

Chapter 4

ENVIRONMENTAL ISSUES

The environmental issues related to meeting power demands are numerous. They include land and water use, impact on wildlife and plants, and emissions related to fossil fueled generation, including mercury, SO_x, NO_x, particulates, and greenhouse gases. The international discussions and federal legislative initiatives to reduce greenhouse gases, primarily CO₂, are assumed to be the most significant of these issues, given the large resource and economic implications. One potential result of CO₂ legislation is to transition the national electricity supply from primarily fossil fuels to renewables, natural gas, and, perhaps nuclear energy. However, in the absence of a clear and defined carbon policy, resource planning decisions within the emerging context of environmental policy makes new resource acquisition decisions both complex and risky. One policy that has already developed to begin this transition is the establishment of Renewable Portfolio Standards, presently on a state by state basis.

This Chapter addresses the following environmental issues:

- Green House Gas Legislation
- Carbon Dioxide (CO₂) Sequestration
- Proposed Clean Air Act amendments of 2010
- NorthWestern's Green House Gas (GHG) Policy and Planning Assumptions
- Other Environmental Emissions

Green House Gas Legislation

The US House of Representatives passed the American Clean Energy and Security Act (ACES) on June 26, 2009. The House bill implements a cap and trade mechanism for CO₂. The US Senate has proposed and considered legislation as well, which would impose a carbon tax, but so far has not passed a bill.

The House bill would reduce emissions from 2005 levels by 3% in 2012, 17% by 2020, 42% by 2030 and 83% by 2050. The Senate bill would reduce emissions to 4.75% of 2005 levels by 2013. These caps cover 85% of present sources. These reductions would initially be facilitated by issuing and auctioning allowances to emit CO₂. The Senate bill would limit trading to those participants with compliance obligations.

The Senate and House bills differ, but under the House bill, initially 85% of emission allowances will be allocated, and 15% auctioned at a beginning minimum bid of \$10 and increasing at 5% plus inflation per year. The initial 15% auctioned will increase over time and the initial 85% given away will decrease over time. The Senate bill would have a smaller percentage auctioned but at the higher beginning price of \$25.

Under the House bill, of those allowances not allocated, about 20% will go to emitters and 80% to industries that will presumably support development of clean technologies and reduce the impact on energy consumers. The clean industries will sell their allowances to the polluting industries, with the proceeds used to develop clean energy technology. Electricity distributors will get 32% and natural gas distributors 9%. Coal fired generators will get 5%. Under the Senate bill more allowances would be provided to the electricity sector in later years, and the allowance formula has been changed from a 50/50 emissions to sales ratio, to a 75/25 ratio.

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 Environmental Protection Agency (EPA) is moving forward with regulation of GHGs. In April 2007 the U.S. Supreme Court found that GHGs are emissions covered by the Clean Air Act (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 GHGs in the atmosphere threaten the public health and welfare of current and future generations. The EPA relied heavily on the Intergovernmental Panel on Climate Change (IPCC) report as the scientific

basis for the findings. On February 10, 2010 a coalition of 13 House members and 17 companies asked that a Federal Court to review the ruling on the basis that the IPCC report is faulty science.

It is not clear at this time what this process will mean for major emitters, other than the possibility of the eventual requirement that all major emitters, such as power plants, steel mills, cement makers, refineries, and others to put the best available equipment on new and modified plants to curb emissions. The EPA Administrator does not currently have a timetable for issuance of a detailed plan. The major impact of the finding could well be to provide the additional impetus for legislation, as business interests have expressed a preference for legislation rather than regulation.

Carbon Sequestration

Carbon capture and sequestration (CCS) is the process of capturing CO₂ from point sources, such as a power plant, and storing it permanently in deep underground geological formations. The CO₂ 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 carbon sequestration in this region. They have identified the potential to store 200

billion tons of CO₂ 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 CO₂ into sandstone rock formations at Big Piney, Wyoming. For comparison, a 1000MW coal unit produces about 7.5M tons of CO₂ per year. In other words, there is sufficient potential storage for the existing coal unit fleet for several thousand years. The expected cost of the demonstration project is approximately \$43/ton (2008\$).

In the event that CCS becomes commercially available, the question arises as to the possibility of retrofitting the existing coal unit fleet with CCS technology. The MIT Study ‘On The Future of Coal’ suggests that existing units would realize a de-rating of 41 %, which would make it uneconomical in contrast to a new unit build with CCS. The MIT study further concluded that the most economical technology that incorporates CCS is integrated gasification combined cycle. Progress on CCS development is presently underway, with proof of concept and cost information available in perhaps 3 to 5 years. Therefore any decisions regarding new coal units with CCS should be deferred until such time as good information is available. Also, given the significance of the GHG variable in the resource planning conclusions, it is advisable to defer consideration of new coal units until such time as there is a clean carbon policy and cost effectiveness of CCS is known with more certainty.

