The Carbon Question: An Overview of Greenhouse Gas Emissions, Policies in Place, and Efforts Underway

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Introduction

As constraints on carbon emissions are increasingly discussed, many experts consider carbon capture and sequestration the top option in the energy industry's near future. Given the U.S. electricity industry's reliance on fossil fuels, it is unlikely that renewable energy will completely replace fossil fuels in meeting the nation's energy demands in the short term. Because coal is cheap and abundant, it is expected to continue to be a usable energy source.

About 50% of the electricity generated in the U.S. is from coal, according to federal Energy Information Administration 2005 annual statistics. At the same time, one 500 megawatt coal-fired power plant produces about 3 million tons of carbon dioxide each year, according to a Massachusetts Institute of Technology study of coal.[1] Ernest Moniz, former assistant Secretary of Energy, co-chaired the study.

The MIT study, which was published in 2007, declares carbon capture and sequestration "the critical enabling technology to help reduce CO_2 emissions significantly while also allowing coal to meet the world's pressing energy needs".[2]

The information in this report has been compiled to assist Energy and Telecommunications Interim Committee (ETIC) members in considering a potential policy or regulatory framework as it relates to carbon sequestration. This report also meets the requirements of the ETIC work plan, which include a review of existing regulations, a comprehensive inventory of emissions, and the preliminary findings of the Montana Climate Change Advisory Committee (MCCAC) related to carbon. Costs and benefits, feasibility, the final recommendations of the MCCAC, and various technologies will be covered in additional reports.

Much of the information about greenhouse gas emissions included in this report is based on the Draft Montana Greenhouse Gas Inventory and Reference Case Projections prepared by the Center for Climate Strategies. ETIC members requested information related to emissions prior to the September 6-7, 2007, meeting in Colstrip, and the information in this report is based on the most up-to-date inventory available.

Climate change is drawing the attention of the general public, government officials, industry representatives, and agriculture, wildlife, and recreation organizations. Climate change is often referred to as global warming. Global warming is a more politicized term, often sparking debate about how much human-caused pollution contributes to a changing climate.

There continues to be disagreement about how much the climate is changing based on natural

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[1] *The Future of Coal: Options for a Carbon-Constrained World,* An Interdisciplinary MIT Study, 2007, Executive Summary, page IX.

[2] Ibid. page X.

cycles versus human contributions. In the scientific community, a growing number of researchers believe that increased greenhouse gases are causing an increase in global temperatures. Greenhouse gases in the atmosphere allow incoming sunlight to pass through, but they absorb heat radiated from the earth's surface.

Some believe gases from factories, cars, and coal-burning power plants contribute to the trapping of heat in the atmosphere and contribute to climate change. Methane, forest fires, and deforestation (trees store carbon) also have a role.

Scientists are observing changes in the earth's climate. Temperatures across the earth increased about 1 degree Fahrenheit over the past century, but the rate of change since 1976 accelerated, according to a report from the World Meteorological Organization.[3] Since the start of the century, each year has ranked among the 10 warmest years of the observational period ranging from 1850 to the present.[4]

The 2007-08 ETIC is not reviewing the issue of climate change overall, but instead is keeping a narrow focus on sequestration. The 2007-08 Environmental Quality Council (EQC) will dedicate a significant portion of its time to studying the broader issue of climate change. Its work will begin with a discussion about humans' potential contribution to a changing climate. The ETIC and the EQC will communicate throughout the interim as greenhouse gas, carbon constraint, and climate change discussions develop.

The 2007-08 ETIC is focusing its efforts on Montana-specific issues related to a carbon-constrained environment and a potential policy framework that would best serve Montana in such an environment. The ETIC will discuss carbon capture, transportation, and sequestration in Montana.

This summary briefly deals with the methods and technologies of carbon capture and focuses on an inventory of sources and volumes of greenhouse gases in Montana and a review of existing and developing regulations and incentives regarding carbon.

Geological carbon sequestration is the process of trapping carbon dioxide after it is created from the production, processing, and burning of coal, gas, and oil at power plants and injecting it underground. Terrestrial sequestration is the process through which carbon dioxide from the atmosphere is absorbed by trees, crops, or plants through photosynthesis and stored as carbon in biomass, like tree branches or soils.[5] Forests and croplands are often called carbon "sinks" because they sequester more carbon than the amount of carbon released during forestry or

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[3] National Oceanic and Atmospheric Administration, Climate of 2004 Annual Review, Annual Review National Climatic Data Center, http://www.ncdc.noaa.gov/oa/climate/research/2004/ann/global.html#Gtempr.

[4]World Meteorological Organization, 2007. http://www.wmo.ch/pages/mediacentre/press_releases/pr_791_e.html.

