Volume 1

Chapter 4

Environmental Issues

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Environmental Discussion

Environmental issues are the source of considerable uncertainty in the NorthWestern resource planning process. The potential for future CO_2 and other Green House Gas (GHG) legislation or regulation is the primary source of this uncertainty. While existing units may be subject to some incremental legislative or regulatory requirements, the potential impacts are minimal in contrast to GHG mitigation potential impacts for new resources.

In contrast to most other utilities that are making incremental resource decisions, NorthWestern is in the process of re-building its portfolio of generation assets. This amplifies the potential effects of future GHG impacts. Relative to the 2009 plan, the unfolding of future GHG legislation is more uncertain today than it appeared previously. The continued slow economic recovery from the Great Recession in the United States and elsewhere, coupled with a significant breakdown in decision-making on issues of national significance, has caused a reluctance to impose new regulations on electricity generation that could hinder economic growth.

On the international front the Kyoto accords are coming to an end in 2012 and it does not appear likely that a subsequent agreement will follow soon. Most countries appear as if they will fail to accomplish the cuts in emissions agreed to in the Kyoto accords, and given that continuation of the accords would involve punitive burdens for non-compliance, that continuation is not likely. Even the international agreements reached in 2010 appear not likely to be implemented, as they entail promises of $100B from wealthy countries to be invested in poorer countries to implement mitigation as they continue to develop their industrial bases.

In this current plan NorthWestern continues to evaluate the potential impact of climate change regulation on electricity supply costs. The potential impact of legislative proposals and environmental regulation of GHG varies widely depending upon the individual proposal. Climate change initiatives have centered on two ways to reduce GHGs – federal legislation and increased Environmental Protection Agency (EPA) regulation. Regulation of GHG by EPA is a potential alternative to legislation that may not materialize in the near future. Also on the federal level, funding for research into technologies to capture and sequester carbon continue, although on a scaled-back level.

On the state level, one policy that has already been developed in response to concerns over climate change is RPS, presently on a state-by-state basis.

This chapter addresses the following environmental issues:

- GHG Issues
  - Legislation
  - EPA regulations
  - Carbon Dioxide (CO_2) Sequestration
  - NorthWestern's GHG Policy and Planning Assumptions
- Other Environmental Emissions and Costs
- Renewable Resource Standards

Green House Gas Legislation

The consequences of potential CO_2 emissions reduction costs, whether imposed by legislation or by regulation, will have an impact on electricity cost. Any policy that increases costs based upon carbon will increase the cost of fossil fuel-burning power plants, change power market prices, and potentially change the mix of resources selected to meet need.

On June 26, 2009, the U.S. House of Representatives passed the American Clean Energy and Security Act, known as either the ACES or Waxman-Markey. Waxman-Markey would have created a cap and trade mechanism for CO_2 and would set increasing targets for carbon emission reductions. The ACES would set targets for reducing carbon emissions from 2005 levels by 3%

in 2012, 17% by 2020, 42% by 2030, and 83% by 2050. Reductions would have been facilitated by issuing and auctioning allowances to emit CO_2. Ultimately, the bill could not gather enough support to pass the U.S. Senate.

In May of 2011, The American Power Act, known as the Kerry-Lieberman bill, was introduced into the U.S. Senate. Kerry-Lieberman would have amended the Clean Air Act (CAA) to establish limits on carbon emissions from the major industrial sectors, including electricity production, heavy industry, and transportation. It included an auction system, cost reduction mechanisms, and market safeguards, as well as measures to invest in key energy technologies. The bill had a phase-in schedule for four major categories of pollution sources: electricity generation, industrial sources, natural gas, and petroleum-based fuels. Electricity generating plants burning coal, natural gas, and oil and producers of refined petroleum products would have been subject to regulation starting in 2013.

The Kerry-Lieberman bill was originally introduced as a bipartisan bill with the support of Sen. Lindsey Graham. Sen. Graham pulled his support for the bill in April of 2010, and in an effort to salvage the bill, Sens. Kerry and Lieberman conceded that they would be willing to scale back their goal of an economy-wide price on carbon and rework the bill into a utility-only bill. Late in July 2010 it became evident that the Kerry-Lieberman bill was not going to survive a Senate vote, and with that realization came the recognition that the U.S. Senate is not going to enact any form of cap and trade or possibly enact any legislation that seeks to put a price on carbon within this Plan's initial years.

Presently no new legislative proposals to regulate GHGs are before Congress.

