

# **Climate Change – An Overview**

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## I. Introduction

A recent study by the U.S. Global Change Research Program states that evidence showing a warming of the climate is “unequivocal” and attributes this warming to human activities.<sup>1</sup> This June 2009 study caps what has been a year of increased focus on combating the perceived threats of climate change. Both the public sector and the private sector are developing programs to address the threat of climate change. On the international level, countries have entered into treaties, such as the Kyoto Protocol, to reduce emissions of GHGs; on national and state levels, programs have been enacted or are being developed to similarly reduce emissions; and private entities and NGOs are participating in voluntary emission reduction programs. The challenge, however, is great. Secretary of Energy Steven Chu has called for a “second industrial revolution” to meet the technology challenges presented by the need to reduce GHG emissions.<sup>2</sup>

This paper discusses basic concepts relating to climate change and provides an overview of the regulatory programs affecting or potentially affecting the regulation of greenhouse gases.

## II. Background on Climate Change

### A. The Vocabulary of Climate Change

A discussion of the climate change requires an understanding of some basic terms.

The concerns with climate change springs from the “greenhouse effect.” The greenhouse effect refers to buildup of heat in the atmosphere, when a portion of solar radiation that reaches the Earth’s surface and that would otherwise be reradiated back into space instead is absorbed by gases in the atmosphere and is returned to the Earth.<sup>3</sup> These gases, which absorb the infrared radiation in the atmosphere, are referred to as “greenhouse gases.”<sup>4</sup> Greenhouse gases, or GHGs, include water vapor,<sup>5</sup> carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), ozone (O<sub>3</sub>), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF<sub>6</sub>). Different regulatory schemes for GHGs focus on different subsets of this list. For example, the Kyoto

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<sup>1</sup> Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson (eds.). Cambridge University Press, 2009, at 9.

<sup>2</sup> Secretary Chu California Institute of Technology Commencement Address, June 12, 2009 (available at <http://www.energy.gov/news2009/7457.htm> , last visited 6/25/2009).

<sup>3</sup> See U.S. Environmental Protection Agency, Glossary of Climate Change Terms, <http://www.epa.gov/climatechange/glossary.html> (last visited 6/20/2009)

<sup>4</sup> *Id.*

<sup>5</sup> Although water vapor is the most abundant GHG, most discussions of the causes of climate change do not focus on it because human activity has little direct impact on the concentration of water vapor in the atmosphere. U.S. Environmental Protection Agency, Glossary of Climate Change Terms, <http://www.epa.gov/climatechange/glossary.html> (last visited 6/19/2009),

Protocol, discussed below, covers CO<sub>2</sub> and five other GHGs: methane, nitrous oxide, HFCs, PFCs, and sulfur hexafluoride.

CO<sub>2</sub> is considered the single largest anthropogenic contributor to global warming and, therefore, from a regulatory perspective, the most important GHG.<sup>6</sup> Thus, when “carbon” is often used as shorthand for all GHGs. GHGs are compared to carbon through use of a measurement of the gas’s “global warming potential” or GWP. According to the IPCC, GWP is an indicator that reflects the relative climate change effect of a GHG compared to CO<sub>2</sub>, which is assigned a value of 1 -- considering a fixed amount of time such as 100 years, *i.e.*, GWP<sub>100</sub>.<sup>7</sup> For example, on a 100 year time horizon, N<sub>2</sub>O is about 300 times and CH<sub>4</sub> 21 times more potent than CO<sub>2</sub>,<sup>8</sup> and therefore would have GWP<sub>100</sub>s of 298 and 25 respectively.<sup>9</sup> The GWP of a gas varies based on the time-scale considered (*e.g.*, 20-, 50-, or 100-year GWP) because some GHGs are more persistent.<sup>10</sup> The term CO<sub>2</sub> equivalent or CO<sub>2</sub>e is the standardized measure of GHG emissions by weight times GWP.<sup>11</sup>

