Mesaba Energy Project

Report to the Minnesota Public Utilities Commission

Section I

Public Interest Determination

Excelsior Energy Inc.

December 2005

INTRODUCTION

This Section I contains the information needed for the Minnesota Public Utilities Commission ("Commission") to find, as contemplated by statute, that the power purchase agreement ("PPA") for Unit One of Excelsior's Mesaba Energy Project ("Mesaba Project" or "Project") is in the public interest.

Minn. Stat. § 216B.1694, the Innovative Energy Project ("IEP") Statute, subd. 2(a)(7) provides:

> Regulatory incentives.
>
> (a) An innovative energy project:
>
> * * *
>
> (7) shall be entitled to enter into a contract with a public utility that owns a nuclear generation facility in the state to provide 450 megawatts of baseload capacity and energy under a long-term contract, subject to the approval of the terms and conditions of the contract by the commission. The commission may approve, disapprove, amend, or modify the contract in making its public interest determination, taking into consideration the project's economic development benefits to the state; the use of abundant domestic fuel sources; the stability of the price of the output from the project; the project's potential to contribute to a transition to hydrogen as a fuel resource; and the emission reductions achieved compared to other solid fuel baseload technologies; . . .

ANALYSIS

Minnesota law states that an innovative energy project is entitled to a power purchase agreement with a public utility that owns a nuclear generating facility subject to a finding by the Commission that the PPA is in the public interest. As noted in Paragraphs 15 – 17 of the Petition, the Mesaba Project is an IEP, and Northern States Power ("NSP") is a public utility that owns a nuclear generation facility in the State. The Mesaba Project is thus entitled to sell 450 MW to NSP under a long-term contract, subject to a public interest determination by the Commission. The IEP Statute instructs the Commission to take five specific statutory criteria into consideration in making its public interest finding. The enumerated criteria are a project's:

- Economic development benefits to the State
- Use of abundant domestic fuel sources
- Stability of the price of the output

- Potential to contribute to a transition to hydrogen as a fuel resource
- Emission reductions achieved compared to other solid fuel baseload technologies.

The evaluation of the Mesaba Project in accordance with these criteria demonstrates that the PPA is in the public interest.

A. THE MESABA PROJECT WILL PROVIDE ECONOMIC DEVELOPMENT BENEFITS TO THE STATE

The IEP Statute directs the Commission to consider and confirm that the Mesaba Project will provide economic development benefits to the State. The economic development benefits of the Mesaba Project will include the creation of (1) new jobs, (2) economic stimulus, (3) syngas feedstock that can retain and attract other industries to the State, (4) stable energy prices that will preserve existing industry and jobs, and create a strong business and investment environment, and (5) a cleaner natural environment, that will attract and retain human capital and promote tourism.

1. JOB CREATION

The Project represents one of the largest investments and construction projects in the State's history and will be located in an economically depressed region. During its three and one-half year construction period and 30 to 40 years of operation, the Mesaba Project Unit One ("Mesaba One") will provide the Iron Range with needed, skilled jobs and a base for future expansion.

In September of 2005, the Bureau of Business and Economic Research at the University of Minnesota, Duluth ("UMD") completed an analysis of Mesaba One. UMD's economic modeling system, IMPLAN, estimated that Mesaba One would directly create a total of nearly 3,000 construction jobs on the Iron Range in the peak year of construction, and more than 100 jobs on the Iron Range in a typical year of operation.[1] UMD estimated that Mesaba One would also create jobs indirectly, by inducing the commercial, government, service, and residential industries to create an additional 2,200 jobs statewide related to construction of the facility, and another 360 permanent jobs statewide related to the operation of the facility.

2. ECONOMIC STIMULUS

Mesaba One will provide significant economic stimulus to the Iron Range and to the State. UMD reported that the facility's construction and operations expenditures will both directly and indirectly generate spending on the Iron Range. Excelsior provided UMD with inputs of $1.04 billion in direct spending on construction over a 42 month period to reflect the earliest general estimates of Mesaba One's capital costs from its contractors and vendors. Based on those inputs, UMD estimated that Mesaba One would also generate economic activity indirectly, by inducing secondary spending across the State of $760 million related to expenditures on construction, and

[1] IMPLAN does not have the capability of differentiating between full-time, part-time, and temporary jobs.

another $90 million annually related to operations. Since providing those figures to UMD, Excelsior has revised several of the parameters which led it to arrive at those inputs. The net output of Mesaba One has since changed from 530 MW to 603 MW, which increased estimates of the overall capital cost. In addition, other increases in capital costs have resulted from the decision to allow design flexibility for the plant to use 100% PRB coal. More significantly, as Xcel Energy also reported in its updated budget for the High Bridge plant, the price of commodities and labor have risen for projects across all sectors. Those events led Excelsior's engineering, procurement, and construction consortium[2] and project engineers to revise their estimates of total project costs upward. In light of these changes, Excelsior would now revise its inputs upward, which means that the economic benefits of Mesaba One to the Iron Range and the State will be significantly greater than forecast by UMD. See Exhibit B for a complete copy of the UMD Report.

3. SYNGAS EXPANSION AND NEW INDUSTRIES

In addition to generating power, the Mesaba Project will have the capability of expanding to produce (or co-generate) syngas that can both improve the competitiveness of existing industry in the region and the State, and attract other businesses to the Iron Range that can use syngas as a feedstock for other production processes. New industries can co-locate on the Mesaba sites and use syngas to produce hydrogen, liquid transportation fuels, pipeline quality gas, and chemicals.

a. Syngas

Syngas produced from coal is a low-cost, fixed-price alternative to natural gas for many applications. Large industrial companies in search of a lower-cost, more predictably priced alternative to natural gas can meet those needs from the Mesaba Project. Like natural gas, syngas from an additional gasifier would have the ability to serve as a fuel for many industrial processes.

b. Hydrogen

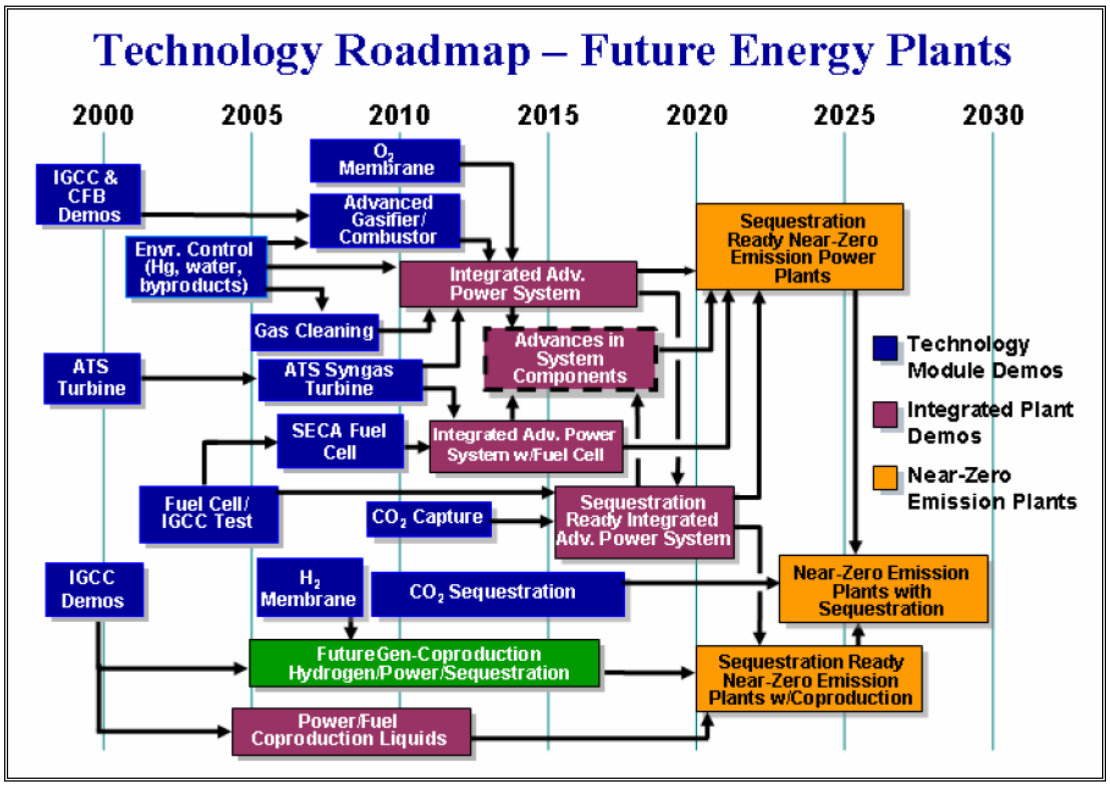
Subsection D of this Section I describes the Mesaba Project's potential to contribute to a transition to hydrogen as a fuel resource by serving as a large, centralized source of hydrogen, and by acting as a first mover in producing it. While facilitating the transition to a hydrogen economy, the Project will provide the State with other economic benefits. Due to the economies of scale that the Mesaba Project will enjoy, expansions of the Mesaba Project will be positioned to minimize hydrogen production costs, allowing it to produce a steady, low-cost supply, a critical component of a hydrogen economy.[3] As a provider of low-cost energy, and as a first mover into the production

[2] Excelsior has selected the consortium team (the "EPC Consortium") of Fluor, Siemens and ConocoPhillips as its preferred provider to engineer the Project, procure all equipment, materials and labor and construct the facility under a lump-sum turnkey engineering, procurement and construction contract. Information about those companies and their role in the Project are provided in a letter from the EPC Consortium to the Commission attached as Exhibit A.

[3] Michael Ramage, Chair of Chairman of the National Research Council Committee on Alternatives and Strategies for Future Hydrogen Production and Use, the National Academies, The Hydrogen Economy: Opportunities, Costs,

market, the Mesaba Project will be poised to attract new technologies and cutting-edge fuel cell research and development projects to the Iron Range. The Project will attract research grants and development capital to the region, as it is an important part of the Department of Energy's research and development roadmap, shown in Figure 1 below, for advancing clean coal technology.[4]

Figure 1. U.S. Department of Energy Technology Roadmap for Advancing Clean Coal Technology



c. Transportation Fuels

Transportation fuels have been produced from coal-derived syngas for many decades. These fuels, produced in a process called "Fischer-Tropsch," are ultra-clean, sulfur free alternatives to all forms of transportation fuel, including fuel for jet engines.[5] With world oil prices remaining at historically high levels, there is a strong interest from many market participants to co-locate on sites where

Barriers, and R&D Needs, slide 21, *available at* http://www.eere.doe.gov/hydrogenandfuelcells/pdfs/nrc_presentation.pdf.

[4] U.S. Dep't of Energy, Econ., et al., "Clean Coal Technology Consensus Roadmap: Background Information," p. 28, (2004) *available at* http://www.netl.doe.gov/coal/CCPI/pubs/CCT-Roadmap-Background.pdf.

[5] NAT'L COMM'N ON ENERGY POLICY, ENDING THE ENERGY STALEMATE: A BIPARTISAN STRATEGY TO MEET AMERICA'S ENERGY CHALLENGES, p. 52, (2004), *available at* http://bcsia.ksg.harvard.edu/BCSIA_content/documents/commission_report.pdf. (The National Commission on Energy Policy is a bipartisan committee composed of 16 members from various institutions, including academic universities and laboratories, government agencies, non-governmental organizations, private corporations, state legislatures, and labor unions. For a complete list, *see* page 2 of the report.)

IGCC facilities are producing syngas. The Department of Defense recently announced an initiative to provide a major portion of its transportation fuels from coal.[6] Excelsior is in a dialogue with the Department of Defense to explore co-locating such facilities on a Mesaba site.

d. Synthetic Natural Gas

Another application for the syngas is to feed a production process to make pipeline quality, synthetic natural gas ("SNG"). Several facilities of this nature have been announced or are in exploratory phases with support at the Governor level in other states, including Illinois, Montana and Pennsylvania.[7] Subsequent expansion of the Mesaba Project's gasification capacity could feed an SNG process that could potentially serve as a more stable, lower cost fuel to meet the needs of Xcel Energy's new natural gas units under the Metropolitan Emission Reduction Program ("MERP") initiative, as well as the rest of Xcel's ever-increasing gas-fired generation fleet and other natural gas consumers in the State.

e. Chemicals

A significant portion of the chemical production that existed in the U.S. in 2000 has been forced out of business because of its reliance on natural gas as a feedstock. Syngas is an equally suitable feedstock for the chemical industry. One chemical facility that is prospering in the U.S. is the Eastman Chemical facility in Kingsport, Tennessee. There, coal is gasified and serves as a feedstock for a host of products. Eastman claims that there is not a household in America that does not have a product made using coal gasified at this facility.[8]

Additional syngas production facilities, and the industrial facilities that would use syngas as a feedstock, would entail billions of dollars of additional investment in Minnesota and the creation of hundreds of new jobs. A true transformation of the entire northeastern region of the State becomes a possibility once Mesaba One is online.

4. STRONG BUSINESS AND INVESTMENT ENVIRONMENT

The Mesaba Project will further improve Minnesota's business climate and enhance economic development by reducing pressure on natural gas prices. Stable energy prices are critical to maintaining base industries (including steel, paper and agriculture) and attracting new industry. As described in Subsection C below, the Mesaba Project will reduce demand for natural gas-fired power generation, which in turn will reduce the overall volume of gas upon which ratepayers are

[6] The following link is to a presentation from Theodore Barna of the Department of Defense on this initiative: http://www.westgov.org/wieb/meetings/boardsprg2005/briefing/CleanFuelsPro.pdf

[7] Illinois' Governor is supporting legislation to enable SNG production. For a description of that initiative, *see* http://www.illinois.gov/PressReleases/ShowPressRelease.cfm?SubjectID=1&RecNum=4077. Montana's Governor is supporting a coal to liquids program as well. *See* http://governor.mt.gov/hottopics/faqsynthetic.asp. Pennsylvania's Governor's "Energy Harvest Plan" for transportation fuels from coal is highlighted in a speech *available at* http://governor.mt.gov/hottopics/faqsynthetic.asp.

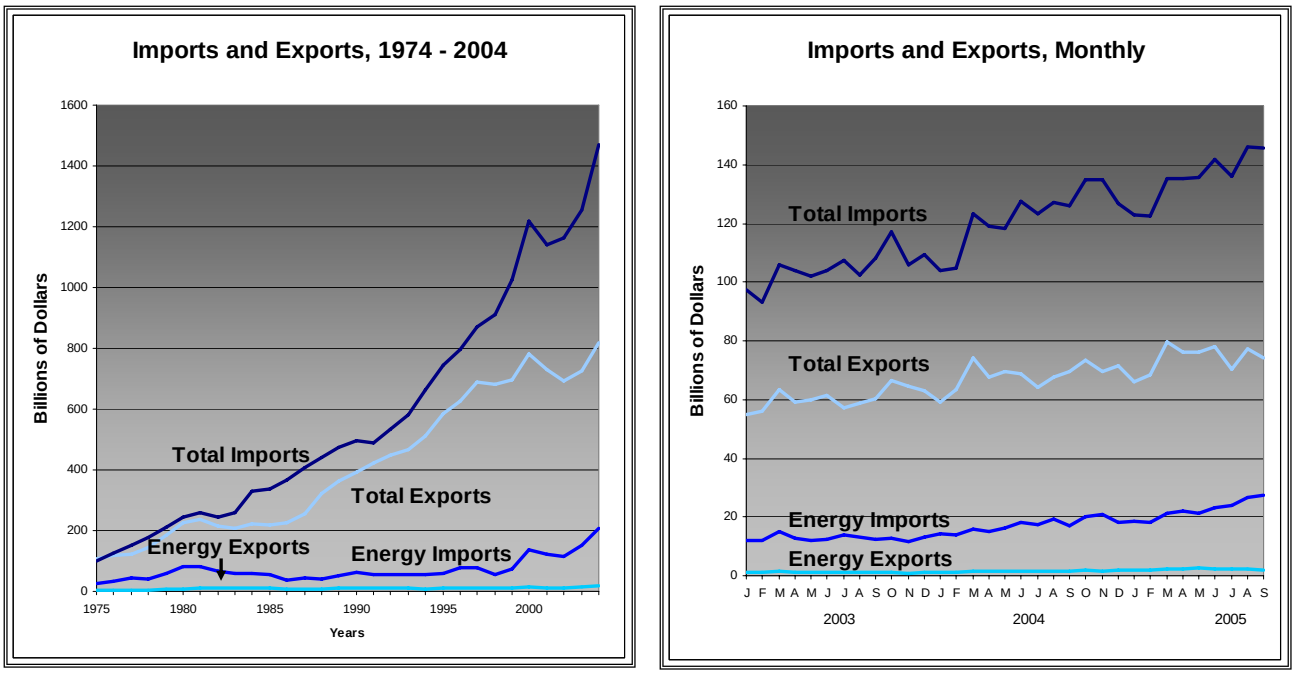
[8] More information about the Eastman Chemical coal gasification facility is available on Eastman's website, www.eastman.com.

forced to rely. Reducing the State's reliance on natural gas will simultaneously insulate Minnesota's homeowners, ratepayers, and businesses from the price instability that accompanies the electricity sector's increasing use of natural gas, while freeing up supply for industrial and residential users.

