Offset Quality Initiative[11] defines an offset as "the reduction, removal or avoidance of GHG emissions from a specific project that is used to compensate for emissions occurring elsewhere."[12] For example, a utility company may choose to meet its emissions requirements through a variety of means, including reducing its previous carbon output by a given percentage, purchasing carbon permits, and purchasing carbon offsets.

Offset projects are those that help to reduce carbon emissions or sequester them through storage mechanisms such as planting, re-planting or preserving forests. An offset can be created when activities in a sector that is outside of the capped industries, such as agriculture, are altered so as to remove or thwart the emission of GHG. Sectors such as agriculture and forestry usually lie outside of the boundaries of the cap largely because their emissions are less significant or more challenging to monitor on a large scale.[13] The offset activity results in a GHG reduction that has an economic value which those firms under the cap can purchase to offset equal amounts of their respective carbon emissions. Thus an offset doesn't add to the reductions under the cap; it simply is another way to meet the cap, but does so via different sectors.

Offsets can come in a number of forms, but the most common is carbon capture via a change in land management practices (e.g., changing farming practices or afforestation). Further types of offsets can include energy efficiency investments in the residential sector and emission reductions for small businesses.[14]

According to the Climate Change Policy Partnership, four categories of farming and forestry

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[10] Ibid.

[11] The Offset Quality Initiative (OQI) was founded in November 2007 to provide leadership on greenhouse gas offset policy and best practices. OQI is a collaborative, consensus-based effort that brings together the collective expertise of its six nonprofit member organizations: The Climate Trust, Pew Center on Global Climate Change, Climate Action Reserve (formerly CCAR), Environmental Resources Trust/Winrock International, Greenhouse Gas Management Institute, and The Climate Group.

[12] Offset Quality Initiative, "Ensuring Offset Quality: Integrating High Quality Greenhouse Gas Offsets Into North American Cap-and-Trade Policy", July 2008, http://www.offsetqualityinitiative. org/ pdfs/OQI_Ensuring_Offset_Quality_7_08.pdf, (Accessed August 10, 2009).

[13] Congressional Budget Office, "The Use of Offsets to Reduce Greenhouse Gases," Economic and Budget Issue Brief, August 3, 2009.

[14] Climate Change Policy Partnership, "Harnessing Farms and Forests – Domestic Greenhouse Gas Offsets for a Federal Cap and Trade Policy", http://nicholas.duke.edu/ccpp/ccpp_pdfs/harnessingfaqs.pdf, (Accessed September 3, 2009).

activities can be used to generate offsets:

1) Activities that increase or avoid losses in the amount of carbon stored in biomass (e.g., trees),
2) Activities that increase the amount of carbon stored in soil,
3) Activities that reduce methane and nitrous oxide emissions from farming, and
4) Activities that reduce methane emissions from manure processing and disposal.

The primary benefit of agricultural and forest-based offsets within a cap and trade program is that they can provide for an inexpensive form of emissions reduction, especially in the early stages of a program when alternative and low-carbon technologies are still coming online and are thus relatively higher in cost.[15] Cost benefits stemming from offsets is dependent upon the details of the cap and trade program, such as the amount of allowed offsets and the stringency of the cap. The Congressional Budget Office (CBO) describes the them as the following:

- The more stringent the cap, the greater the opportunity to reduce costs by using offsets
- The sooner significant emissions reductions are required under the cap, the more expensive it is for emitters to comply, and by extension, the greater the opportunity to reduce costs through the use of offsets
- The more sectors and countries that can contribute to offsets and the greater the proportion of compliance for using them, the greater the opportunity to reduce costs through the use of offsets.[16]

Pros to Offsets:

- Provide flexibility in meeting the carbon cap
- Provide income to those in the receiving end of the offsets (e.g, farmers)
- May have ancillary environmental benefits

Cons to Offsets:

- Difficult to guarantee validity of the offset program
- Require constant monitoring
- No guarantee of permanence (i.e. sequestration)
- Regional variation in offset opportunities (see below)
- Leakage to international offset projects (could also be a strength)

Offset programs such as sequestration have no guarantee of their permanence to sequester and store carbon from the atmosphere. A farmer may change practices or natural shifts can occur which could inadvertently release the carbon. To deal with this, rental agreements can be set up or carbon buffers can be established in the case of sequestration loss by natural causes. [17] There

[15] Bill Chameides, " Cap and Trade Part 4: Forests, Farms, and Offsets," June 17, 2009, http://nicholas.duke.edu/thegreengrok/capandtrade4 (Accessed August 11, 2009).

[16] Congressional Budget Office, "The Use of Offsets to Reduce Greenhouse Gases," Economic and Budget Issue Brief, August 3, 2009.

[17] Climate Change Policy Partnership, "Harnessing Farms and Forests – Domestic Greenhouse Gas Offsets for a Federal Cap and Trade Policy", http://nicholas.duke.edu/ccpp/ccpp_pdfs/harnessingfaqs.pdf, (Accessed September 3, 2009).

is already a burgeoning voluntary market for offsets, but they are not necessarily monitored for quality control or validity.

According to the CBO, verifying offsets would involve four areas:

- Offsets would need to bring about additional reductions in GHGs. Meaning, the offset project would need to result in reductions that would not have already occurred in the absence of the program. This is referred to as "additionality."
- Offsets would need to be quantifiable so that any reductions in GHGs could be reliably measured.
- Offsets would need to be permanent rather than only delaying the release of GHGs into the atmosphere.
- Offsets would need to be credited in a way that accounted for leakage in the form of higher emissions in other locations or sectors of the economy as a result of the offset activity.[18]

One tradeoff to keep in mind is the issue of leakage from offsets. For example, the economic effects of preserving a forest to generate an offset may reduce the overall supply of timber, resulting in higher prices and possibly incentivizing increased harvests of trees in other locations.[19] This could drive forward investment in international offset projects, which represents both an opportunity and a threat. International offset opportunities protect the U.S. emitters' ability to have offset opportunities.;however, the downside to this is that the investment is going overseas rather than staying within U.S. borders

According to the U.S. EPA, offset potential varies across regions. It cites the Corn Belt, South Central, and Southeast regions as having the largest potential for GHG mitigation via offsets. The South Central region holds the greatest potential through forest management, followed by soil sequestration in the Corn Belt, Great Lakes and Plains states. The Northeast, Southeast, and South Central regions also hold significant mitigation potential through biofuels. [20]

[18] Congressional Budget Office, "The Use of Offsets to Reduce Greenhouse Gases," Economic and Budget Issue Brief, August 3, 2009.

[19] Ibid

[20] U.S. Environmental Protection Agency, "Greenhouse Gas Mitigation Potential in U.S. Forestry and Agriculture," 2005. EPA 430-R-05-006. http://www.epa.gov/ sequestration/pdf /greenhousegas2005.pdf (Accessed August 13, 2009).