[5] U.S. Environmental Protection Agency Carbon Sequestration in Agriculture and Forestry, http://www.epa.gov/sequestration/faq.html.

agricultural activities.

Simply put, carbon capture means that the gas doesn't enter the atmosphere. By capturing carbon dioxide at industrial plants, carbon can be kept out of the atmosphere. In terms of geological sequestration, there is an opportunity to store carbon under the earth's surface. Worldwide estimates of carbon storage capacity range from 2 trillion to 10 trillion tons of CO_2, according to the Intergovernmental Panel on Climate Change.[6] In 2004, worldwide carbon emissions reached 27 billion tons, according to the U.S. Department of Energy's Energy Information Administration.

In Montana, storage capacity and potential storage locations are being studied by the Big Sky Carbon Sequestration Partnership. The Big Sky Carbon Sequestration Partnership, led by Montana State University, is one of the U.S. Department of Energy's seven regional partnerships. Researchers are developing a framework to address carbon dioxide emissions and are working with stakeholders to create a "vision for a new, sustainable energy future".[7]

Terrestrial sequestration offers another opportunity in terms of controlling emissions. The National Carbon Offset Coalition includes seven Montana nonprofit corporations that help landowners and other public and private organizations participate in market-based conservation programs to offset greenhouse gas emissions. The coalition has developed a handbook to help landowners plan carbon sequestration efforts and document those efforts, making them marketable.[8] Technical consulting is provided in part by the Chicago Climate Exchange, the world's first marketplace for integrating emissions reductions with emissions trading and offsets.

Climate Change Advisory Committee

Montana started work on a climate change action plan 2 years ago, and work is wrapping up. In December 2005, Governor Brian Schweitzer asked Montana's Department of Environmental Quality (DEQ) to form a Climate Change Advisory Committee to thoroughly study the impact of climate change in Montana.

The MCCAC is made up of 18 members representing industry, environment, local and tribal governments, transportation, and agriculture.[9] The DEQ contracted with the Center for Climate

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[6] IPCC Special Report on Carbon Dioxide Capture and Storage, 2005, http://www.ipcc.ch/activity/srccs/index.htm.

[7] http://www.bigskyco2.org/

[8] http://www.ncoc.us/

[9] A full list of the Montana Climate Change Advisory Committee is available at http://www.mtclimatechange.us/ewebeditpro/items/O127F11863.pdf.

Strategies to develop a comprehensive inventory and forecast of greenhouse gas emissions in Montana from 1990 to 2020. The Center for Climate Strategies is also working with the MCCAC to develop possible policy options for reducing greenhouse gas emissions. The MCCAC voted on individual policy recommendations that will be presented to the Governor for possible implementation.

The MCCAC reached a consensus on about 50 recommendations for reducing greenhouse gas emissions in the state to1990 levels by 2020. Those recommendations include mandatory emissions reporting and requesting the Montana Board of Environmental Review to set rules for carbon reductions. The ETIC will hear a full report on these recommendations in November.

The Center for Climate Strategies, a nonprofit organization that works with groups like the MCCAC to design and implement policies that address climate mitigation, is facilitating development of Montana's plan. The Center for Climate Strategies has or is currently working in 15 other states to develop greenhouse gas reduction plans.

Five technical working groups organized to advise the full MCCAC and provide technical analysis of greenhouse gas policy options. The five groups included agriculture, forestry, and waste; energy supply; residential, commercial, and industrial; transportation and land use; and cross-cutting issues. The energy supply technical working group, for example, examined greenhouse gas reductions and the cost-effectiveness of environmental portfolio standards, renewable energy incentives, and market-based carbon issues, like a carbon tax.

Those working groups flushed out recommendations of "high priority mitigation options". Those recommendations then went to the full MCCAC for discussion. The MCCAC reached agreement on finalizing recommendations based on those options in early July. Those findings are being compiled into a report that will be presented to the ETIC.

Emissions in Montana

The Center for Climate Strategies prepared a greenhouse gas inventory under a contract with the DEQ. The report was prepared to assist the MCCAC. In June, a draft report was released. However, that report is expected to undergo modifications before a final inventory is completed in conjunction with a full set of recommendations from the MCCAC on reducing greenhouse gases.

The inventory includes carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. In the revised report, black carbon, or carbon that is produced by incomplete combustion of fossil fuels or soot, also will be discussed on a limited basis. Emissions inventoried in the report do not solely include carbon dioxide but instead include a common metric, CO_2 equivalent.

Historically, Montana's net greenhouse gas emissions were negative--forests and other lands that remove carbon from the atmosphere were greater than emissions from fossil fuel combustion and

other activities.[10] Based on growing emissions since 1990, Montana is now a net source--not a sink--for greenhouse gases, according to the draft. The inventory shows that greenhouse gas emissions in Montana are increasing and emphasizes that "there are significant uncertainties associated with estimating forest carbon sink estimates".[11] The revised inventory is expected to further elaborate on the issue of carbon sinks in Montana.

