INFORMATION BRIEF
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Nuclear Energy and Xcel Energy's 2002 Resource Plan

Xcel Energy (formerly known as Northern States Power Company) is asking the Minnesota Legislature in the 2003 session whether the nuclear power plants the utility owns in Minnesota should continue to be part of Xcel's electricity supply mix. This report provides legislators with some of the background information on nuclear energy, storage issues for spent nuclear fuel, and laws governing these matters.

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Introduction

As a public utility, Xcel Energy is required by statute to file a resource plan every two years, for approval by the Minnesota Public Utilities Commission (PUC). The resource plan is to detail the utility's resource needs over the next 15-year period, as well as the utility's proposed supply mix to meet those needs.

Xcel filed its 2002 resource plan with the PUC on December 2, 2002. Because of the legislature's role in governing nuclear energy, Xcel Energy directed a question to the 2003 Minnesota Legislature in its report: Should nuclear energy continue to be part of Xcel's supply mix? This report provides legislators with some of the background information necessary for consideration of that question.

The utility's question is influenced by a number of factors, including the lack of interim storage in the near term for the spent nuclear fuel (high-level radioactive waste) generated by its Minnesota nuclear facilities. Unless the private storage option that Xcel is pursuing in Utah is licensed and becomes operational in the near future, both of Xcel's nuclear generation plants will run out of storage capacity in this decade (Prairie Island in 2007, Monticello in 2010). The federal permanent repository proposed to be constructed at Yucca Mountain will not be operational until at least 2015. Some of the waste currently stored in Minnesota would remain here until after 2035.

Without additional storage capacity, those facilities, which provide 14 percent of the state's electricity needs, will have to be shut down. As the result of a Minnesota Court of Appeals decision in 1993, and legislation passed by the Minnesota Legislature in 1994, authorization for additional storage capacity in the state requires legislative approval.[1]

In its resource plan, Xcel describes a number of alternatives to replace the nuclear facilities, but specifies that although the "alternatives examined are viable and can be implemented," Xcel Energy "concludes that nuclear generation should continue to be part of the State's power supply."[2]

Xcel goes on to say:

> We conclude that Minnesota is now at a crossroads. It is now time to decide whether or not nuclear generation is going to continue to be part of the State's power supply so that decisions can be made that are necessary to maintain the reliability of the region's electrical energy supply…. Therefore, Xcel Energy intends to ask the State to address these resource planning issues as they relate to nuclear operations and alternatives in the 2003 legislative session.[3]

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[1] "Decisions about whether relief from the [1994] Act's spent fuel storage limits at Prairie Island and Monticello should be granted to allow the plants to continue to operate must be made by the legislature. All of the decisions necessary to ensure a reliable electric power supply cascade from the legislature's spent fuel storage decision." Xcel Energy, *2002 Resource Plan* (Minneapolis, 2002), 58.

[2] Ibid., 55.

[3] Ibid., 58.

Opponents to continued operation of the Minnesota nuclear plants counter that the state came to this particular crossroad in 1994. The 1994 Legislature granted Xcel Energy (then Northern States Power Company) sufficient storage capacity to allow the Prairie Island facility to operate through 2001. Regulatory decisions extended the time frame to 2007. Xcel's opponents argue that the legislative intent of the 1994 legislation is that the Prairie Island facility would be shut down, and nuclear energy would be phased out of Minnesota's energy supply mix, if spent fuel storage options outside the state were not available by 2007.

Part one of this report provides background information on:

- nuclear power, nationally and in Minnesota, and
- the status of efforts to establish permanent and interim storage facilities for spent nuclear fuel.

Part two summarizes the:

- regulatory and legal decisions leading up to the 1994 legislative session, and
- 1994 legislation authorizing dry cask storage at Xcel's Prairie Island facility.

Part three provides a summary of the alternatives that Xcel has developed for the legislature's and PUC's consideration.

There are a number of issues that policymakers may also find important when considering this question that, due to time and resource constraints, will not be covered in this report. These issues include:

- the safety of long-term disposal at Yucca Mountain;
- nuclear security and safety issues;
- environmental comparisons of nuclear energy with alternative sources of energy;
- the value of Minnesota's nuclear facilities to local economies or to the regional transmission system;
- worker retention issues at the Prairie Island and Monticello plants; and
- Xcel's Metropolitan Emissions Reduction Proposal.

Part One: Nuclear Energy and Spent Fuel Storage Issues

Nuclear Energy

Nationally

There are 104 licensed commercial nuclear reactors at 65 sites in 31 states in the United States.[4] In total, these plants provide 95,000 megawatts of generation capacity, and generate approximately 20 percent of the nation's electricity annually. The average capacity factor for licensed, operating reactors was 90 percent in 2001.[5]

The first set of commercial nuclear reactors were licensed in 1969. There have been four reactors licensed in the 1990s, with the most recent license granted to the Tennessee Valley Authority for its Watts Bar Unit 1 reactor in 1996. These licenses, issued by the U.S. Nuclear Regulatory Commission (NRC) are for 40-year terms, and may be renewed (otherwise known as "relicensed") by the NRC for an additional 20 years, upon application by the licensee. The NRC has approved license renewals for ten reactors, and has applications pending for 16 others. In addition, 23 reactors have been permanently shut down and are no longer operating.[6]

Of the 104 licensed reactors, ten have been operating for 30 years or more (including Xcel's reactor in Monticello, Minnesota), and 51 have been operating for between 20 and 30 years (including Xcel's reactors at Prairie Island).

Minnesota

There are three nuclear reactors in Minnesota. Two reactors are at the Prairie Island station, located near Red Wing, Minnesota. The other reactor is located in Monticello, Minnesota. All three reactors are owned by Xcel Energy, and operated by the Nuclear Management Company.[7] Together, these three reactors provide 1,650 megawatts of generation capacity, and generate approximately 14 percent of the electricity the state used in 2001, and almost 30 percent of the electricity Xcel's Minnesota customers used in that year. All of these reactors are "baseload" resources for Xcel. Baseload generators are operated nearly continuously due to their reliability and relative low cost to ratepayers.

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[4] Of these, 103 reactors are currently operating. The Tennessee Valley Authority expects to resume operation of its Browns Ferry Unit 1 reactor in 2007.

[5] A generation facility's capacity factor is the ratio of electricity actually generated by the facility in a specified period to the amount of electricity that the facility theoretically could have generated in that period. A high capacity factor is an indication that the generation facility is efficient and reliable.

[6] One of these 23 reactors, the Fort St. Vrain facility, was operated and decommissioned by New Centuries Energy. New Centuries Energy was NSP's merger partner in the formation of Xcel Energy. Fort St. Vrain was the first commercial reactor in the United States to be decommissioned. The facility was converted to using natural gas as its primary fuel ("repowered") and continues to be operated by Xcel Energy.

[7] The Nuclear Management Company is a joint operating company formed by Xcel Energy, Alliant Energy, Consumers Power, Wisconsin Electric, and Wisconsin Public Service to operate six nuclear power plants in Minnesota, Wisconsin, Iowa, and Michigan.