III. Current U.S. Regional Schemes for Carbon Cap and Trade

States historically have been drivers of policy innovation, and as U.S. lawmakers debate introducing legislation that would enable the creation of a nationwide cap-and-trade scheme, regional mandatory initiatives already exist and are taking shape across the country.

To date, 23 U.S. states and four Canadian provinces are participating in three regional U.S. cap and trade schemes, accounting for one-third of all U.S. greenhouse gas emissions and covering half of the U.S population. A review of the innovations in policy design and program implementation of these schemes will help illustrate how a national carbon cap and trade scheme might work on the ground. Moreover, the Acid Rain Program (initiated in the 1990s) provides a pioneering example of a successful cap-and-trade program in the U.S. that has greatly reduced power plant emissions of sulfur dioxide (SO_2) and nitrogen oxides (NOx) at a significantly lower cost than originally assumed.

a. Regional Greenhouse Gas Initiative (RGGI)

In December 2005, governors from Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont announced an agreement - the Regional Greenhouse Gas Initiative (RGGI) - to establish a regional cap-and-trade program addressing carbon dioxide emissions from power plants. In 2006, these same governors signed a memorandum of understanding (MOU) that outlined the framework of the RGGI. In 2007, Massachusetts, Rhode Island, and Maryland signed the MOU, joining the first mandatory cap-and-trade program in the U.S. to reduce greenhouse gas emissions. The goal was to reduce CO_2 emissions from the power sector 10 percent by 2018.[21]

The RGGI Approach

The RGGI is intended to encourage power producers in the northeastern states (representing over 50 million people) to cut greenhouse gas pollution by requiring them to buy allowances, which will decrease annually, to offset their emissions. States sell emission allowances through auctions and invest proceeds in consumer benefits such as energy efficiency, renewable energy, and other clean energy technologies.

The RGGI approach to cap-and-trade entails:

- Establishing a multi-state CO_2 emissions cap that will decrease gradually until it is 10 percent lower than at the start;
- Requiring electric power generators to hold allowances covering their emissions of CO_2;
- Providing a market-based emissions auction and trading system where electric power generators can buy, sell, and trade CO_2 emissions allowances;
- Using the proceeds of allowance auctions to support low-carbon-intensity solutions, including energy efficiency and renewable energy, such as solar and wind power; and
- Employing offsets to help companies meet their compliance obligations.

[21] They imply the option of expanding to other sectors in the future.

The scheme is meant to be carried out in phases, with the CO_2 caps intended to be modest at the onset. This allows for a learning curve and adjustments so that electricity generators will be able to plan for and invest in lower-carbon alternatives and avoid dramatic electricity price impacts.

The RGGI is composed of individual CO_2 Budget Trading Programs in each of the ten participating states, which are implemented through state regulations. Regulated power plants can use a CO_2 allowance issued by any of the ten participating states to demonstrate compliance with the state program governing their facility. Taken together, the ten state programs function as a single regional compliance market for carbon emissions.

The authority of the individual states is the basis for the RGGI CO_2 Budget Trading Programs. Through independent rules and regulations (based on a Model Rule), each state limits emissions of CO_2 from electric power plants, creates CO_2 allowances, and establishes participation in CO_2 allowance auctions. The first compliance period for each state's linked CO_2 Budget Trading Program began January 1, 2009.

Tracking Allowances in RGGI

The RGGI CO_2 Allowance Tracking System (RGGI COATS) records and tracks data for each state's CO_2 Budget Trading Program.

COATS supports the administration of the program and facilitates market participation by providing for:

- The award and transfer of RGGI allowances;
- The registration of offset projects; and
- The submittal of offset project Consistency Applications and Monitoring and Verification reports.

COATS also makes it possible for the public to view reports on RGGI CO_2 allowance market activity and program data, setting an example of transparency and accountability.

To date, COATS includes information on COATS account holders; CO_2 allowance awards and allocations; transfer of CO_2 allowances among accounts; tracking of reported CO_2 emissions from regulated emissions sources; emissions source ownership and management; offset project application status; and CO_2 offset allowance awards by participating states.

Offsets in RGGI

In terms of offsets, the RGGI participating states developed regulatory requirements for five offset project categories that are designed to reduce or sequester emissions of CO_2, methane, and sulfur hexafluoride (SF_6) within the 10-state region. These five categories are:

- Landfill methane capture and destruction;
- Reduction in emissions of sulfur hexafluoride (SF6) in the electric power sector;
- Sequestration of carbon due to afforestation;
- Reduction or avoidance of CO_2 emissions from natural gas, oil, or propane end-use combustion due to end-use energy efficiency in the building sector; and
- Avoided methane emissions from agricultural manure management operations.

All offset projects must be located within one of the RGGI participating states and they are fundamental to each state's CO_2 Budget Trading Program. By recognizing CO_2-equivalent emissions reductions and carbon sequestration outside the capped sector, these offsets provide compliance flexibility and create opportunities for low-cost emissions reductions and other benefits across sectors.

The use of CO_2 offset allowances is currently limited to 3.3 percent of a power plant's total compliance obligation during a control period, but this may be expanded to 5 percent and 10 percent if certain CO_2 allowance price thresholds are reached.

Carbon Auctions

The majority of CO_2 allowances issued by each participating state are sold quarterly through a regional auction platform. Each state offering CO_2 allowances for sale in a CO_2 Allowance Auction maintains the authority to make its own regulatory determinations in conducting the auction. All of the 30,887,620 allowances for 2009 were sold at a price of $3.23 each, while 2,172,540 allowances for the next period of the scheme, starting in 2012, were sold for $2.06 each.[22]

Review of the RGGI

There were both achievements and set-backs in the RGGI's first year. Notably, many believe that the cap on carbon that was set in 2005 was too high.

The agreement to set the cap at 188 million tons annually was based on two factors: the anticipated rate of emissions and pressures by industry and consumers to avoid rate increases. However, emissions grew at a lower rate than expected, and 2008 RGGI-regulated facilities were reported to emit 153 million tons of carbon a year. This somewhat defeats the objective of cap and trade, as there is no incentive for power plants to reduce fossil fuel usage or to buy new permits to emit carbon, as a lower ceiling would have forced them to do.