## B. The Carbon Cycle

The carbon cycle refers to the movement of carbon into and out of various “reservoirs” in the environment, primarily in the form of CO<sub>2</sub>. The attached diagram shows a simple example of the carbon cycle. (Exhibit A). Reservoirs include the atmosphere, the oceans, the geological sediments (including fossil fuels),<sup>12</sup> and the terrestrial biosphere (including the plants, soils, and freshwater systems).<sup>13</sup> Chemical, physical, geological, and biological processes in reservoirs result in the movement of carbon either into or out of the various reservoirs. When carbon moves into a reservoir, the reservoir acts as a “sink” and when it moves out of a reservoir, the reservoir acts as a “source”; thus, any given reservoir can act as both sink and source.

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<sup>6</sup> IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)] Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, at 2.

<sup>7</sup> Forster, P., V. Ramaswamy, P. Artaxo, T. Bernsten, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn, G. Raga, M. Schulz and R. Van Dorland, 2007: Changes in Atmospheric Constituents and in Radiative Forcing. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)] Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, at 211.

<sup>8</sup> *Id.* at 212 (Table 2.14).

<sup>9</sup> *Id.*

<sup>10</sup> [www.pewclimate.org/global-warming-basics/full\\_glossary/terms\\_d.cfm](http://www.pewclimate.org/global-warming-basics/full_glossary/terms_d.cfm) (last visited July 25, 2009).

<sup>11</sup> [http://www.pewclimate.org/global-warming-basics/full\\_glossary/glossary.php?term=a](http://www.pewclimate.org/global-warming-basics/full_glossary/glossary.php?term=a) (last visited July 25, 2009).

<sup>12</sup> Different references identify different reservoirs or identify them with slightly different names. In our diagram, sediments and fossil fuels are shown as a separate reservoir.

<sup>13</sup> King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks, 2007: Executive Summary. In: *The First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research* [King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks (eds.)] (hereinafter, “SOCCR”) National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC, USA, at 2.

The carbon cycle is influenced by natural processes and human activities. For example, plant growth results in a significant uptake of CO<sub>2</sub> from the atmosphere through photosynthesis. CO<sub>2</sub> is transferred back to the atmosphere through natural respiration during plant metabolism and through the decomposition of dead plants and is transferred to the soil through decomposition of plant material.<sup>14</sup> Similarly, CO<sub>2</sub> diffuses from the atmosphere into the sea.<sup>15</sup> Much of the ocean's carbon storage occurs in deeper waters,<sup>16</sup> ultimately in the form of bicarbonate and carbonate ions.<sup>17</sup> Phytoplankton use carbon in tissue formation and formation of shells. As the phytoplankton die, decay releases carbon into the ocean water, where some of this carbon will diffuse into the atmosphere. Other parts of this decay material, however, ultimately becomes a part of the ocean sediments. The accumulation of carbon in the sediments, from this and other sources such as decayed plants and animals, over millions of years led to the formation of the fossil fuels.<sup>18</sup>

The focus of much of the debate, and the most important example of human GHG-producing activities, is the burning of fossil fuel to produce energy.<sup>19</sup> Other human activities, such as manufacturing, deforestation and logging, also result produce emissions of GHGs to the atmosphere.<sup>20</sup> Other human activities, such as the reforestation of land, creates carbon sinks, effectively removing GHGs from the atmosphere.

### III. Carbon Footprinting

As focus has sharpened on the impacts of anthropogenic GHG emissions on climate change, the issue of how to measure those emissions has resulted in the concept of a "carbon footprint." There is no universally agreed upon definition of a carbon footprint; a number of protocols developed by various organizations provide a framework for developing a carbon footprint.

One of the most widely referenced protocols is the GHG Protocol developed by the World Business Council for Sustainable Development and the World Resources Institute.<sup>21</sup> The GHG Protocol measures carbon on a *corporate* basis,<sup>22</sup> but its guidance is also useful in developing an individual facility level or a product level carbon footprint.