Table 1
Prairie Island and Monticello
Average Capacity Factors, 1996-2001

Year	Prairie Island Unit 1	Prairie Island Unit 2	PI Units combined	Monticello
1996	83.0%	99.7%	91.4%	81.6%
1997	78.4	81.2	79.8	76.8
1998	89.7	78.6	84.2	82.4
1999	89.0	100.5	94.8	91.8
2000	98.9	91.1	95.0	83.6
2001	79.6	93.4	86.5	76.5
Six-year average	86.1	90.8	88.5	82.1

Source: NRC[8]

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Table 2
Costs at Xcel's Major Power Plants

Plant	Production Expenses per kWh	Primary Fuel
Sherburne County	$0.0131	Coal
A.S. King	$0.0149	Coal
Riverside	$0.0164	Coal
Prairie Island	**$0.0192**	**Nuclear**
High Bridge	$0.0207	Coal
Monticello	**$0.0243**	**Nuclear**
Black Dog	$0.0265	Coal
Angus Anson	$0.0737	Natural Gas

Source: Minnesota Department of Commerce[9]

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Monticello. The 600-megawatt reactor in Monticello was granted a license in 1970, which expires in 2010. The facility has sufficient storage capacity in its on-site storage pool to allow operation of the plant until the end of its current license.[10] However, in Xcel's words, "if Monticello is to continue to operate beyond 2010, provision for spent fuel storage must be made." That storage could either be the development of another dry cask storage facility such as the one at the Prairie Island station, or another dry cask storage facility outside the state, such as the Private Fuel Storage facility proposed to be constructed in Utah.

[8] National Regulatory Commission, *Information Digest*, 2002 edition, appendix A. In 1991, an administrative law judge made a finding that that the most likely capacity factor scenario for the Prairie Island reactors was that the reactors would have a combined capacity factor of 80 percent through the 1990s, declining to 75 percent by 2000. *See* Findings of Fact, Conclusions of Law and Recommendations in the Matter of the Application of NSP for a Certificate of Need for the Construction of an Independent Spent Nuclear Fuel Storage Facility, Office of Administrative Hearings (April 1992), 33.

[9] Minnesota Department of Commerce. "Background on Nuclear Power in Minnesota" (December 2002), 3.

[10] In 1979, the on-site storage pool at Monticello was expanded to provide additional storage, and in 1987, over 1,000 spent nuclear fuel assemblies were shipped to a storage facility in Illinois.

Xcel states that, in order to qualify for "timely renewal" status, it must have its application for the renewal of Monticello's operating license filed with the NRC by early in 2005, and must begin developing its application in 2003. Timely renewal status "allows a plant whose renewal application is under review to continue to operate beyond the expiration of its current license should there be a delay in receiving the renewed license."[11]

Prairie Island. The two reactors at Prairie Island (Prairie Island Units 1 and 2) were licensed in 1973 and 1974, respectively. These reactors have a capacity of 525 megawatts each, for a total of 1,050 megawatts. The licenses for these reactor units expire in 2013 and 2014. However, there are two significant issues confronting Xcel that affect the continued operation of the reactors during this licensed period—the need for additional spent fuel storage, and the need to replace the deteriorating steam generators.

Under normal operating conditions, the Prairie Island facility has sufficient storage for its spent nuclear fuel through the year 2007. If additional storage at the Prairie Island facility is not authorized by the legislature, or if plans for the Private Fuel Storage facility proposed to be constructed in Utah does not come to fruition, Xcel will either need to shut down the Prairie Island nuclear reactors several years before the end of their license, or adjust the operations schedule of the reactors to produce less spent fuel.

This issue of the deteriorating steam generators at Prairie Island is summarized by the Minnesota Department of Commerce as follows:

> Prairie Island is having problems with its steam generators. In the steam generators, heat is transferred between loops. The heat is transferred when water from one loop (which comes from the reactor) passes by tubes from a second loop. These tubes are showing signs of corrosion, which is becoming common in steam generators similar to those at Prairie Island. In response to the corrosion tubes are plugged. By 2001 about 8 percent of the tubes were plugged in Unit 1. When plugging reaches 10 percent more inspections are needed and energy output is decreased. Unit 2 is also experiencing corrosion, but at a lower rate.
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> Originally, Xcel began the preliminary work needed so that the steam generators could be replaced as early as 2004. According to the most recent engineering study, Prairie Island Unit 1 could shut down as early as 2009 due to declining performance. However, the Public Utilities Commission warned Xcel that it did not support replacing steam generators without additional storage since it would not be cost effective to replace the generators if the plant shut down in 2007.[12]

[11] Xcel, *2002 Resource Plan,* 81.

[12] "Background on Nuclear Power," 12.

In the 2002 resource plan, Xcel:

- estimated the cost of replacing the steam generators in Unit 1 to be $132 million;
- stated that it adjusted the operations at Unit 1 "so that an extended outage could occur in the fall of 2004" for replacing the generator; and
- stated that it expects to spend $26 million in 2003 and $75 million in 2004 to keep the replacement project on track.[13]

Storage Of Spent Nuclear Fuel

Generally

How much waste? As of 2002, about 56,000 metric tons of spent nuclear fuel has been generated in the United States—44,000 metric tons generated by commercial reactors, and the rest generated by military and research reactors. The industry generates roughly 2,000 metric tons per year. In Minnesota, Xcel currently stores approximately 950 metric tons of spent nuclear fuel, and generates roughly 60 metric tons per year.

Where is it stored? Initially, the industry planned to store small amounts of spent fuel in small cooling pools for a few years, then send the spent fuel to a reprocessing facility. Reprocessing is a process to retrieve and consolidate the usable radioactive material (plutonium and uranium) within spent fuel for reuse in a nuclear reactor. President Carter declared a moratorium on reprocessing in the United States in 1977 due to nuclear proliferation concerns. This moratorium was lifted in 1981, but a reprocessing industry never developed in the United States. As a result, the cooling pools in nuclear reactors were expanded, to allow for increased spent fuel storage. A large majority of the high-level radioactive waste stored in the United States is stored in such pools. Spent fuel pool storage was intended as a short-term solution, pending construction of a national permanent repository.

In 1982, Congress passed the Nuclear Waste Policy Act (NWPA), directing the Department of Energy (DOE) to site and construct a permanent national repository for spent nuclear fuel, and to begin accepting spent fuel in January of 1998. The most optimistic estimates are the national repository will not begin to accept waste before 2010.

As a result, most spent fuel storage pools are at or approaching capacity. It is estimated that by the end of 2006, approximately 60 facilities will have no more storage space in their spent fuel pools.

Given the lack of a permanent repository, and the lack of capacity in spent fuel storage pools, many facilities around the country have constructed "independent spent fuel storage installations" (ISFSI) on the reactor site, to store spent nuclear fuel in "dry casks." Currently, there are 20 operating dry cask storage installations in the United States. Xcel Energy's facility at Prairie Island is the only site in Minnesota authorized for dry cask storage.

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[13] *2002 Resource Plan,* 78.

Dry cask storage. Dry cask storage is the outside storage of spent fuel rods from nuclear plants. In order to continue operating, the plants need to supplement their indoor storage room (typically in pools of heavy water) with aboveground dry storage facilities. Outside, nuclear fuel assemblies are stored in tall steel casks that are at least 18 inches thick. The steel and lead used to make the casks are intended to keep radiation from escaping. The casks are tested to remain intact through any natural disasters.