[22] Business Green, *"RGGI carbon auction raises more than $100,"* June 22, 2009 http://www.businessgreen.com/business-green/news/2244542/rggi-carbon-auction-raises-100m

Furthermore, it could be argued that because the RGGI affects only one sector - large fuel-burning electric plants with a capacity of 25 megawatts or higher - the initiative is too modest to have any real impact on reducing emissions. However, the decision to keep the program small was necessary at the time in order to gain political support and to be able to implement the program in the desired timeframe. Moreover, since electricity generators account for 24 percent of CO_2 emissions in the RGGI region and 38 percent of CO_2 emissions nationwide, the sector's lead in tackling climate change was seen as a necessary step to achieving energy efficiency while minimizing ratepayer impacts.[23] Whether or not the system has driven up energy costs for the consumer - a serious concern about any cap and trade program - remains to be seen, as no data are currently available on this.

As for achievements, the RGGI has already made progress in the financing and the expansion of energy efficiency programs in the participating states and in generating revenue. The first auctions of carbon dioxide allowances held in September,[24] December 2008, and March 2009 yielded $262 million that states are investing in clean-energy development and job-training programs. The latest auction in June 2009 raised a further $104 million for investments in low-carbon and energy-efficiency projects.

The RGGI stipulates that states may allocate their auction revenue freely, as long as at least 25 percent is used for consumer benefit or strategic energy purposes. However, most states have gone far beyond the 25 percent requirement, placing a much higher percentage of that revenue towards consumer and energy efficiency objectives. As of spring 2009, 71 percent of the revenue has been used for clean energy initiatives.[25]

New York, for example, earned approximately $88 million in revenue from the first three auctions, and designated 36 percent of those funds to residential heating efficiency, 34 percent to waste management efficiency and 13 percent to commercial and industrial efficiency, and another 5 percent to green workforce development. Connecticut, which has gained $14 million from the first three RGGI auctions, has allocated a third of the revenue towards the Connecticut Clean Energy Fund, which provides financial incentives and educational programs for homeowners and business that encourage the use of renewable energy. In New Hampshire, the state's Sustainable Energy Division has offered to distribute $5.3 million in grants to nine groups (chosen from 84 applications from municipalities, organizations, and businesses wanting to use some of the money) to help reduce future energy consumption. The proposed grants would be spent on workforce training, a loan fund and programs to develop energy-efficiency projects for businesses and agriculture, rather than directly on efficiency programs, with the goal of building capacity long-term.[26]

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[23] Environment Northeast, "Lessons Learned from RGGI", http://www.env ne.org/public/resources/pdf /RGGI_Lessons_ Learned_3.3.09.pdf

[24] The first auction included only allowances from six states and raised $38.5 million

[25] Keith Schneider, "*Regional Climate Pact's Lessons: Avoid Big Giveaways to Industry*," Yale Environment 360, May 21, 2009.

[26] New Hampshire Business Review, "*RGGI: Now 'the fun part'*," July 3, 2009.

Going Forward

Supporters of the program hope that it is just the beginning of a steady flow of funds that can then be channeled to the RGGI states so that they can continue to distribute grants to utilities and organizations that will run energy efficiency programs, spurring green jobs in the region and a clean energy infrastructure. The program's success logistically - on a regional level - holds significance as it will most likely serve as a model for a future national cap and trade program in the U.S.

b. The Western Climate Initiative

In February 2007, the governors of Arizona, California, New Mexico, Oregon, and Washington signed an agreement directing their respective states to develop a regional target for reducing greenhouse gas emissions. The agreement - entitled the Western Climate Initiative (WCI) - stipulated that these states participate in a multi-state registry to track and manage greenhouse gas emissions in the region, and develop a market-based program to reach the target. The WCI was built on existing greenhouse gas reduction efforts in the individual states as well as two existing regional efforts.[27] In the last two years, the Premiers of British Columbia, Manitoba, Ontario, and Quebec, Canada, and the governors of Montana and Utah have joined the WCI.

The WCI Approach

With the principal goal of reducing GHG emissions to 15 percent below 2005 levels by 2020, the WCI aims to stimulate growth in new green technologies, help build a strong clean-energy economy, and reduce dependence on foreign oil. When fully implemented in 2015, the program will cover nearly 90 percent of greenhouse gas emissions in WCI Partner states and provinces, including those from electricity, industry, transportation, and residential and commercial fuel use.

The Design Recommendations for the WCI Regional Cap-and-Trade Program were released in September 2008 and aim to:

- Provide opportunities to obtain low-cost emission reductions through emission trading, allowance banking, and inclusion of an offsets component;
- Mitigate economic impacts, including impacts on consumers, income, and employment;
- Balance all principles adopted by the WCI Partner jurisdictions to maximize total benefits throughout the region, including reducing air pollutants, diversifying energy sources, and advancing economic, environmental, and public health objectives, while also avoiding localized or disproportionate environmental or economic impacts.

The WCI cap-and-trade program will cover emissions of the six main greenhouse gases (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride) from the following sectors of the economy:

- Electricity generation, including imported electricity;

[27] In 2003, California, Oregon and Washington created the West Coast Global Warming Initiative, and in 2006, Arizona and New Mexico launched the Southwest Climate Change Initiative.

- Industrial and commercial fossil fuel combustion;
- Industrial process emissions;
- Gas and diesel consumption for transportation; and
- Residential fuel use.

Parts of the WCI are modeled on programs underway in the EU and Japan and will be implemented in two phases with the first beginning January 1, 2012. At that time, emissions from electricity generators and large industrial and commercial sources will be covered under the program. In the second phase, beginning January 1, 2015, the program will expand to cover emissions from transportation and residential, commercial, and industrial fuel use not otherwise covered. Mandatory reporting of GHG emissions will begin prior to the cap-and-trade program, with 2010 emissions to be reported in early 2011.[28] Flexible mechanisms to reduce compliance costs include three-year compliance periods, the banking of allowances, and the limited use of offsets.

Companies covered by the rules will be able to purchase allowances at auction, buy and sell them on secondary markets, or bank them for future use. In some cases, companies also will be able to purchase a limited number of offset credits that reflect reduced carbon emissions elsewhere. Companies may also purchase allowances from other comparable cap-and-trade programs approved in the future. To encourage emissions reductions prior to the official beginning of the program, certain reductions will be awarded Early Reductions Allowances.

The program is designed so that it can stand alone, be integrated into, or be implemented in conjunction with programs that might ultimately emerge from the federal governments of the U.S. and Canada. To participate in the regional system, the states and provinces must have legal authority in place by 2012. California is the furthest along; states such as Utah and Arizona are dealing with resistance from both the legislators and businesses there.[29]

It is notable that California, which is the largest single entity in the WCI, also has the most detailed action plan of any state in the nation. In 2006, the California legislature passed a law to reduce emissions economy-wide, which the governor signed. The California Air Resources Board has created a blueprint for achieving the required reductions. The plan includes a strong set of sector-specific policies forecast to provide about 80 percent of the needed reductions, as well as a broad cap-and-trade program linking it to the WCI.