EPA Regulations

Given the ongoing difficulty of obtaining Congressional action on a carbon policy, the Administration is pursuing an alternative course of action. While the Administration has expressed a preference for cap-and-trade legislation, the EPA is moving forward with regulation

of GHGs. In April 2007 the U.S. Supreme Court found that GHGs are emissions covered by the CAA and ruled in Massachusetts vs. EPA that the CAA gives the EPA authority to regulate emissions of GHG, if they are indeed a threat to human health. On December 7, 2009 the EPA Administrator concluded a public process and scientific review by the signing of findings under the CAA that current and projected concentrations of GHG in the atmosphere threaten the public health and welfare of current and future generations.

U.S. EPA Assistant Administrator for Air and Radiation Gina McCarthy appeared before the House Energy and Power Subcommittee in March of 2011 and testified that EPA could regulate GHG without harming the economy or driving smokestack industries overseas. House members remained unconvinced and in March 2011 the House Energy and Commerce Committee passed the Energy Tax Prevention Act of 2011. The act would strip EPA of its ability to regulate GHG.

On April 7, 2011, the U.S. House of Representatives passed the Energy Tax Prevention Act of 2011 on a 255 to 172 vote that would block EPA regulation of GHG. On the same day, the U.S. Senate prevented four bills that would have revoked EPA's ability to regulated GHG emissions. The Senate vote provided a clear indication to the House that the Energy Tax Prevention Act would not pass the Senate. Additionally, President Obama indicated that he would veto the bill. GHG legislation has been stalled, for a variety of reasons, and most likely will stay stalled until after the 2013 elections.

Carbon Sequestration

Carbon capture and sequestration (CCS) is the process of capturing CO_2 from point sources, such as a power plant, and storing it permanently in deep underground geological formations. The CO_2 is separated from other gases, pressurized to a nearly liquid state, transported to the storage location, and injected underground into saline formations, basalt formations, oil and gas reservoirs, and un-mineable coal beds. President Obama has recently established a Task Force on CCS that is charged with development, within 180 days, of a plan to overcome the barriers to

the widespread, cost-effective deployment of CCS within 10 years, with a goal of bringing 5 to 10 commercial demonstration projects online by 2016. The plan will explore incentives for commercial CCS adoption and address any financial, economic, technological, legal, institutional, social, or other barriers to deployment. This development suggests that new coal should be deferred until such time as concrete results from this Task Force are realized and can be incorporated into the resource planning process.

The Big Sky Carbon Sequestration Partnership at Montana State University is studying the feasibility of CCS in our region of the nation. Members have identified the potential to store 200 billion tons of CO_2 in depleted gas and oil fields and saline aquifers in the region. They received a $67M Department of Energy (DOE) grant to inject and monitor 1M tons of CO_2 into sandstone rock formations at Big Piney, Wyoming.

The Big Sky Carbon Sequestration Partnership recently initiated work on an eight-year large-scale carbon storage project in northern Montana. The Kevin Dome Storage Project will involve permitting, injecting, and monitoring one million tons of CO_2 into deep porous rock formations at a site in Toole County, MT. A naturally occurring carbon gas deposit will be tapped and then re-injected into a rock formation that does not contain CO_2. The research will allow researchers to study rock formations which have been previously exposed to CO_2 and rock formations that have not been exposed. The overall goal of the Kevin Dome Storage Project is to demonstrate that CO_2 can be stored safely in regional geologic formations and that the method is viable.

At the national level, the lack of a comprehensive policy on carbon emissions combined with low natural gas prices has caused power companies to shelve plans to test technology that would sequester carbon dioxide emissions from coal-burning power plants. Since December 2010, at least three CCS projects have been canceled or placed on hold in the United States:

- On July 14, 2011, American Electric Power cancelled its full-scale CCS project at its Mountaineer coal-fired power plant in West Virginia citing a stalemate in federal climate change policy. The project had secured federal funding that would have covered half of

the $668 million needed to install the equipment. The project would have captured 90 percent of the CO_2 emissions from the 1,300 MW power plant using a chilled ammonia process. The sequestered carbon was to be stored in an underground geologic reservoir.

- Other high-profile projects that were suspended included a $100 million coal gasification and CCS research facility in Wyoming, and a demonstration project to capture 25 percent of the CO_2 from one of two coal-fired units at a power plant in North Dakota. The Wyoming project was a joint effort of General Electric and the University of Wyoming called the High Plains Gasification Advanced Technology Center.