The Project's promise in terms of reducing Minnesota's reliance on foreign imports goes far beyond the gas displaced for generation. Expanding production to supply syngas as a natural gas substitute, develop a hydrogen supply, attract chemical companies, and produce transportation fuels and pipeline quality gas from coal will bring investment and jobs to Minnesota, as described above. In addition to the economic development benefits this "home-made energy" would bring, this polygeneration capability to produce a panoply of fuels from coal will create a competitive advantage for Minnesota and ensure a strong business climate well into the future.

The rising prices of natural gas and petroleum have had an adverse impact on the U.S. economy and Minnesota economy. The Energy Information Administration ("EIA") has calculated the impact of energy imports on the U.S. trade balance. *See* Figure 2 below. These charts show that in 2004, the U.S. imported $188 billion more energy than it exported.[9]

Figure 2. Merchandise Trade Value
(In Billions of Dollars)



[9] ENERGY INFO. ADMIN., MONTHLY ENERGY REVIEW, fig. 1.5, p. 10 (2005), *available at* http://www.eia.doe.gov/emeu/mer/pdf/mer.pdf.

The U.S. Department of Commerce ("U.S. DOC") prepared a detailed analysis of the impact of rising natural gas prices on employment and the U.S. economy ("U.S. DOC Report"), showing an average job loss of 489,000 jobs for the period of 2000-2004.[10] This job loss occurred prior to the significant increases in natural gas prices in 2005.

Rising natural gas prices have a much greater impact on the general economy than this impact on manufacturing alone. Assuming Minnesota's employment losses have been proportional to its share of total national employment, the U.S. DOC Report would indicate that these higher natural gas prices have cost Minnesota about 9,500 jobs through 2004.[11] Focusing on manufacturing, the U.S. DOC Report found the greatest job impact on manufacturers of chemicals, plastics, and primary metals (iron and steel). More than 100,000 jobs in the American chemical sector have been destroyed by high gas prices from 1999 - 2004. In 2004, Minnesota had over 32,000 jobs in these three sensitive industries.[12]

The record price levels for natural gas in 2005 will continue to drive out (or dramatically reduce the size of) industries in order to destroy demand until supply and demand equilibrium is reached. In essence, the laws of economics will eliminate the most energy-intensive industries first, and then systematically move to drive out industries in the order of their sensitivity and exposure to energy costs. This "demand destruction" is relied upon by all economists in the assumptions underlying market equilibrium. Without significant policy initiatives to avoid this demand destruction, a "perfect market" is not so perfect for the significant natural gas-intensive base industries in Minnesota.

The American Chemical Council ("ACC") promotes coal gasification as a means to restore the competitiveness of the U.S. chemicals industry. In an open letter to President George W. Bush written in November 2004, the ACC advised the Nation to "expand and diversify its portfolio," stating that "[i]ncentives for deploying proven new clean coal technologies, like coal gasification, must be quickly developed. Coal is, after all, the lynchpin to America's energy security."[13] In Pennsylvania, U.S. Steel Corp. recently joined Governor Edward G. Rendell in commencing efforts to form a coalition of manufacturers called "Pennsylvania Manufacturers for Coal Gasification," as a way to develop substantially cheaper synthetic gas alternatives.[14]

By generating electricity from coal, IGCC can reduce the use of natural gas in the electricity sector. This reduction would free limited natural gas supplies for use in manufacturing and home heating, and allow for substitution of natural gas for imported oil. In addition, the

[10] U.S. DEPT. OF COMMERCE, IMPACTS OF RISING NATURAL GAS PRICES ON THE U.S. ECONOMY AND INDUSTRIES, Table 2.2, p. 8, Jun 29, 2005, *available at* https://www.esa.doc.gov/natural_gas_final_report.pdf.
[11] National employment taken from ftp://ftp.bls.gov/pub/suppl/empsit.compaes.txt.
[12] Minnesota Dep't of Employment and Econ. Dev., http://www.deed.state.mn.us/lmi/jobs.htm.
[13] American Chemistry Council, letter to President George W. Bush, Nov. 19, 2004, *available at* http://www.accnewsroom.com/docs/2100/2073.pdf.
[14] Press release, State of Pennsylvania, Governor Rendell Launches Initiative to Support Manufacturers, Continue Job Growth; Bold Homegrown Solution Maintains PA Energy Leadership, Nov. 25, 2005, *available at* http://www.state.pa.us/papower/cwp/view.asp?Q=447926&A=11&pp=12&n=1.

capability to make transportation fuels, pipeline quality gas and hydrogen from coal offers the promise of reducing Minnesota's reliance on products priced with reference to record high oil and gas prices. While the Mesaba Project cannot change global economics, it will allow Minnesota to help move a bad situation in the right direction.

5. A CLEAN ENVIRONMENT PROMOTES STRONG BUSINESS AND TOURISM

The Mesaba Project will produce energy using a method that is many times cleaner than alternative technologies. As detailed in Subsection E below and Section IV of this Report, as compared to conventional coal alternatives, IGCC technology is much cleaner and will result in lower health costs to Minnesota citizens, a more productive work force for Minnesota, and a better quality of life for everyone. The quality of Minnesota's environment is a feature that helps attract and maintain innovative companies and individuals who are critical to Minnesota's economic prospects. In addition, preserving Minnesota's natural environment is important to tourism. In particular, a clean environment is important to fishing, hunting and other outdoor activities. According to 2003 statistics compiled by Explore Minnesota, about 28.6 million travelers each year spent over $25 million a day (over $9.2 billion a year) in Minnesota, which results in $1 billion in tax revenue. Of those who contacted the Minnesota Office of Tourism, 46% planned to do some scenic touring, 32% planned to fish, 25% were going to stop at a state or national park, 22% were camping, and 14% were going to hike.[15] 230,000 people are employed in the leisure and hospitality industry in Minnesota.[16]

Mesaba One will provide many important economic development benefits to the Iron Range and the entire State, satisfying this requirement of the IEP Statute.

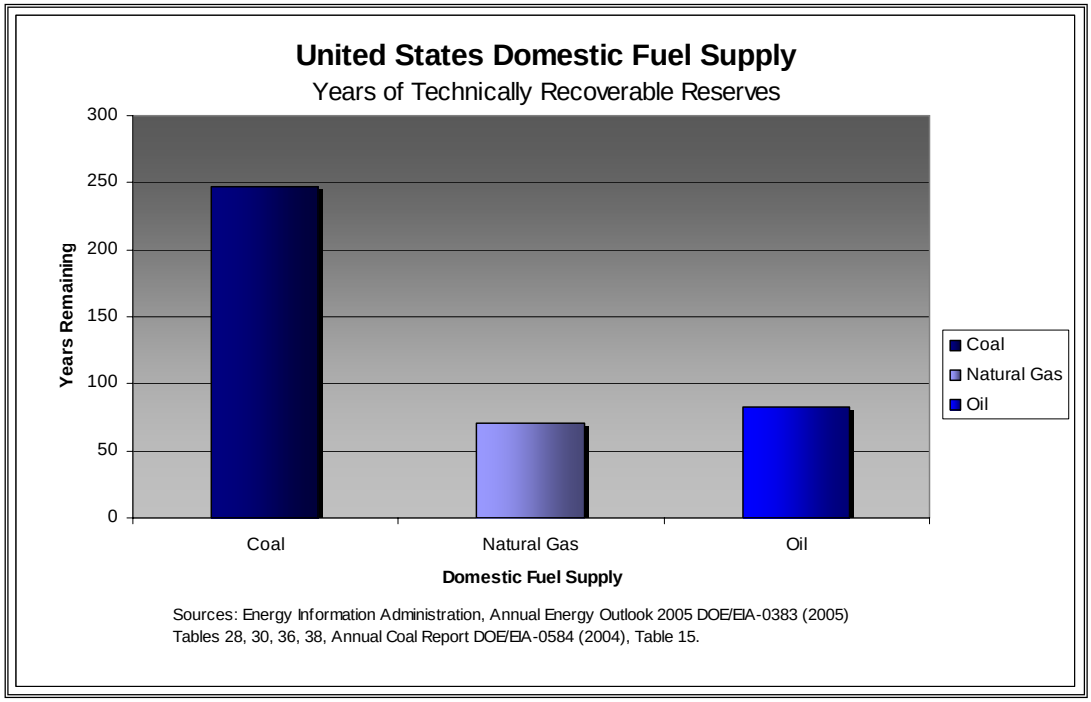
B. THE MESABA PROJECT WILL USE AN ABUNDANT DOMESTIC FUEL SOURCE

The IEP Statute directs the Commission to consider and confirm that the Mesaba Project will use an abundant, domestic fuel source. The Project's primary fuel source is domestic coal, America's most abundant fuel. With coal reserves of 267,312 million short tons and current rates of production at 1,083 million short tons per year, the United States has more than 240 years of technically recoverable coal reserves at its disposal. These coal reserves will last more than 160 years longer than the technically recoverable reserves of domestic oil and domestic natural gas. See Figure 3 below.

[15] "Tourism Works for Minnesota: Tourism and the Economy," Explore Minnesota Tourism, p. 1, 7 (2005), *available at* http://industry.exploreminnesota.com/sites/f998bc45-3bdd-43f1-b100-04b8aaa908d1/uploads/tourism_works.pdf.

[16] The Governor has appointed an Explore Minnesota Tourism Council to promote this industry. For details about the role of tourism to the Minnesota economy, *see* a report on the Explore Minnesota Tourism Council's website, *available at* http://industry.exploreminnesota.com/sites/f998bc45-3bdd-43f1-b100-04b8111908d1/uploads/tourism_works.pdf.

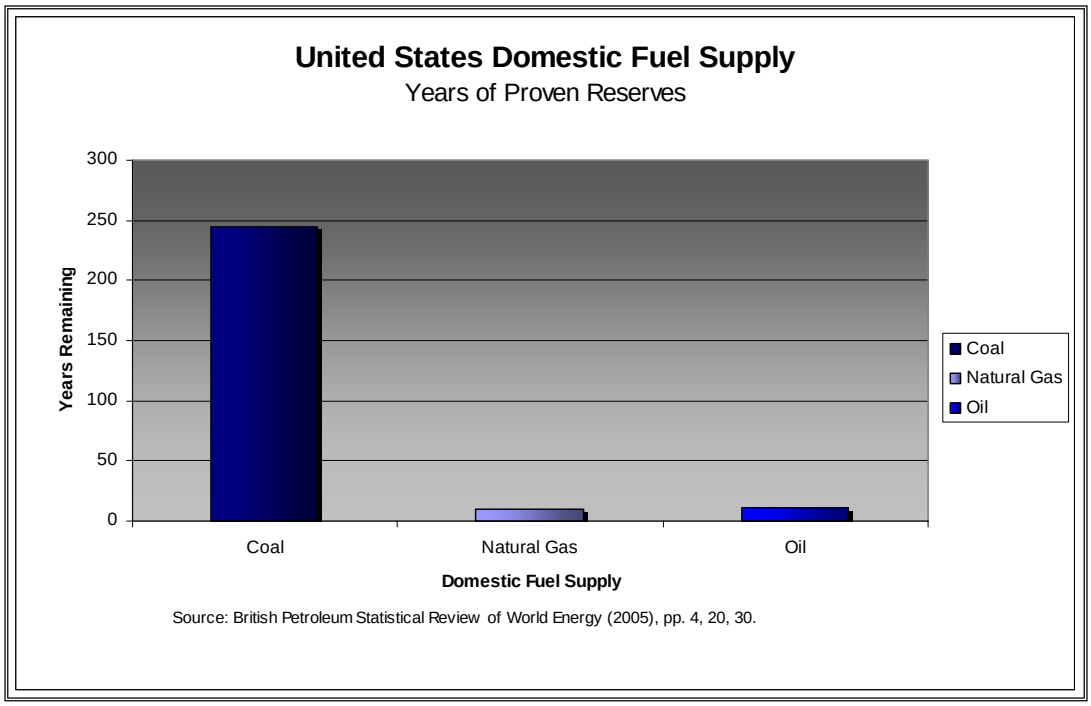
Figure 3. Years of Technically Recoverable Fossil Fuels in the United States



The disparity between the longevity and volume of domestic supplies of coal compared to oil and gas is even more pronounced when proven, rather than technically recoverable, reserves are measured. According to British Petroleum's annual "Statistical Review of World Energy," the U.S. has proven reserves of coal, natural gas, and oil that will last 245 years, 9.8 years, and 11.1 years respectively.[17] See Figure 4 below.

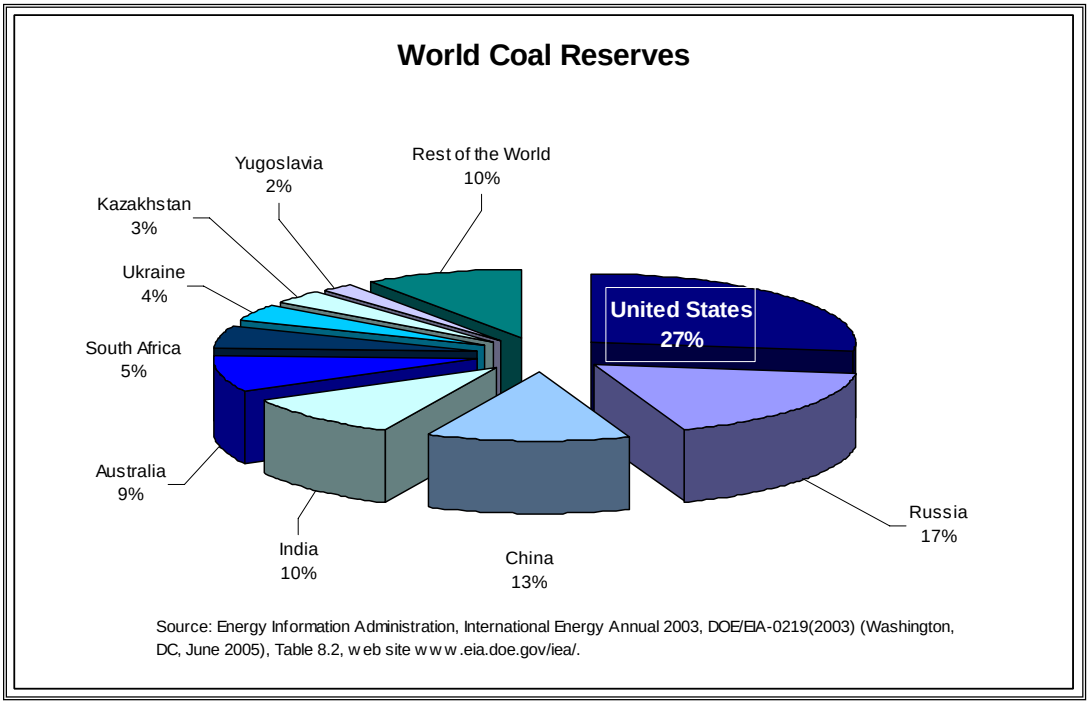
[17] B.P Statistical Review of World Energy, June 2, 2005.

Figure 4. Years of Proven Fossil Fuel Reserves in the United States



Relative to the world, the United States controls the largest reserves of domestic recoverable coal, by a significant margin. With more than 267 billion short tons, America has 56% more recoverable coal than Russia (173 billion short tons), 114% more than China (126 billion short tons), and 166% more than India (102 billion short tons), which have the world's second, third, and fourth largest reserves respectively. See Figure 5 below.