When developing a carbon footprint, the threshold inquiry is what carbon emission to include. The GHG Protocol sets out three different "scopes" or sets of emissions. A Scope 1 footprint analysis accounts for direct emissions of a system, product, or activity; a Scope 2, for indirect emissions associated with electricity, heat and steam purchased to support the system or

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<sup>14</sup> King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks, 2007: What is the Carbon Cycle and Why Care? In: *SOCCR*, at 16.

<sup>15</sup> *Id.*

<sup>16</sup> R.A. Houghton, *Balancing the Global Carbon Budget*, Annual Review Earth Planet Science 2007.35.315.

<sup>17</sup> *Id.* at 316.

<sup>18</sup> King, *supra* note 14, at 16.

<sup>19</sup> King, *supra* note 14 at 16; *see also*, *Global Climate Change Impacts in the United States*, *supra* note 1, at 9.

<sup>20</sup> King, *supra* note 14, at 16.

<sup>21</sup> World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI), *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (Revised Ed.).

<sup>22</sup> The WBCSD and the WRI are in the process of developing a similar guideline for measuring and managing GHG emissions throughout the life cycle of a product, as well as across the entire corporate value chain.

activities; and a Scope 3, for indirect emissions resulting from operations that do not originate at sources owned or controlled by the company, *e.g.*, transportation by suppliers or the use of sold products and services.<sup>23</sup> Scope 3 is an optional part of the GHG Protocol, and companies have discretion over whether to report Scope 3 emissions. Most current regulatory programs focus on Scope 1, direct GHG emissions and, in particular, those emanating from stationary sources.

Many advocate a “life cycle” carbon footprint, especially for products, that accounts for the total GHGs from the product, starting with its raw materials and its manufacture through its use to its ultimate disposal. The Carbon Trust, a United Kingdom government-funded company set up to help entities cut carbon emissions, has outlined a methodology to quantify the lifecycle emissions.<sup>24</sup> The methodology is intended to assist entities in making informed decisions about carbon reductions, which take into account competing costs.<sup>25</sup> Among other things, the Carbon Trust has started a “carbon reduction label” program for products, allowing buyers of those products to see the life cycle carbon impact of the product.<sup>26</sup>

The life cycle movement recently received a boost when Wal-Mart announced that it will create a “Sustainable Product Index” for products that it sells, which addresses carbon management as well as other aspects of sustainability.<sup>27</sup> Wal-Mart is gathering information from its suppliers in four core areas: energy and climate; material efficiency; natural resources; and people and community. Wal-Mart’s goal is to ultimately develop a “global database” on the life cycle of various products.

#### IV. Carbon Regulation

Carbon regulation is an ever evolving area. Carbon regulation has been in place internationally for some time, the key milestone being the Kyoto Protocol. In the United States, carbon regulation is in its early stages, with federal regulation still developing, and with state and regional regulation filling the void left by lack of federal regulation.

##### A. Kyoto Protocol

On the international level, the Kyoto Protocol is the key regulation on the control of GHG emissions.<sup>28</sup> The Kyoto Protocol is an international agreement committing certain industrialized countries to reduce their greenhouse gas emissions. Kyoto went into effect in 2005 and has been ratified by 186 countries; the United States, though actively involved in its development, has not ratified Kyoto and is the only industrialized nation not to have done so. Representation from 170 countries are expected to participate in talks in Copenhagen in December 2009 to develop a successor to Kyoto.

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<sup>23</sup> WBCSD, *supra* note 20, at 25.

<sup>24</sup> The Carbon Trust, [http://www.carbontrust.co.uk/carbon/briefing/carbon\\_label.htm?print=1](http://www.carbontrust.co.uk/carbon/briefing/carbon_label.htm?print=1) (last visited 1/18/2009).

<sup>25</sup> *Id.*

<sup>26</sup> *Id.*

<sup>27</sup> “Wal-Mart Announces Sustainable Product Index”, July 16, 2009, <http://walmartstores.com/Sustainability/> (last visited 6/19/2009).