Dry casks must be continually monitored for radiation leakage and relicensed by the NRC every 20 years. The limits on how much dry cask storage each nuclear plant can have is determined by the type of NRC operating license. The NRC places an upper limit of fuel assemblies that can be stored on-site for plants with a site-specific license. Plants operating under a general license for dry storage do not have an upper limit for the number of fuel assemblies that can be stored.

The NRC must approve every dry cask container design, and it regulates the testing, manufacture, and maintenance of the casks. Several dry cask storage systems have been approved by the NRC and each system is licensed for 20 years.

Yucca Mountain

There has been a 20-year history of trying to find a federal permanent repository for storing high-level nuclear waste. As required by the NWPA, as amended in 1987, DOE has been studying one site at Yucca Mountain, Nevada, to determine its suitability for disposing of highly radioactive wastes in a mined geologic repository within and under the mountain. A permanent repository at Yucca Mountain will not be operational before 2015.

Timeline. After a long and difficult political struggle, Congress officially designated the Yucca Mountain site as suitable for a geologic repository for spent nuclear fuel in 2002. Congress did so, following the recommendations of President Bush and Secretary of Energy Spencer Abraham, and over the objections of the state of Nevada.

Although the *site* at Yucca Mountain has been found to be suitable, there are several technical, regulatory, and political hurdles that remain before a *facility* for the permanent storage of nuclear waste is constructed and opens for business. The state of Nevada remains adamantly opposed to the project, and has vowed to exhaust all administrative, regulatory, legal, and political options to forestall construction and operation of the repository.

The DOE must then submit a license application to the NRC to construct and operate the repository. Under the NWPA, the DOE has only a few months after the president and Congress find that the site is suitable for a repository to file the application. However, the General Accounting Office (GAO) estimates that it may several years before the DOE has sufficient information to submit an acceptable application to the NRC.[14] The DOE must get construction authorization from the NRC and complete initial construction before the NRC could license the facility and allow spent nuclear fuel to be placed at Yucca. Obtaining the authority to begin construction could itself take at least three years.

[14] General Accounting Office. *Nuclear Waste: Technical, Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project* (Washington, December 2001), 3.

Although the DOE plans to have the facility open and accepting waste by 2010, the GAO estimates that 2015 may be the earliest date the facility could be open, given the amount of technical information about the facility that still must be developed and large sums of money that Congress must appropriate for construction.[15] For purposes of its resource plan, Xcel assumed in its analysis that "Yucca Mountain will become available for spent fuel shipments in 2015 and that acceptance rates will be as most recently published by the Department of Energy, 3,000 [metric tons] per year."[16]

Nuclear waste fund. The costs for siting and constructing the national repository are paid for by a federal nuclear waste fund. The fund was established in 1983 by the NWPA, and is financed by a one-tenth of a cent per kilowatt-hour charge on utilities for the electricity generated at their nuclear power plants. Since the fund was established, $20 billion has been collected for future nuclear waste storage through March 2002—$360.1 million from Xcel ratepayers. Less than $6 billion has been disbursed.[17]

Litigation. Given that the DOE had a statutory (and contractual) obligation to begin accepting waste at a national repository by 1998 and has missed this deadline, there has been a considerable amount of litigation over the DOE's failure and the remedies that may be available to utilities with nuclear reactors. As summarized by the Department of Commerce:

> In 1998, Xcel brought a lawsuit against the DOE. Xcel's claim is that DOE breached the contract under which DOE was to begin accepting spent nuclear fuel by January 1, 1998. Xcel's lawsuit seeks more than $1 billion in damages resulting from DOE's breach. The Court of Federal Claims dismissed Xcel's lawsuit. However, on August 31, 2000, the U.S. Court of Appeals for the Federal Circuit in Washington, D.C., revived Xcel's lawsuit and sent the case back to the Federal Court of Claims for a determination of damages. At this time, a determination of damages is still pending.[18]

Capacity. Under the NWPA, the Yucca Mountain repository is limited to a total of 70,000 metric tons of high-level radioactive waste. At the current rate of waste generation, the industry will have produced that amount of waste by 2009. The DOE estimates that the Yucca Mountain site could hold as much as 120,000 metric tons. Expansion of the capacity of the national repository would require a change in the NWPA. The DOE is required to provide Congress with a report on the need for a second permanent repository by 2010.

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[15] Ibid., 20. The DOE estimated in May 2001 that roughly $50 billion of appropriations will be needed for the project between 2001 and 2119 (the date the repository is intended to be permanently closed). Environmental Quality Board. *Annual Report on Federal Programs for the Management of High-Level Radioactive Waste* (January 2002), 13.

[16] Xcel, *2002 Resource Plan,* 60.

[17] Commerce, "Background on Nuclear Power," 6.

[18] Ibid. In 1996, NSP's partner in the Xcel Energy merger (New Centuries Energy, which was named Public Service Company of Colorado) settled out of court with the DOE "for management of the waste fuel from the shut down Fort St. Vrain facility… Under the terms of the settlement agreement, the DOE has taken title to, and operation of the plant's ISFSI in Colorado and title to the fuel stored in it." EQB, *Annual Report,* 19.

Dry Cask Storage in Utah – Private Fuel Storage

What is being proposed? Xcel Energy is a member of Private Fuel Storage (PFS), L.L.C., a consortium of eight commercial nuclear utilities proposing to establish an interim storage facility for high-level nuclear waste using 820 acres of the Skull Valley Goshute Reservation in Utah. The PFS project would be an aboveground facility designed to hold a maximum of 4,000 dry casks, or 40,000 metric tons, of spent nuclear fuel.

Timeline. In July 1997, PFS filed a license application for this project with the NRC. Xcel states that an NRC license for the facility could be issued as early as the first quarter of 2003. If granted, PFS plans to complete construction of the facility and begin shipping nuclear waste in 2005.

Outlook. However, even if the NRC approves the PFS license, PFS is certain to face other legal and regulatory hurdles before spent fuel can be transported to and stored at the Utah facility. The state of Utah is adamantly opposed to the project. The project faces other problems as well. As summarized by Xcel:

> Some uncertainty remains about whether PFS can successfully be implemented once regulatory authorizations are granted. Last spring, six of the eight partners in PFS sent a letter to Senator Bennett of Utah during the Senate's review of Nevada's objection to the Yucca Mountain designation decision. The letter indicates a commitment by the six not to fund construction of PFS, beyond the licensing phase, if satisfactory progress on licensing Yucca Mountain is being made by the Department of Energy. Xcel Energy and Dairyland Power Cooperative did not sign the letter.
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> Based on the history of Yucca Mountain, we do not believe that it will be ready to accept waste by 2010. When this uncertainty is combined with the term of a nationwide shipment schedule, we believe that PFS has a reasonable probability of success such that it continues to make sense to pursue in the event that we are able to continue operations of the plants. However, while our assessment continues to be that the project is viable and needed, we are not likely to have any assurance of that until late 2003 or early 2004 at the earliest.
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> Given the need to make decisions about steam generator replacement; investment in relicensing and the potential for incurring escalating costs to preserve our ability to replace the Prairie Island resource, we can no longer count on PFS being there in our planning scenario.[19]

[19] Xcel, *2002 Resource Plan,* 64-66.

Dry Cask Storage in Minnesota

Storage history. The storage pool at Prairie Island has been expanded twice over the years, a process known as re-racking.[20] The storage pool at Prairie Island was originally designed for 198 fuel assemblies. This was expanded to 687 in 1977 and 1,386 in 1981. When faced with a shortage of storage capacity in 1989, Xcel opted to develop a dry cask storage facility at the site in lieu of a third re-racking.