Figure 5. Distribution of World Coal Reserves, By Country



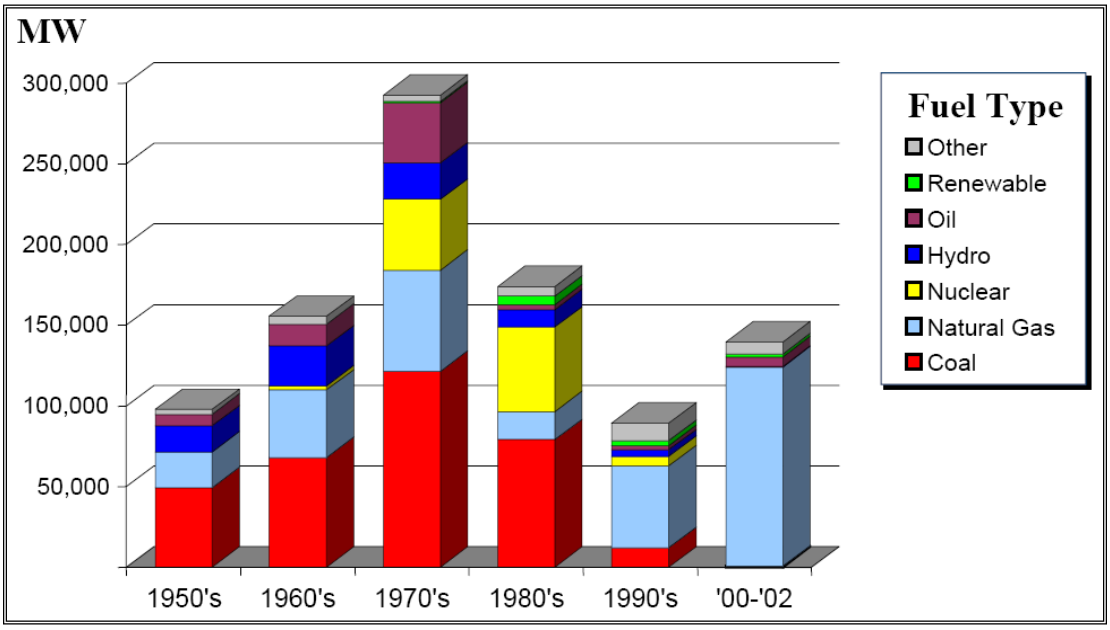
The Department of Energy's Deputy Assistant Secretary for Coal and Power Systems, George Rudins, testified to the remarkable size of American coal supplies before the U.S. House of Representatives' Committee on Energy and Commerce two years ago:

> Coal is our Nation's most abundant domestic energy resource. One quarter of the entire world's known coal supplies are found within the United States. In terms of energy value (Btus), coal constitutes approximately 95 percent of U.S. fossil energy reserves. Our nation's recoverable coal has the energy equivalent of about one trillion barrels of crude oil - comparable in energy content to all the world's known oil reserves.[18]

Despite the relative abundance of domestic coal and the fact that all incremental supplies of natural gas must come from foreign sources of liquefied natural gas ("LNG"), virtually all electric capacity additions during the past 15 years have been natural gas-fired capacity. This is in stark contrast with the investment decisions of utilities in the 1970s and 1980s. *See* Figures 6 and 7 below, showing EIA data.

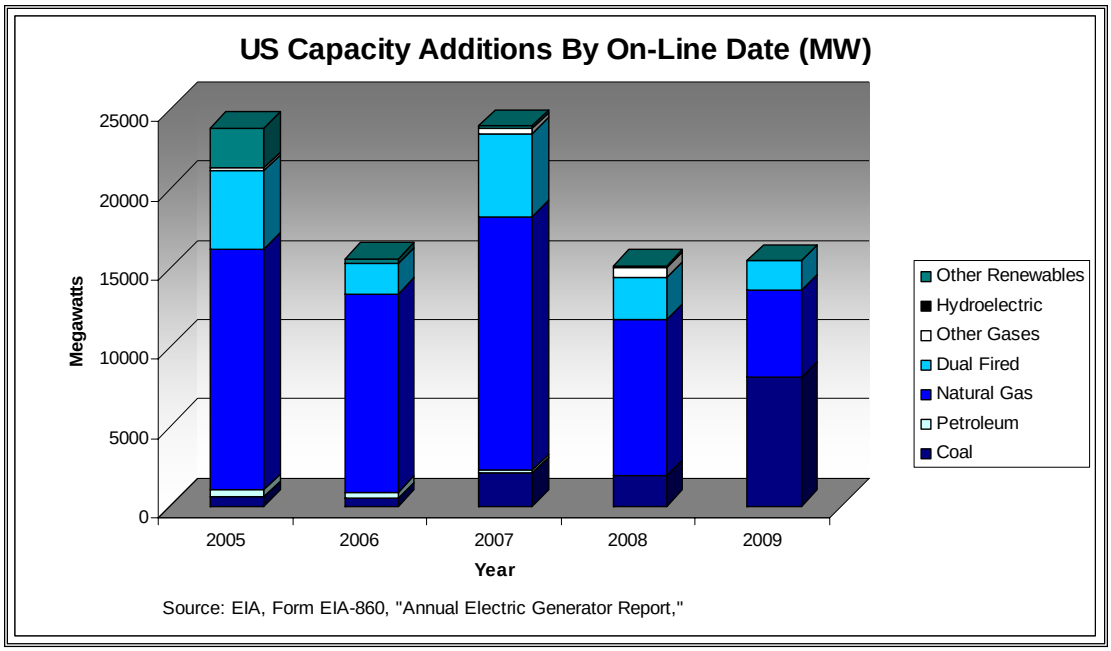
[18] Testimony of George Rudins, Deputy Assistant Secretary for Coal and Power Systems, Department of Energy, before the U.S. House of Representatives' Committee on Energy and Commerce, Jun. 24, 2003, *available at* http://energycommerce.house.gov/108/Hearings/06242003hearing968/Rudins1544.htm.

Figure 6. U.S. Capacity Additions, By Decade 1950 – 2000



Significant growth in gas-fired power generation capacity is forecasted to persist for the long term. EIA estimates that in the next four years, utilities plan to add another 59,074 MW of gas-fired capacity. See Figure 7 below.

Figure 7. U.S. Capacity Additions by Year, 2005 – 2009



Decisions to place further reliance on natural gas for power generation are driven by low natural gas price forecasts that, paradoxically, rely on the assumption that new coal-fueled and nuclear generating units will come online in significant numbers such that demand for natural gas moderates to the point where prices drop to historical levels. This assumption, along with the assumption that LNG will be available to fill all supply gaps caused by shrinking domestic production, drive the EIA forecast.[19] Excelsior has briefed the Commission on the danger of predicating Minnesota's energy mix on gas price forecasts that are based upon these vulnerable assumptions in its November 23, 2005 filing in the Xcel Integrated Resource Plan docket. A report that underscores the flaws and consequences of relying on these critical assumptions, prepared by Mr. Andrew Weissman of FTI Consulting and filed by Excelsior with its November 23 comments, is attached as Exhibit C.

The Federal government has recognized the numerous benefits attending the use of abundant, domestic coal to meet our national energy needs. These include economic security through low electricity prices, reduced balance of trade deficit, job creation, and improved energy security.[20] According to former Secretary of Energy Spencer Abraham, "[c]lean-coal technology will be the key to continuing coal's invaluable contribution to meeting the nation's energy, economic and environmental goals."[21]

In recent years, the critical role of IGCC in ensuring energy security and providing the optimal path towards energy independence has taken the forefront position in energy and environmental policy. Section VII of this Report provides an overview of these and other benefits that underlie the national consensus that has emerged in support of IGCC as a cornerstone of the national energy policy. Section VII attaches many publications and documents that reflect this growing consensus.

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[19] From 2003 to 2005, despite the widening domestic production and the increasingly grim import outlook, EIA introduced its discussion of net imports in the Annual Energy Outlook ("AEO") with the same flat assertion: "[n]et imports of natural gas make up the difference between U.S. production and consumption." *See* ENERGY INFO. ADMIN., U.S. DEPT. OF ENERGY, SUPPLEMENTAL TABLES TO THE ANNUAL ENERGY OUTLOOK 2003 76 (2003), *available at* http://www.eia.doe.gov/oiaf/archive/aeo03/supplement/sup_ogc.pdf; ENERGY INFO. ADMIN., U.S. DEPT. OF ENERGY, ANNUAL ENERGY OUTLOOK 2004 91 (2004), *available at* http://seca.doe.gov/coal/refshelf/aeo.pdf, and ENERGY INFO. ADMIN., U.S. DEPT. OF ENERGY, ANNUAL ENERGY OUTLOOK 2005 96 (2005), *available at* http://www.eia.doe.gov/oiaf/archive/aeo05/pdf/0383(2005).pdf. That may be about to change. In the early release of EIA's AEO 2006, EIA dropped its forecast of LNG imported by 2025 by 36% (from 6.4 TCF to 4.1 TCF):

> More rapid growth in worldwide demand for natural gas in the *AEO2006* reference case reduces the availability of LNG supplies to the United States and raises worldwide natural gas prices, making LNG less economical in U.S. markets.

ENERGY INFO. ADMIN., U.S. DEPT. OF ENERGY, AEO 2006 OVERVIEW, p. 3 (2006), *available at* http://www.eia.doe.gov/oiaf/aeo/pdf/earlyrelease.pdf.

[20] *See* the remarks of Secretary of Energy Spencer Abraham on the purpose and importance of the Clean Coal Power Initiative, at http://www.fossil.energy.gov/news/techlines/2004/tl_ccpi_round2_proposals.html

[21] Remarks by Energy Secretary Spencer Abraham to the National Petroleum Council, Apr. 10, 2002, *available at* http://energy.gov/engine/content.do?PUBLIC_ID=13388&BT_CODE=PR_SPEECHES&TT_CODE=PRESSSPEECH.

In a February, 2005 speech, President Bush summed up the situation, saying "dependence on foreign oil is a matter of national security. To put it bluntly, sometimes we rely upon energy sources from countries that don't particularly like us."[22]

The National Resources Defense Council ("NRDC") succinctly outlined the dangers of American reliance on foreign sources of energy (in this case, foreign oil):

> The United States consumes 25 percent of all the oil produced in the world, yet we control just 3 percent of the world's oil reserves. As a result of this imbalance, we've become heavily reliant on foreign oil, much of which comes from the conflict-ridden Middle East. In 1974, our country imported one million barrels a day from the Persian Gulf; today, that figure tops 2.5 million. This dependence means our economy is highly vulnerable to wild swings in the price and supply of oil -- a fact that's become all the more unsettling since the Sept. 11th terrorist attacks in New York and Washington.[23]

The danger of reliance on natural gas for power generation have in recent years fundamentally changed from an issue of prioritizing scarce domestic resources to an issue of national energy security, as U.S. reserves are depleted and LNG imports must meet a larger portion of current demand and all future growth in natural gas demand. The FTI Report describes the numerous links in the LNG supply chain that must come together in order for LNG to be a factor in meeting projected demand, and chronicles the formidable obstacles to the realization of that supply.[24]

The executive director of the Institute for the Analysis of Global Security, a think tank focused on energy security issues, observes a parallel between our current dependence on oil with the projected new dependence on LNG:

> All we're talking about doing is replacing one dependency with another…The main sources of natural gas are located in the Middle East and Russia. So we're talking about the same sort of problem.[25]

The executive director of the Energy Future Coalition agreed:

> There are certainly people who are worried about the U.S. trading one form of energy dependence for another….If LNG became a principal source of energy

[22] Remarks by President George W. Bush, "Remarks on Energy Efficiency," Feb. 25, 2002, *available at* http://www.whitehouse.gov/news/releases/2002/02/20020225-5.html.
[23] Website of the National Resources Defense Council, Energy and National Security: It's Time to Bring America's Appetite for Oil Under Control, *available at* http://www.nrdc.org/air/energy/qsecure.asp.
[24] *See* FTI Report, attached as Exhibit C.
[25] The Christian Science Monitor, "A New Fuel Fix: Boon or Bane?" Jun. 23, 2005, *quoting* Gal Luft, executive director of the Institute for the Analysis of Global Security, *available at* http://www.csmonitor.com/2005/0623/p13s01-sten.htm. (The IAGS also pointed out that IGCC can also provide a technological way to achieve energy security through the minimization of water usage. *See* "Finding Technological Solutions to the Energy-Water Nexus," *available at* http://www.iags.org/n0829052.htm.)

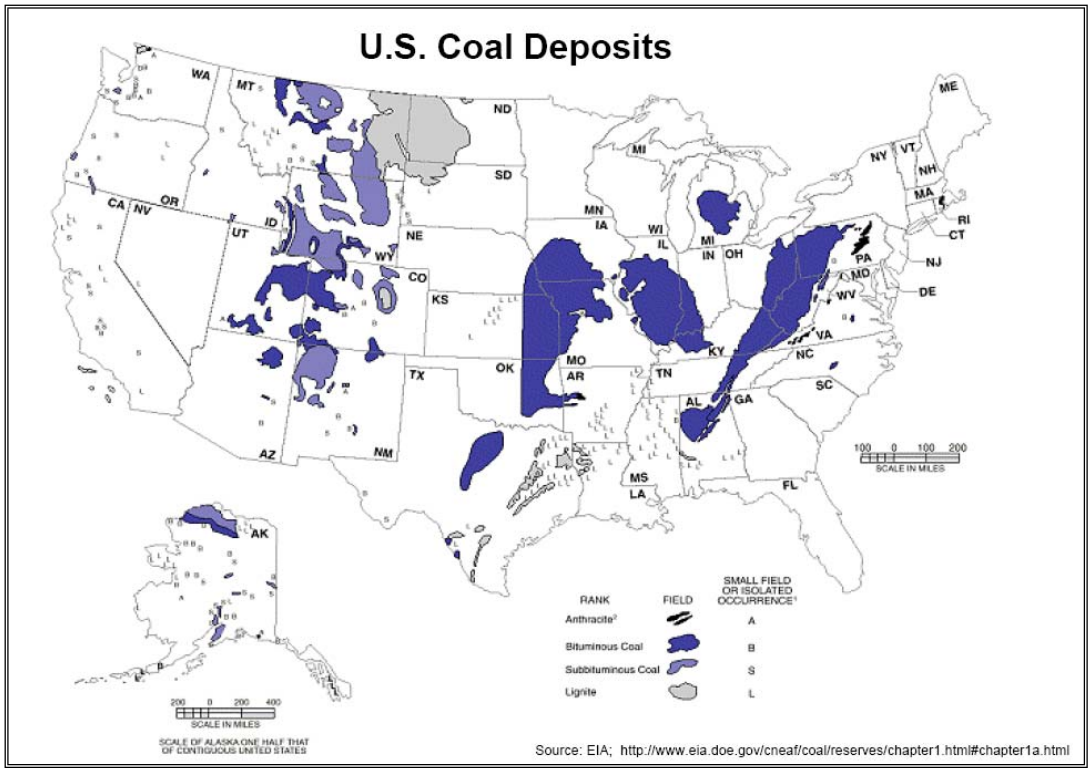
> for the U.S. and demand rises around the world, we're going to have problems in the future similar to those that we have with oil today.[26]

The executive director of the American Council for an Energy Efficient Economy expressed a similar concern:

> The U.S. won't be able to avoid at least some use of LNG….But we have to ask ourselves how dependent do we want to become on foreign energy?[27]

In addition to avoiding dependence on foreign supplies of oil and gas, reliance on coal for power generation provides additional supply security due to coal's broad geographic dispersion across the U.S. Supply of coal is therefore not susceptible to material disruptions in supplies at a single, concentrated source. Figure 8 depicts the broad distribution of coal resources in the U.S.

Figure 8. Geographic Distribution of United States Coal Deposits



For these reasons, IGCC facilities that can use coal with minimal environmental impacts are critical to energy security for Minnesota and to national security.

[26] The Christian Science Monitor, "A New Fuel Fix: Boon or Bane?" Jun. 23, 2005, *quoting* Reid Detchon, executive director of the Energy Future Coalition, *available at* http://www.csmonitor.com/2005/0623/p13s01-sten.htm.

[27] The Christian Science Monitor, "A New Fuel Fix: Boon or Bane?" Jun. 23, 2005, *quoting* Steven Nadel, executive director of the American Council for an Energy Efficient Economy, *available at* http://www.csmonitor.com/2005/0623/p13s01-sten.htm.

The Mesaba Project uses coal as a primary feedstock, satisfying the statutory requirement that it use an abundant domestic fuel source.

C. THE PRICE OF THE MESABA PROJECT'S OUTPUT WILL BE STABLE

The IEP Statute directs the Commission to consider and confirm the price stability benefits of the Mesaba Project.

The Project will be able to offer energy at a price far more stable than that of competing natural gas facilities and even more than traditional coal-fired facilities. The PPA provides for a stable, predictable tariff. Reducing pressure on natural gas prices will have a stabilizing effect on other energy costs borne by consumers. In addition, the fuel flexible design of the Mesaba Project will minimize ratepayers' exposure to spikes in the cost of any single fuel. Even the Project's choice of coals will be flexible, allowing the Project to change supply or transportation if any single source becomes too expensive or is disrupted. The Project's spare gasifier, and the capability of the combined cycle-power plant to run on natural gas when the gasification facilities are unavailable, provide additional hedges to the total cost of generation.