<sup>28</sup> 37 I.L.M. 22 (1998) (the full text of the Protocol is also available at [http://unfccc.int/kyoto\\_protocol/items/2830.php](http://unfccc.int/kyoto_protocol/items/2830.php))

Under Kyoto, 37 industrialized nations and the European community committed to reduce GHG emissions over the five year period from 2008 to 2012. Talks are underway to establish a successor to Kyoto post-2012.

The key feature of Kyoto is that it allows the member countries to achieve the emission reduction goals through “market-based mechanisms”: emissions trading, clean development mechanism (CDM) and joint implementation (JI). Under Kyoto, each party with a binding commitment is given an emissions target or an “assigned amount.” Each Assigned Amount Unit (AAU) equates to 1 ton of CO<sub>2</sub>. These AAUs can be traded under the emissions trading scheme, essentially a “cap-and-trade” system. To implement this trading, as an example, the EU has developed the EU Emissions Trading System (EU ETS). The EU ETS covers energy intensive facilities, such as oil refineries, steel plants and cement factories.<sup>29</sup>

The other two market based mechanisms, JI and CDM, are “project” mechanisms. Both in essence allow an entity to create emissions reductions by performing or funding projects that achieve emissions reductions. JI allows an entity in an industrialized country with a binding commitment (an Annex I country) to perform projects in other developed nations to reduce GHG emissions, resulting in the creation of Emission Reduction Units (ERUs) which can be used to meet the binding commitment. CDM involves projects in developing countries (non-Annex I countries) to reduce GHG emissions, resulting in the creation of Certified Emission Reductions (CERs). Kyoto requires that the emissions reductions achieved under these mechanisms be actual, measurable, long-term and additional.<sup>30</sup> Industries have grown around these project based mechanisms to monitor and verify the achievement of emission reductions.

## B. Federal Programs

The United States does not presently have an overarching program regulating the emissions of GHGs. Much of the regulatory debate has involved whether GHGs must be regulated under the existing federal Clean Air Act (CAA). In *Massachusetts v. EPA*, the U.S. Supreme Court addressed whether the CAA mandated regulation of certain GHGs.<sup>31</sup> The case was an appeal from EPA’s denial of a rulemaking petition from a number of environmental groups asking EPA to regulate GHGs from mobile sources. The case turned upon EPA’s interpretation of what constitutes an “air pollutant.” The Court determined that “greenhouse gases fit well within the Clean Air Act’s capacious definition of ‘air pollutant’” and that EPA had authority to regulate them.<sup>32</sup> The Court directed EPA to consider the rulemaking petition and to make an “endangerment” finding – to determine whether the GHGs “cause or contribute to, air pollution which may reasonable by anticipated to endanger public health or welfare” or to provide a reasoned explanation of why it cannot make a finding.<sup>33</sup>

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<sup>29</sup> European Union, Questions and Answers on Emissions Trading and National Allocation Plans, <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/05/84&format=HTML&aged=1&language=EN&guiLanguage=en> (last visited 6/19/2009)

<sup>30</sup> See Kyoto Protocol, Articles 6, 12, and 17.

<sup>31</sup> 549 U.S. 497 (2007).

<sup>32</sup> *Id.* at 532.

<sup>33</sup> *Id.* at 532-33.

The decision in *Massachusetts v. EPA* has been felt in permitting matters. The permitting process for stationary combustion sources, such as electric generating facilities, usually requires an applicant to meet both technology-based and ambient air quality-based limitations for specified air pollutants. Historically, CO<sub>2</sub> has not been considered an air pollutant subject to regulation. In light of *Massachusetts v. EPA*, however, the EPA's Environmental Appeals Board remanded a prevention of significant deterioration (PSD) permit for a coal-fired generating unit for further discussion of why EPA failed to require that CO<sub>2</sub> be addressed by the applicant as an air pollutant subject to regulation.<sup>34</sup>