- A North Dakota CCS project proposed by Basin Power Cooperative was cancelled after nearly three years of study. The Basin project would have retrofitted carbon capture technology to an existing coal-fired electric generation unit. Basin Power had received a promise of $100 million in federal funding, but the project's costs had risen to as high as $500 million. Basin Power had planned to sell the CO_2 captured from the plant for use in enhanced oil recovery, a process which pumps and stores CO_2 deep into oil wells to increase the amount of oil that can be extracted. The company stated that the market for enhanced oil recovery techniques had not developed in the region.

A few CCS projects, however, are still moving forward:

- FutureGen, which was to be a green field demonstration project, has been downsized and reconfigured to a retrofit of a shuttered 200 MW coal-fired generation station owned by Ameron and located in Morgan County, Illinois. The project will utilize oxy-combustion, a process that burns coal in pure oxygen, creating a high concentration of CO_2 in the emissions stream. A 32-mile pipeline will be built to transport CO_2 to the injection site.

- Summit Power Group announced that the Texas Clean Energy Project had reached an agreement to sell the CO_2 captured from a coal-fired power plant near Odessa, Texas to operators of nearby oil fields for use in enhanced oil recovery.

In the event that CCS technology becomes more available, the question arises as to the possibility of retrofitting the existing coal unit fleet with it. A Massachusetts Institute of Technology (MIT) study, "On The Future of Coal," suggests that existing units would realize a de-rating of 41%, which would make them un-economical in contrast to a new unit build with CCS. The MIT study further concluded that the most economical technology to incorporate CCS is Integrated Gasification Combined Cycle (IGCC). Progress on CCS information is presently under way, with proof of concept and cost information still uncertain. Additionally, as discussed in Chapter 6 of this Plan, natural gas prices have dropped significantly, displacing coal-fired resources with natural gas resources. Therefore any decisions regarding new coal units with CCS should be deferred until such time as better information is available. Given the significance of the GHG variable in the resource planning conclusions, NorthWestern will defer consideration of new coal units until such time as the cost and effectiveness of CCS is known with more certainty.

NorthWestern's GHG Policy and Plan Assumptions

The ability to forecast what policies will be implemented in the future, and what ultimate impact they will have on resource choices including market-based acquisitions, remains an uncertain and difficult task. The issue of climate change is not going to go away and GHG regulations are likely to occur at some point in NorthWestern's planning future. Although NorthWestern does not anticipate that there will be comprehensive climate change legislation or control of GHG through EPA regulations in the near term, environmental responsibility and prudence dictate that NorthWestern should make future resource decisions consistent with some expected level of GHG regulation.

Regardless of an individual's or a corporation's position regarding the anthropogenic interference with the global climate system, sound business decision-making dictates that NorthWestern proceed under the assumption that some level of regulation will occur in the future. Decisions made today consistent with anticipated regulation will make the transition to a renewable energy

structure more efficient for NorthWestern in the future. This approach suggests that resource decisions should be influenced by the long-term goal of reducing CO_2 emissions in both resource development and resource contracting.

Relative to most utilities, NorthWestern finds itself in the unique position of re-building its portfolio to serve its future obligations. This position provides NorthWestern with the opportunity to build a portfolio of resources that minimizes the rate impact of future potential climate change policies with minimal impacts due to legacy resources. However, if GHG legislation is implemented later or at a lower cost than anticipated, NorthWestern could find itself with a somewhat higher cost portfolio. This uncertainty suggests a "middle of the road" policy will provide NorthWestern with the flexibility to respond to future developments in a manner that protects our customers and the company from unanticipated consequences.

In its 2009 RPP, NorthWestern adopted the Northwest Power and Conservation Council's (NWPCC) average carbon tax from its 6th Power Plan as the base case for carbon taxes. This level of tax results in the region meeting the expected goals of anticipated carbon legislation. The NWPCC assumes various carbon penalty cost trajectories that vary between zero and $100 per ton and average $47 per ton by 2030 (2006$). The average case results in a regional CO_2 reduction consistent with targets adopted by the northwest states and anticipated federal legislation. The annual CO_2 tax rates used are shown in the table 10 below.