In 1994, the legislature approved a total of 17 casks to be filled and placed at an independent spent fuel storage installation (ISFSI) at Prairie Island.[21] The details of that legislation will be discussed in Part Two. All 17 of these casks have been filled and placed within the ISFSI. The Prairie Island storage facility was constructed to hold, and has a federal permit for, a total of 48 casks.

How long can the plant operate on the existing storage capacity? The Prairie Island facility has sufficient storage capacity to continue operations at current levels until the year 2007.

At the time of the 1994 legislation, it was thought that these 17 casks would provide sufficient storage for Xcel to keep the Prairie Island plant operating at full-scale until the year 2001, absent storage options outside the state.

Subsequent to that legislation, the PUC approved an additional 195 temporary storage spaces in the cooling pool. These storage spaces were to be used in the event of a full core offload (where all 242 fuel assemblies in the reactors must be removed and cooled). Prior to the PUC's decision, the space for storage in the event of a full core offload was in the permanent storage spaces within the cooling pool. The PUC's decision regarding these temporary spaces opened up an additional 195 storage spaces for permanent storage, the near-equivalent of an additional five dry casks.

A number of parties before the PUC objected, arguing that:

- the commission's limited Certificate of Need (CON) for the ISFSI and the 1994 Prairie Island legislation required the shutdown of the Prairie Island facility by 2001 if storage outside the state was not available; and
- storage at the Prairie Island facility could not be extended beyond the equivalent capacity of 17 casks.

The PUC found, and the Minnesota Court of Appeals affirmed, that:

- neither the PUC's limited CON nor the 1994 legislation required the shutdown of the Prairie Island reactors; and

[20] Re-racking is the process of replacing existing spent nuclear fuel storage racks in the pool, with racks that provide for increased storage density.

[21] Currently, Minnesota is the only state that limits the amount of dry cask storage by statute.

- by explicitly adopting the commission's CON order, the legislation implicitly authorized the commission to retain authority over pool storage space for a full core off-load.[22]

Primarily as a result of this decision, the date that Prairie Island is expected to run out of spent fuel storage has been extended from 2001 to 2007.[23]

How long might waste be stored at Prairie Island? Some of the waste currently stored at Prairie Island will be stored there through at least 2035, unless the PFS site or some other alternative site becomes operational. This is true regardless of whether additional storage is authorized by the legislature.

The administrative law judge (ALJ) in the CON proceeding on the ISFSI at Prairie Island found that "The Yucca Mountain storage facility would reach maximum capacity under current storage schedules before all of Prairie Island's waste is taken."[24] Xcel has confirmed that this is still true. Given the DOE's proposed shipping schedule of 3,000 metric tons per year to the Yucca facility, the facility would not reach its statutory capacity until approximately 2036. Thus, some waste will continue to be stored at Prairie Island for at least 30 more years, unless Xcel finds alternate interim storage elsewhere, such as the PFS facility.

Decommissioning. If additional storage is not authorized, the Prairie Island facility will shut down in 2007, and Monticello in 2010. Part of shutting down a nuclear facility is the "decommissioning" process. The NRC's regulations define decommissioning as:

- removing a facility or site safely from service and reducing residual radioactivity to a level that permits either the release of the property for unrestricted use and termination of the license; or
- release of the property under restricted conditions and termination of the license.[25]

To facilitate the decommissioning process, the spent fuel currently stored in pools at Prairie Island and Monticello could be taken out of these pools and placed in dry cask storage at the facilities, for later transport to a permanent repository or another interim storage facility. Under the 1994 legislation, dry cask storage for decommissioning does not require legislative approval, but Xcel must receive the approval of its state and federal regulators.

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[22] See *In the Matter of a Request by Northern States Power Company for Approval of its 1998 Resource Plan, Order Modifying Resource Plan*, February 17, 1999, pages 10-14, and *In the Matter of the Application of Northern States Power Company for Approval of its 1998 Resource Plan,* Docket Number 99-917, Minnesota Court of Appeals, January 18, 2000.

[23] The decision by Xcel to use a "higher burn-up rate" for the fuel at Prairie Island, allowing the Prairie Island reactors to refuel less often (thus generating fewer spent fuel assemblies) also contributed to the time extension from 2001 to 2007.

[24] Findings of Fact, Conclusions and Recommendations, 16.

[25] Code of Federal Regulations, title 10, section 20.1003.

Part Two: The 1994 Legislation and Xcel's Compliance

The 1994 Prairie Island Legislation

Procedural History

In 1989, realizing that spent fuel storage at its Prairie Island plant was near capacity, Northern States Power Company (NSP), now Xcel Energy, sought approval from the NRC and the Minnesota PUC to store radioactive waste in 48 aboveground dry casks. The NRC granted a facility license to NSP for up to 48 casks in October 1993.

ALJ recommendation. The PUC referred the CON request to the Office of Administrative Hearings for a contested case proceeding. The ALJ, whose role in a CON case is to find facts and make recommendations to the PUC, recommended **denial** of the request until either:

- the legislature authorizes construction of the ISFSI (dry cask storage facility); or,
- the PUC finds that there is a reasonable certainty that the spent fuel proposed to be stored in the dry casks will be removed from the state within a reasonable period of time.[26]

The ALJ recommended **granting** the CON if either of the two events occurred. The ALJ found it unlikely that a federal facility will be available to take waste from the dry casks in the predictable future and that the facility is likely "permanent" in the sense that it has no foreseeable end. The ALJ thus determined the proposed ISFSI to be a

Prairie Island Dry Cask Storage Chronology

May 1989	NSP applies for CON for 48 casks
May 1991	Environmental Quality Board determines no significant environmental effects
April 1992	ALJ finds legislative approval is necessary because storage may be permanent
June 1992	PUC grants limited CON for 17 casks
June 1993	Minnesota Court of Appeals rules storage may be permanent and requires legislative approval
October 1993	NRC grants storage facility license for 48 casks
May 1994	Minnesota Legislature authorizes 17 casks, and adopts the terms and conditions of the PUC's limited CON
February 1999	PUC grants Xcel authority to create an additional 195 temporary spent fuel storage spaces in storage pools, freeing up 195 permanent storage spaces
January 2000	Minnesota Court of Appeals affirms grant of authority for 195 additional pool storage spaces
July 2002	17th cask filled and placed at Prairie Island
December 2002	Xcel files 2002 resource plan

[26] Findings of Fact, Conclusions and Recommendation, 41.

"radioactive waste management facility" within the meaning of Minnesota Statutes, section 116C.71, subdivision 7. That subdivision defines a "radioactive waste management facility" to mean: "a geographic site, including buildings, structures, and equipment in or upon which radioactive waste is retrievably or irretrievably disposed by burial in soil or permanently stored."

The finding that the facility was a radioactive waste management facility was important, in that Minnesota Statutes, section 116C.72, states that "no person shall construct or operate a radioactive waste management facility within Minnesota unless the expressly authorized by the Minnesota legislature."

