

Carbon Markets in North America

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ABSTRACT

This paper outlines some of the highlights and issues surrounding carbon markets in North America. Carbon markets are a new branch of environmental finance. The issues covered include US Federal and State carbon policy, climate change legislation and trading systems. A particular focus will be on the Regional Greenhouse-Gas Initiative, the first mandatory cap-and-trade scheme to be set up in the US, as well as other similar initiatives in the US. The paper will also discuss carbon trading and investments and the growing role of carbon as an impetus for investments in low-carbon technologies. A general overview of carbon finance and Clean Development Mechanism (CDM) projects will be provided, as well as a general review of expert opinion on how the cost of carbon impact will affect other energy resources. Finally, the paper will conclude with a short assessment of the potential role of agriculture and forestry in reducing carbon emissions.

KEY WORDS

CAP AND TRADE, CARBON EMISSIONS, CLIMATE CHANGE, US Regional Greenhouse-Gas Initiative

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Introduction

Carbon markets players attempt to probe and predict the immediate and future monetary implications of continuing to function as a carbon-based society and world. This includes an assessment of levels of greenhouse gases (GHGs) including carbon dioxide (CO₂). The US market is based on the fact that financial risks, as well as opportunities, will directly affect earnings and standings of US corporations. Financial-market instruments and indicators are capable of assessing environmental risk to some extent, as well as the accrual of environmental objectives that lessen the deleterious effects of CO₂ emissions. Today's financial markets both in the US and abroad are all too aware of the fact that environmental issues related to climate change, CO₂ emissions and GHG emissions, need to be addressed as an elemental and urgent component of corporate management and decision-making.

Carbon trading ("cap and trade") began in the US as a mechanism designed to reduce carbon emissions, and thus to reduce the escalating effects of global warming. Federal and state governments have been successful in setting limits on companies as to how much carbon can be emitted. This numerical value is then divided into units assigned to different groups. The "market" aspect lies in the ability for these groups to trade these units as a commodity, both with other countries and among industries. Secondly, the US (and other) markets allow for "green projects" which allow a group to generate a greater amount of carbon credits through investment in these so-called green projects which are reducing emissions. In essence, wealthy countries and industries can pay a charge for the emissions, while the seller of the carbon credits is being paid for having reduced emissions in the future.

Despite reports from the Intergovernmental Panel on Climate Change (IPCC), which state that "there is unequivocal evidence that human activities have contributed to a gradual warming of the planet which has resulted in a change in climate," the US government has fallen behind its European counterparts in carbon policy not only on a federal, but especially on a state level.

One active trading programme in the US is the national market to reduce acid rain through the Acid Rain Program in the 1990 Clean Air Act. This cap-and-trade emissions trading programme proposed that sulphur dioxide (SO₂) emissions could be reduced by 50% between 1980 and 2010. Many experts believe that the SO₂ emissions programme helped to reduce the cost of controlling acid rain by as much as 80%.¹

Regional Greenhouse Gas Initiative (RGGI) and Future Outlook

The US federal government recently enacted the Regional Greenhouse Gas Initiative (RGGI). This is the first mandatory cap-and-trade scheme in the US designed to use carbon markets to reduce GHG emissions in the country. The initiative will include ten northeastern states, and will allow them to cap and reduce carbon emissions in the power sector by 10% by 2018. These ten states alone, according to data from the 2001 report from the Oak Ridge National Laboratory, are reported to be responsible for a substantial

¹ IPCC Fourth Assessment Report: Climate Change 2007.

amount of collective CO₂ emissions. The report states that, collectively, these states are the fifth highest CO₂ emitter in the world, and emit some 527 million metric tonnes of CO₂.²

Many believe that the RGGI will allow states to sell these allowances, and then invest in more renewable energy and clean energy technologies. Those hopeful for the outlook of the RGGI, state that it will spur innovation in and funding for a clean energy economy and will create green jobs for the country. The future of the RGGI is multi-faceted, and includes both challenges and opportunities for the states involved.

Some difficulties have been reported in the state-wide coordination of the CO₂ cap-and-trade programme. Some claim that there needs to be a balance between formalities and flexibility, as well as policies that do not interfere with the affordability and reliability of energy supplies within the states.

Critics of the programme state that RGGI unfairly transfers costs to the citizens or rate-payers, and especially to small business owners. The New Hampshire Business and Industry Association (BIA) has been particularly active in voicing concerns about the impact of the RGGI cap-and-trade initiatives on energy costs. This Association fears that there is a possibility that local businesses will expand or relocate to states with lower energy prices or less restrictions. The BIA claims that the only solution is a nationwide one, stating that the federal government is required to coordinate programmes for assessing and dealing with the impact of these gases on global warming.