Then-EPA Administrator Stephen Johnson responded on December 18, 2008 in an interpretative memorandum, offering EPA's view of pollutants subject to the federal PSD program. The December 18 memorandum noted that regulated pollutants (for which BACT must be applied) do not include any pollutant, such as CO<sub>2</sub>, that is subject only to monitoring and reporting requirements under the Clean Air Act. The December 18 memorandum immediately drew attack both from legislators<sup>35</sup> and from environmental groups, who have filed suit challenging the memorandum in the Court of Appeals for the D.C. Circuit.<sup>36</sup> EPA has since granted a petition for reconsideration of the issues raised by the memorandum and by *Deseret*.<sup>37</sup>

On April 24, 2009, EPA published its response to the decision in *Massachusetts v. EPA*.<sup>38</sup> In its proposal, EPA proposed to find that the GHGs threaten public health and welfare (the endangerment finding) and that emissions of GHGs from new motor vehicles and motor vehicle engines contribute to GHG concentrations in the atmosphere and thus to the threat of climate change (the cause or contribute finding). If adopted these finds could well trigger a cascade of regulations under the CAA.

Separate from any requirements under the CAA, EPA has proposed a rule requiring the reporting of certain GHG emissions.<sup>39</sup> The proposed rule covers various sources of GHG emissions, including certain industrial sources of GHG emissions, suppliers of fossil fuels and industrial GHGs, as well as manufacturers of vehicles and engines. Reporting is proposed to be conducted on a facility basis, except that reporting by certain suppliers and vehicle manufacturers would be at the corporate level.

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<sup>34</sup> *In re: Deseret Power Electric Cooperative, PSD Permit No. PSD-OU-0002-04.00*, PSD Appeal No. 07-03, before the Environmental Appeal Board, United States Environmental Protection Agency, November 13, 2008.

<sup>35</sup> On December 22, 2008, Senator Barbara Boxer, Chair of the Senate Committee on Environment and Public Works, sent a strongly worded letter to the Attorney General requesting that he intervene with Administrator Johnson to withdraw "his blatantly illegal memo." Letter from Sen. Barbara Boxer, Chair, Senate Committee on Environment and Public Works, to Hon. Michael Mukasey, Attorney General (Dec. 22, 2008) (available as of January 18, 2009 at

[http://epw.senate.gov/public/index.cfm?FuseAction=PressRoom.PressReleases&ContentRecord\\_id=5ff1fa60-802a-23ad-48f7-70e4f829d9a5](http://epw.senate.gov/public/index.cfm?FuseAction=PressRoom.PressReleases&ContentRecord_id=5ff1fa60-802a-23ad-48f7-70e4f829d9a5) )

<sup>36</sup> *Sierra Club et al. v. Environmental Protection Agency and Stephen L. Johnson, Administrator*, No. 09-1018, Court of Appeals for the D.C. Circuit.

<sup>37</sup> Feb. 17, 2009, Letter from Lisa Jackson, Administrator, US Environmental Protection Agency, to David Bookbinder, Sierra Club.

<sup>38</sup> 74 Fed. Reg. 18886 (April 24, 2009).

<sup>39</sup> 74 Fed. Reg. 16448 (April 10, 2009).

### C. ACES

Many commenters believe that the Clean Air Act is ill suited to the regulation of CO<sub>2</sub> and advocate for a comprehensive federal program designed to address CO<sub>2</sub> and climate change. A first step in that direction was taken when, on June 26, 2009, the U.S. House of Representatives passed a comprehensive global warming bill, entitled the American Clean Energy and Security Act (ACES), which creates a number of different regulatory programs and incentives, including a GHG cap-and-trade program.

ACES addresses five primary areas relating to emissions of GHGs: clean energy; energy efficiency; direct global warming/emissions control; mitigation of economic impacts of regulation; and specific issues associated with agriculture and forestry offsets. It also addresses state and regional cap-and-trade programs and how the Clean Air Act is to apply to GHGs.