PUC decision. The PUC disagreed with the ALJ's characterization of the ISFSI, finding that:

- the facility was temporary; and
- it comes under the "point of generation" exception to the Radioactive Waste Management Act.[27]

The PUC granted Xcel a CON for the facility, but limited the capacity of the ISFSI to 17 casks, enough to allow the Prairie Island facility to operate until 2001. The PUC stated its reasoning as follows:

> The Commission finds that the Company has demonstrated need for a partial certificate of need, one limited to 17 casks. Seventeen casks will allow the Company and its ratepayers to reap the benefits of full power production at Prairie Island through 2001. Until 2001, dry cask storage is the most prudent, cost-effective option for meeting the load currently served by the Prairie Island plant.
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> After 2001, it is unclear what the most prudent, cost-effective option will be. By then, research and development in renewable energy sources, conservation, and load management may have made those resources more prudent investments than dry cask storage. By then, the aging plant's capacity factor may have dropped to the point that it would be more cost-effective to replace its generation than to continue dry cask storage. By then, the federal government will either have sited a permanent repository and opened a Monitored Retrievable Storage facility, or it will still be struggling to accomplish these goals. In either case, the costs of continuing dry cask storage past 2001 will be much clearer than they are today.[28]

Court of Appeals: the legislature must decide. The PUC's order granting a CON for 17 casks was appealed to the Minnesota Court of Appeals. That court held that substantial evidence supported the PUC's action to grant the CON. However, the court also held that because the

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[27] Minnesota Statutes, section 116C.71, subdivision 2e, defines "dispose" or "disposal" as "the permanent or temporary placement of high-level radioactive waste at a site within the state other than a point of generation.

[28] Order granting Limited Certificate of Need in the Matter of an Application for a Certificate of Need for Construction of an Independent Spent Fuel Storage Installation, Minnesota Public Utilities Commission, August 1992, pages 8 and 9.

facility is more likely than not the type of facility that the legislature must approve under the Radioactive Waste Management Act, legislative approval is required before the facility may be operated. As a result, Xcel was required to obtain express legislative authorization to be allowed to operate or construct the facility.[29]

The 1994 Prairie Island bill. In the 1994 legislative session, with a considerable amount of controversy and tension, the legislature passed Laws 1994, chapter 641, commonly known as the "Prairie Island bill." This legislation had several important components, including:

- authorization of dry cask storage, but limiting Xcel to 17 casks
- establishment of an alternate storage site
- establishment of renewable energy mandates
- establishment of a legislative electric energy task force
- low-income discounted electricity rates
- increased conservation spending and
- the contractual agreement between the state and the utility, of which the Mdewakanton Dakota Tribal Council at Prairie Island is an intended third-party beneficiary.

Preemption issues. In drafting the legislation, the legislature was cognizant of federal preemption issues and the limits of state jurisdiction over nuclear energy facilities. The state is preempted by the federal Atomic Energy Act from regulation of the radiological hazards and safety considerations of nuclear power plants.[30] Courts have interpreted the federal law to prohibit any type of state regulation imposed for the purposes of protecting health, safety, or the environment from radiation hazards. In the first major case in this area, Minnesota attempted to limit radioactive releases from the Monticello power plant and to require monitoring of the releases. The courts held that Minnesota was preempted from this type of regulation.[31]

Other cases have established that regulation based on unproven technology of a plant or any other issues related to safety considerations at a plant are preempted and may only be decided by the federal NRC.[32]

A state may regulate (or prohibit) nuclear power plants for:

(1) economic reasons, such as the unknowable cost of management of radioactive waste in the future;

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[29] *In re Independent Spent Fuel Storage Installation,* 501 N.W.2d 638, 645 to 648 (Minn. Ct. App. 1993), *rev. denied* (July 15, 1993).

[30] The express preemption in the Atomic Energy Act is stated in the negative: "Nothing in this section shall be construed to affect the authority of any state or local agency to regulate activities for purposes other than protection against radiation hazards." 42 U.S.C. 2021(k).

[31] *Northern States Power Co. vs. Minnesota*, 447 F.2d 1143 (8th Cir. 1971), affd, 405 U.S. 1035 (1972).

[32] *Marshall v. Consumer Power Co.,* 237 N.W.2d 266 (Mich. Ct. App. 1975); *County of Suffolk v. Long Island Lighting Co.,* 728 F.2d 52 (2d Cir. 1984).

(2) lack of economic need for electricity to be generated by a proposed nuclear power plant; and

(3) erosion and sedimentation control or public nuisance such as excessive steam generation making visibility difficult.[33]

Also, state tort law may apply to nuclear power plants for the purposes of compensating workers for excessive contamination or protecting workers from retaliatory firing for reporting safety violations.[34]

The legislature stated that it was basing its decision to limit the ISFSI to 17 casks, notwithstanding the federal license for 48, as follows:

> The legislature finds that there is great uncertainty over the means and costs of disposing of radioactive wastes generated at nuclear-powered electric generating plants. Current and future electric ratepayers are at risk to pay for these uncertain and potentially enormous costs. These costs could cause economic hardship for the citizens of this state and damage economic growth. For these reasons the legislature finds it necessary to protect its citizens against these costs. While these potential costs do not currently warrant closing an operating nuclear power plant, they do warrant a moratorium on new nuclear plant construction and closer monitoring of operating nuclear power plants.[35]

Authorization of Dry Cask Storage

Staggered authorization. As discussed above, the legislature affirmed the PUC's CON decision, and authorized Xcel to store its spent nuclear fuel in 17 storage casks. Five casks were approved for use immediately. However, several conditions were placed on the authorization for the other 12.

In order to use the next four casks, the utility was required to:

- obtain a determination by the EQB that Xcel had made a good faith effort to find a site for an alternative spent nuclear fuel facility in Goodhue County away from Prairie Island;
- file a license application with the NRC for the alternate storage site;[36] and
- construct, contract for construction and operation, or purchase 100 megawatts of wind power.

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[33] *Kerr McGee Chemical Corp. v. City of West Chicago,* 914 F.2d 820 (7th Cir. 1990); *Marshall v Consumers Power Co.,* 237 N.W. 2d 266 (Mich. Ct. App. 1975).

[34] *Silkwood V. Kerr-McGee Corp.,* 464 U. S. 238 (1984); *English v. General Electric Corp.,* 110 S.Ct. 2270 (1990).

[35] Laws 1994, ch. 641, art. 2, § 1.

[36] Minn. Stat. § 116C.771.

In October 1996, the EQB found that Xcel had met all of these requirements and authorized Xcel to fill the four additional casks.

To obtain authorization to fill the remaining eight casks, the legislature required Xcel to fulfill certain mandates regarding the development of renewable resources, as discussed below.

Did the 1994 legislation require a shutdown of Prairie Island? On the one hand, there is significant legislative history to support the contention that the 1994 Legislature intended that the Prairie Island facility be shut down after it used all of the authorized storage capacity, if no storage capacity outside the state was available to Xcel.[37] The mechanics of the 1994 legislation support this contention as well. The plant could not continue operating without additional storage capacity—either outside the state, or in the state if authorized by the legislature.

On the other hand, the only explicit shutdown requirement in the 1994 legislation is in Minnesota Statutes, section 216B.244, which requires a nuclear facility that has an annual load capacity factor of less than 55 percent for each of three calendar years to be shut down. The legislative findings in article 2 of the 1994 legislation state that the potential costs of disposing of spent nuclear fuel "do not currently warrant closing an operating nuclear plant." Instead the legislature found that such costs warrant "closer monitoring of operating nuclear plants."[38] In addition, the conference committee on the 1994 legislation rejected explicit language in the Senate bill requiring the facility to be shut down as of a fixed date unless storage capacity outside the state was available.

