

GLOBAL WARMING FROM THE PERSPECTIVE OF A COAL BURNING UTILITY

Kristine M. Krause

Global warming is a topic of discussion today in the media, in corporate boardrooms and around dinner tables. Electric utilities, specifically ones that produce electricity from coal, are in the spotlight.

Wisconsin Electric, a subsidiary of Wisconsin Energy, is a traditional vertically integrated gas and electric utility. Our customers are all people in our “service territory”. We are required to serve everyone including those who don’t have the means to pay and those on a fixed income who experience real problems with even the smallest rate increase. Our operations can’t pick up and move.

Fuel diversity is necessary to protect our customers from rapidly escalating or, at least, volatile and uncertain prices. Wisconsin Electric’s plants currently deliver energy that is about 65% from coal, 25% from nuclear and the balance from natural gas and renewable sources. We have recently announced plans to construct 2,800 megawatts (MW) of new generation over the next ten years, 1,800 MW of coal and 1,000 MW of natural gas. The plan also includes retiring old coal plants, upgrading remaining coal plants, providing additional renewable resources and significantly upgrading the distribution system. This plan is intended to insure a reliable supply of electricity to our customers along with significantly improved environmental performance and price protection.

Kristine Krause is Vice President, Environmental, Wisconsin Energy Corporation.

If planned correctly, the key to achieving emission reductions is improvements in efficiency. These can occur in generation, transmission and distribution.

Opportunities for Efficiency Gains in Delivery Systems

Distribution systems, the wires that connect homes to power plants, are in some cases over 100 years old. Aging urban infrastructure is complicated and expensive to replace and upgrade, and is invisible until a failure occurs. With customers now expecting a level of power quality not anticipated at the time the systems were designed and installed, more attention is being focused on these areas. The advent of the digital clock and the drop in price of consumer electronics has changed the way the average customer views their electricity provider. Capital investment in distribution systems can lead to better efficiency. It is estimated that in this case, as much as a three percent improvement could be gained.

Transmission is another challenge. Wisconsin has become transmission constrained as native load grows within the state. On January 1, 2001, the major utilities in the state pooled their transmission assets and formed a new company, the American Transmission Company (ATC). The Wisconsin electric utilities are now completely independent of their surrounding transmission system. This restructuring has not changed the fact that, due to overloaded transmission line conditions, additional lines will be needed if the state is to return to a supply plan that includes 15-20% importation of supply without interruption due to overloaded transmission line conditions. New construction and technology for transmission systems also holds potential for gains in efficiency. It is not clear under the current "unbundled" structure how the ATC would be rewarded for designing the new system upgrades to maximize efficiency.

The Power Plant – Regulatory Uncertainty and Environmental Frustration

The supply side of the system is similarly creaky. For example, all of the coal fired power plant capacity in Wisconsin is more than 15 years old. More than half is greater than 30 years old, and there are some plants that have been in operation more than 60 years. Long service has provided benefits to customers enjoying some of the lowest rates in the country. However, it is also the source of what some environmentalists feel is the broken promise of the Clean Air Act Amendments of 1977 and 1990.

A complex series of events moved the power supply situation in the United States from one that was largely fueled by coal and oil to one in which announcing a supply plan that includes new coal looks almost radical. As utilities developed compliance plans in response to the Clean Air Act Amendments, it soon became obvious that many systems could achieve compliance by switching from high to low sulfur coal, which lowered sulfur dioxide (SO₂) emissions and effectively kept many older plants economically viable. Increases in productivity in Western mines producing low sulfur sub-bituminous coal led to coal switching and contributed to lowering costs. This helped justify some reduction in capacity in boilers designed to burn Eastern bituminous higher sulfur coal. Had these plants been forced to install expensive scrubbers, the choice might have been to retire them. While the decrease in sulfur emissions was impressive, many fewer inefficient “grandfathered” plants were retired than some had anticipated.