Challenges for the RGGI also arise as a result of the great diversity among the states' policies and programmes for dealing with environmental concerns. The RGGI remains a valid opportunity for many of these states to experience growth through the development of renewable energy and other green technologies. Undoubtedly, the future economy will be one that embraces green technologies that allow the country to reduce the astronomical carbon emissions. The states participating in the RGGI seem to be committed to reducing the high CO₂ levels through the initiative, as they are increasingly motivated by the perceived opportunity for economic, environmental and even political gains. Although the programme was initially established to counteract emissions in the electric power sector, proponents of the programme state that it may expand to additional industrial sectors, as well as other forms of deleterious greenhouse gases. Advocates of RGGI claim that it will serve as a model for future federal and local-level cap-and-trade programmes for limiting GHGs.³

²Thorning, Margo. *A Reality Check on Initiatives to Reduce Greenhouse Gas Emissions in California, Oregon, the Northeast and in Europe*. American Council for Capital Formation. 2007.

³ *Grappling with Global Warming: RGGI, Air Quality and Power Production*. Environmental and Energy Advisory. October 2005.

State and Other Initiatives in Cap-and-Trade Markets

There have also been several state-mandated markets to reduce nitrous oxide emissions. Other markets involving different kinds of pollutants tend to be mandated by state and local governing bodies.

In 2007, California launched the California Global Warming Solutions Act, which included projects on landfill gas capture, animal waste-product management and forestry. The Western Climate Initiative was also created as a collaborative project between California and three Canadian provinces, for regional control of GHGs through an offset trading environment.⁴

In 2000, the state of Illinois started a trading programme for organic compounds called the Emissions Reduction Market System. In 2003, New York began the Regional Greenhouse Gas Initiative (RGGI), which is planned to be launched in 2009. This programme will attempt to lower the carbon "budget" of the state's electricity generation sector by 10%. The Chicago Climate Exchange allows all US corporations to trade CO₂ emission allowances, as well as including projects for destroying ozone-depleting substances in an environmentally safe way. North America is also home to The Climate Registry, a nonprofit agency created to track the GHG emissions of participating businesses, local governments and other groups. This Washington DC-based initiative covers thirty-one US states, and acts as an independent agency for collection of data on carbon-reduction initiatives.

The Western Climate Initiative (WCI) is another North American initiative for combating global warming and climate change. This is a government-independent organization, which requires member-partners to "identify, evaluate and implement ways to collectively reduce greenhouse gas emissions in the region." This organization encourages members to set goals for emissions reductions, and to create market-based strategies to allow them to achieve these goals. The WCI plans to create an international cap-and-trade programme for the US and Canada, setting a GHG emission reduction goal of 15% by 2020.⁵

The Midwestern Greenhouse Gas Accord is another regional accord set up by the governors of six states in the US. This registry is managed by the abovementioned Climate Registry, which tracks and manages other US state programmes. The Midwestern Greenhouse Gas Accord has similar aims, namely to:

"Establish greenhouse gas reduction targets, develop a market-based, multi-sector cap-and-trade mechanism to achieve reduction targets, establish systems for tracking, management, and crediting for entities that reduce greenhouse gas emissions, and