Finally, the environmental profile of the Project provides a hedge against changing emission limits and corresponding retrofit costs for conventional coal plants, providing additional price stability.

1. THE COST OF POWER FROM THE FACILITY IS HEDGED UNDER THE PPA

The tariff in the PPA provides for a very stable, predictable cost of power. This is due to the small portion of total costs represented by fuel, and the stability of solid fuel prices. Figures 3 and 4 in Section III of this Report depict the capacity and energy components of the PPA tariff. The charts illustrate that the bulk of the total tariff under the PPA is tied to a capacity payment that is fixed and flat for the life of the Project, and reducing in real terms over the life of the contract. In addition, because supplies of domestic coal are abundant and the costs of production are stable, the price of the facility's solid feedstocks will be much less volatile than the price of natural gas and the small variable energy component of the total price will be stable.

In addition, the PPA structure provides for greater price certainty than a utility cost of service model, because the tariff is fixed for the life of the contract, locking in the benefits of the current low interest rate environment. In contrast, prices quoted by utilities reflect an assumption that the required allowed tariff to cover interest expense and a return on equity will not increase over the life of the plant and be passed through to ratepayers in subsequent rate cases.

2. AVOIDING FURTHER EXPOSURE TO NATURAL GAS PRICES IMPROVES PRICE STABILITY

The Mesaba Project will avoid additional exposure to natural gas prices for Xcel's ratepayers. In addition, the impact of reduced demand for gas will reduce price pressure on natural gas for all Minnesota gas consumers. Further, the role the Project will play in increasing the number of hours of each day that coal is at the margin of the merit order dispatch of generation will have a multiplier effect on the price NSP's and other Minnesota utility ratepayers will pay for all open market purchases of capacity and energy, which embed the average cost of production on the NSP system into their market-based pricing.

Xcel's preferred 2004 Integrated Resource Plan ("IRP") proposes to increase significantly Minnesota's consumption of natural gas for power generation even from the levels proposed in its 2002 Resource Plan which were a cause of concern to the Legislature. In the 2002 Resource Plan, Xcel projected additions of only 800MW of natural gas-fired capacity through 2015 and recommend the addition of 1804MW of new coal-fired capacity through 2015.

Despite the near tripling of natural gas prices that has occurred since Xcel made these recommendations to the Commission, Xcel has in fact added 2041MW to its list of approved gas-fired capacity since the 2002 Resource Plan was under consideration. In addition, Xcel proposes adding yet an additional 349 - 562MW of new combined cycle and peaking capacity by 2012. Cumulating Xcel's gas-fired capacity additions during this period, Xcel will expose its ratepayers to an additional $71 - 78 million of costs they will pay under the fuel adjustment clause for every dollar that gas prices exceed the low forecasted levels that formed the basis for these decisions.[28]

The Mesaba Project will reduce a portion of this additional pressure on natural gas supplies. Assuming that between 2011 and 2015, all of Mesaba One's output will reduce energy from natural gas-fired generation from new and existing facilities, Mesaba One will reduce the annual volume of natural gas consumed for Xcel's ratepayers by 32,000,000 MMBtu. The second Mesaba Project facility, Mesaba Two, will come online in 2013. Mesaba Two will reduce gas consumption annually by an additional 32,000,000 MMBtu. With both Mesaba units in the mix, for every $1/MMBtu gas prices go up, ratepayers would be shielded from additional annual expense of $64,000,000 by the displacement of gas-fired dispatch with energy from the Mesaba Project.

[28] Xcel's current and forecasted natural gas consumption patterns are designated by Xcel as a trade secret. This calculation is therefore made using estimates, based upon publicly available information, about capacity factors and heat rates for each of Xcel's new gas-fired units. For example, the Mankato Energy Center is forecasted by Xcel to run at a 60% capacity factor from normal combined cycle operations, and 20% from the peaking capacity offered by its duct firing. MERP is forecasted to run at a 62% capacity factor and a 7000 Btu/kWh heat rate. For purposes of the calculation, the capacity factor for the combined cycle units was assumed to average 60% and the heat rate was assumed to be 6800 Btu/kWh. The capacity factor for the peaking units was assumed to average 20% and the heat rate was assumed to be 9000 Btu/kWh. Assuming the additional 349 – 562 MW Xcel has proposed is a similar mix of peaking and intermediate capacity as the previously approved additions, Xcel's new gas-fired capacity will consume an additional 71,000,000 – 78,000,000 MMBtu of natural gas per year.

The extent to which Xcel's material increase of natural gas-fired generation will increase price and volatility levels of the commodity remains to be seen. But the costs imposed on Minnesota's economy by every dollar increase in the price of natural gas can be quantified. Minnesotans consumed 350,000,000 MMBtu of natural gas in 2004, which consumption is projected to grow by 2011 to at least 405,000,000 MMBtu.[29] Therefore, for every $1 increase in the price of natural gas, Minnesotans will pay at least an additional $405 million annually for natural gas to meet statewide energy needs.

In addition, electric prices will increase for all open market purchases for every hour that natural gas-fired capacity is at the margin in Xcel's energy production. This holds true not only for short-term and medium-term open market purchases to meet demand fluctuations from natural gas-fired facilities, but also for all other sources of power generation as well. For example, hydroelectric purchases that are currently under contract have historically been priced with reference to the excess coal capacity in the region. As this over-capacity dries up, so will hydroelectric capacity at bargain prices. Without adequate coal in the resource mix, Minnesota will experience a pricing surprise when seeking renewal of the hydroelectric PPAs. Similarly, as Xcel's power purchase agreements with wind generation suppliers expire, the utility will be forced by the Renewable Energy Objective to renew those contracts at a time when the independent owners of the wind facilities will be looking to a natural gas driven marketplace to set their asking prices. Finally, even if limited coal-based generation in the region were to be available for purchase on the open market, natural gas prices will be setting the clearing price for a much larger proportion of the day. Paradoxically, too much gas-fired capacity will even result in higher open market prices for coal-fueled generation.

Reduction in natural gas consumption for power generation – and ensuring coal is at the margin for as many hours of the day as possible - will therefore provide a very dramatic multiplier benefit to all electric consumers in Minnesota.

The forces behind natural gas price volatility have intensified dramatically since 2003, when the Minnesota Legislature articulated a strategy for mitigating natural gas price risk by enacting the IEP Statute and the Clean Energy Technology Statute. In the two and one-half years since enactment, domestic natural gas supplies have shrunk dramatically, and new demand, principally from the power sector, has replaced the industrial demand that was destroyed by the first major price increase. That former industrial demand served as a price elastic buffer between supply and demand. The new power sector demand for natural gas that has taken the place of this former industrial demand, in contrast, is of the "keep the

[29] While the Energy Information Administration's "Natural Gas Annual" contains profiles of historical natural gas consumption on a state-by-state basis, its "Annual Energy Outlook" only predicts growth on a nation-wide basis. Minnesota's natural gas consumption in 2011 was forecasted in two ways - by applying Minnesota's .96% average historical annual growth in natural gas consumption, and by calculating the proportion of Minnesota's 2004 consumption to consumption nation-wide and assuming that it would compose roughly the same proportion in 2011. The former method predicts consumption of 395 Bcf while the latter predicts consumption of 397 Bcf. 395 Bcf of natural gas is roughly equivalent to 405 trillion Btu. Both methods will understate total consumption in Minnesota in light of Xcel's dramatic increase in demand for natural gas for power generation, which will cause demand growth statewide to far outstrip historical demand growth.

lights on" variety and is not able to be reduced, at least in the medium term, in response to spikes in price. The extent of the increased volatility of natural gas prices in a marketplace where the remaining purchasers' consumption patterns are much less price elastic remains to be quantified and experienced.

In addition to requiring consumers to absorb natural gas price increases, inadequate coal-fueled base load capacity exacts an additional toll on Minnesota consumers by forcing them to deal with the challenges associated with increasing yearly and seasonal price volatility. School boards, counties, taconite producers and other manufacturers all must budget for the coming year, or price their products in advance of actual production, based on gas price projections, and then live in the real world and adjust their tight operating budgets to pay the natural gas bill when actual prices don't match forecasts. While the value of the hedge offered by a coal-based alternative is difficult to quantify, Florida Power and Light attempted to do so in its analysis of the benefits of coal. A simple factoring of that analysis would suggest that the hedge value of Mesaba One would be, at a minimum, $18 million per year. This value is over and above the difference in price levels for the coal and gas alternatives.[30]

Natural gas price volatility leads Minnesota businesses - particularly small businesses that cannot use market hedging mechanisms - to price their products based on worst-case natural gas pricing assumptions, as a matter of survival. This leads to an upward spiral that can lead to inflation, and has a chilling effect on the State's economic activity.

Another negative consequence of forcing natural gas into the power generation mix is that consumers may turn to electric power to meet home heating needs when gas prices are high. Electric heating makes little sense when the electric generation mix becomes dominated by natural gas for fuel. In a world where supplies of natural gas are scarcer, and in a nation where natural gas supplies are even scarcer, the net effect is that consumers are paying for natural gas to generate power at a 50% thermal efficiency instead of using those same Btus in a home furnace with a 90% thermal efficiency. This inefficient utilization of a finite resource illustrates the importance of balancing Minnesota's overall energy portfolio and minimizing gas-fired generation on the behalf of electric ratepayers. Regulators should play an active role to ensure that an overall balance is maintained on behalf of consumers that they cannot maintain themselves. This is particularly important in the context of Minnesota's vertically integrated, monopoly franchised power sector, where electric customers do not choose their electric power supplier.

3. FUEL FLEXIBILITY ADDS TO PRICE STABILITY

The Project's use of coal for fuel provides an inherent price hedge. This hedge is enhanced by the Project's fuel flexible design.[31] One of the benefits of the IGCC technology is the ability to design for and utilize a wide range of hydrocarbons, including a wide variety of

[30] *See* FPL's Report on Clean Coal Generation, provided to the Florida Public Service Commission on March 10, 2005, *available at*: http:www.fpl.com\about\contents\clean-coal.shtml.
[31] *See* Section VII, Project Overview, for an overview of the Project's design.

coal qualities and petroleum coke. This unique feature will allow the plant to select fuels that reflect the best value over the life of the plant. As a result, the Project's output price will be even more stable than that of conventional coal-fired alternatives.

Mesaba One is expected to use approximately 2.7 million tons of coal annually, with coal from the Powder River Basin serving as the design reference fuel. Petroleum coke may also be used for blending and to reduce the cost paid by consumers for the plant output. The gasification process is generally indifferent to the amount or quality of sulfur contained in the fuel since the gasification process removes the sulfur in its elemental form. High sulfur coal reserves that cannot be used by other technologies are given new market potential by the IGCC technology. The Project design will also, therefore, accommodate the use of high sulfur Midwestern bituminous coals such as Illinois No. 6.[32]

4. CONFIGURATION OF THE PLANT ADDS TO PRICE STABILITY

The Mesaba Project's design incorporates a full spare gasification train to provide redundancy and dramatically improve availability from that of a single train configuration. In addition, the Mesaba Project's plant design integrates a gasification island with a combined-cycle power island to produce electricity. The power island is a combined-cycle power plant, optimized to run on syngas and, as an energy efficiency boost, configured to take advantage of waste heat available from the gasification process to make more electricity. *See* Section IV of this Report for a detailed description of the gasification process.

The Mesaba Project will be capable of producing electricity from either coal-derived syngas or natural gas. The operational conversion from one fuel to the other can be made very quickly, in a matter of seconds. The facility can provide dependable capacity on natural gas during hours when the gasification island is unavailable, unlike a conventional coal facility that must go offline when its boilers are unavailable. This back-up fuel capacity provides an additional price hedge compared to conventional coal facilities.

5. EMISSION PROFILE AND FLEXIBILITY PROVIDE ADDITIONAL PRICE STABILITY

As outlined in Subsection E below and detailed in Section IV, the Mesaba Project's superior environmental profile and its flexibility to meet tightening emission limits will result in greater price certainty than can be achieved by conventional coal alternatives.

Mesaba One will generally reduce emissions by 60% from those of a state-of-the-art, advanced supercritical pulverized coal plant.

Because IGCC cleans impurities from the syngas at a high-pressure, high-temperature stage in the process, clean-up is much more efficient and manageable when compared to conventional technologies, which must clean up flue gases after combustion has occurred.

[32] *See* Section VII, Project Overview, for a description of the Project's fuel strategy.

The clean-up equipment is modular, creating the flexibility to reduce emissions further, as improvements to the clean-up technology develop and emission limits tighten over time. This provides a hedge against tightening emission limits.

Additionally, the United States Department of Energy has identified a technology pathway to zero emissions from IGCC technology. This pathway will provide a continuous improvement cycle for the first fleet of IGCC plants. IGCC is at the beginning of a path of continuous improvement, while conventional coal has reached its limits in terms of its flexibility to respond to emission control requirements. Conventional coal plants will therefore require significant and continuing capital investment to keep up with ever-tightening emission limits, resulting in less price stability to ratepayers over the life of the conventional plant.

In sum, coal-fueled generation has very stable pricing due to the fact that the fuel costs associated with coal-fueled generation make up a minimal proportion of the cost of generation. The PPA structure locks in stable capacity prices by contract, offering superior price stability to a rate based alternative. The Mesaba Project's IGCC technology surpasses the price stability of conventional coal technologies by virtue of its fuel flexibility, higher availability due to its spare gasification train and its ability to run on natural gas during downtimes when a conventional coal plant would require other sources of back-up power, and the hedge against changes in environmental requirements provided by IGCC's inherently low emission profile and ability to meet tightening limits. For all of these reasons, the Mesaba Project satisfies this requirement of the IEP Statute by offering the most stable output prices of any available alternative.

D. THE MESABA PROJECT CAN FACILITATE THE TRANSITION TO A HYDROGEN ECONOMY

The IEP Statute directs the Commission to consider and confirm the Project's ability to contribute to a transition to a hydrogen economy in making the public interest determination. The Mesaba Project will be able to facilitate the development of hydrogen fuel by serving as a large, centralized source of hydrogen, and by acting as a first mover in producing it.

The Federal government has made the utilization of hydrogen for transportation fuel a national priority. President George W. Bush underscored the importance of hydrogen to the U.S. economy during his 2003 State of the Union address, pledging $1.2 billion over five years to support research and development efforts.[33] This was the culmination of a series of events that began with the President's National Energy Policy, which sought to modernize and expand the country's energy infrastructure in part by developing hydrogen as a fuel.[34] The Policy prompted DOE to convene a 2001 National Hydrogen Vision Meeting in

[33] President George W. Bush, State of the Union Address 2003, Jan. 28, 2003, *available at* http://www.whitehouse.gov/news/releases/2003/01/20030128-19.html.
[34] White House National Energy Policy, "The President's Energy Legislative Agenda, " Jun. 2001, *available at* http://whitehouse.fed.us/news/releases/2001/06/energyinit.html.

Washington, which led to a DOE report in early 2002 on the National Vision of America's Transition to a Hydrogen Economy ("Vision"),[35] and led in turn to a National Hydrogen Energy Roadmap ("Roadmap")[36] in late 2002 and a Hydrogen Posture Plan ("Posture") [37] in early 2004.

DOE's three documents all sought to ascertain the best route for achieving a hydrogen economy. The Vision examined the current hydrogen industry, described the key drivers affecting its future, and separated the steps needed to transition to a hydrogen economy into four distinct phases: (1) progress in technologies, policies and markets, (2) transitioning to the market place, (3) expansion of markets and infrastructure, and (4) realization of the hydrogen vision. The Roadmap expounded on the Vision, identifying specific challenges and paths forward for each stage in the supply chain (production, delivery, storage, conversion, and end-use).[38] Finally, the Posture established a specific timeline of milestones and next steps using specific technologies.