Some smaller units on the margin were “mothballed.” They were essentially paid for, and there was little cost in keeping them available for emergency situations. They stayed on the books as available capacity, and as a result, the supply situation in most of the United States looked comfortable.

In the last ten to fifteen years deregulation, rather than supply or reserves of supply, captured the attention of regulators and utility management. New capacity was not built as uncertainty crept in, and the traditional “regulatory compact” between federal, state and local agencies and the regulated utility companies came under fire from those promoting economic benefits of deregulation. Prior to discussion about deregulation, there were fairly clear relationships between regulatory agencies that had been developed over many years. Utilities tended to do planning openly with regulators and each other. While some have argued that this process did not produce the lowest costs, it did create a climate of low risk for investment. Stockholders expected a return on their investment commensurate with that level of risk.

At the same time, complete overhaul of regulation of the natural gas industry was taking place. Suppliers, transporters and users of natural gas focused on sorting out the new rules, and both supply and transportation became real commodities, allowing the opportunity for radical price fluctuations. Natural gas distribution utilities and utilities using natural gas for electricity generation started developing competency in hedging and other financial instruments designed to

protect customers from price swings. Even in states where electricity deregulation was not being openly contemplated, there were major changes in the way utility business was conducted.

Utility chief executives watched their stock prices plunge as Wall Street responded to uncertainty in an industry that previously had the risk profile of a high rated bond. The investor profile changed from one of many smaller private investors to a higher percentage of institutional investors with vastly different expectations.

In the absence of a national energy policy, an aggressive environmental agenda helped fill the vacuum. Environmental regulators looked for other means to retire old coal plants. The international community started looking at global warming. In the meantime, population and the economy kept growing, with resulting load growth occurring even as gains in demand side efficiency were realized. Electricity use per capita actually declined in some areas of the country. In Wisconsin, peak summer demand for electricity has grown 2.3% annually during the last five years.

Competition took another step forward with the deregulation of the transmission system by the Federal Energy Regulatory Commission. The pinch started. As load grew, the lack of construction of new generation and transmission lines started to reveal weaknesses and constraints in some parts of the country. The result was creeping system isolation in a time when markets for trading supplies of electricity were supposed to be opening. Some of the “mothballed” coal units were pressed back into service on high load days. Reserve margins evaporated.

In some parts of the country, independent power producers stepped in to fill the gap. In other areas, utilities scrambled to build natural gas fired combustion turbines. These machines were the logical choice as they represented the smallest and least risky capital investment. And even though the fuel was expensive and subject to wildly fluctuating price relative to coal or nuclear, it was still a relatively small part of the average energy portfolio. Still, load continues to grow and requires the construction of additional large baseload power plants. This fact became painfully obvious with the supply shortages, price increases, and black-outs in California in 2000 and 2001.

In the generation portion of the supply equation, Wisconsin imports virtually all of its fuel. As a result, the state is vulnerable to outside market forces driving fuel prices. Technology converting biomass from dairy herd manure has recently been put into service successfully, and this renewable resource looks like a promising source of electricity that will also address water quality and odor problems on large dairy farms. “Cow power”, although with potential for only about one percent of total supply in Wisconsin, is still another way of reducing greenhouse gas.

Relatively little new generation has been built in the U.S. over the past two decades. New plants have been almost exclusively fueled by natural gas because they benefit from shorter permitting and construction times. This lowers the capital investment required for construction and the associated financial risk. The only major new power plant fueled with coal to go into service in the last 10 years was the replacement of a unit in Kansas City destroyed in an accident.

As can easily be imagined based on all of these issues, the industry is surrounded by uncertainty. Yet regulatory predictability over a relatively long time horizon is needed to accomplish the goals of meeting the climate challenge and other environmental objectives, providing a continuing reliable and affordable supply of electricity to customers, and satisfying the need for fair return on investment for shareholders.

What is the strategy for creating predictability where only uncertainty exists today? Our approach is to anticipate change and make it predictable.