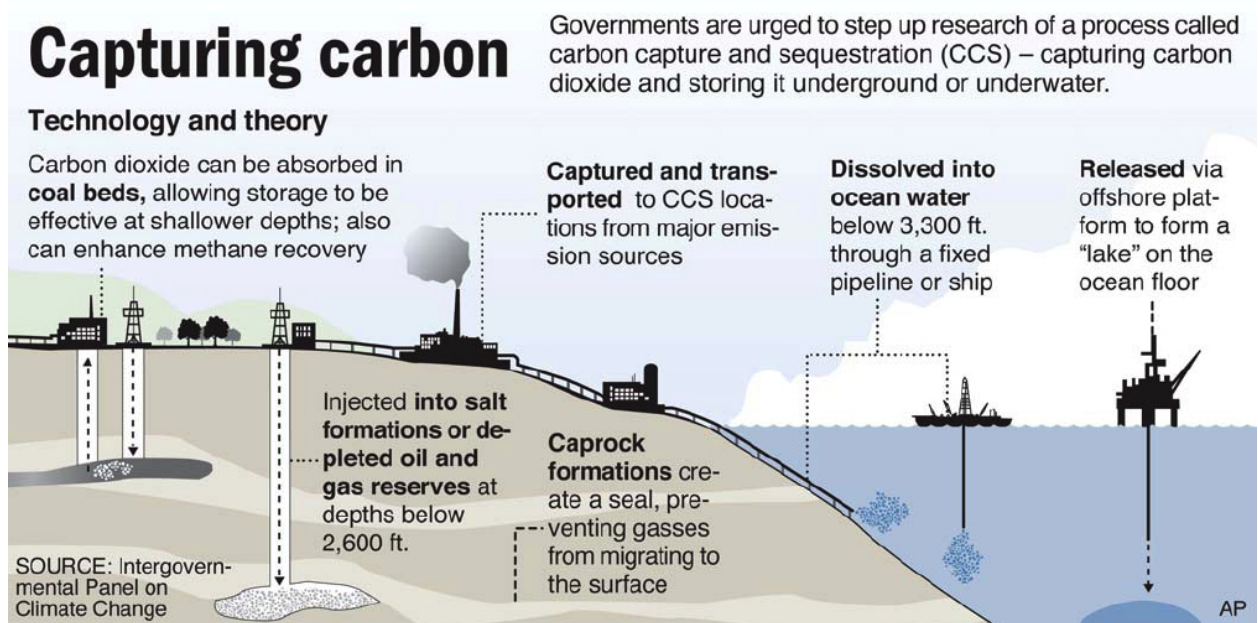
⁴ California Global Warming Solutions Act. CA Legislature Moves On Global Warming Senate Environmental Quality Committee Votes On Historic Legislation: 27-Jun-2006; Updated: 27-Jun-2006. Environmental Defense Fund. <http://www.edf.org/pressrelease.cfm?ContentID=5308>

⁵ Energy Advantage: Independent, objective total energy management - 06/30/2008 - Western Climate Initiative: United States.

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.”⁶

Carbon as a Driver for Investments in Low-carbon Technologies

High oil prices and continual climate change woes, in addition to government-supported initiatives to reduce carbon emissions are a few of the drivers spurring on soaring rates of investment in energy efficiency, as well as renewable energy. According to a 2006 report from the United Nations Environment Programme (UNEP), this trend is on the rise. The report even goes so far as to call it the “world's newest gold rush,” whereby investors are giving US\$ 71 billion to companies in the energy efficiency industries. The following text box shows an example of one of these technologies for renewable energy (Source: IPCC).



These investments represent a 43% increase since 2005, and a rise of 158% over the past two years. In 2007, experts showed that the value of investments ranged from US\$ 85–100 billion, with wind-generation technologies at the forefront of investments. Bio-fuel energy technologies and solar technologies are also growing very quickly. Moreover, US\$ 30 billion entered the energy efficiency industries sector in 2006 through leveraged buyouts, asset refinancing, mergers and acquisitions.

The attempt by many federal and local governments, as well as non-profit and international organizations to lower carbon emissions has been a huge driver for investments in low-carbon technologies such as carbon capture and storage mechanisms, solar and wind power, natural gas turbines, hydro-electric power, geothermal power, and

⁶ Working Group II Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability: <http://www.ipcc.ch/SPM6avr07.pdf>

other types of alternatives. Increasing carbon-reduction efforts have led investments in low-carbon power sources and technologies to increase at an astonishing rate. While zero-carbon or low-carbon power sources produce only 2% of the world's energy, these power sources account for more than 18% of global investment in power generation. In 2006, US\$ 100 billion were invested in zero-carbon power sources.⁷

Recently, the world's richest city and oil-mogul, Abu Dhabi, had led the world in making investments in zero-carbon technologies. The country has embarked on plans for a 100,000-resident, zero-carbon emissions metropolis in the desert. This venture is in addition to some US\$ 250 million worth of investment in clean-tech companies as well as another billion-dollar plan for future technologies for the country. Sultan Al Jaber, the Chief Executive Officer of the company leading the effort, states the investments are: "...just smart planning. After all, Abu Dhabi's petroleum reserves will someday be used up. What could be better for the country than investing our oil and gas revenues [in something] that will give us leadership in the future?"⁸