Establishment of an Alternate Storage Site

In the Prairie Island bill, the 1994 Legislature directed Xcel to identify and construct an alternate site for the storage facility in Goodhue County, away from Prairie Island. In order to do this, Xcel was required to obtain a "certificate of site comparability" from the EQB. Prior to issuing such a certificate, the board was required to find that the alternate Goodhue County site was comparable to the Prairie Island facility.[39] However, in October 1996, the EQB denied Xcel's request for a certificate of site comparability, finding no site comparable to the present one.[40] This decision did not affect the board's determination that Xcel had made a good faith effort to implement the alternate site.

The decision to deny the application for a certificate of site comparability was challenged by the Mdewakanton Dakota Tribal Council at Prairie Island, but was upheld by the Minnesota Court of Appeals in May 1997. The tribal council appealed the appellate court's decision, but the

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[37] See, for example, the comments of Sen. Steve Novak, Senate author of the 1994 legislation, in response to a question from Rep. Willard Munger, stating, "You are correct that under the Senate bill, if after eight years and 17 casks, they are unsuccessful in finding a place to ship the waste outside of Minnesota, the plant would close." Conference Committee on S.F. 1706/H.F. 2140, 78th Minn. Leg., April 26, 1994 (audio tape).

[38] Laws 1994, ch. 641, art. 2, § 1.

[39] Minn. Stat. § 116C.80.

[40] The EQB concluded that no site would be comparable to the existing site because of the risks involved in the transportation and handling of the nuclear waste required to move it to another location.

Minnesota Supreme Court declined to hear the appeal. Xcel then withdrew its application to the NRC for federal approval of the alternate storage site.

Renewable Energy Mandates

As part of the Prairie Island bill, the 1994 Legislature imposed three renewable and alternative energy mandates on the utility. These three mandates relate to:

- wind power
- biomass power and
- investment in renewable and alternative energy

Wind. Minnesota Statutes, section 216B.2423, requires Xcel to acquire:

(1) 425 megawatts of wind energy capacity by December 31, 2002; and
(2) an additional 400 megawatts if, by December 31, 2002, the PUC determines that to do so would be in the public interest.

The statute gives Xcel three options with regard to the manner in which this capacity is acquired. The utility may do so by:

(1) constructing and operating the wind energy conversion facilities itself;
(2) purchasing the wind energy capacity from a third party; or
(3) contracting with a third party to construct and operate the wind energy conversion facilities.

Xcel opted to meet the initial mandate by contracting with a number of third parties to construct and operate the necessary wind energy capacity. At the end of 2002, Xcel had 480 megawatts of wind energy capacity built or under contract.[41]

In February 1998, the PUC determined that requiring Xcel to acquire the additional 400 megawatts of wind was in the public interest, in that the cost difference between the wind energy capacity and other nonrenewable energy capacity was "not large enough to overcome the strong public policies favoring the development of this wind resource."[42]

Accordingly, the commission ordered Xcel to "construct and operate, purchase, or contract to purchase an additional 400 megawatts of electric energy installed capacity generated by wind energy conversion" by 2012. [43] The commission ordered the utility to fulfill this requirement through an "all-source bidding process" where wind energy and other renewable energy technologies will compete against other technologies. That process is currently ongoing at the commission.

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[41] Xcel, *2002 Resource Plan,* 116.

[42] See Order Modifying Resource Plan, 10.

[43] Ibid, 24.

Biomass. Another section of the Prairie Island bill (Minn. Stat. § 216B.2424) required Xcel to acquire a total of 125 megawatts of biomass capacity by December 31, 1998.

Xcel had 125 megawatts of eligible biomass capacity under contract by that date, but one of the projects was not able to meet its contractual requirements. Xcel replaced the 75 megawatts of biomass that was to be provided by this project, by expanding one of the other projects by 25 megawatts, and contracting with a vendor for 50 megawatts of biomass electricity using poultry litter as its biomass fuel source.

Currently, the required 125 megawatts of biomass capacity under contract are from the following three projects:

Project Name	Contract Date	Size	Fuel	Operation Date
FibroMinn	August 31, 2000	50 MW	Poultry Litter	Dec. 31, 2002
EPS/Beck	December 30, 1998	50 MW	Whole Tree	June 30, 2004
St. Paul Cogeneration	December 23, 1998	25 MW	Waste Wood	Dec. 14, 2002

House Research Department

Investment in renewable and alternative energy. As part of the Prairie Island legislation, the Minnesota Legislature passed Minnesota Statutes, section 116C.779. Among other things, this statute requires Xcel to transfer to a renewable development account (the Renewable Development Fund or RDF) $500,000 annually for each dry cask full of spent fuel and placed at Xcel's Prairie Island ISFSI after January 1, 1999. With 17 casks filled and placed, Xcel is required to devote $8.5 million a year to the development of renewable energy.
The RDF is overseen by the Renewable Development Board, consisting of two representatives from Xcel and two representatives from the environmental community. Expenditures from the fund must be approved by the PUC. Preference must be given to renewable energy projects located in the state. Under the current procedures, the PUC approves the selected projects and their contracts.

The PUC-approved RDF criteria divide the available funds up into three categories:

- **Category A:** projects that result in the actual development of new, commercially viable renewable resources (60 percent of the funding);
- **Category B:** projects that advance research and development of technologies that are in a stage of development between the fully commercial scale and the experimental, research stage (20 percent); and
- **Category C:** projects that involve basic fundamental experimental research and development of "pre-commercial" renewable technologies in the early stages of development (20 percent).

In April 2002, the PUC approved the first round of RDF projects, listed below.

Approved RDF Projects

The PUC approved the following Category A ("commercially viable") projects, totaling $9.8 million, in the first round of RDF awards:

- **The Greden Dairy and Crop Farm, Altura,** would receive $80,000 to use cow manure from its 900-head herd to produce methane, which would then produce up to 100 kilowatts of electricity and usable heat. Some of the excess energy could be used on-site for a soybean processing facility, which would produce a soybean oil fuel that would replace diesel fuel.
- **Minnesota Corn Processors, Marshall,** would receive $400,000 to burn methane that is currently being wasted in an engine that could produce up to 580 kilowatts of electric power.
- **AnAerobics Inc.** would receive $1.3 million to use a first-of-its-kind technology to convert solid and liquid waste from the corn and pea canning process at the **Seneca Foods plant in Montgomery** to produce methane and up to 1,700 kilowatts of electric power.
- **Crown Hydro, Minneapolis,** would receive $5.1 million to generate up to 3,200 kilowatts of electricity using the power of the Mississippi River in downtown Minneapolis. The plant would be located on the west bank of St. Anthony Falls.
- **The Minnesota Department of Commerce** would receive $1.15 million for a rebate program for solar photovoltaic power system installations up to 4 kilowatts that are wired into the electrical grid. Rebates of up to $8,000 would be offered to help buy down the high initial costs of such systems.
- **The Science Museum of Minnesota** would receive $100,000 to install a solar photovoltaic roof on its new Environmental Experiment Center, with power generated serving the museum.
- **Project Resources Corp.** would receive $900,000 to construct at three locations in southwestern Minnesota six wind turbines of a design not previously installed in the United States.
- **The Pipestone-Jasper school system** would receive $752,835 to install a 900-kilowatt wind turbine on school property, with the school using 75 percent of the power and selling the rest to a local cooperative.