With respect to the direct control of GHG emissions, Title III establishes a market-based cap-and-trade program for reducing GHGs from electric utilities, oil companies, large industrial sources, and other covered entities, starting in 2012. This program creates a system of tradable federal “allowances” for the emission of CO<sub>2</sub> equivalents. Many companies that took early action to reduce emissions will be pleased that there is some provision to provide compensatory allowances for those early reductions. The number of allowances is set annually and is reduced over time to achieve an emission reduction of over 80% (as measured against 2005 emissions) by 2050. Each covered emitting entity must hold allowances or other credits for its GHG emissions.

To meet the emission reduction goals, ACES creates a system of offsets, to enable covered entities to emit GHGs above their allowances by creating emissions reductions at other approved projects. Subject to certain restriction, ACES permits these allowances to be banked and borrowed for use in other years. It also authorizes EPA to create a strategic reserve of allowances to create a cushion in case prices rise faster than expected. The regulation of offsets was controversial in the House, with authority over agriculture and forestry offsets being given to the Department of Agriculture.

In one of the major compromises of the bill, ACES now initially distributes approximately 80% of the allowances without charge -- to protect consumers from price increases, to assist industry in the transition to a clean energy economy, and to spur energy efficiency and the development and deployment of clean energy technology. Early discussions about ACES contemplated that all allowances would be auctioned. ACES provides for oversight and regulation of new markets for carbon allowances and offsets, to insure transparency and liquidity.

ACES makes other significant changes to the regulation of GHGs by states. It bars states from implementing or enforcing a cap on GHG emissions for 5 years -- 2012 through 2017 -- but allows them to regulate GHG emissions by other means. It also generally exempts GHGs from Clean Air Act regulation.

ACES directly addresses changes to our electric generation and use needed to achieve reductions in GHG emissions. ACES would set a federal renewable energy standard, requiring retail

electric suppliers to meet a certain percentage of their load with electricity generated from renewable resources, and with electricity savings. It also contains provisions to facilitate development of a smart grid and allows each state to establish State Energy and Environment Development or SEED Funds, to serve as a repository for federal assistance for clean energy and energy efficiency projects. ACES also would promote energy efficiency by, among other things, providing for various codes for buildings and for appliances and for transportation-related emission standards and planning. It also would provide for energy efficiency resource standards for electricity and natural gas distribution companies, which requires them to demonstrate efficiency-related energy savings by their customers.

ACES addresses the technological challenges – Secretary Chu’s second Industrial Revolution – that must be met in order to reduce GHGs, by providing for investment and incentives for clean technologies. ACES provides support for the development of commercial scale carbon capture and sequestration (CCS) technologies. ACES also provides support for Smart Grid initiatives and for systems to develop and support electric vehicles.

To assist with the transition to a clean energy economy, ACES generally provides for rebates and incentives. It also establishes an interagency council to assure an integrated federal response to the effects of global warming.

ACES will next be considered by the Senate. Senate leaders have indicated that ACES will serve as a starting point for the Senates climate change bill, but that major changes may occur.

#### D. Other Federal Programs

Management of CO<sub>2</sub> emissions may have its own regulatory implications, especially in the case of carbon capture and sequestration. EPA regulates the geologic sequestration of carbon in the deep subsurface under the Underground Injection Control (UIC) program of the Safe Drinking Water Act. When the carbon is used to enhance oil and gas recovery, the injection is permitted by EPA as a UIC Class II well.<sup>40</sup> However, EPA has proposed to regulate CO<sub>2</sub> injection for the purpose of reducing carbon emissions as a new class of injection wells, Class VI wells.<sup>41</sup> In deciding to regulate CCS projects, EPA expressed concerns over the use of potentially new technologies, the greater volumes of CO<sub>2</sub> involved, the potential presence of impurities in the CO<sub>2</sub> and its mobility in the subsurface.<sup>42</sup>

The preamble to the proposed Class VI well rules flagged other regulatory concerns with CCS. One such concern noted that impurities in the CO<sub>2</sub> stream could result in the injected material being classified as a hazardous waste, raising the potential of RCRA regulation. It also indicated that these impurities could be hazardous substances, raising the potential of CERCLA liability.<sup>43</sup>

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<sup>40</sup> 73 Fed. Reg. 43492.