The UN Convention on Climate Change reported that the financial sector, as well as investors, are confident that the existing technologies which rely on carbon-emitting power sources, will "de-carbonize", given the correct government policies. Experts say that the amount of the world's energy produced from renewable sources will continue to rise, as tens of billions of dollars of investment money pour into the market. UNEP believes that renewable energy sources will increasingly become the investments of the future, as they are not subject to the rising and falling of oil prices. More and more, communities, countries and power companies are looking towards these technologies to invest in. The UNEP report attributes the renewable energy technology industry's boom to a range of global concerns and rising consumer awareness of the need for renewable energy and energy efficiency.⁹

Renewable energy markets are growing and steadily entering capital markets. Most of the capital is coming from venture capitalists, as well as stock markets and inter-company refinancing. The sector is shifting towards mainstream status, as uncertainty has been reduced via the diversification of renewable technologies. Others cite the fact that the efficient-energy markets are significant but "unseen" markets attracting more and more attention from investors who realize the important role that these technologies will play in meeting the world's demand for power. In this sense, the very capital investors putting money into this sector are closely aligned with industry proponents in regard to expected growth.

The NEX index, a composite of clean energy stocks, rose 64% in the 15 months prior to April 2007. Investments in clean energy technology development, manufacturing, and

⁷ United Nations Environment Programme. *Investors Flock to Renewable Energy and Efficiency Technologies: Climate Change Worries, High Oil Prices and Government Help Top Factors Fueling Hot Renewable Energy Investment Climate*. 2007.

⁸ Inskeep, Steve, et.al. NPR Morning Addition. *Oil-Rich Abu Dhabi Builds Renewable-Energy City*. 2008

⁹ The United Nations Framework Convention on Climate Change. 2007.

http://unfccc.int/essential_background/convention/items/2627.php

commercialization rose 140% in 2006, when compared to the previous year. Private equity investments and venture capital rose 163% in the same period. Meanwhile, investment in energy generation assets rose by 22.9%. The biggest source of renewable energy investment, asset financing of new generation capacity, accounted for total investments worth US\$ 70.9 billion of in 2007.¹⁰

The Role of Private Equity and Venture Capital in Supporting Emission-Reduction Projects and Technologies

Private equity investments and venture capital investors paid US\$ 2.3 billion towards biofuels, US\$ 1.4 billion towards solar power and US\$ 1.3 billion towards the wind power industry and manufacturing capacity. Investment in renewable energy sources in the US is mostly in the form of technology and private investment, with much high profile investment in bio-fuels by entrepreneurs. Worldwide, the strongest growth in the industry has come in the form of venture capital and private equity investment. In 2006, this amount totalled US\$ 7.1 billion, as most of the investments in energy efficiency are still in their early stages of funding. In the past years, global investments in clean energy have quadrupled to reach US\$ 150 billion in 2007. For this reason, venture capitalists believe that the clean energy sector will be the biggest economic opportunity of the century. Major corporations like Toyota are examples of this growth, as the company is growing rapidly, facilitating the creation of their fuel-efficient cars.

Energy experts state that we will need US\$ 200 billion to return carbon emissions to current levels by 2030. Because of the massive cost of this effort, private finance through private equity, venture capitalists, institutional investors and carbon funds, will play a major role in the huge investments needed to combat climate change. These investments will also be needed as the world begins its transition towards becoming a low-carbon world economy. Major investment firms and banks, normally the key players in the investment economy, have avoided what they see to be the “risky investment” in renewable technologies.¹¹

Carbon Finance and Project Development

Experts agree that there are several ways that the Federal Government in the US can bring about a voluntary carbon offset market. Most agree that the US should endorse existing programmes and provide guidance and mandatory enforcement. There has been a huge surge in sales on the voluntary offset market and it has grown from 6 million CO₂-equivalent tonnes in 2004, to 13 million tonnes in 2007. This has led federal policymakers to think about establishing more regulations and standards governing how investors buy carbon offsets.

Pecala et al. (2004), in an analysis of the role of voluntary offset credits in the context of a mandatory market, state that the federal government will have a tougher time than

¹⁰ <http://www.nexindex.com/>

¹¹ Rohan, et. al. United Nations Environment Programme. Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency. 2008.

expected when trying to provide guidance on voluntary carbon offsets. This is because there are many ways not only to substantiate, but also to quantify emission reductions for carbon offsets. There has so far been no agreed-upon way to measure this, and the “correct” way may be highly dependent on how one views the overarching goals of the carbon-offset market.