The Western Governors Association is under contract to the WCI to provide overall project management. Other U.S. states, Canadian provinces, Mexican states and tribes are encouraged to participate in the WCI as either members or observers.

[28] Pew Center on Global Climate Change, "Western Climate Initiative Releases Final Design Recommendations," http://www.pewclimate.org/node/6177.

[29] Margot Roosevelt, "Business group condemns climate initiative on economic grounds," Los Angeles Times, February 18, 2009.

c. Midwestern Greenhouse Gas Reduction Accord

The Midwestern Greenhouse Gas Reduction Accord (MGA) was first agreed to in November 2007 in Milwaukee, Wisconsin, by nine Midwestern governors and two Canadian premiers as a means of acknowledging the impact that the Midwestern states play in the emissions of carbon. Through the Accord, these leaders agreed to establish a Midwestern GHG program to reduce greenhouse gas emissions in their states, as well as a working group to provide recommendations regarding the implementation of the Accord. The members of the Accord are Iowa, Illinois, Kansas, Manitoba, Michigan, Minnesota, and Wisconsin. Observers are Indiana, Ohio, Ontario, and South Dakota.

The Accord's Goals

While the region's intensive manufacturing sectors make it the most coal-dependent region in North America, it also has world-class renewable energy resources and opportunities to take a lead role in mitigating the causes of climate change. Building on existing greenhouse gas reduction efforts in each state, as well as existing regional efforts, the Accord aims to:

- Establish greenhouse gas reduction targets and timeframes consistent with MGA member states' targets;
- Develop a market-based and multi-sector cap-and-trade mechanism to help achieve those reduction targets;
- Establish a system to enable tracking, management, and crediting for entities that reduce greenhouse gas emissions; and
- Develop and implement additional steps as needed to achieve the reduction targets, such as a low-carbon fuel standards and regional incentives and funding mechanisms.

Recommendations

In June 2009, the Midwestern Greenhouse Gas Reduction Accord Advisory Group finalized its recommendations.[30] Recommendations include:

- Reducing emissions targets to 20 percent below 2005 levels by 2020 and an 80 percent reduction below 2005 levels by 2050. The Advisory Group also recommends that the targets be revisited and adjusted from time to time based on future scientific findings, technology developments, and program results, and recommends the establishment of a mechanism to conduct this review.
- The program should cover the following greenhouse gases, as appropriate: carbon dioxide, methane, nitrous oxide, hydro-fluorocarbons, perfluorocarbons, and sulfur hexafluoride.

[30]Midwestern Greenhouse Gas Reduction Accord: Draft Final Recommendations of the Advisory Group http://www.midwesternaccord.org/Accord_Draft_Final_7-16-09.pdf

- The participating states and provinces will seek to link the Accord to the Northeast Regional Greenhouse Gas Initiative, the Western Climate Initiative, and the European Emissions Trading System.
- The GHG registry will be managed by the Climate Registry,[31] which manages the registry for other U.S. state schemes.
- The effort should encourage the participation of more states.
- Carbon dioxide emissions from the combustion of biomass or biofuels, or the proportion of carbon dioxide emissions from the combustion of biomass or biofuels in a blended fuel, are not to be included in the cap-and-trade program, except for the purposes of reporting.

Allowances and offset recommendations are presented in the draft with a range of choices that need to be determined by the members before being finalized. The governors are currently reviewing the recommendations to offer their input on next steps to be taken in the region and at the federal level. The recommendations are from the Advisory Group only, and have not been endorsed or approved by individual governors.

IV. What Are the Impacts of Carbon Cap and Trade to the Economy?

A national carbon cap and trade program would undoubtedly create shifts in the economy. Specific impacts, however, can only be explored as they relate to a specific policy. On June 26, 2009, the U.S. House of Representatives passed the American Clean Energy and Security Act of 2009 (ACES, H.R. 2454). The bill, also referred to as the Waxman-Markey (W-M) comprehensive energy bill, would establish an economy-wide cap-and-trade program for the reduction of greenhouse gas emissions. A brief summary of its anticipated impacts is provided below.

It should be noted that cap and trade policy is a moving target and that while there are many studies trying to assess it, no study can perfectly capture its outcomes because the anticipated effects are tied very specifically to the details of the policy, which is still undergoing changes in the Senate. Further, the challenge to estimating cap and trade costs is dependent upon multiple outside factors and assumptions that are still unknown.

The legislation has four titles: (1) a "clean energy" title that promotes renewable sources of energy and carbon capture and sequestration technologies, low-carbon transportation fuels, clean electric vehicles, and the smart grid and electricity transmission; (2) an "energy efficiency" title that increases energy efficiency across all sectors of the economy, including buildings, appliances, transportation, and industry; (3) a "global warming" title that places limits on the emissions of heat-trapping pollutants; and (4) a "transitioning" title that protects U.S. consumers and industry and promotes green jobs during the transition to a clean energy economy.[32]

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[31] The Climate Registry is a nonprofit collaboration among North American states, provinces, territories and Native Sovereign Nations that sets consistent and transparent standards to calculate, verify and publicly report greenhouse gas emissions into a single registry.

[32] Congressional Quarterly, "Discussion Draft: The American Clean Energy and Security Act of 2009," http://www.cq.com/displayfile.do?docid=3088835.

According to Congressional Quarterly, the bill proposes the following specific elements:

- Creates a market-based program to reduce greenhouse gas pollution by electric utilities, oil companies, large industrial sources and other entities that emit at least 25,000 tons of carbon dioxide per year.
- Caps overall emissions and distributes tradable federal permits, or "allowances," for each ton of pollution emitted.
- Decreases the number of allowances issued each year with the aim of reducing emissions to 83 percent below their 2005 levels by 2050.
- Allows entities to reduce emissions through special projects, such as planting trees, at a value of five tons of emissions "offsets" for every four tons of emissions. Total offsets could not exceed 2 billion tons a year, split evenly between domestic and international offsets.
- Authorizes "rebates" to manufacturing companies to ensure they are competitive with other countries. The president could set new fees for importers to account for the carbon in U.S.-bound products if the rebates are insufficient.
- Allows entities to bank unused allowances for use in future years and to borrow allowances from one year ahead without penalty. Permits limited borrowing of allowances from two to five years in the future.
- Directs the Environmental Protection Agency to create a "strategic reserve" of 2.5 billion allowances that would be available at an auction if prices rise to unexpectedly high levels.
- Directs the EPA to devote 5 percent of allowances to international deforestation agreements, with the aim of reducing pollution by 10 percent of total 2005 emissions by 2020. [33]

Below are summarized analyses that have attempted to put a price tag on carbon cap and trade, specific to the Waxman-Markey legislation. While looking at the analyses collectively can aid in gaining an overall understanding of potential impacts of the bill, they are not without their limitations. Namely, there are several unknown factors within this type of legislation that demand any form of economic analysis to set out with large uncertainties and assumptions. Therefore, while one can get a sense for potential scenarios that the bill presents, none of them are certain to emerge, and any economic analysis is limited to the assumptions that accompany a vastly complex web of possibilities.