The preliminary inventory shows that activities in Montana account for about 37 million metric tons of carbon dioxide equivalent emissions or 0.6% of all greenhouse gas emissions in the United States. Electricity use, transportation, and agriculture are the principal emissions sources. The combustion of fossil fuels for generating electricity used in Montana combined with the transportation sector account for about 50% of the gross greenhouse gas emissions in the state.[12] Agricultural emissions are primarily methane and nitrous oxide from manure management, fertilizer use, and livestock. Other types of emissions are from households, large industry, commercial business, wastewater treatment operations, and the oil and gas industry.

In the draft inventory, emissions associated with the electricity sources used to meet Montana's demands--a consumption-based approach--were used. The consumption-based approach better reflects emissions associated with activities that occur in Montana, particularly electricity use, and are most useful for policymaking, according to the Center for Climate Strategies.[13] Under this approach, which according to the Center for Climate Strategies is consistent for comparisons between states, emissions associated with electricity that is exported to other states must be covered in those other states' emissions inventories.

Although consumption-based reporting on emissions is useful, Montana is in a unique position. Rather than a consumption-based approach, greenhouse gas emissions related to electricity may be considered based on the amount of electricity generated by facilities in Montana--a production-based approach. Historically, Montana produced about twice as much electricity as was consumed in the state.

The consumption versus production scenario is particularly helpful in reviewing Montana's carbon emissions related to electricity exports. For example, in 2000, Montana exported 41% of the electricity that it produced, according to the inventory. That same year, emissions associated with electricity consumption were 9.5 million metric tons of CO_2 equivalent--significantly lower than emissions associated with electricity production, which were 17.1 million metric tons of

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[10]DRAFT Montana GHG Inventory and Reference Case Projections Center for Climate Strategies, June 2007, page 2.

[11]Ibid. page 2.

[12]Ibid. page 4.

[13]Ibid. page 6.

CO_2 equivalent.[14] These numbers also may require additional scrutiny because much of the energy exported in Montana is generated by hydroelectric facilities.

The Center for Climate Strategies report shows estimates based on electricity consumption and electricity production. However, the draft inventory reflects electricity consumption emissions in its overall comparisons.

Under what is referred to as a "business as usual" approach, Montana's greenhouse gas emissions are expected to increase, climbing to 42 million metric tons by 2020 or 31% above 1990 levels, according to the inventory. However, transportation is expected to be the largest contributor to future emissions, followed by electrical generation. The estimates are based on a scenario in which no coal-to-liquids facilities are operating.

The inventory also contemplated a "high fossil fuel production" scenario with two coal-to-liquids plants being developed. That scenario assumes that additional electricity transmission lines are developed between Montana and the southern United States and from Montana to Alberta, Canada. The additional capacity on those lines is assumed to be used by a mix of 65% circulating fluidized bed coal electricity production and 35% wind energy production. The scenarios also show natural gas production tripling over current levels and refining capacity increasing. Under those assumptions, emissions reach 52 million metric tons in 2020.[15]

In 2004, coal accounted for 65% of electricity generation in Montana, and hydropower accounted for 33%. This is important in relation to carbon emissions because coal-fired power plants produce about twice the CO_2 emissions per megawatt-hour of electricity compared to natural gas-fired power plants, according to the inventory. Coal figures prominently then in the discussion of carbon sequestration.[16] Total greenhouse gas emissions from the four largest Montana plants totaled 18 million metric tons of $C0_2$-equivalent emissions in 2004. Colstrip, the largest plant, accounts for 82% of Montana's greenhouse gas emissions from power plants.[17]

A final inventory is being developed and will be presented to Governor Schweitzer. Again, the 2006 preliminary report is based on electricity consumption in Montana. The full report can be viewed at http://www.mtclimatechange.us/ewebeditpro/items/O127F12485.pdf.

The federal Energy Information Administration also tracks greenhouse gas emissions through the Voluntary Reporting of Greenhouse Gases Program, which is required by the Energy Policy Act of 1992. The reporting includes voluntary measures to reduce, avoid, or sequester greenhouse

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[14]Ibid.

[15]Ibid. page 8.

[16]Ibid. page 16.

[17]Ibid. page 20.

gas emissions. Although $C0_2$ emissions don't include all greenhouse gases, energy-related carbon dioxide emissions in 2005 represent about 83% of U.S. greenhouse gas emissions.[18] The 2005 EIA report uses 1990 to 2003 data to calculate state-level emissions from fuel categories, including coal, natural gas, and 10 petroleum products. The 2005 EIA report shows 32.7 million metric tons of CO_2 being emitted in Montana, 18.3 million metric tons resulting from electric power. Regardless of where the electricity is consumed, the emissions from the energy consumed to produce the electricity are attributed to the state where the generation takes place, according to the 2005 report.