This generation has seen the world get smaller with the advent of technologies such as improved transportation and communication systems. This change has brought a new awareness of the effects of emissions such as carbon dioxide (CO₂) and mercury, which are orders of magnitude more complicated in terms of both effect and control than previously regulated emissions. For example, virtually every lake in Wisconsin has a fish advisory due to mercury. This has been blamed on the fact that about 65% of the electricity produced in Wisconsin comes from coal combustion. Unfortunately, the most current science on the matter indicates that less than one percent of the mercury in Wisconsin’s lakes comes from those power plants, and more than half comes from sources outside of North America. Still, Wisconsin utilities have agreed to take a first step in

reducing mercury emissions. Wisconsin Electric believes it is not reasonable to expect others to act if we are not willing to step forward and make a start.

While the debate on the science of climate change may not be resolved in our lifetime, it is a fact that improving efficiency in power plants and in other areas of the electric system would be a big step forward in reducing these emissions. Rather than spend more time and energy arguing about global warming, some companies, including ours, have taken the position that starting down a path toward greenhouse gas reductions integrated with other controls is the most cost effective way toward a better solution.

Voluntary Efforts

A start was made in the Energy Policy Act of 1992. The Voluntary Reporting of Greenhouse Gas Program, required by Section 1605(b), was specifically designed to demonstrate how reductions could be accomplished, and to ultimately provide "credit for early action." In 1994, the first reporting year, Wisconsin Electric and 94 other electricity providers voluntarily reported greenhouse gas emissions and supplied plans for further reductions. In 1999, the most recently reported period, it is expected that this number will grow to over 115. In addition, the number of other companies in businesses other than electric supply that are now reporting has grown to more than 100. It is clear that regardless of the political rhetoric in the U.S. and around the globe, companies in the U.S. understand the benefits of early participation in reduction of emissions. According to the Energy Information Administration, the total reduction in CO₂ emissions reported by electricity providers in 1999 was 171.4 million metric tons. While this is a self reporting program, and the reductions were less than eight percent of the approximately 2,252 million metric tons total emitted by the electricity sector, the participants do not now and are not likely to get any direct "credit" for these actions and hopefully will not be penalized due to lack of baseline protection.

Another part of the Energy Policy Act, the Joint Implementation process, was designed to demonstrate how the U.S. could work with other cooperating countries to achieve these reductions in the most cost-effective way. Wisconsin Electric took a lead role in two of the first seven of these projects to be approved. One project involved replacing a boiler burning brown coal with virtually no pol-

lution controls in the Czech Republic with modern gas-fired engines. The second involved a project in Belize, where 14,400 acres of rainforest were protected along with creating a center to train the local community in ways to use forest products sustainably for income.

The reason Wisconsin Electric and other participating companies choose to spend significant dollars on essentially an experiment is a belief that regulations will be more effective with the participation of the regulated. In order to earn the right to participate in the process, there is an obligation to come to the table with ideas and experience. There should be a commensurate willingness by regulators to follow through and act on information gained as a result of these efforts.

The most recent example of Wisconsin Electric's efforts to utilize innovative regulatory programs was a proposal submitted jointly with the Wisconsin Department of Natural Resources (WDNR) to the EPA. It was submitted as part of Project XL, EPA's pilot program to encourage innovation and efficiency by allowing more regulatory flexibility to companies that agree to go beyond mere compliance with environmental standards. The WDNR is one of the few state environmental regulatory agencies with the delegated authority to issue a full range of permits. This proposal covered all of Wisconsin Electric's fossil generating facilities in two states. It offered significant early reductions of SO_x, NO_x, particulates and mercury along with targets for carbon dioxide (CO₂) in exchange for the regulatory certainty that these reductions could take place without the threat of second-guessing interpretations of the Clean Air Act's New Source Review requirements. This proposal has languished at the EPA since being submitted in June, 2000, and is just now gaining some renewed attention with the discussions of a multi-pollutant approach to emissions reductions and the increase of federal legislative activity.