Potential Impacts from American Clean Energy and Security Act of 2009 - H.R. 2454

The Congressional Budget Office released an analysis on June 19, 2009, which looks at the average cost per household that would be incurred from a GHG program from the Waxman-Markey bill. (The analysis focuses on the year 2020, when 17 percent of the allowances would be sold by the government and the remaining 83 percent would be given away.) The analysis also looks at how the cost burden would be distributed among households of different incomes. It does

[33] Congressional Quarterly Today, "Highlights of House Cap and Trade Plan," April 1, 2009.

not examine aspects of the bill such as energy efficiency standards or programs to speed the development of clean technologies.

The analysis found that the proposed cap and trade program would reduce emissions by increasing emission prices, which means most households would experience higher prices and as such have less to spend. However, the revenue earned from emission allowances would improve household finances through benefit payments, rebates, tax decreases, credits, wages and returns on investment. Notably, the exact impact depends on how the bill sets up the management of allowances: 1) how many are auctioned versus given away; 2) how the free allowances are allocated; and 3) how the allowance revenues are used.[34] Overall, it found that the net (annual) cost of the program in 2020 would be $175 per household ($22 billion in total).[35]

The EPA analysis of the Waxman-Markey bill evaluates it in five areas: energy transformation; electricity sector impacts; household impacts; allowance and offset prices; and offsets. The EPA's analysis assumes that the majority of revenues from allowances are returned to households as a lump-sum rebate. As such, their analysis shows the bill having modest impacts on household consumption. However, the specifics of the allowance allocations are uncertain. EPA also notes that a policy that is not designed to return revenues to consumers would lead to higher losses in consumption. [36]

In August 2009, the Energy Information Administration (EIA) also released an economic impact analysis of HR 2454. (EIA is the independent statistical and analytical agency within the Department of Energy.) Its analysis focused on two key areas of uncertainty: 1) offsets - their timing, regulation, and degree of use within national and international boundaries; and 2) low- and no-carbon technologies – their timing, cost, and public acceptance. Given these uncertainties, the EIA's analysis includes six scenario cases that provide a range of possible futures under which the bill would be functioning. Their analysis includes, but is not limited to the following findings:[37]

- Allowance prices are sensitive to the cost and availability of emissions offsets and low- and no-carbon generating technologies. Lower prices occur when technological options (e.g., adoption of new nuclear power plants) can be deployed on a large scale before 2030 at relatively low costs, and when international offsets can be used to help hold down compliance costs. It found higher allowance prices when international offsets are unavailable.

- The bill increases energy prices, but effects on electricity and natural gas bills of consumers are substantially mitigated through 2025 by the allocation of free allowances to regulated electricity and natural gas distribution companies.

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[34] Congressional Budget Office, "The Estimated Costs to Households from the Cap-and-Trade Provisions of H.R. 2454," June 19, 2009.
[35] Figure includes the cost of restructuring the production and use of energy and of payments made to foreign entities under the program, but it does not include the economic benefits and other benefits of the reduction in GHG emissions and the associated slowing of climate change.
[36] Environmental Protection Agency, "Analysis of the Waxman-Markey Discussion Draft: The American Clean Energy and Security Act of 2009 Executive Summary," April 20, 2009.
[37] Energy Information Administration, "Energy Market and Economic Impacts of H.R. 2454, the ACESA of 2009," August 2009.

- Impacts to household consumption: In 2020, the reduction in household consumption is $134 (2007 dollars) in the base scenario, with a range of $30 to $362 across all main scenario cases. In 2030, household consumption is reduced by $339 in the base scenario, with a range of $157 to $850 per household across all main scenario cases.

- Free allocation of allowances to electricity and natural gas distributors significantly ameliorates impacts on consumer electricity and natural gas prices prior to 2025, when it starts to be phased out. While this result may serve goals related to regional and overall fairness of the program, it reduces the efficiency of the cap-and-trade program by delaying the price signal that would encourage cost-effective changes by consumers in their use of electricity and natural gas.

The bill would create profits in certain sectors, while creating losses in others. According to the CBO, the increased production of alternative energies such as solar and wind would create a shift to jobs in those areas. However, there may be regional variations, with such jobs opening up in a different part of the country and with the possibility of those jobs having different skills sets than the jobs that were lost. The CBO notes that the degree of these transition costs depends upon how fast emission reductions are made, as a faster transition would lead to bigger costs.[38]

Conclusion

On September 30, Senators Barbara Boxer and John Kerry unveiled the preliminary draft of the Senate's version of the climate bill, the *Clean Energy Jobs and American Power Act*. The following highlights the main differences between the House and the Senate bills; however, as the bill is still making its way through several Senate committees, it should be noted that these may change.

[38] Congressional Budget Office, "The Estimated Costs to Households From the Cap-and-Trade Provisions of H.R. 2454," June 19, 2009.

	Waxman-Markey	Boxer-Kerry
Targets	17 percent reduction below 2005 levels by 2020	20 percent reduction below 2005 levels by 2020
Price Collar on Permit Prices	Uses a reserve pool to stabilize prices when they exceed 60 percent of the historical price	Uses a reserve pool to stabilize prices when they drop below $11/ton or go above $28/ton
Free Allowances	Focused on utilities	Still unknown
Tariff	Mandatory tariff on imports from countries that don't implement climate programs by 2020	Still unknown
EPA's Role	EPA's authority to regulate large emitters of greenhouse gases overruled	Maintains EPA's authority to regulate large emitters of greenhouse gases
Oversight	Authority shared between Federal Energy Regulatory Commission and Commodity Futures Trading Commission	Authority given to Commodity Futures Trading Commission and more power to regulators to control speculation
Green Transportation	*Allows* states to use a percentage of revenue for green transportation program (e.g., bike-ped infrastructure, public transit)	*Requires* states to use a percentage of revenue for green transportation program (i.e. bike-ped infrastructure, public transit)
Methane	Strict regulations on emissions from natural gas pipelines, landfills and coal mines	Voluntary capture from these sources in exchange for carbon offsets

V. What Does Carbon Cap and Trade Mean for Economic Development?

Awareness of the carbon footprints of business and industry are gaining in the global spotlight, and carbon emissions are increasingly one of the factors that global and multinational firms are using to guide their investments. While there is no official cap (in the U.S.) as of yet, the carbon race is in effect "on" and other countries are already moving ahead of the curve. For example, like the U.S., China has also provided a stimulus package for investment in green projects.[39]

There would be economic benefits and opportunities stemming from a national carbon cap and trade policy, namely investment certainty for businesses and industries in the development of clean tech, energy efficiency, etc. There would also, without question be transition pains. The degree to how local economies will be impacted will be dependent on the details of local industry mix, their innovative capacity to adapt, and exactly how the cap and trade system is designed and setup.