Based on the 1992 Energy Policy Act, the EIA also is required to provide estimates of U.S. emissions of greenhouse gases. Carbon dioxide emissions from the U.S. electric power sector increased by 2.8% from 2,309.4 million metric tons in 2004 to 2,375 million metric tons in 2005. Carbon dioxide emissions from the electric power sector have grown by 32% since 1990, according to the EIA 2005 report.[19]

The U.S. Environmental Protection Agency also has published an Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005. Energy-related activities, primarily fossil fuel combustion, accounted for the majority of U.S. CO_2 emissions between 1990 and 2005. In 2005, about 86% of the energy consumed in the United States was produced through the combustion of fossil fuels.[20] A similar EPA 2003 report offers a state-by-state look at CO_2 emissions from fossil fuel combustion. That report shows 32.5 million metric tons of CO_2 produced in Montana, with 18.13 million metric tons from electric power.

The findings in the federal reports closely track with the draft inventory prepared by the Center for Climate Change Strategies. Overall in Montana, electrical generation is responsible for about 18 million metric tons of CO_2 equivalent. For the sake of comparison, electric power in North Dakota emits about 31 million metric tons of CO_2 equivalent and Wyoming generation is responsible for about 42 million metric tons of CO_2 equivalent. The numbers are based on the EPA's 2003 CO_2 Emissions from Fossil Fuels report.

In general, federal tracking of greenhouse gas emissions is based on a voluntary national registry that was created under the Clinton administration's Climate Change Action Plan. Power plants subject to the 1990 Clean Air Act acid rain program, however, must report air pollutants, including carbon dioxide, to the Environmental Protection Agency (EPA). In Montana, those plants include: Rocky Mountain Power, PPL Corette, PPL Colstrip, Montana-Dakota Utilities Lewis and Clark Station, and Montana-Dakota Utilities Glendive Station. (Figure 2)

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[18]EIA/Emissions of Greenhouse Gases in the United States, 2005, page X of Executive Summary.

[19]Ibid. page XIII.

[20] *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005*, page 11 of Executive Summary.

Some organizations have raised concerns that under the existing voluntary reporting system, emitters can record emission reductions without referencing total emissions. In 2000, for example, 222 U.S. companies and organizations reported to the national Department of Energy tracking program that 1,882 projects to reduce or sequester emissions were undertaken. Of those, only 100 reported entitywide emissions, as opposed to just projects to reduce greenhouse gas emissions.[21]

Efforts to report emissions

During the 109th Congress, multiple bills related to climate change were introduced to establish mandatory greenhouse gas reduction programs and reporting programs. None of those proposals were passed out of committee.[22] Congress is currently contemplating a multitude of bills on the same subject.

Greenhouse gas emissions aren't currently restricted by the federal government, however, earlier this year the U.S. Supreme Court ruled that the Environmental Protection Agency has failed to use its authority to regulate carbon in automobile exhaust as a pollutant. In the absence of federal laws on the subject of greenhouse gas emissions, states are forming individual and regional tracking and reductions programs.

Regional climate registries are developing across the nation. A Western Regional Climate Action Initiative includes Arizona, California, New Mexico, Oregon, Utah, and Washington. British Columbia, Canada, and Manitoba, Canada, also have joined. States will identify, evaluate, and implement ways to reduce greenhouse gas emissions. The initiative requires an overall regional goal to reduce emissions. A market-based, multisector mechanism must be developed to achieve that reduction. Members also will participate in a greenhouse gas registry. Montana currently has observer status with the organization. The MCCAC reached agreement on a recommendation that Montana join the initiative.

The Regional Greenhouse Gas Initiative (RGGI) includes Connecticut, Delaware, Maine, Maryland, New Hampshire, New Jersey, New York, and Vermont. Starting in 2009, carbon emissions from power plants in those states will be capped at current levels--about 121 million metric tons annually. The cap remains until 2015 when the states then incrementally reduce emissions by 10% by 2019. It establishes the first cap-and-trade program for carbon dioxide. It

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[21] Comments by the Pew Center on Global Climate Change regarding Voluntary Reporting of Greenhouse Gas Emissions, Reductions, and Carbon Sequestration. Response to notice of inquiry by the Department of Energy, May 6, 2002, Volume 67, Number 87, pages 30370-30373.