The challenges to a transition to a hydrogen economy are significant. Foremost among them is a lack of significant hydrogen production facilities. Hydrogen is the most abundant element on earth, but it does not exist in its pure elemental form (H_2). Every molecule of H_2 must be manufactured before it can be used which means that it will take energy to make energy.[39] The United States currently manufactures about 9 million short tons of hydrogen a year.[40] This amount could fuel "20 to 30 million hydrogen fueled cars, or enough to power 5 to 8 million homes."[41] Approximately 40 million short tons of hydrogen (equivalent to the output of 280 dedicated IGCC plants) would be required to fuel 75% of light-duty vehicles alone.[42] Current production levels will not increase until an identified large-scale demand is

[35] U.S. DEP'T OF ENERGY, A NATIONAL VISION OF AMERICA'S TRANSITION TO A HYDROGEN ECONOMY – TO 2030 AND BEYOND (2002), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/vision_doc.pdf.
[36] U.S. DEP'T OF ENERGY, NATIONAL HYDROGEN ENERGY ROADMAP (2002), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/national_h2_roadmap.pdf.
[37] U.S. DEP'T OF ENERGY, HYDROGEN POSTURE PLAN (2004), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/hydrogen_posture_plan.pdf
[38] U.S. DEP'T OF ENERGY, NATIONAL HYDROGEN ENERGY ROADMAP, p. iii (2002), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/national_h2_roadmap.pdf.
[39] U.S. DEP'T OF ENERGY, A NATIONAL VISION OF AMERICA'S TRANSITION TO A HYDROGEN ECONOMY – TO 2030 AND BEYOND, p. 4, (2002), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/vision_doc.pdf.
[40] U.S. DEP'T OF ENERGY, A NATIONAL VISION OF AMERICA'S TRANSITION TO A HYDROGEN ECONOMY – TO 2030 AND BEYOND, p. 3, (2002), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/vision_doc.pdf.
[41] U.S. DEP'T OF ENERGY, A NATIONAL VISION OF AMERICA'S TRANSITION TO A HYDROGEN ECONOMY – TO 2030 AND BEYOND, inset, p. 7, (2002), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/vision_doc.pdf.
[42] U.S. DEP'T OF ENERGY, HYDROGEN POSTURE PLAN, P. 29, (2004), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/hydrogen_posture_plan.pdf

on the horizon. Large scale hydrogen demand will not materialize until an identified source of production is identified. A first mover with significant hydrogen production capability would address this quandary.[43]

DOE identifies a combination of inertia and uncertainty as another obstacle standing in the hydrogen economy's way:

> The United States' energy sector is experiencing a confluence of events. New technologies are being developed and opportunities for entrepreneurial ideas and innovative approaches are ripening at a time when our capital-intensive, aging energy infrastructure is in need of improvement. Despite this window of opportunity, the overall business environment for energy investments in America today is not conducive to the massive introduction of new technologies.
>
> The Nation faces uncertainties in our energy future and inertia in our infrastructure system. America's energy future will include unpredictable ups and downs, price volatility, regional gluts and shortages, and market instabilities. The natural pace of turnover of existing capital in our infrastructure is relatively slow, there is reluctance to alter traditional systems, and the framework of changing policies and regulations tends to favor incumbent suppliers and technologies.
>
> These factors introduce uncertainties and risk and interfere with making changes. For example, existing inertia in our energy system has made it difficult for policy makers and business executives to make strategic decisions about long-term energy requirements, which has led to delays in decision-making, and has made it hard for businesses to commit to large financial resources to energy investments.
>
> The factors affecting hydrogen's potential are rooted in these issues.[44]

The Mesaba Project is poised to address many of these problems. First, it has the capability of being a first mover. Hydrogen is one of the major components of the Project's syngas so that additional gasification units can be readily configured to provide Minnesota with a steady stream of cost-competitive hydrogen. *See* Section IV of this Report. Until there is a demand for all of a gasification unit's hydrogen, excess syngas can be used for power generation, or sold as a natural gas substitute, which will help to defray the risks and costs of acting as a first mover. Second, the Mesaba Project can address DOE's concerns about

[43] U.S. DEP'T OF ENERGY, A NATIONAL TRANSITION OF AMERICA'S TRANSITION TO A HYDROGEN ECONOMY – TO 2030 AND BEYOND, p. iii, (2002), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/vision_doc.pdf.

[44] U.S. DEP'T OF ENERGY, A NATIONAL TRANSITION OF AMERICA'S TRANSITION TO A HYDROGEN ECONOMY – TO 2030 AND BEYOND, p. 11 (2002), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/vision_doc.pdf.

inertia and uncertainty by replacing "aging energy infrastructure," hedging "uncertainties in our energy future," and committing "large financial resources to energy investment."

DOE's Hydrogen Vision, Roadmap, and Posture all recognize IGCC's value in realizing the hydrogen economy. In the Vision, DOE recognized "the significant role that IGCC will need to play in developing the hydrogen economy.[45] DOE's Roadmap identified high production costs, low demand, carbon dioxide emissions, and the lack of a developed technology as key barriers to production. To overcome these barriers, the Roadmap advocated the pursuit of IGCC as a way to both improve the technology and develop carbon dioxide capture and sequestration procedures while at the same time defraying the cost of a pure demonstration project through co-generation.[46] The Posture specifically recommended conducting research to develop a "multi-fuel, oxygen-blown, integrated gasification combined cycle system that can produce hydrogen and power" by 2015.

This thought was echoed by the leader of NETL's Methane Hydrates Research Group, who said that "coal must be a significant component of R&D aimed at making very large amounts of hydrogen," and called IGCC "the lowest cost path for producing hydrogen."[47]

Hydrogen has a wide range of future applications. It can be used to fuel automobiles and trucks instead of gasoline, thereby reducing the nation's current dependence on foreign sources of oil. It can be used to power fuel cells. The Mesaba Project is viewed by the U.S. Department of Energy (DOE) as a major stepping-stone in its Clean Coal Power Initiative (CCPI) toward FutureGen, a coal-fired, IGCC power plant with near-zero environmental emissions.[48] FutureGen would use a turbine powered by hydrogen, instead of syngas.[49]

The IEP Statute and Minnesota law in general reflect an intention to encourage technologies that can contribute to a transition to a hydrogen-based fuel economy. Minn. Stat. § 216B.013 declares that it "is the goal of this state that Minnesota move to hydrogen as an increasing source of energy for its electrical power, heating, and transportation needs." The Mesaba Project produces a gas from coal of which approximately 35% of its heat content comes from hydrogen, which can be separated into a pure stream for fuel cell and other hydrogen applications. In fact, in the scenario where carbon sequestration becomes a financially prudent means of meeting greenhouse gas limits, hydrogen will become the primary fuel of the Project.

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[45] U.S. DEP'T OF ENERGY, A NATIONAL VISION OF AMERICA'S TRANSITION TO A HYDROGEN ECONOMY – TO 2030 AND BEYOND, p. 22, (2002), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/vision_doc.pdf.
[46] U.S. DEP'T OF ENERGY, NATIONAL HYDROGEN ENERGY ROADMAP, p. 10 (2002), *available at* http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/national_h2_roadmap.pdf.
[47] Charles E. Taylor, Leader of the Methane Hydrates Research Group, Nat'l Energy Tech. Lab., "Technical Aspects of Clean Hydrogen Production," GCEP Energy Workshop at Stanford University, p. 4, 5, Apr. 26, 2004, *available at* http://gcep.stanford.edu/pdfs/energy_workshops_04_04/hydrogen_taylor.pdf.
[48] For a description of the FutureGen Initiative, *see* http://www.fossil.energy.gov/programs/powersystems/futuregen/index.html.
[49] *See* the description of the goals of Round Two of the Clean Coal Power Initiative at: http://www.fossil.energy.gov/news/techlines/2004/tl_ccpi_round2_proposals.html.

In sum, IGCC and the Mesaba Project satisfy this requirement of the IEP Statute and are a critical foundation to any strategy to transition to hydrogen as a fuel source.

E. THE MESABA PROJECT WILL ACHIEVE SIGNIFICANT EMISSION REDUCTIONS COMPARED TO OTHER SOLID FUEL BASE LOAD TECHNOLOGIES

The IEP Statute directs the Commission to consider and confirm the Project's emission reductions compared to other solid fuel base load technologies. The overall air emissions profile characterizing the Mesaba Project is superior to that of any other conventional coal-fueled electric generating unit in the nation. This subsection provides comparative analyses of the emissions profile of the Mesaba Project: first, with those of recently permitted state-of-the-art supercritical pulverized coal-fueled boiler ("SCPC") plants; second, with the existing fleet of coal plants in Minnesota; and third, with the lowest-emitting coal-fueled power plants in the nation.

Subsection 1 below compares sulfur dioxide, nitrogen oxide, particulate matter, volatile organic compound, carbon monoxide, and mercury emissions of the Mesaba facility (on a worst-case basis) with three recently permitted SCPC plants.

Although the adverse environmental and human health impacts of many criteria pollutants have been known for years, recent scientific and epidemiological research focusing specifically on fine particulate matter, or $PM_{2.5}$, and mercury, have confirmed the connection between fine particulate matter and mercury from power plants and adverse human health impacts. To assist the Commission in understanding and quantifying the human health and welfare costs associated with fine particulate matter from power plants, and the mercury deposition impacts associated with power generation, Excelsior engaged ICF Consulting, the consulting firm that provides modeling services to the U.S. Environmental Protection Agency, to provide a detailed analysis of the comparative expected human health impacts between a new state-of-the-art SCPC plant (such as those analyzed in Section 1 below) located in Central Minnesota and the Mesaba Project. The full ICF Health Benefits Report is attached as Exhibit D to this Report and is discussed in detail in Section IV of this Report.

The ICF Report concludes, with respect to fine particulate matter, that "[t]he net present value of annual mortality cost savings for residents of Minnesota associated with the Phase 1 [Mesaba Unit One] and Phase 2 IGCC Power Station [Mesaba Unit Two], relative to the Alternative SCPC plant [a SCPC in Central Minnesota], are estimated to be approximately $11.7 million, and $24.4 million, respectively. Mortality cost reductions associated with the IGCC Power Station for the U.S. as a whole are calculated to be approximately $49.5 million for Phase 1 and $98.6 million for Phase 2."[50]

With respect to mercury deposition, for each unit of the Mesaba Project and the "Alternative SCPC Plant" (a SCPC plant in Central Minnesota), the ICF Health Benefits Report demonstrates in absolute terms and through maps of its modeling results the expected geographical area subject to mercury deposition, the total population within impacted areas, the number of women of childbearing age within impacted areas, the number and surface area of lakes within impacted areas, and the estimated annual harvest of selected fish species

[50] ICF Health Benefits Report, attached as Exhibit D, at p. 3-15.

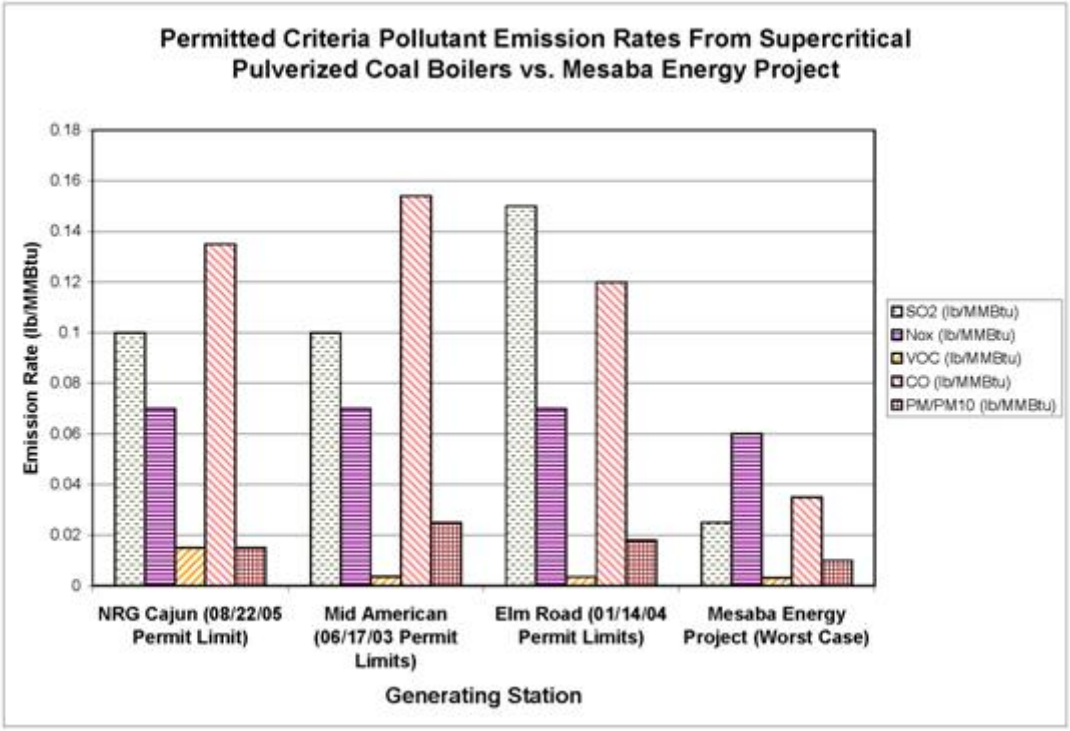
within impacted areas.[51] The analysis and resulting conclusions are dramatic with regard to the difference in health impacts between the two technologies and provides incontrovertible evidence of why the time has come to move beyond conventional coal technologies for power generation.

1. MESABA VS. RECENTLY PERMITTED COAL PLANTS

The analysis below compares Mesaba to the following three recently permitted, utility-scale, SCPC plants: (1) NRG Cajun in Louisiana (8/22/05); (2) Mid American in Iowa (6/17/03); and (3) Elm Road in Wisconsin (1/14/04). This group of plants typifies the emissions profile of a SCPC plant with a full suite of pollution control technology. Figure 9 below compares the permitted criteria pollutant levels for each of these facilities with the maximum expected Mesaba Project emission levels. The first column for each plant represents sulfur dioxide emissions. The Mesaba Project's sulfur emissions are 75-85% less than those of the best comparison SCPC facility. The second column for each plant represents emissions of NO_X. NO_X emissions from the Mesaba Project are lower than the emissions rates of these newest coal plants by about 15%. The third column for each plant represents volatile organic compounds (VOCs) emission rates. The Mesaba Project's VOC emission rate is comparable to two of the comparison units, but about 80 percent less than one of the comparison units. Column four for each plant represents carbon monoxide (CO) emission rates. Compared to the most recently permitted SCPC facilities, carbon monoxide (CO) emission rates for the Mesaba Project would be reduced by 70-80%. Finally, column five for each plant represents particulate matter emissions. Particulate matter emissions from the Mesaba Project are 30-60% less than those from the SCPC comparison plants.

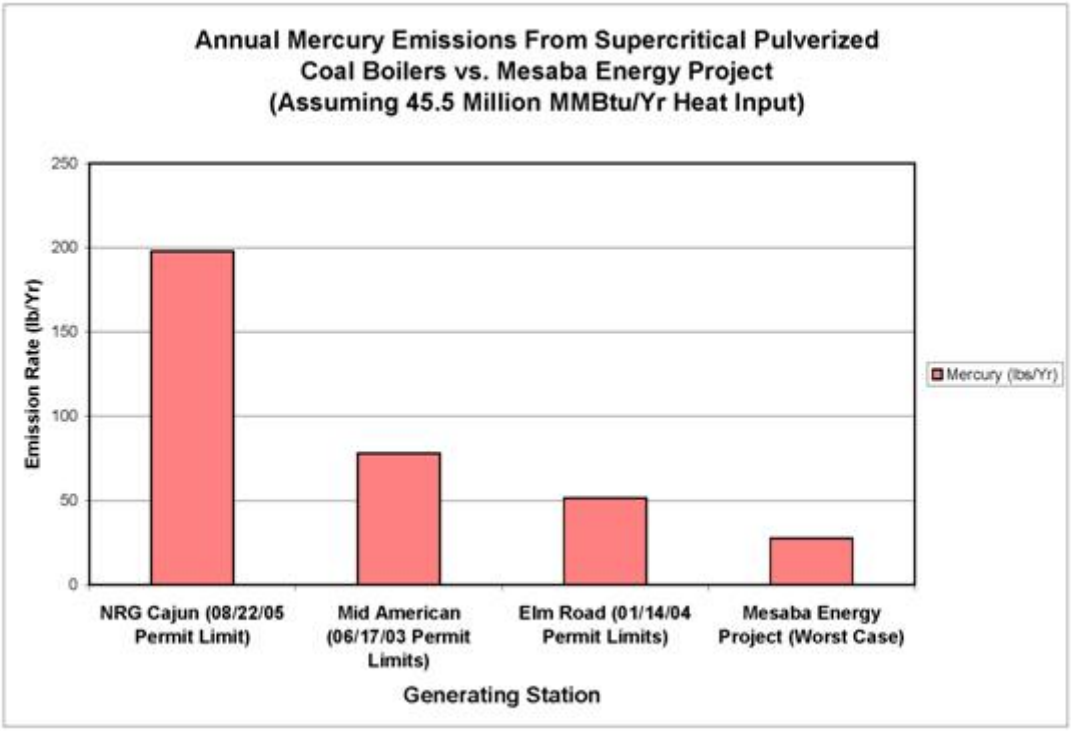
[51] *Id*., at pp. 4-22 through 4-26.