[39] Nick Hoffman and James Twining, "Profiting from the low carbon economy," McKinsey Quarterly, August 2009, http://www.mckinseyquarterly.com/Profiting_from_the_ low_ carbon_ economy_2412 (Accessed September 3, 2009).

a. Opportunities

Primary economic development opportunities stemming from cap and trade are largely tied to the price signal that it would place on carbon, the regulatory certainty it would provide, and funding for new and cleaner energy related technologies. The Council on Competitiveness notes, that a transparent price on carbon will not only help businesses to better understand and integrate the true cost of energy into their planning, but a sound market price will stimulate innovation needed to improve energy productivity and create new, lower carbon products and services.[40] By creating the conditions that require the market to set the price for carbon, cap and trade provides an incentive for the creation of new products and services that can promote clean energy industries, make existing industries more energy efficient, and ultimately manage energy prices. To better manage energy efficiency and promote clean energy, innovation is essential. As David Hill, deputy laboratory director for science and technology at the Idaho National Laboratory, noted, "..one of the things that we have to admit to ourselves is that the answers aren't all discovered yet."[41] When discovery is catalyzed, there is economic opportunity.

Second the Council on Competitiveness also noted that, from a business perspective, "Climate change is viewed as an unpredictable disruptive force," which is rewriting the future of business competitiveness.[42] This uncertainty is created not only by unforeseeable physical changes and challenges, but by rapidly changing political, social and economic forces. The lack of certainty is already felt in the investment community. According to McKinsey Quarterly, banks that can integrate climate change and carbon policy into their lending decisions will stand at a competitive advantage.[43] At the National Energy Summit held by the Council of Competitiveness, Kevin Parker, the CEO of Deutsche Asset Management at Deutsche Bank noted that Banks, insurers and other investors will start to move their investments toward companies that take low carbon approaches. Banks, insurers and other investors will limit their risks in today's uncertain environment and we will see investment increasing in lower carbon solutions and companies to help mitigate the risk of uncertainty. The flip side to this, according to Parker, is that they are not investing in high carbon options such as coal fired plants. Looking at the market, Parker noted that energy efficient companies were outperforming the investors while the renewable energy sector was of high interest for investors.[44] As such, knowledge will be power when it comes to finding new business and investment opportunities that the market will create in reaction to the changes in demand stemming from a lower carbon economy.

Finally, cap and Trade provides resources in the form of revenues and offsets that can be invested into new clean energy industries or to help existing industries transition. We are already beginning to see movement in the building of a clean energy economy to some degree within all

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[40] Council on Competitiveness. Define. Progressive Dialogue I: The Energy-Competitiveness Relationship. Washington, D.C. 2007.

[41] Cited in Ron Starner, "How Waxman-MarkeyWill Change America", The Site Selection Energy Report, Vol. 1, issue 7, November 16, 2009.

[42] Ibid. 2007.

[43] Nick Hoffman and James Twining, "Profiting from the low carbon economy," McKinsey Quarterly, August 2009, http://www.mckinseyquarterly.com/Profiting_from_the_ low_ carbon_ economy_2412 (Accessed September 3, 2009).

[44] Kevin Parker, "Driving Competitiveness through Sustainable Energy," Discussion at The Council on Competitiveness National Energy Summit, Washington, D.C. September 23rd, 2009. The Renaissance Mayflower Hotel.

states through the development and deployment of energy efficient technologies and renewable energy sources and technologies.[45] A significant percentage of stimulus dollars have also been used to stimulate the cleaner and more efficient energy practices and industries. An energy policy that places a price on carbon, such as cap and trade, would provide future investment certainty and a price mechanism that would further support the growth of low and non emitting technologies, and as such help to reduce the cost of reducing emissions in the future.[46]

How industries manage carbon risk is already beginning to change. For example, climate change is already becoming integrated with investment and insurance decisions. According to McKinsey Quarterly, the National Association of Insurance Commissioners (NAIC) has set new requirements that insurers that hold premiums greater than $500 million will be required to share their climate change risks and mitigation plans with regulators. Investors, such as the Carbon Disclosure Project – a group of 385 investors managing over $57 trillion in assets, are also taking a closer look at carbon by demanding that companies release their emissions data to empower investors towards more nuanced decision making.[47] The companies that can stay innovative and ahead of the curve will undoubtedly be the winners. According to McKinsey Quarterly,

> *Forward-looking companies are using such discussions as opportunities for supplier development, for example by transferring best practices in manufacturing, purchasing, and R&D—as well as energy efficiency—to key suppliers. This opens the possibility of still lower costs and improved operational performance, in addition to helping suppliers remove more carbon from their supply chains.*[48]

b. Challenges

Economic development challenges stemming from carbon cap and trade include higher energy prices, the transition costs for firms and communities to reduce GHG emissions, and the degree to which energy-intensive industries are concentrated within certain regions. For businesses and industries, the effects will largely be felt by the transition costs that they will incur from the need to reduce emissions and/or increased energy costs. Primary affected industries –both those that are energy intensive and are heavy GHG emitters—are the most vulnerable. The direct costs will be in the purchasing of allowances for emitting carbon and investing in carbon-reducing technologies. Further, with potentially volatile energy costs, companies may face competitiveness impacts due to higher energy costs in the short to midterm timelines. Indirect impacts will likely be felt across the board as the primary affected industries pass their costs through their supply chains to suppliers and ultimately consumers. This may come through higher electricity prices and fuel costs, as well as the cost of adapting to more efficient equipment and processes needed to make

[45] National Governors Association. State Green Economy Profiles. www.nga.org (Accessed November 5, 2009).

[46] Robert Stavins. A U.S. Cap and Trade System to Address Global Climate Change," John F. Kennedy School of Government, Harvard University, 2007.

[47] Ibid

[48] The McKinsey Quarterly, "How Companies Think About Climate Change: A McKinsey Global Survey," February 2008, http://www.mckinseyquarterly.com/How_companies_think_about_climate_change_A_McKinsey_Global_Survey_2099 (Accessed August 26, 2009).

carbon emission reductions.[49] Further, there will be churn in the form of market incentives creating opportunities for new competitors to enter into industry, while some compliance regulations will create new barriers to competitors entering other industries.[50]

For businesses and industries to adapt, they will need to understand how carbon flows through their direct and indirect supply chains as well as overall carbon markets. In fact, those who understand where they stand will have a monumental advantage over those that do not.[51] Integrating the price of carbon into an overall business strategy will need to become part of standard operations.