[22] *Climate Change: Federal Laws and Policies Related to Greenhouse Gas Reductions,* by Brent Yacobucci and Larry Parker, Congressional Research Service Report.

is the first mandatory cap and trade program for emissions in the U.S.[23]

Thirty-one states, including Montana, are part of the Climate Registry, a national initiative to track greenhouse gas emissions. The registry, a nonprofit organization, will be used to track, measure, verify, and publicly report greenhouse gases. The registry will accept data starting in January 2008. State agencies, corporations, and educational institutions will be invited to report emissions under the voluntary program. Some states also have specific sources and facilities that are required to report under regulatory programs. In Montana, facilities are not required to report carbon emissions, but the MCCAC reached agreement on a recommendation that a mandatory reporting program be designed.

The Climate Registry is modeled after the California Climate Action Registry, which has operated since 2001 and includes 240 members, certifying more than 320 million metric tons of greenhouse gas emissions, roughly the annual emissions of Brazil. California has one of the most comprehensive sets of legislation regulating not only carbon emissions from stationary sources but also vehicles. In 2006, California approved legislation setting out a comprehensive greenhouse gas reduction program. The California Air Resources Board must implement a program to reduce state emissions to 1990 levels by 2020. Beginning in January 2008, a mandatory emissions reporting program for greenhouse gases must be established.

Fourteen states have formally adopted or are poised to adopt California's vehicle requirements, according to July 2007 research by the Pew Center on Global Climate Change. In the west, Washington and Oregon have adopted those standards. The New Mexico Environment Department must submit a proposal to the state Environmental Improvement Board by January 2008 to implement standards consistent with California's rules.

New Mexico also is the first state with substantial coal and petroleum resources to move toward emissions targets. Based on U.S. Department of Energy information, Energy Information Statistics, in 2005 New Mexico ranked 11th in coal production and 6th in crude oil production.[24] The New Mexico Environment Department is going through rulemaking to expand the existing criteria air pollutant reporting requirements to include greenhouse gases. The proposed regulation requires specific greenhouse gas reporting for three industrial sectors--power plants, refineries, and cement manufacturing plants.

Several other states are taking individually tailored steps to require stationary sources, like power plants, to report carbon dioxide and other greenhouse gas emissions. The majority of

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[23]*Model Rule and Amended Memorandum of Understanding,* Regional Greenhouse Gas Initiative.

[24]*Climate Change: Action by States to Address Greenhouse Gas Emissions,* by Jonathan Ramseur, Congressional Research Service, January 2007, page 6.

state-initiated greenhouse gas registries, however, are voluntary. New Jersey requires entities that report air emissions to the state Department of Environmental Protection to also report carbon dioxide and methane. Wisconsin requires entities emitting 100,000 tons or more of CO_2 to report emissions to the state Department of Natural Resources. Maine and Connecticut also have forms of mandatory reporting based on different criteria.

Thirty states have completed or are in the process of completing climate change action plans.[25] Montana is included, with its MCCAC wrapping up its work in July. As noted earlier, a summary of the MCCAC recommendations will be presented to the ETIC.

Another 17 states have set statewide greenhouse gas emissions targets. However, only a fraction of those states require mandatory emissions reductions.[26] Montana's Climate Action Plan recommends steps to reduce emissions to 1990 levels by 2020. The reductions for state governments go even further. A detailed analysis of those recommendations is forthcoming. A multitude of states, including Montana, also have adopted renewable portfolio standards, requiring that a percentage of a utility's power source comes from renewable resources. Montana's portfolio sets steps toward a goal of 15% by 2015.

At the local level, the mayors of Billings, Missoula, and Bozeman signed on to the U.S. Mayors Climate Protection Agreement, committing to reduce emissions in their cities to 7% below 1990 levels by 2012.[27]

Regulatory efforts

Many states are working through policy discussions that deal with regulatory frameworks, liability, and storage versus surface rights related to CO_2 storage. Most recently, legislative leaders in Wyoming made carbon sequestration the top-priority interim study for the Wyoming Joint Judiciary Committee. Information on efforts in Wyoming will be shared with the ETIC.

The Interstate Oil and Gas Compact Commission (IOGCC) has drafted a report titled "Carbon Capture and Storage: A Regulatory Framework for States," which includes a series of recommendations on a CO_2 framework. The report analyzes technical, policy, and regulatory issues related to storage of carbon dioxide in the subsurface, including oil and natural gas fields, saline formations, and coal beds. Efforts to draft the report were funded by the Department of Energy and the National Energy Technology Lab. The report analyzes regulatory frameworks for

[25]Ibid. page 5.

[26] Pew Center on Global Climate Change, http://www.pewclimate.org/what_s_being_done/in_the_states.