Table No. 10

Carbon Cases Under Potential Scenarios		
Year	Base Case 2013 Legislation 2015 Implemented	Delay Case 2017 Legislation 2019 Implemented
2012	$0.00	$0.00
2013	$0.00	$0.00
2014	$0.00	$0.00
2015	$9.55	$0.00
2016	$12.63	$0.00
2017	$16.20	$0.00
2018	$19.34	$0.00
2019	$22.17	$10.54
2020	$25.70	$18.44
2021	$29.85	$26.34
2022	$34.16	$34.24
2023	$38.67	$42.14
2024	$43.18	$50.04
2025	$48.27	$57.94
2026	$53.83	$65.84
2027	$58.78	$73.74
2028	$64.29	$81.64
2029	$69.10	$89.54
2030	$74.36	$97.44
2031	$80.41	$105.34
Levelized	**$24.67**	**$23.40**

With the current uncertainty about carbon regulation or costs and in the absence of better information, NorthWestern will continue to use the NWPPC's carbon tax assumptions in developing its 2011 RPP. NorthWestern uses the NWPCC carbon tax assumption to represent the cost of potential federal carbon tax legislation and also as a proxy for the cost of complying with EPA GHG regulations.

NorthWestern's 2011 Plan base case pushes out the date of implementation as discussed below with implementation beginning in 2015 at the earliest, and being fully realized in 2032. In the interim between plans, NorthWestern has found no better information that would cause it to

move away from using the NWPCC's forecast values. However, due to the uncertainty surrounding adoption and implementation of GHG regulations or taxes, NorthWestern has moved the Council's base case carbon costs out in time.

Therefore NorthWestern's base case essentially adjusts the NWPPC's base case assumptions and with implementation beginning in either 2015 or 2019. NorthWestern has also developed a sensitivity case that assumes no legislation during the planning horizon.

NorthWestern's analysis incorporates the requirements of Montana law passed in HB25. This legislation requires that any new facility used to generate electricity that is primarily fueled by coal must capture and sequester at least 50% of CO_2 produced, and that any natural gas-fired generator must implement cost-effective carbon offsets, which do not increase the cost more than 2.5%.

CO_2 Emissions Allowances

NorthWestern incorporated into the CO_2 emissions modeling assumptions its analysis of the impacts of H.R. 2454 – The American Clean Energy and Security Act of 2009 (also known as "ACES" and the "Waxman-Markey" bill) and the estimation of CO_2 allowances, or credits, it would be granted on an annual basis. NorthWestern understands that although this bill was passed over, the "phase-in" concept contained in the Waxman-Markey bill is likely to be incorporated into any future legislation or regulation to lessen the immediate impacts of any CO_2 emissions penalties. Under provisions in the Waxman-Markey bill, the total number of allowances available for CO_2-emitting entities decline over time and are totally eliminated in 2030. For base planning purposes, NorthWestern has pushed the assumed legislation start date and associated allowances out two years from the 2009 plan to 2015 causing the total elimination of allowances to occur in 2032, as demonstrated in table 11 and figure 20 below.

The provisions in the Waxman-Markey bill allocate roughly 2 billion allowances to the electric utility sector in the first year of legislation implementation, which is assumed to be 2015 in the base resource plan. Of the 2 billion allowances, the bill designates that 1 billion, or 50%, will be

derived from the electric utility sector's retail sales and that 1 billion, or 50%, will be derived from the electric utility sector's CO_2 emissions. By applying the formula based on this "50-50" allocation method to base period retail sales and CO_2 emissions, NorthWestern estimates that it will receive sufficient allowances to cover 69% of its CO_2 emissions in 2015. NorthWestern's estimated allowances decline over time and reach a number in 2029 that would cover 22% of its emissions.