Figure 9. All Criteria Pollutants: Mesaba vs. Newest SCPC Plants



With respect to mercury as shown in Figure 10 below, the Mesaba Project mercury emissions will be half of the mercury emissions from the Elm Road SCPC plant in Wisconsin, and will represent a two-thirds to seven-eighths reduction in the mercury emissions from the other recently permitted SCPC plants in Iowa and Louisiana. This is a significant achievement by the IGCC technology.

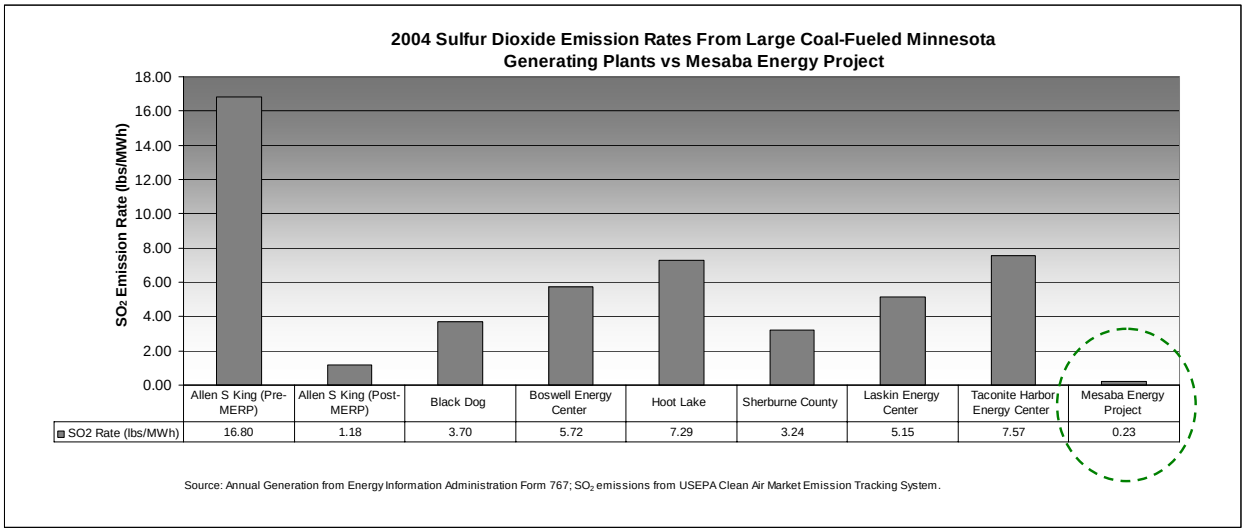
Figure 10. Mercury: Mesaba vs. Recently Permitted Coal Plants



2. MESABA VS. EXISTING MINNESOTA COAL PLANTS

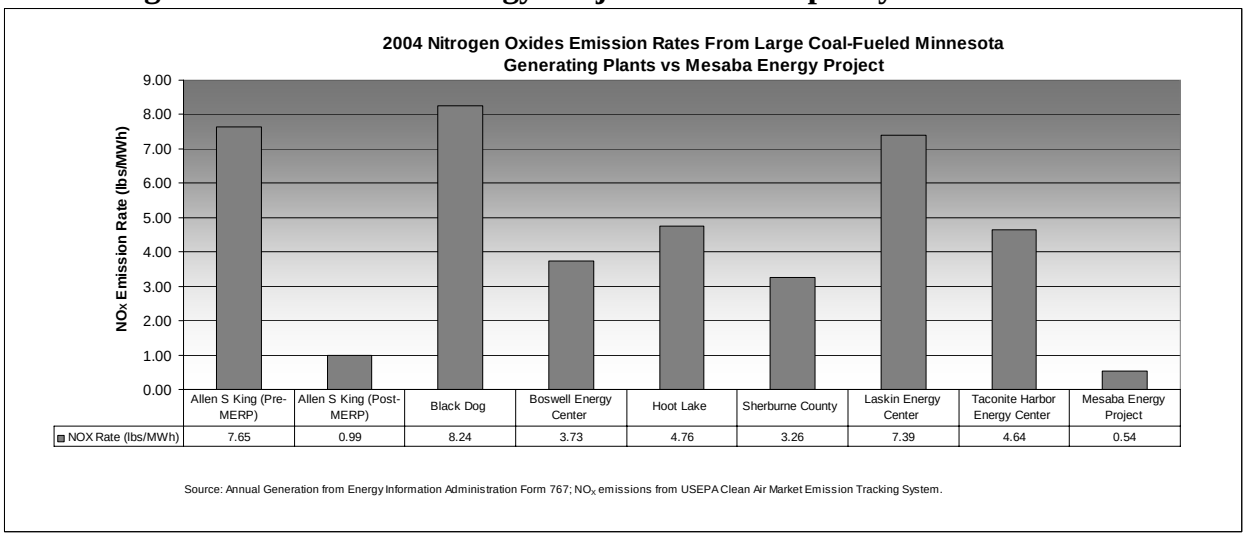
The second category of comparison plants are the existing fleet of Minnesota coal plants. Figures 11 through 13 below demonstrate that across the board on all criteria pollutants and mercury, compared to historical actual emission rates of existing coal plants in Minnesota, the Mesaba Project is in a class by itself. Compared to Sherco, the source exhibiting the lowest SO_2 emission rates in 2003, the Project's emissions are 94% less. Nitrogen oxides are emitted from Minnesota's existing coal-fired electric generating units at rates six to fifteen times that of Mesaba. Because NO_X, in addition to SO_2, is a precursor of fine particulate matter, these emissions also add significantly to the fine particulate matter burden in the State. With respect to particulate matter, no comparisons with other Minnesota sources are available. However, the existing Minnesota coal plants, with their relatively high emissions of sulfur dioxide and nitrogen oxides can be expected to emit PM10 at dramatically higher rates than the Mesaba Project. Mercury emission from the Mesaba Project will be reduced from 74% (versus King, pre-MERP) and 91% (versus Sherco) to levels that are less than existing facilities. Even after the MERP retrofit at the King Plant, the Mesaba Project's mercury emission rate will be less than 50% of the expected rate from King.

Figure 11. 2004 Sulfur Dioxide Emission Rates From Large Coal-Fueled Minnesota Generating Plants vs. Mesaba Energy Project



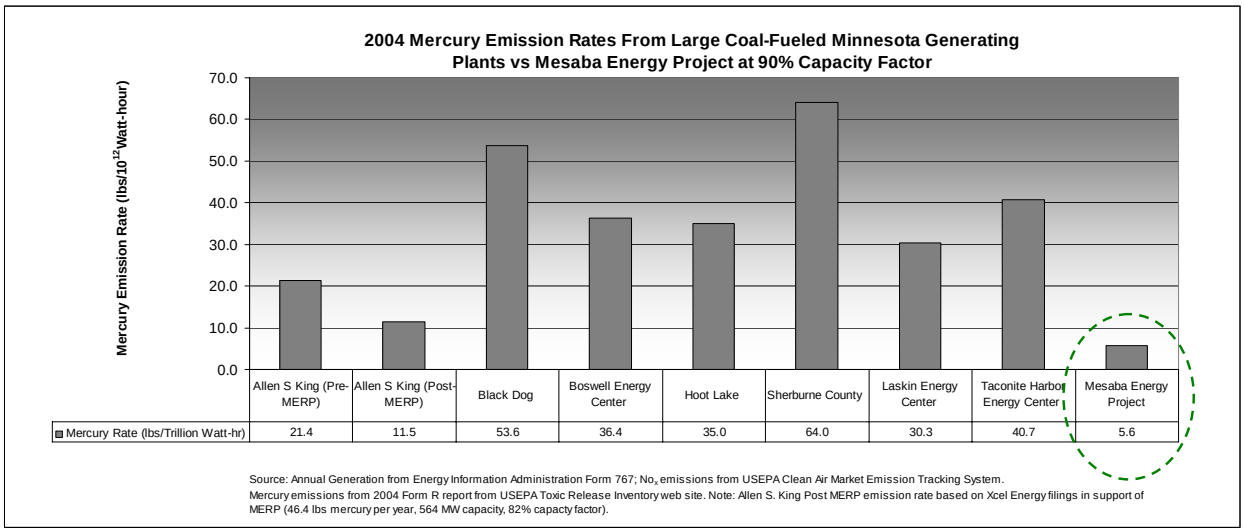
Source: Annual Generation from Energy Information Administration Form 767; SO_2 emissions from USEPA Clean Air Market Emission Tracking System.

Figure 12. 2004 Nitrogen Oxides Emission Rates From Large Coal-Fueled Minnesota Generating Plants vs. Mesaba Energy Project at 90% Capacity Factor



Source: Annual Generation from Energy Information Administration Form 767; NO_x emissions from USEPA Clean Air Market Emission Tracking System.

Figure 13. 2004 Mercury Emission Rates From Large Coal-Fueled Minnesota Generating Plants vs. Mesaba Energy Project

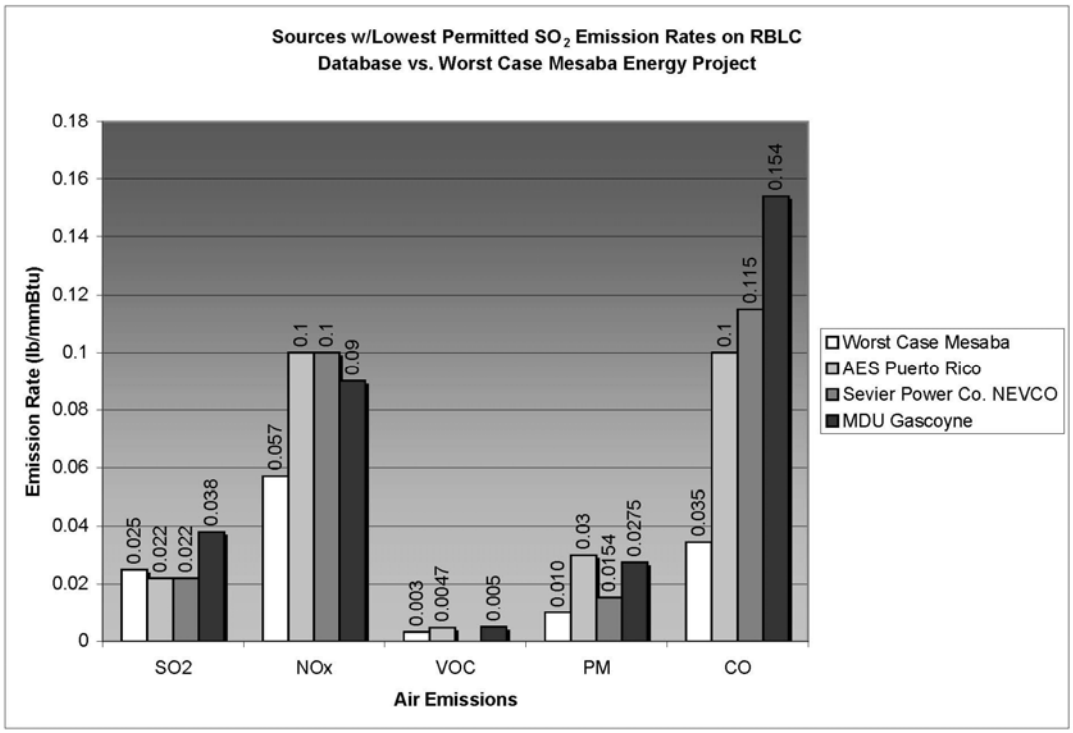


3. MESABA VS. NATION'S CLEANEST COAL PLANTS

Even when compared to the cleanest existing coal-fueled power plants in the nation, the Mesaba Project achieves substantially better across the board emission results. In order to establish the comparison group of power plants, regulatory decision-making was reviewed on three levels to find the coal-fueled power plants that emit the least of each pollutant to compare to the Mesaba Project's emissions of that pollutant.[52] The comparisons illustrate that whenever a combustion facility achieves emission parity with IGCC for one pollutant, that same facility has significantly, and often, dramatically higher emissions of other pollutants than does IGCC. The fact that the Mesaba Project's emissions of each category of pollutant are essentially equal to or lower than even those plants subjected to the maximum controls achievable with a combustion technology for that category of pollutant underscores IGCC's superior environmental profile. Figures 14 through 18 illustrate the results of comparing the Mesaba Project to these "best in class" existing coal-fueled plants.

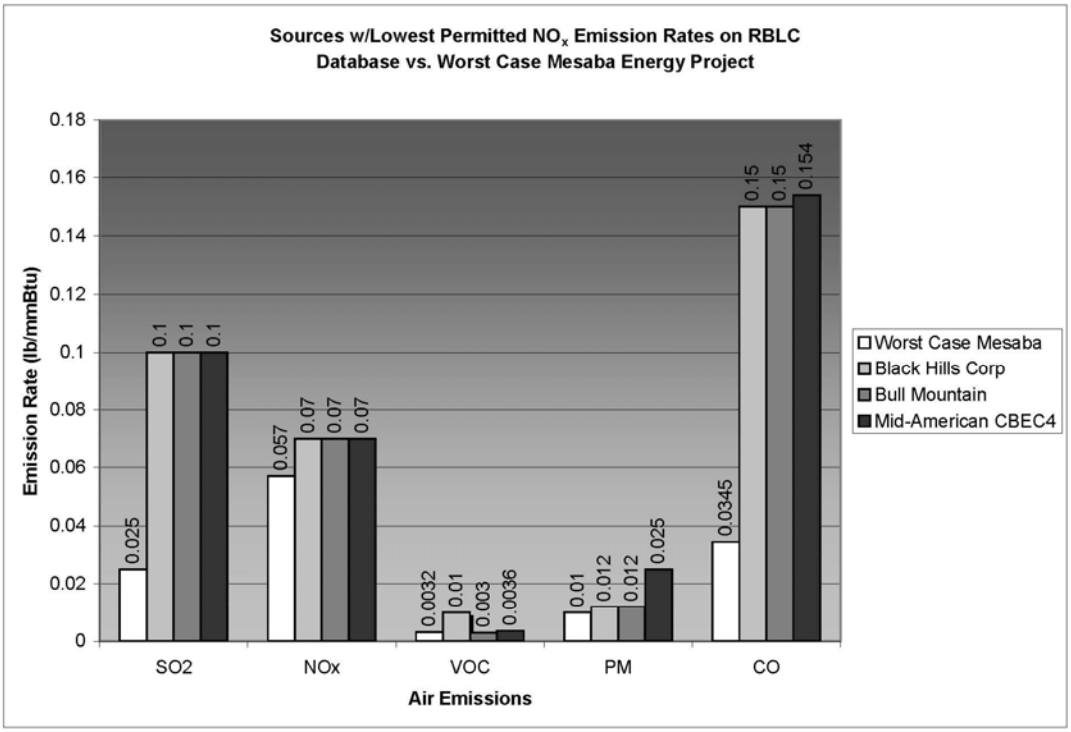
[52] The comparison plants were selected as "best in class" by conducting a review of U.S. EPA's RACT/BACT/LAER clearinghouse and other governmental agency databases. All recently permitted, utility scale, coal-fueled electric generating units of any type that have triggered review under the Prevention of Significant Deterioration (PSD) regulations and, therefore, were subject to top-down, Best Available Control Technology (BACT) review were reviewed. The emissions of the coal facilities that have met the most stringent BACT determinations for any coal-fueled, utility scale source were selected to compare emission rates for the criteria pollutants sulfur dioxide, nitrogen oxides, particulate matter, volatile organic compounds, and carbon monoxide.