[27]www.usmayors.org/climateprotection/

capture, transportation, injection, and post-injection storage. "Establishment of a carbon capture and geological sequestration regulatory scheme in any particular jurisdiction will require an assessment for each component of the technical issues and a review of the existing regulatory framework".[28]

Storage of CO_2 raises the question of whether CO_2 captured, for example, at a power plant is considered a pollutant or a resource and what agencies need to be involved in monitoring and regulation. In many states, including Montana, storage of natural gas, liquefied natural gas, and petroleum reserves is currently regulated with permitting, siting and monitoring regulations in place. "Conceptually a societal decision has been made that the benefit of storage in terms of energy security and improved ability to meeting demand outweighs the potential for negative impacts".[29] The benefits and risks of such storage as it relates to CO_2 is being discussed in many forums. The underground storage of natural gas in Montana is outlined in Title 82, Chapter 10 of the Montana Code Annotated.

Underground fluid injection is currently regulated through the EPA's Underground Injection and Control (UIC) Program. The program is part of the Safe Drinking Water Act established to protect underground water resources from contamination. Based on that system, there are five classes of wells for waste injection. Class II permits currently are issued for wells that are used for energy production, like enhanced oil recovery. The first U.S. injection of CO_2 into an underground saline reservoir, a federal project in Texas, was permitted under a Class V designation. Such a designation covers wells that do not fall under the other four classes. Discussions about permitting for CO_2 injection wells have generated considerable debate. The costs and requirements associated with the five different permits are notably different. The IOGCC report discussed above recommends CO_2 injection wells be a subclass of Class II permits, or be permitted under an entirely new federal classification. In Montana the EPA enforces permitting for Classes I, and III-V. The Montana Board of Oil and Gas Conservation enforces Class II as outlined in Title 82, Chapter 11, Montana Code Annotated. State programs are required to address environmental health and safety and protect the Safe Water Drinking Act from contamination by the injection or storage of natural gas.

Pipeline movement of CO_2 is currently regulated under Title 49 of the Code of Federal Regulations Part 195 (49 CFR 195) by the U.S. Department of Transportation Office of Pipeline Safety. Depending on location and size, a new pipeline proposed in Montana that is regulated under the Natural Gas Pipeline Safety Act of 1968 or the Hazardous Liquid Pipeline Safety Act of 1979 may need permitting through the DEQ, the Public Service Commission, and multiple other sources.

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[28] *"Carbon Capture and Storage: A Regulatory Framework for States,"* Interstate Oil and Gas Compact Commission, 2005, page 2.

[29] *"Regulatory Barriers for Carbon Capture, Storage and Sequestration,"* Sarah M. Forbes, National Energy Technology Laboratory, November 2002.

The scope of a regulatory framework discussed by the ETIC may need to address siting of potential CO_2 storage projects, injection at a site, monitoring and mitigation requirements, and accounting for emissions offsets gained through storage. By early next year, the ETIC will receive a summary of existing rules and practices related to pipelines to assist members in determining if existing regulations are adequate for CO_2 capture and storage projects. In addition, the ETIC will receive a report discussing liability and storage versus surface rights issues.

Incentives and outside related efforts

Additional state-level actions to address the effects of climate change and greenhouse gas emissions are taking shape. To date, 14 states have enacted or are in the process of enacting legislation with some form of financial incentive for "clean coal technologies".[30] Those incentives range from streamlined permitting in Colorado for certain technologies to tax credits for coal gasification facilities in Kansas. Kentucky, for example, requires its state Public Service Commission to approve various long-term contracts by utilities when the projects are for synfuel plants that use coal. Kentucky also has an environmental surcharge for pollution control retrofit costs.

Illinois is offering $5 million in public-private support for a $1.1 billion Integrated Gasification Combined Cycle (IGCC) Energy Center. Wyoming offers a sales and use tax exemption for equipment purchased to develop coal gasification or liquefaction facilities.[31] Indiana currently has the most comprehensive and aggressive portfolio of incentives, according to a report by the National Center for State Legislatures.

Several states also have formed carbon sequestration advisory boards to provide guidelines and calculate the costs of offsetting emissions. In general, these advisory boards focus on terrestrial sequestration in agriculture and forestry ecosystems. Nebraska, Wyoming, South Dakota, North Dakota, Oklahoma, Illinois, and Idaho have advisory committees.[32] In 2002, Idaho created a carbon sequestration advisory committee. The Idaho Soil Conservation Commission provides leadership for the group, and a Carbon Sequestration Assessment Fund was developed.[33] The

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[30] National Conference of State Legislatures, Quarterly Review of Energy Policy and Activities in the State Legislatures, March 2007.

[31] Wyoming State Statutes 39-15-105 (2006).

[32] *Carbon Sequestration Role in State and Local Actions,* Department of Energy/NETL, Melissa Chan and Sarah Forbes, January 2005, page 5.

[33] Idaho Law 22-5101 (2002).