In addition, the commission approved the following Category B and C (experimental and research/development) projects, totaling $6.3 million in the first round of RDF awards:

- **Sebesta Blomberg & Associates, Inc.,** to study the feasibility of producing electricity from spent distiller grains used in the production of ethanol.
- **Energy Performance Systems, Inc.,** to explore the possibility of burning whole trees and waste wood to generate electricity.
- **University of North Dakota,** to 1) study an idea of burning biomass materials with coal, 2) study ways to reduce emissions from that process, and 3) to research biomass gasification (three projects).
- **National Renewable Energy Laboratory,** to research a new way of removing contaminants from the end product of biomass gasification processes.

- **D.H. Blattner & Sons,** to develop a system to erect wind turbine generators without the use of large cranes, as is current practice.
- **Colorado School of Mines,** to develop improved fuel-cell prototypes.
- **National Renewable Energy Laboratory,** to research new, lower cost solar photovoltaic power cells.
- **Global Energy Concepts,** to develop improved controls for wind turbines.
- **The University of Minnesota,** to study better ways to store power from wind turbines.

The Legislative Electric Energy Task Force

The legislature created the Legislative Electric Energy Task Force (LEETF) as part of the Prairie Island bill, in order to have a joint legislative body whose specific charge was to study future electric energy policy and nuclear waste management issues. The task force was required to develop "detailed, credible, and reliable information" and make recommendations to the legislature by reporting to the chairs of the House and Senate committees responsible for environmental and natural resource issues.[44]

Pursuant to the 1994 legislation, the task force has issued two reports to the chairs of those committees. The first report, a preliminary report issued on September 15, 1995, provides an overview of the status of state energy planning at the time, an analysis of the statutory energy policies and goals in Minnesota, and information on high-level radioactive waste management and transportation.

The second report, titled *Energy Policy, Electric Industry Restructuring and Nuclear Waste Management in Minnesota,* was issued in February 1997. This report had two parts. The first part is a critique of two studies funded by the task force titled:

- *Evaluation of the Current Energy System in Minnesota*; and
- *Evaluation of Emerging Generation Technologies in Minnesota*.

The second part of this report is a compilation of information regarding the management of high-level radioactive waste.

These two reports completed the specific statutory requirements set for the LEETF in the 1994 legislation. In the 1997 and 1998 legislative sessions, the legislature amended the focus of the task force and directed the LEETF to review and analyze issues relating to the restructuring or deregulation of the electric industry.[45]

The task force was set to expire as of June 2000. However, in 2001, its mission was expanded again, and the task force was extended to June 30, 2005. The 2001 Energy Reliability and Security Act directed the task force to "evaluate options and priorities related to energy source

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[44] Minn. Stat. § 216C.051.

[45] *See* Laws 1997, ch. 191, and Laws 1998, ch. 380.

development of resources derived from agricultural production and to energy options available in rural parts of the state." The act specified that these energy sources included:

- alternative diesel engine fuels derived from soybean and other agricultural plant oils or animal fats;
- ethanol derived from grains or other agricultural products or by-products;
- methane or other combustible gases derived from the processing of plant or animal wastes;
- biomass fuels such as short-rotation woody or fibrous agricultural crops produced for conversion to useful energy;
- use of corn and corn by-products as a fuel for electric generation, including for cogeneration facilities; and
- further development of the solar, wind, and biomass energy potential in the state.[46]

The task force was also given an annual assessment budget of $150,000 for its costs. Energy utilities in the state are to be assessed for costs incurred by the LEETF.[47]

Low-Income Discount Electric Rates

The Prairie Island law required Xcel to provide a 50 percent discount on the first 300 kilowatt hours per month consumed by low-income customers receiving federal low-income home energy assistance.[48]

Xcel submitted a proposed low-income discount rate in October 1994, which was approved by the PUC after notice and comment hearings. Xcel implemented the low-income rate in January 1995.

This discount is available to any residential customer who is certified and receiving assistance from the Low-Income Home Energy Assistance Program (LIHEAP) during the federal fiscal year. Customers must receive certification annually through Community Action Agencies or authorized LIHEAP agencies to be eligible for this discount. For those eligible, the rate for average daily use up to the first ten kilowatt hours is billed at 50 percent of the usual charge. Energy use in excess of that amount is billed at the usual charge.

Increased Conservation Spending

Under the state's Conservation Improvement Plan program, energy utilities in Minnesota are required to spend a certain percentage of their gross revenues on energy conservation (Minn. Stat., § 216B.241). The 1994 Prairie Island legislation increased the percentage that Xcel is required to spend on conservation, from 1.5 percent of its gross revenues to 2 percent. Only Xcel

[46] Laws 2001, ch. 212, art. 3, § 3.

[47] Laws 2001, ch. 212, art. 8, § 8.

[48] Minn. Stat. § 216B.16, subd. 14.

is required to spend this larger percentage. As a result, Xcel spent about $8.5 million more on conservation in 2002 than it otherwise would have.[49]

Contractual Agreement

One of the provisions of the Prairie Island legislation, codified at Minnesota Statutes, section 116C.773, states:

> The authorization for dry casks contained in section 116C.77 is not effective until the governor, on behalf of the state, and the public utility operating the Prairie Island nuclear plant enter into an agreement binding the parties to the terms of sections 116C.771 [authorizing dry cask storage but limiting Xcel to 17 casks] and 116C.772 [requiring reports on a number of topics, including the development of a plan to phase-out nuclear power] and the mandate for 200 megawatts of wind power and 75 megawatts of biomass required by December 31, 2002, in sections 216B.2423, subdivision 1, and 216B.2424. The Mdewakanton Dakota Tribal Council at Prairie Island is an intended third-party beneficiary of this agreement and has standing to enforce the agreement.

That contract, signed by Governor Arne Carlson and Edwin Theisen, president of Northern States Power Company, was executed on May 20, 1994. Since that date, there has been a great deal of debate as to how that contract should be viewed and what rights the Mdewakanton Dakota Tribal Council at Prairie Island received by virtue of the council's status as an intended third-party beneficiary. There are at least four alternative ways to view the legal status of the contract and the rights of the tribal council, summarized below.

1. **The contract is a valid contract, and additional storage may not be authorized without approval of the tribal council.** Under this view, Xcel and the state are bound by the terms of the contract, and cannot amend the contract without the approval of the tribal council. In addition, the state legislature is prohibited from amending the statute or the contract by the "contract clause" of the U.S. Constitution. Article 1, section 10, of the Constitution specifies that "No state shall … pass any … [l]aw impairing the obligation of contracts." A related view of the contract is that, while the state may authorize additional storage, if it does so without the approval of the tribal council, either the state or Xcel (or both) may be required to pay damages to the tribal council.

2. **The contract is not a valid contract because it attempts to bind a future legislature.** One reason that a court might invalidate a contract is if the court finds that enforcing the contract is against public policy. As a general rule, a legislature may not restrict the actions of a future legislature, especially with regard to that future legislature's exercise of its inherent police powers. A court might find this particular contract to be against public policy, if the intent of the contract is to prohibit a future legislature from amending the incorporated provisions of the Prairie Island legislation. Alternatively, a court may find that, although the

[49] Commerce, "Background on Nuclear Power," 14.

contract itself may be valid, the impairment of the contract by a future legislature may be permissible if the state law impairing the contract is designed to promote a significant and legitimate public purpose. The constitutional prohibition against contract impairment by states is not absolute.