Proposed Clean Air Act Amendments of 2010

The intent of proposed Senate bill 2995 legislation is to reduce NO_x, SO_x, and Mercury from current levels to much lower levels. For example, Mercury is to be reduced by 90%, NO_x in the west is to be reduced by 50%, and SO_x goes down to 1.5 million tons by 2020. The bill also sets up an allowance system which increases the number of allowances to be auctioned by 10% over every year starting in 2015 for NO_x, and 2018 for SO₂. So for SO₂, in 2017 there are expected to be 250,000 allowances auctioned (approx 2% are currently being auctioned now under Acid

Rain). Under the bill, 275,000 allowances will be auctioned in 2018 (or 18% of the allowance cap). In 2018 302,500 allowances to be auctioned (20% of the allowance cap).

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. Given the dual approach of the Obama administration to accomplish GHG mitigation either through legislation or EPA regulation, it seems likely that limits will be established and enforced at some point in the mid-future.

This suggests that at this time NorthWestern should make future resource decisions consistent with some expected level of GHG regulation. Additionally, it appears that regardless of an individual's or a corporation's position regarding the anthropogenic interference with the global climate system, that sound business decisions dictate 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 goal of reducing CO₂ emissions in both resource development and resource contracting.

Several eminent economists have analyzed the impact of implementing the Kyoto Accords agreement on the economic growth of the major economies in the world and have concluded that the impact would be a reduction in GNP of about 2% annually. This has been presented in the form of an insurance policy to prevent global warming, which may or may not occur. The conclusion is that regardless of what your opinion may be regarding global warming, you may be wrong, and purchasing insurance against the potential of a catastrophic outcome would be a rational choice.

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 that realizes the potential to transition to a renewable energy portfolio with minimal legacy impact.

NorthWestern has adopted the Northwest Power and Conservation Council's (NWPCC) average carbon tax from its 6th Power Plan as the base case annual 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 CO₂ reduction consistent with targets adopted by the Northwest region and anticipated Federal legislation. The annual CO₂ tax rates used are shown in the chart below.

Table 19

Carbon Scenarios				
Year	CO2 Emission \$/ton (2006\$)	Inflation Index @ 2.5%	Base Case 2011 Legislation 2013 Implemented	Late Case 2015 Legislation 2017 Implemented
2010	\$0.00	1.1014	\$0.00	\$0.00
2011	\$0.00	1.1289	\$0.00	\$0.00
2012	\$8.05	1.1572	\$0.00	\$0.00
2013	\$10.39	1.1861	\$9.55	\$0.00
2014	\$13.00	1.2157	\$12.63	\$0.00
2015	\$15.14	1.2461	\$16.20	\$0.00
2016	\$16.93	1.2773	\$19.34	\$0.00
2017	\$19.15	1.3092	\$22.17	\$10.54
2018	\$21.70	1.3419	\$25.70	\$18.44
2019	\$24.23	1.3755	\$29.85	\$26.34
2020	\$26.76	1.4099	\$34.16	\$34.24
2021	\$29.15	1.4451	\$38.67	\$42.14
2022	\$31.79	1.4813	\$43.18	\$50.04
2023	\$34.59	1.5183	\$48.27	\$57.94
2024	\$36.85	1.5562	\$53.83	\$65.84
2025	\$39.32	1.5952	\$58.78	\$73.74
2026	\$41.23	1.6350	\$64.29	\$81.64
2027	\$43.29	1.6759	\$69.10	\$89.54
2028	\$45.67	1.7178	\$74.36	\$97.44
2029	\$46.72	1.7608	\$80.41	\$105.34
Levelized			\$24.06	\$22.59

NorthWestern's base case presumes that GHG legislation will be passed in 2011, with implementation beginning in 2013 at the earliest (in contrast with a 2010 implementation under the NWCC's assumptions), and being fully realized in 2030 (2011/2013-2030). The NWPC's assumption that legislation can be passed in 2010 seems unrealistic given the current political climate. Therefore the NorthWestern base case essentially delays the NWPC's base case assumptions of legislation in 2010 and implementation beginning in 2013, both by one year.

NorthWestern has also developed a sensitivity case that delays legislation and implementation. This sensitivity case delays both legislation and implementation an additional 4 years (2017-2029) from the base case. The annual level of taxes is kept consistent with the base case in the first sensitivity run.