Figure 14.[53] Sulfur Dioxide: Mesaba vs. Cleanest Coal Plants



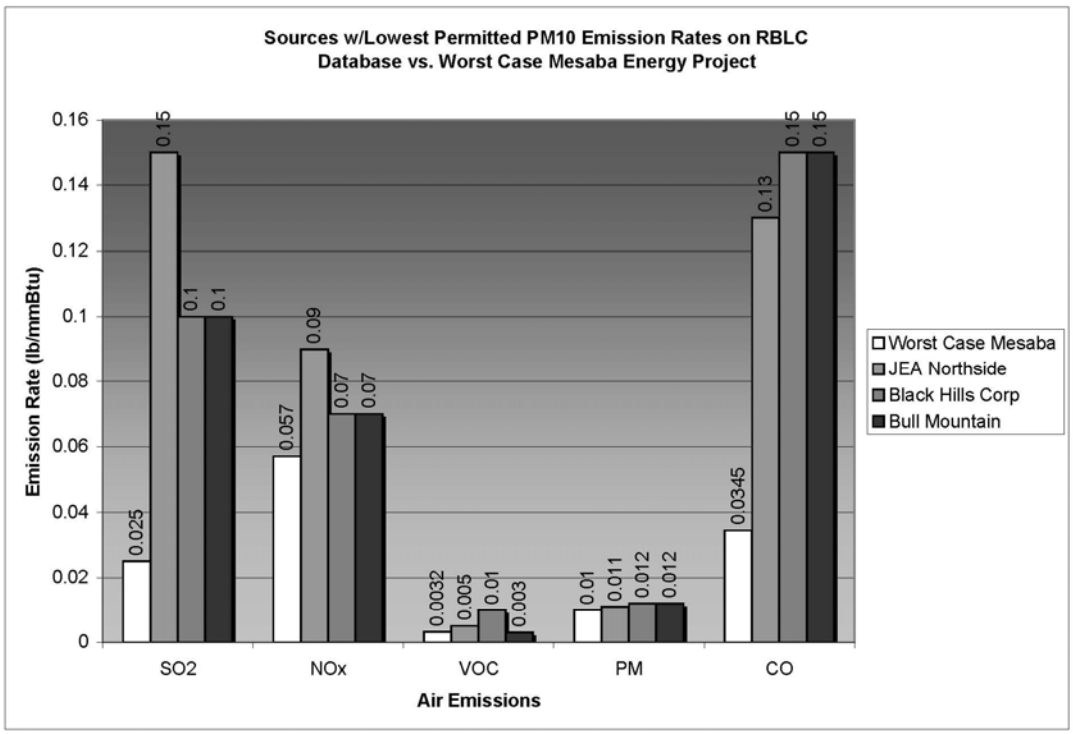
[53] Mesaba criteria pollutant emission rates vs. rates which characterize the sources having the lowest permitted SO_2 emission rates over the past 10 years.

Figure 15. NITROGEN OXIDES: MESABA VS. CLEANEST COAL PLANTS[54]



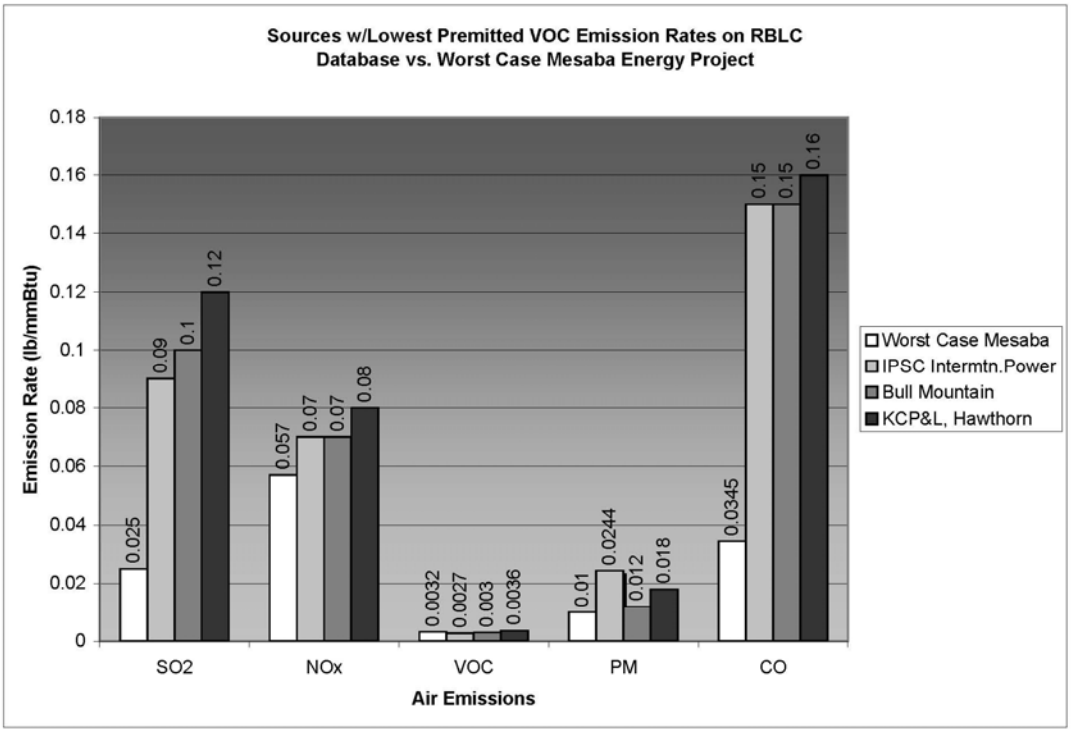
[54] Mesaba criteria pollutant emission rates vs. rates which characterize the sources having the lowest permitted NO_X emission rates over the past 10 years.

Figure 16. PARTICULATE MATTER: MESABA VS. CLEANEST COAL PLANTS[55]



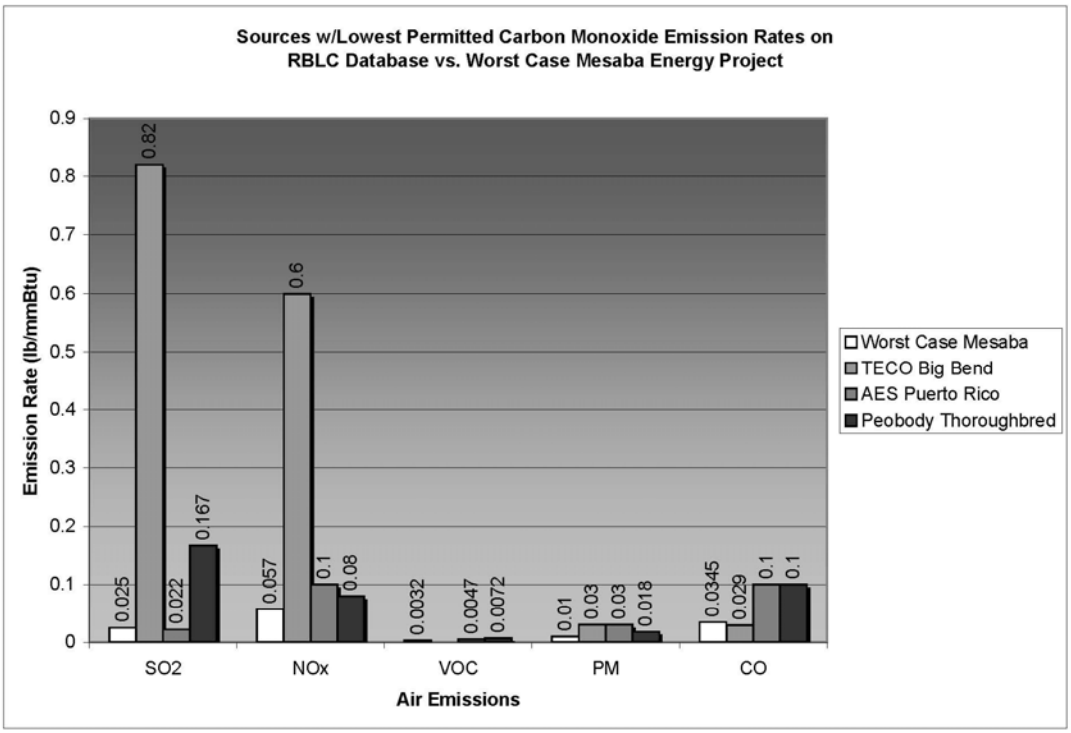
[55] Mesaba criteria pollutant emission rates vs. rates which characterize the sources having the lowest permitted PM_{10} emission rates over the past 10 years.

Figure 17. VOLATILE ORGANIC COMPOUNDS: MESABA VS. CLEANEST COAL PLANTS[56]



[56] Mesaba criteria pollutant emission rates vs. rates which characterize the sources having the lowest permitted VOC emission rates over the past 10 years.

Figure 18. CARBON MONOXIDE: MESABA VS. CLEANEST COAL PLANTS[57]



In sum, the emissions reductions achieved by the Project in comparison to those of traditional technologies are significant.

[57] Mesaba criteria pollutant emission rates vs. rates which characterize the sources having the lowest permitted CO emission rates over the past 10 years.

4. THE MESABA PROJECT WILL SIGNIFICANTLY REDUCE EMISSIONS OF CARBON DIOXIDE

The Mesaba Project will be a cornerstone of a meaningful carbon mitigation strategy for Xcel's ratepayers and shareholders. Xcel's merger approval was conditioned upon the development and adoption by Xcel of a carbon dioxide mitigation strategy. The Commission's Order at page 10 stated:

> In response to Commissioner Garvey's proposal . . . to condition the merger on NSP's agreement to submit strategies for mitigating CO2 emissions and other greenhouse gases from any and all Xcel Energy facilities, the ALJ recommended that, in addition to the parties' stipulated conditions, the Commission adopt an additional condition of approval: that NSP be required within six months of approval of the merger, to submit a report to the Commission detailing its 1990, 1997, 1998, and 1999 CO2 emissions from NSP-owned generating facilities used to provide utility service and, within one year of merger approval, develop strategies (in cooperation with the parties to this proceeding) to mitigate CO2 and other greenhouse gas emissions from such facilities. NSP specifically accepted this condition in its March 10, 2000 filing.[58]

Xcel filed a compliance report with the Commission on June 12, 2001.[59] In describing its actions and plans in its 2001 compliance report, Xcel concluded that "[n]otably the only scenarios developed that produce the largest reductions were: (1) a low demand forecast and (2) the extension of life of our nuclear units."[60]

[58] Commission Order Approving Merger, as Conditioned, dated June 12, 2000, in Docket No. E,G-002/PA-99-1031 (the "Merger Order").

[59] Xcel Energy, Mitigating Carbon Dioxide: Compliance Report, Docket No. E, G002/PA-99-1031, Jun. 12, 2001. It is noteworthy that (i) Xcel made no representation that it produced the strategies "in cooperation with the parties to [the] proceeding;" (ii) no specific strategies were in fact developed for any of "such facilities" referenced in the Merger Order and (iii) it does not appear that the Commission has ever formerly taken action to accept the Xcel report and/or determine that the merger condition has been met. As the Commission recognized in its Merger Order, a carbon dioxide mitigation strategy is critical for any electric utility. Following up on the Commission's direction from the Merger Order, Excelsior recently submitted an information request to Xcel in its IRP docket asking if Xcel had a written carbon mitigation strategy and if so, if they would provide a copy of it. Xcel objected to the question as "vague and ambiguous as to the term 'carbon mitigation strategy' and . . . irrelevant and not reasonably calculated to lead to the discovery of admissible evidence." *See* Excelsior IR No. 18 and Xcel response dated December 2, 2005, in Docket No. E002/RP-04-1752. Xcel's unwillingness to provide a written carbon management strategy as part of its resource plan stands in stark contrast to the very public statements and efforts regarding carbon strategies being made by some of the largest coal generation power companies in the nation, such as AEP and Cinergy.

[60] Xcel Energy, Mitigating Carbon Dioxide: Compliance Report, p. 19, Docket No. E, G002/PA-99-1031, Jun. 12, 2001.

Xcel also noted its hesitation regarding taking proactive steps to plan for carbon constraints, reflecting in part a concern that it had identified no cost-effective technological strategy to manage the reality that utilities will be expected to produce more power to meet demand growth and simultaneously reduce emissions:

> Perhaps if one really believed society could solve all the problems of global warming by sacrificing the growth of one year of [Gross State Product], one would deem that a viable cost. In contrast, if a shareholder noted that one company whose stock that shareholder owned was foregoing a year of profits while all the competitors were realizing that profit, then the shareholder would likely jump ship. [61]

The Mesaba Project offers Xcel a viable means to solve both its problems. IGCC can provide Xcel with a way to achieve immediate and future environmental improvements while helping Xcel to avoid disproportionate economic impacts.[62] The Mesaba Project offers built-in flexibility for managing carbon emissions without incurring any significant upfront costs in exchange for that flexibility.

In addition, the reality is that the phenomenon associated with greenhouse gas concentrations is called "global" warming. This means that Minnesota cannot play a meaningful role in addressing greenhouse gas concentrations solely by decisions to build wind capacity. In order to make a difference, Minnesota must play a role in driving technological innovation that can provide a cost-effective solution not only for Minnesota or the U.S., but also for the coal-rich developing economies like those of China and India.

China is a prime example of a developing nation that is readily willing to compromise the environment on its path to growth.[63] China's phenomenal industrial growth creates massive demand for new power generation resources. [64]

Without a readily available IGCC alternative, China will select traditional coal technologies for all of its new generation needs. This "lock in" by one of the world's largest power generators on inflexible technologies that do not have the means to address greenhouse gas emissions would make meaningful global greenhouse gas reduction initiatives difficult to achieve.[65]

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[61] Xcel Energy, Mitigating Carbon Dioxide: Compliance Report, p. 24, Docket No. E, G002/PA-99-1031, Jun. 12, 2001.

[62] Some shareholders might be more inclined to retain their shares of Xcel if the company chooses to embrace IGCC technology. *See* William Baue, "Three More Companies Address Climate Risk, So Shareholders Withdraw Resolutions," SocialFunds.Com, May 4, 2004, *available at* http://www.socialfunds.com/news/article.cgi/article1412.html (noting that two large institutional investors asked American Electric Power Co., Cinergy Corp., Reliant, Southern Company, TXU, and Xcel to address their environmental risk, and noting that AEP, Cinergy, Reliant, Couther Company, and TXU responded).

[63] Brian Bremner, "China's Big, Dirty Secret: China's Runaway Growth is Taking a Heavy Toll on the Environmental and Public Health. Beijing Hints at Changes, But So Far, It's Mostly Talk," Business Week, Feb. 1, 2005, *available at* http://www.businessweek.com/bwdaily/dnflash/feb2005/nf2005011_6686_db065.htm.

[64] Matt Kinver, "How Coal Is Cleaning Up Its Act: Coal is Back on the Agenda As a Serious Player in Meeting the World's Future Energy Demands," British Broadcasting Corp., Nov. 27, 2005, *available at* http://news.bbc.co.uk/1/hi/sci/tech/4466040.stm.

[65] One analyst puts it this way: "The threat of massive carbon lock-in becomes truly staggering when the rest of the world enters the picture. Although the United States now emits more CO2 than any other country, accounting for 20

In the absence of a market for IGCC with carbon capture flexibility, traditional coal technologies will proliferate in both the U.S. and in China and India, simply because the need to use coal for power generation is paramount. [66]

The DOE has recognized that it is imperative for the U.S. to drive the market penetration of IGCC and to move the technology to a zero emission endpoint. The U.S. initiated an international Carbon Sequestration Leadership Forum to encourage technological solutions to carbon emissions from coal.[67] IGCC is a cornerstone of that initiative.

5. Further Emission Reductions from Early Market Penetration of IGCC Technology

Minnesota will achieve further emission reductions, above and beyond those brought directly by the Project, by the earlier market penetration of IGCC that will be achieved as a result of the Project's 2011 in-service date. Removing the final barriers to market adoption will reduce pollution in Minnesota from out of state plants.