For states and regions, the challenges will stem from the degree to which their economies, businesses and workers depend on energy intensive industries, low cost energy and/or the fossil fuel industry. The energy industry and energy intensive industries, which includes some manufacturing industries maybe more concentrated in certain regions, thus requiring transition investments in the public and private sectors to even out regional disparities. Regions with economies focused on carbon-based energy industries, such as Appalachia, would likely feel the effects more than other regions that are more diversified. Thus, if a carbon cap and trade bill passes, resources for transitioning would be critical.

According to the CBO, many firms will not bear the direct costs incurred from purchasing allowances and offsets, rather they will pass the cost on to consumers as goods pass through the supply chain. However, the company's ability to do so depends on the type of industry and whether or not it is trade sensitive. Some industries that are competing globally may be more limited in their ability to transfer the costs of compliance. Further, there would be resource costs incurred by firms as part of their requirements to reduce emissions in the form of changing practices, improving energy efficiency, and changing behaviors.[52] Further effects may include consumers themselves changing their behavior to choose less GHG intensive products, thereby reducing the demand for carbon.[53] As such there will be a strong need to establish a balancing act between short and long term goals as carbon cap and trade becomes integrated into business practices.

Another possible challenge is emissions leakage, which is the shifting of energy intensive firms to countries that have less stringent or no carbon controls. While this is of great concern, it is highly debated. Some believe that energy-intensive manufacturers will most assuredly be driven offshore, while others argue that this is unlikely as environmental regulations and controls have

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[49] Pew Center on Global Climate Change, "Addressing Competitiveness in U.S. Climate Change Policy," Congressional Policy Brief, Fall 2008.

[50] Marshall Chase and Ryan Schuchard, "Why Climate Change Will Matter to Every Company," GreenBiz.com, August 20, 2009, http://www.greenbiz.com/blog/2009/08/20/why-climate-change-will-matter-every-company (Accessed September 4, 2009).

[51] Deloitte, "Business Implications of the Developing North American Carbon Markets," July 2, 2009, http://www.deloitte.com/us/sustainability/confrontingthecarbonchallenge (Accessed September 7, 2009).

[52] Peter R. Orszag, "Issues in Designing a Cap and Trade Program for Carbon Dioxide Emmissions," Testimony before the Committee on Ways and Means, U.S. House of Represenatives, September 18, 2009, http://www.cbo.gov/ftpdocs/97xx/doc9727/09-18_ClimateChange_Testimony.pdf (Accessed on August 5, 2009).

[53] Pew Center on Global Climate Change, "Addressing Competitiveness in U.S. Climate Change Policy," Congressional Policy Brief, Fall 2008.

been shown to only be *one* factor in the location decisions of firms, with factors such as business climate and access to labor being much more paramount. To counter this, cap and trade can include border controls, which enact a tariff on imports with more lax carbon policies to even the marketplace to assist sensitive industries transition.

Both direct and indirect costs will be dependent on the industry sectors' GHG footprint and how simple or complex it is for the sector to adapt to meet reductions. According to McKinsey global business survey, "*40 and 60 percent of a company's [consumer goods makers, high-tech players, and other manufacturers] carbon footprint resides upstream in its supply chain—from raw materials, transport, and packaging to the energy consumed in manufacturing processes. For retailers, the figure can be 80 percent.*"[54] As such, firms will need to make sense of the complex picture of where carbon resides in their supply chains and processes and make critical decisions that will enable them to account for and reduce carbon in ways that empower them towards competitiveness.

c. How Can Economic Development and Businesses Prepare?

Economic development will likely find a new role in helping firms to rapidly adapt to the low-carbon economy while finding ways to tap into and support new opportunities. This can come through extensions and outreach and capacity building in the form of sustainability training and technical assistance to help firms adapt. Economic developers in some regions may face tough choices on how to allocate resources. For example, rebates from allowance proceeds could be used to help compensate energy-intensive firms for their direct and indirect costs stemming from GHG regulation and increased fossil fuel costs. However, the flipside to this is the opportunity cost of losing out on using the revenues towards other investments, such as clean tech development and deployment.[55]

Allowance and rebate assistance would be especially important for industries that are trade sensitive and/or have prices for their goods set by the global market, which would make it difficult for them to pass along their increased costs to consumers. Direct transition assistance is a more targeted option to help firms and people adapt to a lower carbon economy.[56] This could likely come in the form of tax credits for the development of energy efficient technologies.

The role of the economic developer centers on several broad activities: understand; educate; and engage.

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[54] The McKinsey Quarterly, "How Companies Think About Climate Change: A McKinsey Global Survey," February 2008, http://www.mckinseyquarterly.com/How_companies_think_about_climate_change_A_McKinsey_Global_Survey_2099 (Accessed August 26, 2009).

[55] Pew Center on Global Climate Change, "Addressing Competitiveness in U.S. Climate Change Policy," Congressional Policy Brief, Fall 2008.

[56] Ibid

Understand

Economic development professionals will need to first understand the specific opportunity and challenge sets facing their regions, industries and workers. That includes:

- Understanding the carbon footprint and energy-sensitivity of their community, particularly of their largest industries and employers, and the opportunity and challenge sets they face;
- Knowing what sustainability-oriented goals, visions, programs and policies are already in place (e.g., LEED certification, recycling programs, etc) that could be built upon;
- Assessing what local businesses or research and development are emerging that create or tap into opportunities that emerge in clean energy, energy efficiency or carbon reduction;
- Understanding what resources are available to stimulate the growth and assist the transition of the clean energy economy in the community and how to access them—including but not limited to: allowances, offsets and other state and federal incentives.

Educate

Economic development professionals, as a key conduit to the business community and other economic development stakeholders, will need to help them understand how to adapt to an economy with a price on carbon. Actions include:

- Helping the business community to get up to speed on issues of sustainability, energy efficiency/productivity and clean energy policy;
- Educating civic and community leaders on these opportunities and challenges and ways of finding resources to enable the transition;
- Bringing business and community leaders together (through strategic planning and scenario planning techniques) to identify available local resources and create a consensus of its strengths, weaknesses, opportunities and threats, and the strategies to address them.

Engage

For economic developers, helping their community transition and exploit new opportunities, means creating partnerships, leveraging resources and catalyzing growth:

- Building relationships with regional players that can help to create the opportunities in a clean energy economy (e.g. universities, community colleges, banks, small business technical assistance providers) and assist the workforce and businesses that are facing challenges induced by increasing energy and carbon prices to transition to new opportunities;
- Engaging with the private sector (both emerging and threatened industries) to help them transition to greater energy efficiency and to the clean energy economy.