NorthWestern's analysis also 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 CO₂ produced, and that any natural gas fired generator must implement cost-effective carbon offsets, which do not increase the cost more than 2.5%.

CO₂ Emissions Allowances

NorthWestern also incorporated into the CO₂ 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 CO₂ allowances, or credits, it would be granted on an annual basis. NorthWestern understands that the language in this bill has been and will be further revised through the development of new legislation, but the assumption in its Plan is that any enacted legislation will be phased in over a period of time and that CO₂ allowances will be allocated to CO₂ emitting entities to lessen the immediate impacts of any CO₂ emissions penalties.

Under provisions in the Waxman-Markey bill, which were scheduled to begin in 2012, the total number of allowances available for CO₂ 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 one year to 2013 causing the total elimination of allowances to occur in 2031.

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 2013 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 CO₂ emissions. By applying the formula based on this "50-50" allocation method to base period retail sales and CO₂ emissions, NorthWestern estimates that it will receive sufficient allowances to cover 69% of its CO₂ emissions in 2013, (covering Colstrip, Basin Creek, Mill Creek, Thermal QF's, and market purchases). 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 2015 and implemented in 2017. Under this scenario, first year allowances are the same as in the base case but decline more rapidly until 2020 when they parallel the base allowance schedule through 2029.

Table 20

Carbon Emission Allowances		
Year	Base Case CO2 Emissions Allowances	Delay Case CO2 Emissions Allowances
2010	0%	0%
2011	0%	0%
2012	0%	0%
2013	69%	0%
2014	68%	0%
2015	64%	0%
2016	67%	0%
2017	60%	69%
2018	59%	64%
2019	59%	60%
2020	59%	59%
2021	58%	58%
2022	58%	58%
2023	58%	58%
2024	58%	58%
2025	57%	57%
2026	57%	57%
2027	45%	45%
2028	34%	34%
2029	22%	22%

Other Environmental Emissions

Fossil fuel generating resources emit other pollutants in addition to CO₂. Coal units emit mercury, SO_x, and NO_x as well. Currently, capture of these pollutants can be addressed through inclusion of the Best Available Control Technology in new resource construction. This regulatory standard has been in place since the late nineties and is well understood.

The risk premium related to these emissions, however, is largely overshadowed by the extreme uncertainty related to the CO₂ risk. This does not mean that the issues related to these other emissions should be disregarded, however. The current environmental and political climate does

not appear poised to add any significant future costs to generating plants that were built to this standard. For these reasons, the SO_x and NO_x related to various plant choices is noted, but attempts to reduce the emissions rate to an explicit cost externality were not undertaken.

Of greater concern is the emission of mercury. Prior to the advent of the current high state of concern over GHGs and global climate change, it appeared that the emission of mercury would be the primary environmental concern related to the construction of new power plants. In March 2005, the EPA issued the Clean Air Mercury Rule (“CAMR”) creating regulatory limits and establishing a market based cap and trade process to reduce the amount of mercury emissions from power plants. The desired goal is a 70% reduction in mercury emissions. The first phase of CAMR relies on co-benefits or reductions in mercury resulting from efforts to reduce NO_x and SO₂ and sets defined limits for coal plants based on the form of SO₂ control technology employed. The lower limit, for wet SO₂ controls is .042 lbs/GWh of energy produced. The representative new coal units as shown in the Table below and modeled in this Plan have mercury emission rates which are approximately half of this rate, representing the use of improved mercury control technology.

Table 21

Coal Unit Emissions	
Coal Plant Type	Hg Emission Rate (lbs/GWh)
PV Subcritical	0.02
PV Sub w/ CCS	0.024
PV Supercritical	0.02
PV Super w/ CCS	0.024
IGCC	0.0126
IGCC w/ CCS	0.0148

The second phase of CAMR establishes a market-based cap and trade system that includes specific state-by-state mercury emissions limits, beginning in 2010 and stepping down in 2018. The 2018 limits are much more stringent, with Montana's allocation dropping from 0.378 tons to 0.149 tons. The Montana Department of Environmental Quality has adopted rule 17.8.771, pursuant to CAMR, that sets the mercury emissions limit to 0.9 pounds per trillion Btu based on a rolling 12-month average. It is conceivable that this reduction in allowed mercury emissions related to coal plants will have a cost impact on NorthWestern's supply portfolio costs, but it is very unclear at this time what that cost impact will be. At this time, the potential impacts of mercury emission limits are noted and explicit cost impacts are not included in the modeling effort.