Both the WRI and the World Business Council for Sustainable Development, in their analysis of voluntary offset credits, *Greenhouse Gas Protocol for Project Accounting* (2005), stated that it is difficult to separate larger policy questions about the carbon market from the techniques used to certify these offsets. They suggest that clear and consistent rules can be better developed within the context of a mandatory programme, such as that of Lieberman-Warner. They warn that in a voluntary market, there is no central authority, and therefore no one to ensure determination to transparency and the integrity of the environment.

Many companies seem to be moving ahead with carbon offset credits. The Greenhouse Gas Protocol Corporate Reporting Standard is one such tool for emissions-accounting for use by companies. Companies like Dell and Pepsi have adopted the tool to measure their emissions. The WRI and the World Business Council for Sustainable Development see it as a positive step that companies are attempting to measure their “ecological footprints”, but state that it is also important to find ways to lessen their GHG emissions internally. For this, federal and state governments need to set clearer standards for carbon offsets through guidance for voluntary markets or through a government-offset programme which is mandatory.

The Clean Development Mechanism

The Clean Development Mechanism (CDM), an agreement under the Kyoto Protocol allows nations such as the US, with a GHG reduction promise, to invest money in projects that reduce emissions in developing countries. The CDM is led by the CDM Executive Board, under the supervision of the Conference of the Parties and the UN Framework Convention on Climate Change (UNFCCC). They offer this as an alternative to creating mandatory emission reductions in their own countries, as these tend to be much more expensive.

The CDM theory is that globally we can reduce GHG emissions at a lower cost to the world economy. Wealthier nations, such as the US can finance emissions reduction projects in developing countries where the prices for changes will be less. This would enable poorer countries to generate investment and promote their own environmentally-friendly technologies. Projects include the additions of renewable energy, bio-fuels, forestation, reforestation, energy efficiency on multiple levels, landfill gas flaring, substitution of fuel, disposal of waste and handling of toxic substances, as well as other ways to improve energy efficiency. Critics say that approved projects do not always lead to incentives given through emission reductions credits.¹²

¹² CDM Project Statistics UNFCCC. 2007.

CDM Opportunities in the Americas

Currently, the Americas (Latin America and the Caribbean region) possess 44 per cent of all CDM-registered projects globally. Brazil offers the biggest opportunity for investment, with a total of 94 registered projects. The table below outlines the distribution of CDM projects by country. In Latin America, the energy industry is running the largest number of CDM projects, with most involving a source of renewable energy such as wind or hydro power. Other CDM projects are primarily composed of a wide range of applications and technologies for energy, transportation, agriculture and GHG sequestration.

Distribution of CDM projects¹³

Total in the CDM Pipeline	Number	kCERs	2012 kCERs	Population	2012 CER per cap.
Latin America	757 19,8%	73847	417121 15,2%	449	0,93
Asia & Pacific	2899 75,9%	425442	2177219 79,3%	3418	0,64
Europe and Central Asia	40 1,0%	4030	19464 0,7%	149	0,13
Africa	71 1,9%	17431	94407 3,4%	891	0,11
Middle-East	3 0,1%	549	2924 0,1%	186	0,02
Less developed World	3819 100%	528602	2744744 100%	5093	0,54

There are many US traders and brokers investing in Latin America's CDM market. Investors include both groups involved in multilateral development banks and private market brokers. Participants in CDM investment in Latin America include the Prototype Carbon Fund, the Latin American Carbon Program (PLAC), as well as Netsource, EcoSecurities, Point Carbon, EuroCarbon and CO2e.¹⁴

Latin America represents a huge opportunity for US investment in CDM markets. Continually, there are new implementations of CDM activities in the area, and many investors feel that taking advantage of these opportunities can be done through better technologies. Currently, CDM projects represent a value-plus option for those US investors seeking to do business in the modern-day global energy market. Furthermore, there has been a great deal of transparency in these projects, due to the stringently controlled activities that the CDM governing body requires, as well as the emphasis on keeping these activities and projects as cost-effective as possible. In parallel to the emphasis on energy security, many CDM projects in the Americas are seen as an opportunity to help lessen dependency on imported fuel. Although the processes of both development and financing a CDM project require time, knowledge and a significant amount of financial resources, the greatest challenge for the region is working with country and local leaders on reshaping policies, as well as financial frameworks to enable renewable resources to flourish in the region.