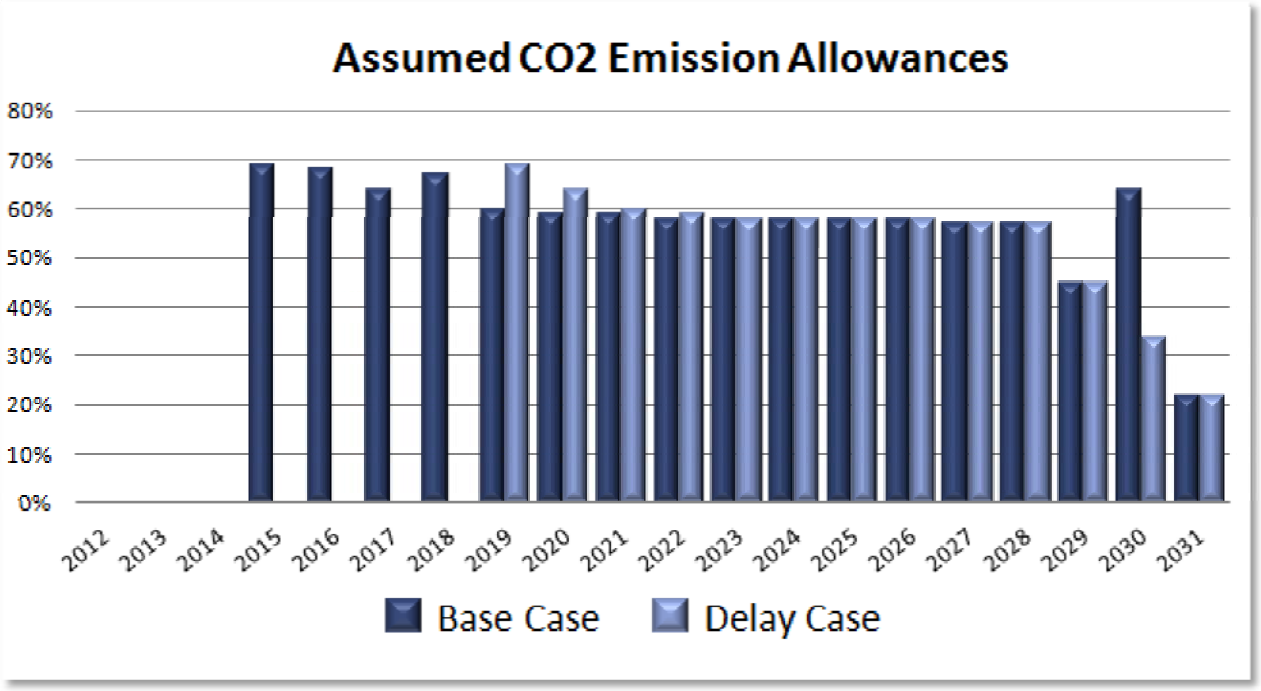
NorthWestern has also considered a scenario in which legislation is passed in 2017 and implemented in 2019. Under this scenario, first-year allowances are the same as in the base case but decline more rapidly until 2022 when they parallel the base allowance schedule through 2029.

Table No. 11

Carbon Emission Allowances

Year	Base Case CO_2 Emissions Allowances	Delay Case CO_2 Emissions Allowances
2012	0%	0%
2013	0%	0%
2014	0%	0%
2015	69%	0%
2016	68%	0%
2017	64%	0%
2018	67%	0%
2019	60%	69%
2020	59%	64%
2021	59%	60%
2022	59%	59%
2023	58%	58%
2024	58%	58%
2025	58%	58%
2026	58%	58%
2027	57%	57%
2028	57%	57%
2029	45%	45%
2030	34%	34%
2031	22%	22%

Figure No. 20



Other Environmental Emissions

Fossil fuel units emit other pollutants in addition to GHG and CO_2. The other pollutants emitted by coal units are highly dependent on the chemical composition of the source coal. However, the primary other pollutants associated with coal-fired generation include particulate matter, oxides of sulfur, oxides of nitrogen, acid gases, and heavy metals including mercury. Capture of these pollutants is addressed through compliance with various emission regulations. That compliance is accomplished with the installation of Best Available Control Technologies (BACT) in new resource construction. The risk premium related to the emission of these pollutants, however, is largely overshadowed by the extreme uncertainty related to the CO_2 risk. This does not mean that the issues related to these other emissions should be disregarded, however. The current environmental and political climate creates uncertainty regarding to what extent any significant costs will be added to the cost of new resource construction for control of the primary pollutants emitted by coal plants. Due to this uncertainty, costs to comply with various future regulations of primary pollutants (the oxides of sulfur and nitrogen) of various plant choices are noted, but attempts to project costs to reduce the emissions rate to an explicit level were not undertaken.

Ongoing environmental compliance capital costs for existing thermal units are expected to be incurred by CU4 to comply with Utility MACT for Hazardous Air Pollutants (HAPS) and Coal Combustion Residue disposal requirements. Additionally, the Regional Haze requirement to have zero impacts in national parks by 2064 is expected to cause CU4 to incur cost in order to comply. It is unknown, however, to what extent or what timeframe costs will be incurred to comply. CU4 is in compliance with other potential requirements and is not located in one of the 27 states impacted by the Cross State Air Pollution Rule (CSAPR). Given this considerable uncertainty of costs and timing, it is unknown whether they will cause significant incremental cost at CU4. Therefore, no incremental analysis of C4 was completed for this Resource Plan. However, it is important to note that costs will be incurred in the future and it is possible those costs could be significant.