Wyoming Carbon Sequestration Advisory Committee was created through state legislation under the Wyoming Carbon Storage Law and is authorized for 8 years from 2001 until 2009. [34]

The National Association of Regulatory Utility Commissioners adopted a resolution in early 2005 supporting state incentives that increase IGCC. Direct loans, loan guarantees, lines of credit, tax incentives, production incentives, and direct subsidies are discussed. The U.S. Clean Coal Power Initiative is providing government cofinancing for new coal technologies that can help utilities meet the Clear Skies Initiative to cut sulfur, nitrogen, and mercury pollutants from power plants by nearly 70% by the year 2018. Some of those projects also are working to reduce greenhouse gas emissions.

2007 Montana Legislature

During the 2007 legislative session, members of the Montana Legislature were introduced to a multitude of greenhouse gas and climate change-related bills. Carbon and related greenhouse gases were the topic of at least 12 bills considered during the session (Figure 1). Rep. Sue Dickenson requested that the Legislative Council assign a study of climate change, House Joint Resolution No. 60, which would have coordinated efforts with the Governor's MCCAC. That resolution was tabled. Rep. Alan Olson introduced a study bill, House Bill No. 828, which outlined a study of carbon sequestration issues in Montana. That bill also died in the process.

Two bills were passed and approved that address the carbon issue--House Bill No. 25 (HB 25) approved during the regular 2007 session, and House Bill No. 3, approved during the 2007 special session. Both bills address, to some degree, the issue of carbon sequestration, particularly as it applies to power generation and equipment.

The Electric Utility Industry Generation Reintegration Act (HB 25) includes a carbon sequestration component. Until the state or federal government adopts uniformly applicable standards, HB 25 prohibits the Public Service Commission from approving acquisitions or leases of facilities or equipment used to generate electricity that is primarily fueled by coal unless a minimum of 50% of the CO_2 produced by the facility is captured and sequestered. Natural gas plants also must include cost-effective carbon offsets. The bill applies only to electric generating units constructed after January 1, 2007. The Public Service Commission is responsible for rulemaking related to carbon dioxide as stipulated in HB 25. By March 31, 2008, the PSC must adopt rules to implement the cost-effective carbon offsets required at new facilities fueled by natural or synthetic gas. Montana joins California, Oregon, and Washington as states that have adopted a CO_2 emissions performance standard for electric generating units.

House Bill No. 3, as it relates to topics covered in this summary, provides tax incentives for energy generation facilities that emit less carbon than conventional technologies. Incentives also are provided for equipment that sequesters carbon. Based on the legislation, numerous types of

[34] http://www.wyomingcarbon.org/

facilities constructed after May 2007, including integrated gasification combined cycle plants that sequester carbon dioxide and natural gas combined cycle plants that offset a portion of the carbon dioxide produced through carbon credit offsets, are eligible for tax abatements. The percentage of carbon dioxide to be sequestered must be based on technology that is "practically obtainable as determined" by the DEQ, but not less than 65%.

Eligible facilities will be assessed at 50% of their taxable value for a period not to exceed 19 years, which includes up to 4 years for construction and 15 years of operation. Integrated gasification combined cycle facilities that apply for an air quality permit after 2014 are not qualified. Coal-to-liquids plants and other gasification plants that sequester carbon are not subject to the deadline.

An IGCC facility would be considered class fourteen property and taxed at 3% of its market value, as opposed to 6%currently. New equipment at existing power plants used to capture and to prepare for the transport of carbon dioxide also is considered class fourteen property. House Bill No. 3 gives permanent property tax rate reductions from 12% to 3% of market value for new investments in carbon sequestration pipelines. Coal-to-liquids facilities with carbon sequestration also are taxed at 3% of market value.

Conclusions

This report is intended to be a starting point for discussion about carbon emissions, regulatory frameworks, and incentives. As the ETIC learns more from various sources over the next 12 months, the report will be updated and revised. Additional information also will be incorporated into the report based on the requirements of the work plan.

Notably, the information on emissions is based on the Draft Montana Greenhouse Gases Inventory and Reference Case Projections prepared by the Center for Climate Strategies. When the final report is released to the public, all new information and findings will be incorporated into a revised document. Additional information on the MCCAC's recommendations also will be included in this report as those recommendations are finalized through the DEQ and Governor's Office.

Figure 1

2007 CO_2-related legislation

HB 3 "Jobs and Energy Development Incentives Act"// Approved Special Session// Rep. Llew Jones.

Provides permanent property tax rate reductions from 12 percent to 3 percent of market value for new investments in transmission lines for "clean" electricity, "clean" liquid and carbon sequestration pipelines. Property taxes on new generation technology with sequestration goes from 6 percent to 3 percent. New DC converter stations serving two regional power grids go from 6 percent to 2.25 percent. Nonpermanent incentives from 3 percent to 1.5 percent are available for new investments in biodiesel, biomass and other defined technologies.