Carbon Offsetting and its Effect on Alternative Markets

Many critics of carbon offsetting projects such as the RGGI, mentioned earlier, state that in recent reports by the state of Connecticut, which modelled the impact of RGGI on

¹³ UNEP. 2006. <http://www.unep.org>

¹⁴ *New Opportunities for Sustainable Energy in Response to Climate Change*. <http://www.oas.org/dsd/Documents/SustainableEnergyENGLISH-4.pdf>, 2007

electricity prices, it was found that the average price of wholesale electricity increased significantly over the period studied. Key findings from this report show the following important predictors of how the cost of carbon will affect other power resources such as coal and gas and other power markets.¹⁵

The following represents an overview of key points of the study:¹⁶

- * By 2030 coal will supply 40% of global electricity, leading to an increase in world coal-fired capacity.
- * Short-term demands for CO₂ emissions by 2020 will lead to an increased utilization of highly efficient coal-fired power plants using pulverized coal technology.
- * Carbon dioxide capture, as well as other forms of sequestration technologies will eliminate the need to build traditional “emission coal-fired plants”.
- * The use of gas will still be competitive with newer forms of renewable technologies.

While electricity from coal makes up close to 40% of global supply currently, some experts predict that even with renewable technologies, capacity may double by the year 2030. Obviously, from an environmental perspective, this would have a severely negative effect on CO₂ emissions. This fact will remain clear unless cleaner technologies are implemented. Forecasts from scientists and experts vary, but most state that demand for coal will grow. Some predict 50% growth by the year 2030, while others find that it will double. This creates a big drive for the development of clean coal technologies, which are also economically viable.¹⁷

Furthermore, even though many developed countries are beginning to offset CO₂ emissions, many countries such as China and India have a huge demand for coal. This will be compounded by the fact that emissions controls tend to be much less demanding and less strictly enforced in developing countries than in the US or Europe for example. The existence of carbon capture technologies, a clean form of carbon use, will eventually cause the cost of power from coal plants that power the new technologies to become increasingly competitive, as well as costly. This will come in the form of nuclear, hydro and wind power.

According to plans for policy by the federal government, the United States will soon have a US\$ 1 trillion carbon emission market by the year 2020. This is part of a cap-and-trade plan, for domestic trading. From their recent analysis of US federal energy bills, research economists from New Carbon Finance predict that within 12 years, the US economy, if it uses this carbon-constrained policy will cause the carbon price to be US\$ 40 per tonne by the year 2015.¹⁸

¹⁵ Business Insights Study. Coal Markets and Carbon Off-setting. 2007

¹⁶ Comments to Connecticut on State Implementation of RGGI. Ten-Year Forecast of Connecticut Electric Loads and Resources. 2006.

¹⁷ Comments to Connecticut on State Implementation of RGGI. Ten-Year Forecast of Connecticut Electric Loads and Resources. 2006.

¹⁸ New Energy Finance. \$1 trillion US carbon trading market by 2020: study. 2008

This will subsequently cause consumer energy prices to rise by:¹⁹

- 20% for electricity
- 12% for gasoline
- 10% for natural gas.

It will also have:

- incremental impacts on prices for higher energy
- incremental impacts on prices for transportation costs.

In conclusion, agriculture and forestry will have to also play a role in reducing carbon emissions. Agriculture is one of the main sources of GHG emissions in the United States. In 1995, this sector alone was responsible for a large proportion of the country's total GHG effect on the ozone layer with the energy sector being the major contributor. Agriculture contributes due to its being a source of dangerous nitrous oxide and methane emissions. These particular gases are more potent than carbon dioxide in regard to their global warming effect.

Forests and any plant matter also play a role in our ability to reduce CO₂ emissions and dangerous GHGs in the atmosphere. Trees and other plants have the ability to absorb CO₂ from the air. As a forest grows, it absorbs more CO₂ as a necessary step in the process of increasing in biomass. During this process the forest is called a carbon "sink". When the area reaches its maximum growth potential, the carbon absorption remains constant, and it becomes a carbon "reservoir". When a forest is cleared, that reservoir of stored carbon is quickly converted into CO₂, and released into the atmosphere. This makes it vital to maintain our existing biomass of forests and plants in our attempt to reduce, or avoid more emissions of GHGs. This can come about through the protection of native forests, substantial carbon reservoirs, which, if preserved, can lead to the creation of a large carbon sink.²⁰

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<http://www.edf.org/pressrelease.cfm?ContentID=5308>

¹⁹ Liebreich, Michael. New Energy Finance. New Carbon Finance. UN Climate Change Roundtable Discussions. Feb. 2007.

²⁰ Karl, Thomas R.; Kevin E. Trenberth (2003). "Modern Global Climate Change". *Science* 302 (5651): 1719-1723. doi:10.1126/science.1090228.

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