VI. Looking Towards a Low Carbon Future

While the specifics of how the transition to a lower carbon economy are still being deliberated both nationally and internationally, it is clear that we do expect to see carbon pricing come to fruition in the near future. Further, such a transition will hold significant implications for U.S industries, regions and the nation as a whole. This document is intended to be a first step in helping those in the economic development and allied professions to think about how they can prepare and position local economies for the transition.

While economic development may end up in a largely reactionary role to the overall transition to a lower carbon economy, it should not remain dormant in the interim. Rather it should be leading the charge towards understanding the opportunities and challenges presented by the transition so that it can guide industries and firms towards maintaining their competitive advantage, and thus the competitive advantage of local economies and communities.

Appendix: Previous Cap and Trade Programs in the U.S.

The Acid Rain Program

The 1990 Clean Air Act[57] is a piece of U.S environmental policy relating to the reduction of smog and air pollution. Title IV of the Act established the allowance market system that we know as the Acid Rain Program (ARP) as a means of reducing atmospheric levels of sulfur dioxide (SO_2) and nitrogen oxides (NO_x), which cause acid rain. Initiated by the U.S. Environmental Protection Agency (EPA), the ARP's primary goal was to reduce annual SO_2 emissions by 10 million tons below 1980 levels of about 18.9 million tons to 8.95 million tons by 2010.

To achieve these reductions, the law required a two phase tightening of operating restrictions placed on fossil fuel fired (e.g., coal, oil, natural gas) and electrical power plants, representing a shift from traditional command and control regulatory methods that establish specific, inflexible emissions limitations with which all affected sources must comply. Instead, the ARP introduced an allowance trading system that harnessed the incentives of the free market to reduce pollution. Under this system, affected utility facilities are allocated allowances based on their historic fuel consumption and a specific emissions rate. Each allowance permits a unit to emit 1 ton of SO_2 during or after a specified year. For each ton of SO_2 emitted in a given year, one allowance is retired (it can no longer be used).

The ARP was not intended to replace the requirement to meet the National Ambient Air Quality Standards at the local level, but to instead help to achieve the standards through substantial reductions in background pollution that is often transported across state boundaries.

Phases of the ARP

The first phase of the Acid Rain Program started January 1, 1995 and the second phase began in January 1, 2000 and is currently in effect. The program is to be fully implemented in 2010. Phase I affected 445 units at 110 mostly coal-burning electric utility plants located in 21 eastern and mid-western states. Emissions data indicate that 1995 SO_2 emissions at these units nationwide were reduced by almost 40 % below their required level. Together, Phase I units represented 20% of the 1,250 operable coal-fired generating units in the U.S. in 1990.

Starting in 2000 with Phase II, annual emissions limits imposed on large, higher emitting plants were tightened and restrictions were set on smaller, cleaner plants fired by coal, oil, and gas, covering over 2,000 facilities. The program affects existing utility facilities serving generators with an output capacity of greater than 25 megawatts and all new utility facilities. The permanent cap was set at 8.95 million allowances for total annual allowance allocations to utilities. This cap firmly restricts emissions and ensures that environmental benefits will be achieved and maintained.

[57] The 1990 Clean Air Act follows the Clean Air Act of 1963, the Clean Air Act Amendment in 1966, the Clean Air Act Extension in 1970, and the Clean Air Act Amendments in 1977. Under this law, the EPA sets limits on how much of a pollutant can be in the air anywhere in the US. States are not allowed to have weaker pollution controls than those set for the whole country

Allowances and Monitoring

The SO_2 allowance trading feature of the Acid Rain Program allows utilities to be innovative in adopting the most cost effective strategy to reduce SO_2 emissions. Allowances may be bought, sold, or banked and regardless of the number of allowances a source holds, it may not emit at levels that would violate federal or state limits set under Title I of the Clean Air Act to protect public health. Every ARP operating permit outlines specific requirements and compliance options chosen by each source.

Affected utilities were required to install systems that monitor emissions of SO_2, NO_x and other related pollutants on a continuous basis in order to track progress, ensure compliance, and provide credibility to the trading component of the program. The monitoring data is then transmitted hourly to the EPA via telecommunications systems. An enhanced auditing system launched in 2002 ensures that accurate, consistent and complete data emissions are readily available to the public and stakeholders alike, facilitating transparency and accountability. Source emissions as well as information on trading can be found on www.epa.gov/airmarkets

ARP Results

The results of the Program have exceeded expectations, reducing SO_2 emissions faster and at a lower cost than predicted, generating a range of health and environmental improvements. In the 1990s, the U.S. acid rain cap and trade program achieved 100% compliance in reducing sulfur dioxide emissions, and compliance has remained consistently high, in the 99% range. Moreover, power plants took advantage of the allowance banking provision to reduce SO_2 emissions 22% (7.3 million tons) below mandated levels for the first phase of the program. Through the program, companies were not permitted to meet their obligations by buying offsets in emission reduction projects elsewhere.

By 2002, emissions from power plants were 9% lower than in 2000, and 41% lower than in 1980. According to the EPA, SO_2 emissions had fallen to 7.6 million tons by 2008, well below the 2010 cap. NOx emissions also decreased, posting a 13% reduction in 2002 from 2000 levels and a 33% decrease from 1990 levels.[58]

In terms of cost, the EPA had estimated that the program would cost $6 billion annually once it was fully implemented (in 2000 dollars). However, the Office of Management and Budget (OMB) has estimated actual costs to be $1.1 to $1.8 billion, about 25% less than the original forecasts.[59] Notably, a 2003 OMB study found that the program accounted for the largest quantified human health benefits of any major federal regulatory program implemented in the last 10 years, with benefits exceeding costs by more than 40:1.

Respiratory diseases such as chronic bronchitis, asthma, and hospitalizations for related illness have been reduced due to the success of the Acid Rain Program in reducing pollutants that cause these diseases. Ambient concentrations on SO_2 have decreased almost 40% in the Northeast and

[58] Clean Air market Programs, "Cap and Trade: Acid Rain Program Results", http://www.epa.gov/airmarkt/cap-trade/docs/ctresults.pdf

[59] Environmental Defense Fund, "*The Cap and Trade Success Story,*" March 2009, http://www.edf.org/page.cfm?tagID=1085.

Mid-Atlantic states and acid deposition that is harmful to lakes and streams has been greatly reduced, particularly in the Northeast, allowing for recovery.

The market-based approach of the Acid Rain Program has demonstrated that environmental protections do not systematically compete with economic well-being, and that cap and trade programs can and do have positive results for the protection of the environment and human health. Applications of the key principles of this program could have similar outcomes for a federal carbon cap and trade program, fostering innovation and investments.