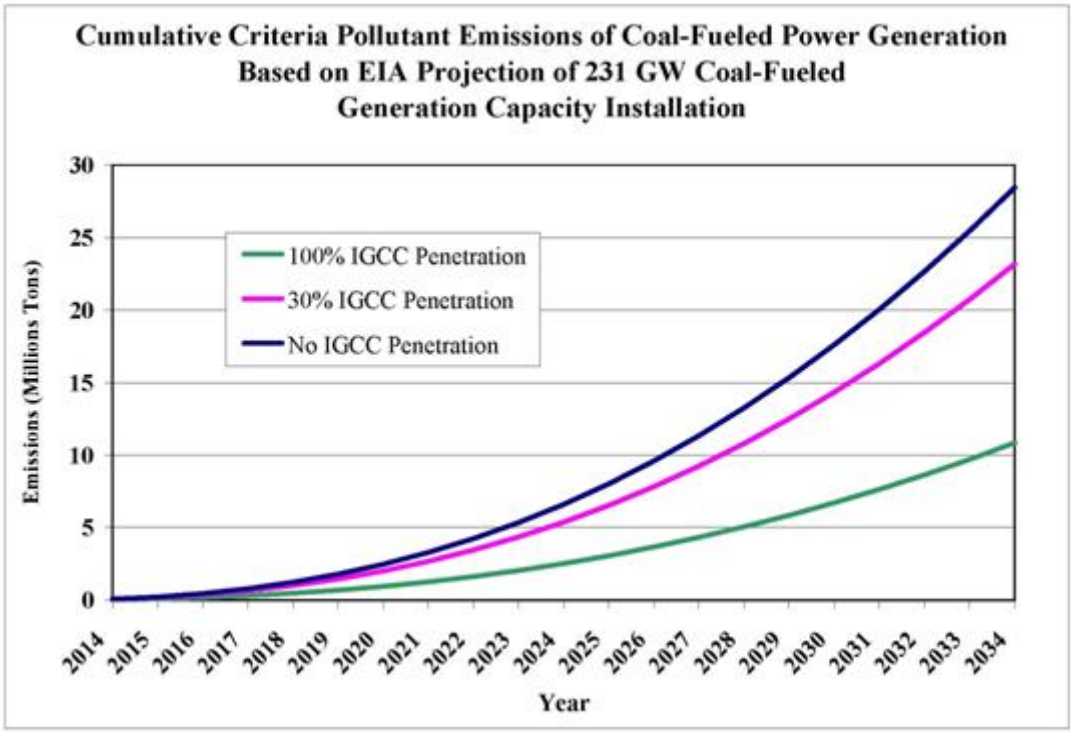
Figure 19 below depicts this result. The top line shows national emissions in the event all new coal plants are SCPC facilities. The middle line shows the emissions reduction achieved if 30% of all new coal plants after 2014 use IGCC rather than combustion technologies. The bottom line shows the emission reduction achieved if all plants after 2014 were IGCC rather than combustion based.

percent of the world's total, China is catching up fast and will probably take the lead by 2020. It has already overtaken the United States as the world's largest coal consumer. Coal fuels 90 percent of China's electricity demand. That demand is increasing so rapidly that China expects to expand its generating capacity over the next 30 years by 300,000 MW, or almost half of America's current consumption. As matters now stand, nearly all of China's projected new capacity will use standard pulverized coal technology. Craig Canine, "How to Clean Coal: If We Burn This Stuff the Old Way, the Planet is Toast. But a New Technology is Waiting in the Wings," OnEarth, Journal of the National Resources Defense Council, p. 22 (2005), *available at* http://www.nrdc.org/onearth/05fal/coal1.asp.

[66] As Professor Li Zheng, the director of the Clean Energy Center at Beijing's Tsinghua University said of his country: "[t]he public's and government officials' knowledge of climate change is increasing. But for the current situation in China, I think the action will come down to more efficient power plants. That is a current and practical way." Mark Kinver, How Coal is Cleaning Up Its Act, British Broadcasting Corp., Nov. 27, 2005, *available at* http://news.bbc.co.uk/1/hi/sci/tech/4466040.stm.

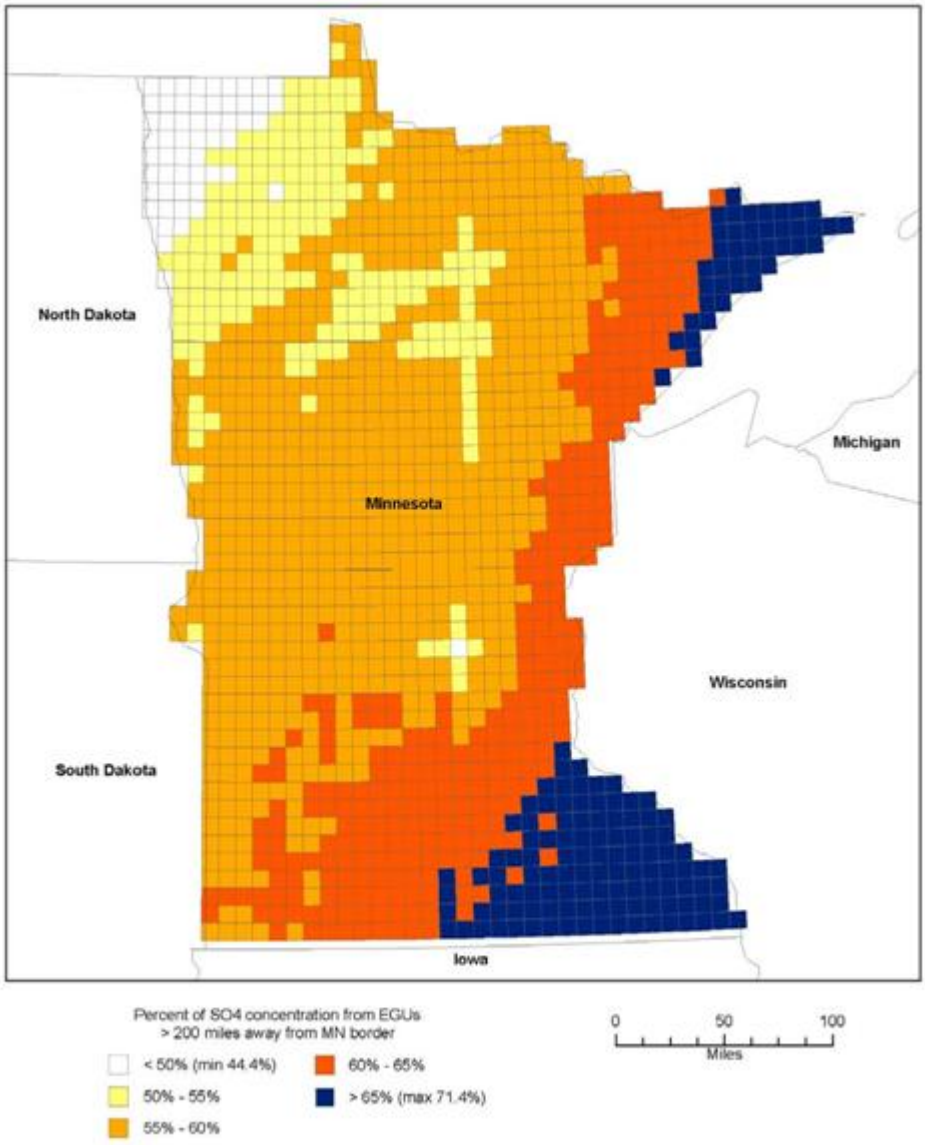
[67] For more information about the Carbon Sequestration Leadership Forum, see its website at www.cslforum.org.

Figure 19. Cumulative Criteria Pollutant Emissions Avoided with IGCC



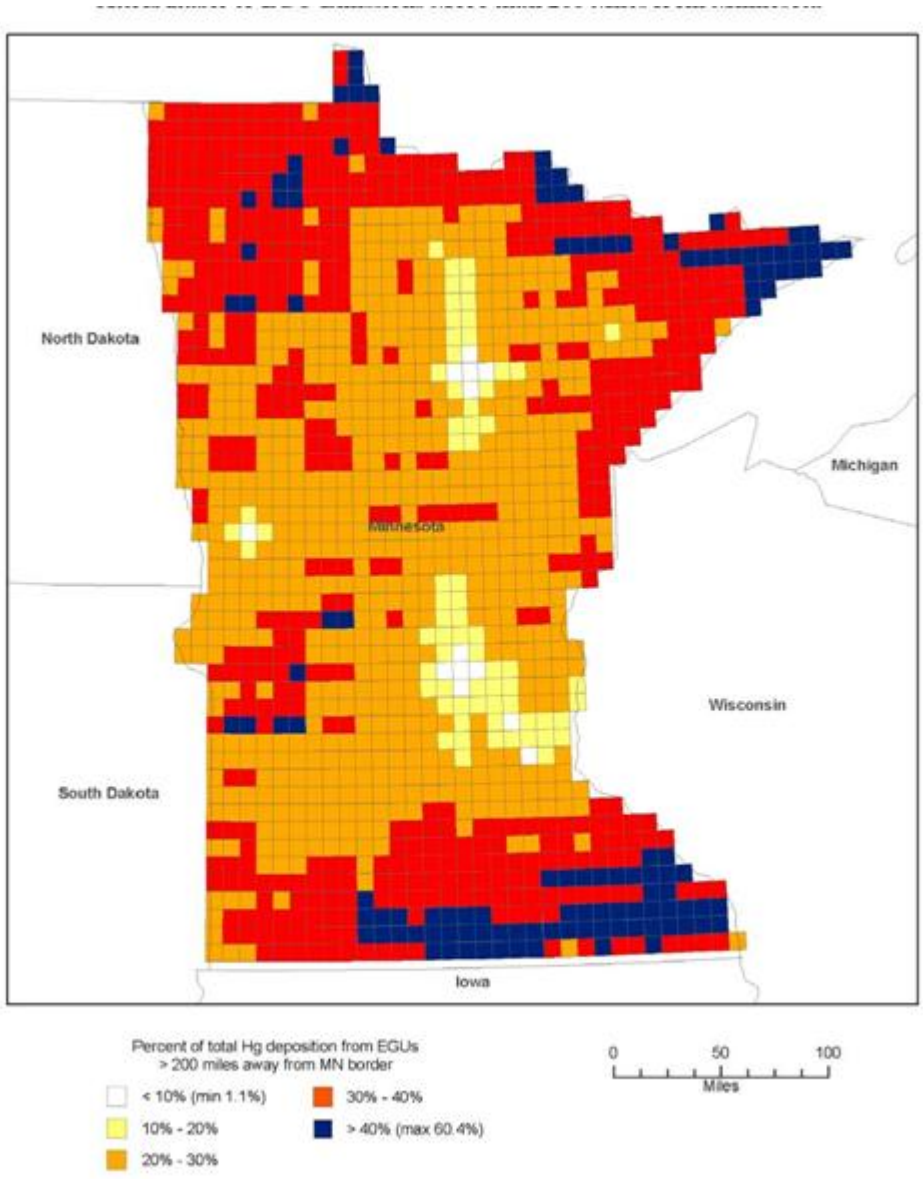
Most of the negative emission impacts on the State from power generation are caused by out of state power plants. More than 60% of the sulfate concentration present in the air over the Eastern part of the State comes from sources greater than 200 miles distant from Minnesota's boundaries. More than 55% of the sulfate concentration in air over the remainder of the State comes from such out-of-State sources. The distribution of sulfate in air over Minnesota is shown in Figure 20. These sulfate concentrations arise from sources emitting SO_2 that is transported, and transformed to sulfate over long distances.

Figure 20. Percent of Modeled Sulfate Air Concentrations (originating from power plants) that is attributable to power plant emissions more than 200 miles from Minnesota



Mercury is another pollutant for which the bulk of deposition in Minnesota comes from out of state sources. 90% of the mercury deposited in Minnesota comes from out of state sources. Influx of mercury into the State from electric generating units more that 200 miles beyond Minnesota is shown in Figure 21. Both Figures 20 and 21 have been taken from the ICF Health Benefits Study attached as Exhibit D.

Figure 21. Percent of Modeled Total Mercury Deposition (originating from power plants) that is attributable to power plant emissions more than 200 miles from Minnesota



Given the dramatic role of out of state pollution sources on Minnesota, one important action that Minnesota can take to reduce the impact of power generation on Minnesota's environment is to provide decision-makers in other states the opportunity to choose IGCC technology to replace their aging fleet of coal fueled plants. Additionally, as the health benefits analysis shows, it is also critically important for Minnesota to reduce its local and controllable emissions of mercury.

6. OTHER ENVIRONMENTAL BENEFITS OF IGCC.

While the Statute does not require an analysis of other environmental attributes of the Project, in addition to reducing air emissions, waste water and water consumption is reduced by the Project compared to conventional coal technologies, waste products are reduced from those of comparable facilities, and the technology has a much smaller footprint and visual impact than a conventional coal facility.

a. The Mesaba Project Will Reduce Wastewater and Water Consumption

Discharge of wastewater is reduced by roughly 50% versus other coal-based plants.

The process uses considerably less water than a traditional coal plant. *See* Section IV (Project Overview). This attribute will be important as water supply increasingly becomes an issue in power generation. In a report written for the Institute for the Analysis of Global Security, a senior analyst for the U.S. Department of Energy ("DOE") observed that:

> Competition for fresh water is already limiting energy production. For example, Georgia Power lost a bid to draw water from the Chattahooche River, the Environmental Protection Agency ordered a Massachusetts power plant to reduce its water withdrawals, Idaho has denied water rights requests for several power plants, Duke Power warned Charlotte, NC to reduce its water use, and a Pennsylvania nuclear power plant is planning to use wastewater from coal mines. Other utilities are warning of a power crunch if water availability is reduced.
>
> In response, the Electric Power Research Institute (EPRI), the research and development arm of the private electric utility sector, has initiated a major new research program that will address the connection between fresh water availability and economic sustainability. As a first step, EPRI, which has projected that the world will need 7,000 GW of additional electrical generation capacity by 2050 (today's total is just over 3,000 GW), undertook a screening study aimed at characterizing the probable magnitude of the quantity of water demanded and supplied, as well as the quality of such water, in the U.S. for the next half century (2000-2050). This screening study, published in 2002, concluded that "…the water budget of the United States in the next 50 years is more uncertain than the currently available predictions suggest," that "…the cost of insufficient water availability over the next 50 years can be huge," and that "…water availability can severely constrain electricity growth."

b. The Mesaba Project Will Reduce the Production of Waste Products

The Mesaba Project will produce other commodities that can be marketed in lieu of waste products that would be produced by a coal combustion facility.

The Mesaba Project will produce a significant stream of high purity sulfur cleaned from the syngas. Both the Polk Power Station in Tampa, Florida[68] and the Wabash River facility sell high purity sulfur recovered in their IGCC processes. Wabash produced 33,388 tons of sulfur with 99.99% purity during its demonstration period.[69] A conventional coal facility must scrub sulfur from stack gases post-combustion, resulting in waste products that entail costs for disposal. Sulfur is a key component to fertilizer production, and a low-cost, local supply may therefore be of benefit to agriculture in the region.

The Project also produces a vitreous slag as a by-product of the gasification process, in lieu of the vast quantities of bottom and fly-ash produced by conventional coal technologies. Consistent with principles of industrial ecology and waste stream minimization, the gasifier slag can be sold as aggregate for roofing shingles, grit in blasting media, or construction building products, like cement. The PPA provides that any revenues associated with sulfur and slag byproducts will reduce the tariff paid by the ratepayers for power from the Mesaba Project.

c. The Mesaba Project's Footprint and Visual Profile Will Be Small

The Project's total footprint will be much smaller than that of a conventional coal plant. The visual profile is reduced dramatically by the fact that the plant has a single source of air emissions, which is the stack associated with the combined-cycle power island. Compared to a conventional coal stack, the IGCC stack is about half the height.

In sum, the emission reductions achieved by Mesaba over the cleanest alternative coal combustion technologies are dramatic and important to protect Xcel ratepayers, in addition to the benefits they bring to all Minnesotans in the form of a cleaner natural environment.

These factors contribute to the growing consensus that, because of likely emission constraints, conventional coal plants are not in the best interests of ratepayers. The Mesaba Energy Project represents the best of two worlds - providing a way for a the State to meet forecasted base load capacity shortfalls using coal, while at the same time achieving dramatic emissions reductions and providing flexibility to meet ever-tightening environmental laws. The Mesaba Project's cleaner profile, in addition to minimizing impacts on the natural environment, increases public support for this alternative.

For all of the reasons stated above, the Mesaba Project satisfies the requirement of the IEP Statute of reduced emissions compared to alternative solid fuel technologies.

[68] Testimony of Charles R. Black, Vice President of Energy, Supply, Engineering & Construction at the Polk Power Station, before the U.S. House of Representatives' Committee on Energy and Commerce, Jun. 24, 2003, *available at* http://energycommerce.house.gov/108/Hearings/06242003hearing968/Black1548.htm.

[69] Nat'l Energy Tech. Lab., Office of Fossil Energy of the U.S. Department of Energy, Wabash River Coal Gasification Repowering Project: Project Fact Sheet, *available at* http://www.netl.doe.gov/cctc/summaries/wabsh/wabashrdemo.html.

CONCLUSION

The IEP Statute enumerates five public interest criteria for evaluating the PPA. The Project meets these requirements. First, the Mesaba Project provides dramatic economic development benefits. Second, it uses coal, our Nation's most abundant fossil fuel, avoiding an increase in demand for scarce domestic natural gas supplies and reducing Minnesota's new dependency on foreign LNG imports. Third, the price of the output is stable, and the Project will make a material contribution to predictable, low energy prices in Minnesota. Fourth, the hydrogen component of the syngas produced by the gasification process can provide a long-term, stable source of hydrogen for the region, contributing to a transition to hydrogen as a fuel resource. Fifth, the emission reductions achieved by the Project are dramatic, even compared to the cleanest alternative coal plants currently in the permitting phase. Because the Project compares favorably to all these enumerated criteria, the Mesaba Project PPA meets all of the public interest criteria prescribed by the IEP Statute and is in the public interest.