<sup>41</sup> *Id.*

<sup>42</sup> EPA Proposes New Requirements for Geologic Sequestration of Carbon Dioxide, EPA Office of Water, EPA 816-F-08-032, p. 1.

<sup>43</sup> 73 Fed. Reg. at 43503-43504.

## E. State and Regional Programs

In the absence of a federal program controlling GHG emissions, several states and regions have acted to regulate the emissions. One of the most developed regional program is the Regional Greenhouse Gas Initiative (RGGI). RGGI is a mandatory market-based program addressing CO<sub>2</sub> emissions from the power sector in 10 Northeastern and Mid-Atlantic states.<sup>44</sup> Emission allowances are sold through auctions. Another regional program in the development stages is the Western Climate Initiative (WCI). The WCI is a collaboration among seven western states and four Canadian provinces. WCI plans to implement a regional cap-and-trade program covering 90% of emissions in the participating states and provinces.<sup>45</sup>

Among the states, California has passed the Global Warming Solutions Act of 2006 (AB-32).<sup>46</sup> AB 32 limits GHGs through the use of a cap-and-trade system, as well as through renewable portfolio standards and energy efficiency measures.

## F. Voluntary Markets

Aside from the regulatory or potential regulatory initiatives, many companies have taken GHG emission reduction measures ahead of any regulatory mandate and participate in voluntary emission reduction programs and markets. For example, the Chicago Climate Exchange (CCX) is a voluntary market for the trading of emission reductions. Members of CCX make commitments to reduce emissions upon joining, and to the extent they make greater emission reductions, they may sell those surplus allowances. Additional emission offsets can be generated through specific types of offset projects, which are required to be verified by a third party verifier.<sup>47</sup>

## G. Disclosures relating to GHG issues

Increasingly companies are making public statements regarding their GHG emissions and efforts to mitigate the impact of their operations on climate change. These type of carbon disclosures arise in a number of contexts including in SEC filings, in corporate sustainability or climate change reports, in submissions to non-governmental organizations, such as the Carbon Disclosure Project or in marking materials. Even when such disclosures are not mandatory, disclosures which are found to be inaccurate or misleading can result in legal liabilities.

### 1. Green Marketing

Much attention has focused on “green” marketing campaigns, particularly those that make claims of carbon neutrality or climate friendly. In general, the Federal Trade Commission Act prohibits unfair and deceptive trade practices.<sup>48</sup> A statement is “deceptive” if it is material and “is likely

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<sup>44</sup> See <http://www.rggi.org/home> (last visited 6/25/2009).

<sup>45</sup> <http://www.westernclimateinitiative.org/index.php> (last visited 6/25/2009).

<sup>46</sup> Cal. Health & Safety Code § 38500 (2009).

<sup>47</sup> See <http://www.chicagoclimatex.com/>

<sup>48</sup> 15 U.S.C. § 45.

to mislead consumers acting reasonably in the circumstances.”<sup>49</sup> To provide further guidance specifically on environmental marketing claims, the FTC has issued “Green Guides.”<sup>50</sup> The Green Guides outline general principles for environmental marketing and provide safe harbors if they are followed.<sup>51</sup> The Green Guides, however, were established before the proliferation of carbon-related marketing. The FTC is in the process of updating the Green Guides to specifically address these types of claims.

Companies making marketing claims should be aware of the FTC’s position that “all marketers making express or implied claims about attributes of their product or service must have a reasonable basis for their claims at the time they make them.”<sup>52</sup> The FTC further explains that green claims should be backed by competent scientific evidence developed by qualified professionals using generally accepted procedures.<sup>53</sup> This could be particularly problematic for carbon claims where the method for determining a carbon footprint is not settled and is subject to several competing standards.