HB 25 Revise Electric Industry Restructuring laws.// Approved Regular Session///Rep. Alan Olson

The "Electric Utility Industry Generation Reintegration Act" includes a carbon sequestration component. Until the state or federal government has adopted uniform, applicable standards for the capture and sequestration of carbon dioxide, HB 25 prohibits the PSC from approving electric generating units primarily fueled by coal unless a minimum of 50 percent of the CO_2 produced by the facility is captured and sequestered. Natural gas plants also must include cost-effective carbon offsets.

The bill applies only to electric generating units constructed after January 1, 2007. Montana joins California, Oregon, and Washington as states that have adopted a CO_2 emissions performance standard for electric generating units.

HB 24 Revise laws related to carbon dioxide for energy purposes//Approved Regular Session//Rep. Harry Klock

Provides common carrier status to pipelines carrying carbon dioxide that is transported for permanent sequestration in a geological formation.

This bill, however, was contingent upon the passage and approval of SB 218, which authorized the Board of Environmental Review to adopt rules establishing a carbon sequestration program and permit system. SB 218 was tabled, so HB 24 is void.

HB 55 Carbon sequestration -- ecosystem services leasing and licensing. Tabled by House Natural Resources//Rep. Kevin Furey

Authorized the Department of Natural Resources and Conservation to lease or license state trust lands for carbon sequestration or other ecosystem services such as open space or biodiversity. The board of land commissioners was charged with promulgating rules for this program.

HB 227 Create carbon sequestration loan program. Tabled by House Appropriations//Rep. Ron Erickson

Established a carbon sequestration revolving loan account administered by the DNRC. Funded by interest income off a portion of the interest on coal severance taxes. Funds from the loan account would be used to provide loans to individuals, small businesses, units of local government, units of the university system, and nonprofit organizations for the purpose of terrestrial carbon sequestration. The amount of a loan could not exceed $50,000, and the loan must be repaid within 10 years

HB 282 Sequestration to slow global warming. Tabled by House Natural Resources//Rep. Ron Erickson

Required all coal-fired electrical generation facilities or synthetic fuel facilities that file construction permits with the DEQ to capture CO_2 at the site and permanently store it in a geological formation or provide verification that 100 percent of the carbon emissions would be offset.

HB 753 Montana global warming solutions act. Tabled by House Natural Resources//Rep. Betsy Hands

Required the DEQ to develop and the Board of Environmental Review to adopt a global warming program for the State of Montana that included identification of historical and current sources of greenhouse gas emissions. A plan also would have been developed to reduce emissions to 1990 levels.

Modeled after legislation in California, it also would have allowed the BER to adopt a schedule of fees that would be paid by greenhouse gas emission sources.

HB 828 Study carbon sequestration. Died in process// Rep. Alan Olson

Outlined a study of carbon sequestration issues in Montana and required the Energy and Telecommunications Interim Committee to complete such a study.

HJ 60 Study climate change. Tabled by Federal Relations, Energy and Telecommunications// Rep. Sue Dickenson

Required a study that would review existing federal and state regulations related to greenhouse gas emissions, energy efficiency, renewable energy, and tax incentives. Included review and analysis of findings by Governor's Climate Change Advisory Council.

SB 105 Tax break for equipment to sequester carbon. Tabled House Taxation// Sen. Greg Lind

Placed equipment specifically used for carbon sequestration in class 5 (3 percent) and made such property exempt from taxation for three years after it becomes operational.

SB 218 Sequestration standards for carbon dioxide. Tabled by House Natural Resources// Sen. Greg Lind

Required the state to develop a new program to monitor underground injection of carbon dioxide. The Board of Environmental Review would be charged with adopting rules to administer the program. It also created a special revenue fund with fees and penalties to support the program.

SJ 20 Carbon reduction timeline. Tabled in House Natural Resources/ Sen. Mike Cooney

Urged Congress to enact a mandatory and science-and-market based limit on overall limits of greenhouse gas emissions and to provide incentives for development of energy efficiency and renewable energy programs.

LC 1469 Carbon Dioxide as pollutant. Not introduced//Requested by Rep. Ron Erickson

Revised the definitions of "air pollutants" under the Clean Air Act of Montana to include CO_2. Required the BER to establish CO_2 emission levels.

Figure 2

EPA Clean Air Markets: Co_2 Tons			
Facility	**2007 (3 months)**	**2006**	**2005**
Colstrip	5,016,395	18,240,485	19,219,042
Glendive	19,663	30,824	37,715
Hardin	101	3,293	(not in operation)
Corette	397,517	1,528,248	1,268,273
Lewis and Clark	127,227	503,041	441,038