3. **The contract is valid, but only allows the tribal council to enforce the contract in regulatory and legal proceedings, but not to prohibit legislative action.** The contract grants the tribal council intended third-party beneficiary status with standing to enforce the agreement. One view of this status might be that the tribal council has standing to enforce the contract in regulatory and legal proceedings, but has no authority to prevent the legislature from acting to approve additional storage capacity at the Prairie Island facility. Under this view, if Xcel attempted to place an 18th cask at the Prairie Island facility without legislative authorization, or if Xcel failed to meet its renewable energy obligations under contract, the tribal council would have standing to ask a court or the PUC to enforce the contract.

4. **The contract is a valid contract, but may be complete and no longer enforceable.** The contract between the state and Xcel may be viewed as an exchange of promises. The state agrees to allow up to 17 casks, in exchange for performance by the utility of certain acts, such as to contract for a certain amount of renewable energy by a certain date. To the extent that a court might find that both parties have lived up to their respective obligations under the contract, the contract may be complete.

In any event, the validity of the contract, and the rights of the tribal council under the contract will remain unclear until a court has ruled on those issues. In addition, the above analysis focuses only on legal issues regarding the contract. There may be considerations other than legal issues that policymakers may want to consider regarding the interests of the tribal council.

Part Three: Summary of Alternatives

In its 2002 resource plan, Xcel developed and compared a number of alternatives for the legislature and the PUC to review and consider. Xcel discusses four nuclear options, described Table 3.

Table 3
Nuclear Options
Xcel 2002 Resource Plan

Nuclear Option	Description	Notes
1	Close the Prairie Island reactors in 2007 and the Monticello reactor in 2010	• No storage authorization needed • Need to consider regulatory process of bringing PI replacement online by 2007/2008 • No need to replace steam generators at PI
2	Close the Prairie Island reactors in 2007 and extend the license of Monticello until 2030	• Need storage for Monticello (in-state or PFS) • Need to consider regulatory process of bringing PI replacement online by 2007/2008 • No need to replace steam generators at PI
3	Allow the Prairie Island reactors to operate until the end of their licenses (2013/2014) and extend the license of Monticello until 2030	• Need storage for both PI and Monticello (instate or PFS) • Need to replace PI, but considerable time to do so • Need to replace steam generators at PI Unit 1
4	Extend the licenses of the Prairie Island reactors until 2033/2034 and the license of the Monticello reactor until 2033	• Need storage for both PI and Monticello (instate or PFS) • Need to replace steam generators at PI units 1 and 2

House Research Department

At the direction of the PUC, Xcel has also developed a list of possible projects to replace the Prairie Island facility if the legislature does not authorize additional storage or if the PFS facility does not open for interim storage. These projects are the finalists of a competitive bid process.

Table 4
Prairie Island Replacement Options Short List

Company	Size	Technology/Fuel	Location
Aquila	585 MW	Natural Gas Combined Cycle	Missouri
Calpine	565 MW	Natural Gas Combined Cycle	Mankato, MN
LS Power	550 MW	Coal	Rosemount, MN
Calpine	998 MW	Natural Gas Combined Cycle	Red Wing, MN
Nordic Energy	1,100 MW	Coal-Fired Integrated Gasification Combined Cycle	Rosemount, MN

House Research Department

In addition to these contingency bid projects, the PUC directed Xcel to analyze the possibility of "re-powering" Prairie Island with natural gas; that is, to convert the facility from a nuclear facility to a natural gas generation facility. Xcel looked at a number of scenarios, and chose two to add to the list of replacement alternatives for the purposes of the resource plan. Those two are:

1. Replacement of generation with two combined cycle natural gas units on the Prairie Island site; and
2. A "true" repowering using four combustion turbines and two heat recovery steam generators in concert with one of the Prairie Island plant's existing steam turbine generators.

Xcel then did an analysis of the various scenarios, combining the bid costs of the five winning bids for Prairie Island replacement with a forecast of the costs of replacing Monticello. The results of that analysis are contained in Table 5, comparing Xcel's estimate of the potential costs of these alternatives with Xcel's baseline alternative of relicensing both Prairie Island and Monticello, and operating those facilities until the end of the relicensed period. Costs listed in the table are the costs for each alternative in excess of the cost for the relicensing alternative.

Table 5
A Cost Comparison of Several Prairie Island Life Extension and Replacement Alternatives (selected by Xcel)

Alternative	Projected Cost of Alternative (in billions)	
	Low	High
Prairie Island 2033, Monticello 2030	0	0
Prairie Island 2013, Monticello 2030	$1.075	$1.4
Prairie Island 2007, Monticello 2030 IGCC Coal Bid Replacement	$1.15	$1.5
Prairie Island 2007, Monticello 2030 Gas Bid Replacement (Red Wing)	$1.495	$1.95
Prairie Island 2007, Monticello 2030 Gas Bid Replacement (Mankato)	$1.795	$2.175
Prairie Island 2007, Monticello 2030 Repower 1 PI unit	$1.23	$1.565
Prairie Island 2007, Monticello 2030 Combined Cycle on Site	$1.36	$1.685
Prairie Island 2007, Monticello 2010 IGCC Coal Bid Replacement	$1.775	$2.585
Prairie Island 2007, Monticello 2010 Gas Bid Replacement (Mankato)	$2.375	$3.125

House Research Department

Parties other than Xcel are discussing alternatives as well. One such alternative would be to replace the output of the Prairie Island facility with a combination of wind energy and natural gas-fired generation. Wind energy is an intermittent resource, meaning that wind generation facilities only produce electricity when the wind is blowing. In order to produce electricity at an equivalent reliability as nuclear power, wind energy must be backed up by a dispatchable resource. Certain types of natural gas generation facilities, in combination with wind, can provide that level of baseload reliability. Xcel is currently in the process of analyzing the costs and technical issues of this proposal.

Another proposal that is being discussed would be to shut down Unit 1 at Prairie Island immediately, and operate Unit 2 until the end of its license. Under this scenario, Xcel would not incur the cost of replacing the steam generators at Unit 1, and no additional storage capacity would be needed. The 525 megawatts of baseload capacity currently provided by Unit 1 could be replaced by a combination of wind energy and natural gas-fired generation, or wind energy backed up by generation fueled by agricultural fuels, such as bio-diesel. Xcel and others are currently developing the cost and feasibility analysis of this alternative.

One more alternative proposed to replace Unit 1 at Prairie Island would be to expand Xcel's Metropolitan Emissions Reduction Proposal (MERP). Currently, Xcel is proposing to reduce emissions from three metropolitan area generation facilities, and expand the total generation capacity of these three facilities by 324 megawatts. Under this alternative, dubbed the Mega-MERP, Xcel would expand the generation capacity of these facilities by another 100 megawatts. Xcel is analyzing the cost and feasibility of this proposal as well. The cost to Xcel's ratepayers of the MERP as it stands currently would be in excess of $1.2 billion and is subject to PUC approval.

For more information about nuclear energy, visit the utility regulation area of our web site, www.house.leg.state.mn.us/hrd/issinfo/pubutil.htm.