When making these green claims, companies should also consider the reputational risk they face if green claims are found to be untrue or misleading. Several large companies have found themselves in the uncomfortable position of having their green claims either criticized or questioned in prominent media outlets.<sup>54</sup> These articles highlight the need for clarity regarding items such as how carbon footprints were calculated (specifically whether suppliers’ emissions and consumers’ emission from product use were included). The articles also show how the use of offsets in making carbon neutral claims requires careful vetting of the offset projects to verify that the offsets were actually “additional” – that is that the project would not have otherwise occurred without the sale of offsets.

## 2. SEC Disclosures

Disclosure of GHG emissions and the impacts of climate change are pertinent in SEC filings. Under the Securities Exchange Act of 1934, and Rule 10b-5, it is unlawful to make an untrue statement or to omit to state a material fact in connection with the purchase or sale of any security. Liability under the Act can result in third party actions and civil and criminal sanctions and injunctive relief. The key question in the context of climate change is whether a misrepresentation relating to these areas will rise to the level of materiality.

Much of the focus of SEC disclosure issues in the climate change context is on whether there is a duty to report on climate change issues in any of a company’s SEC filings. Many companies

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<sup>49</sup> See *FTC Policy Statement on Deception* appended to *Cliffdale Associates, Inc.*, 103 F.T.C. 110, 174 (1984) (<http://www.ftc.gov/bcp/policystmt/ad-decept.htm>).

<sup>50</sup> 16 C.F.R. Part 260.

<sup>51</sup> *Id.* § 260.3.

<sup>52</sup> 72 Fed. Reg. 66094, 66096 (Nov. 27, 2007).

<sup>53</sup> *Id.*

<sup>54</sup> Jeffrey Ball, “Green Goal of ‘Carbon Neutrality’ Hits Limit”, *Wall Street Journal*, December 30, 2008 (<http://online.wsj.com/article/SB123059880241541259.html>) ; (last visited July 25, 2009); Ben Charney, “How Green is Apple?”, *Wall Street Journal*, December 31, 2008, (<http://online.wsj.com/article/SB123066532721343231.html>) (last visited July 25, 2009)

voluntarily discuss the impacts of climate change in the “Management’s Discussion and Analysis” or MD&A portion of their SEC filings. The MD&A covers “known trends or any known demand, commitments, events, or uncertainties that will reasonably result in or that are reasonably likely to result in the registrant’s liquidity increasing or decreasing in any material way,” and known trends or uncertainties reasonably expected to have a material impact on sales, revenues or income.<sup>55</sup> In 2007, New York Attorney General Cuomo launched an investigation of five major energy companies regarding the sufficiency, under New York law, of their disclosures regarding CO<sub>2</sub> emissions from new power plants. Recently, there has been some indication that the SEC is open to considering requirements for climate risk disclosures, a move which the SEC had been resisting.<sup>56</sup>

## V. Conclusion

Carbon and climate change concerns are becoming an integral part of our legal landscape. Carbon regulation exists at many levels, from international treaties to local ordinances. Although no comprehensive federal program exists to control GHG emissions, federal regulation in some form – either through legislation or through regulatory action by EPA – seems likely. As public attention continues to focus on climate change, regulations will continue to evolve and become more prevalent.

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<sup>55</sup> 17 C.F.R. § 229.303(a)(1), (a)(3)(ii); Securities Act Release No. 33-6835.

<sup>56</sup> Evan Lehmann, “SEC Turnaround Sparks Sudden Look at Climate Disclosures” The New York Times, July 13, 2009, <http://www.nytimes.com/cwire/2009/07/13/13climatewire-sec-turnaround-sparks-sudden-look-at-climate-65102.html> (last visited July 25, 2009).

\* This paper relies heavily upon prior publications by the author and Jeff Civins, including “The Carbon Revolution” by Jeff Civins and Mary Mendoza prepared for “2009 Carbon and Climate Change,” University of Texas School of Law Continuing Legal Education.

# The Carbon Cycle – A Simplistic Overview

Exhibit A