Wisconsin Electric has also signed on to participate in a recently announced project to study the formation of a "Chicago Climate Exchange." This project brings together 33 leaders in the Midwest from energy, industry, transportation, farm and forest sectors. It is anticipated that by taking a diverse group from a fixed geographic region, a model can be developed to provide useful information on how an effective mechanism for trading carbon can be developed across sectors.

Next Steps

Eventually a limit is reached in how much time and resources a company can invest to study an issue, even one so central to its future. In all of the examples above, the same theme is present. What is needed now is action. All of the parties participating in the discussion of the energy future in the United States must come to grips with the fact that in order to make progress in ensuring a sound energy future, a first step must take place. This step must provide an opportunity for companies to demonstrate significant progress toward environmental goals without the cloud of recrimination. Utilities must be allowed enough time to replace aging assets to produce the significant gains in efficiency required to reduce greenhouse gas and other emissions in a way that customers can afford.

This plan should allow companies to reach beyond just coal-fired power plants. Credit for efficiency gains in distribution and other operations should be counted. Programs to encourage customers to invest in end-use efficiencies similar to the days of demand-side management should be encouraged. For example, generators could buy CO₂ reductions from customers willing to retire their old appliances and replace them with new. The role that nuclear generation plays in providing emission free energy also cannot be ignored or penalized.

In order for progress to begin, there has to be a mechanism for those already working on solutions to be assured they will not be penalized for early action. A starting line must be defined so those wanting to run the race can line up and begin. As much of the rest of the world starts to implement agreements for greenhouse gas reductions, and as environmental regulation in the United States takes place in the courts, the environment, electricity customers and utility stockholders all lose.

The slow pace at which federal legislation is enacted can protect citizens, but it will make it difficult to provide a timely solution to the greenhouse gas dilemma. Through the leadership of the EPA, states, and companies working together, a reasonable parallel path program with sufficient regulatory safeguards can provide part of the answer. Companies could choose to "opt in" to a program of reductions early to gain certainty and a longer time period to achieve reductions. Those choosing to wait would ultimately have to achieve the same reductions, but could select a path with a later start and no opportunity to bank. There have been

some encouraging statements coming from Washington recently indicating a general recognition that the nation will lose if it cannot take part in a global market for low-cost greenhouse gas reductions.

A Framework Proposal

In addition to baseline protection, including credit (or at least insurance against penalty) for early action, four elements are required for success. First, reductions from all sources must be counted to insure the least cost solution is achieved. For example, in the utility sector, a mechanism should be in place to encourage investment in improvements in efficiency in delivery systems as well as power plants. In other sectors, examples such as appliance standards and building code upgrades have been shown to be successful in improving efficiency, and have significant potential for wider application. This will ensure the broadest opportunity for participation.

Second, enough time for the turnover of generation and utility assets must be allowed so that capital investment is not prematurely written off and customers can continue to afford the electricity they need and expect. The timeline is also a factor for investment. Investors must be able to evaluate a company's ability to plan and execute the reductions so that they will be willing to provide the huge amount of capital needed and gain a fair return. A phased reduction period over fifteen to twenty years, with progress requirements and the ability to bank early reductions, could allow for orderly conversion of the vast majority of older coal plants in the United States to advanced coal technology. In this way, fuel diversity could be preserved with the added benefit of less reliance on natural gas and foreign oil. A longer timeline will also allow for promising alternate technologies, such as fuel cells, to develop and become more affordable. While the timeline is likely one of the most controversial components, it is also the one that drives the ultimate cost.

Third, some room for sequestration must be included so that the forestry and agricultural industries can play a role. The amount and type of sequestration has been the subject of much debate internationally. More than any other element, the United States stands to lose out here by not engaging in the international discussion.

The first three elements enable the last – a mechanism for trading, between sectors and globally. With sufficient flexibility and timeline, it should be possible for a cap to be established in such a way that it will achieve the reductions demanded by the international community and not have an adverse impact on the United States economy. Only when all of these elements are provided will we be confident that the United States will have a secure energy future while achieving the significant environmental improvements of which we are capable.