



Minnesota Center for Environmental Advocacy

The legal and scientific voice protecting and defending Minnesota's environment

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November 25, 2013

Dr. Burl Haar
Executive Secretary
Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

VIA ELECTRONIC SERVICE

Re: *In the Matter of Minnesota Power's Boswell Energy Center Unit 4
Environmental Retrofit Project
PUC Docket No.: E-015/M-12-920*

Dear Dr. Haar:

On behalf of the Izaak Walton League of America – Midwest Office, Fresh Energy, Sierra Club, and the Minnesota Center for Environmental Advocacy, please find the enclosed Request for Rehearing and the attached statement of Dr. Ranajit Sahu.

Sincerely,

/s/ Beth Goodpaster
Beth Goodpaster
Attorney

BG/lh

Enclosure

cc: Attached service list

STATE OF MINNESOTA
FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of Minnesota Power's Boswell
Energy Center Unit 4 Environmental Retrofit
Project; Request for Extension to File
Comments

AFFIDAVIT OF SERVICE

PUC Docket No.: E-015/RP-12-920

STATE OF MINNESOTA)
)ss.
COUNTY OF RAMSEY)

Leah Harms being duly sworn, says that on the 25th day of November 2013 she served via U.S. mail, e-dockets and e-mail the following:

- Request for Rehearing and the statement of Ranajit Sahu filed on behalf of Izaak Walton League of America – Midwest Office, Fresh Energy, and the Minnesota Center for Environmental Advocacy.

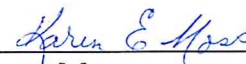
on the following persons, in this action, by filing through e-dockets and e-mail or mailing to them a copy thereof, enclosed in an envelope, postage prepaid, and by depositing the same in the post office at St. Paul, Minnesota, directed to said persons at the last known mailing address of said persons:

Attached Service List

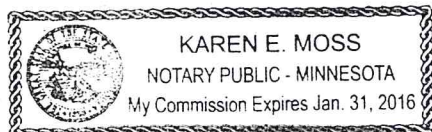


Leah Harms

Subscribed and sworn to before me
this 25th day of November 2013



Karen Moss



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**STATE OF MINNESOTA
MINNESOTA PUBLIC UTILITIES COMMISSION**

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Dr. David C. Boyd	Commissioner
Nancy Lange	Commissioner
J. Dennis O'Brien	Commissioner
Betsy Wergin	Commissioner

**In the Matter of Minnesota Power's
Boswell Energy Center Unit 4
Environmental Retrofit Project
and Boswell 4 Environmental
Improvement Rider**

PUC Docket No. E015/M-12-920

**REQUEST FOR RECONSIDERATION BY THE IZAAK WALTON LEAGUE OF
AMERICA – MIDWEST OFFICE, FRESH ENERGY, SIERRA CLUB, AND
MINNESOTA CENTER FOR ENVIRONMENTAL ADVOCACY**

I. INTRODUCTION

Pursuant to Minn. Stat. §216B.27 and Minn. R. 7829.3000, the Izaak Walton League of America – Midwest Office, Fresh Energy, Sierra Club and Minnesota Center for Environmental Advocacy (“Environmental Intervenors”), hereby petition for reconsideration of the Commission’s November 5, 2013 *Order Approving Boswell Energy Center Unit 4 Retrofit Project and Authorizing Rider Recovery* (“Order”). Environmental Intervenors assert that the Commission’s Order violates Minn. Stat. § 216B.6851 subd 6. The Order approving Minnesota Power’s proposed Boswell Energy Center Unit 4 Retrofit Project (“BEC4 Retrofit Project” or “Petition”), and related cost recovery rider, depends upon a legally deficient report prepared by the Minnesota Pollution Control Agency (“PCA”) pursuant to Minn. Stat. § 216B.684 (“PCA Report”).

The record is clear that the PCA Report failed to include statutorily-required and analytically-critical environmental, health, and cost analyses of alternatives to the BEC4 Retrofit Project that Minnesota Power considered. The PCA Report does not comply

with Minn. Stat. § 216B.684. Because the Commission may not approve Minnesota Power's BEC4 Retrofit Project absent a legally sufficient PCA Report, the Commission's November 5, 2013 Order is itself in violation of law and therefore arbitrary and capricious. Accordingly, Environmental Intervenors request that the Commission grant this Petition; stay this proceeding pending completion of a legally sufficient report by the PCA; and then reconsider the Petition in light of a revised and legally sufficient PCA Report, as required by law.

II. FACTUAL BACKGROUND

On August 31, 2012, Minnesota Power submitted to both the Commission and the PCA its Petition for Commission approval of its proposed BEC4 Retrofit Project, pursuant to the Minnesota Emission Reduction Act, Minn. Stat. §§ 216B.68-216B.687 ("MERA"). The Petition described "an environmental retrofit project on BEC4 as a multi-pollutant solution for reducing mercury, particulate matter, sulfur dioxide, and other hazardous air pollutants being addressed by United States Environmental Protection Agency ("EPA") regulations while also reducing plant wastewater." Petition at 1. Specifically, Minnesota Power proposed to continue operation of its existing coal-fired boilers by installing "a semi-dry flue gas desulfurization system, fabric filter and powder activated carbon injection system" *Id.*

Section VII of the Petition considered the following alternatives to Minnesota Power's preferred approach:

- A. delaying the project by temporarily shutting down the BEC4 unit until 2020 and building a 213 MW natural gas combustion turbine power plant in the interim to help with replacement power needs, Petition at 57-58; and

B. closure of BEC4 and replacement with a natural gas power plant, either through a “direct” replacement, in which Minnesota Power would build a new 400 MW natural gas plant and a bank of reciprocating engines (55 MW) and also buy 20 MW of power from wholesale markets, or an “ownership share” replacement, in which Minnesota Power would own 60% of a larger natural gas power plant, Petition at 58-59.

Thus, the alternatives considered by Minnesota Power all include replacement of BEC4 coal-fired generation with some form of natural gas generation. The Petition considered each of these alternatives in greater detail in its Appendix A.

On March 1, 2013, the PCA filed its report on Minnesota Power’s Petition. The PCA Report acknowledged its specific statutory obligations. PCA Report at 1. On page 3, it summarizes its obligation to “evaluate the environmental and public health benefits of each option proposed or considered” by Minnesota Power, as required by Minn. Stat. § 216B.684(2). This summary fails to include any discussion of alternatives to Minnesota Power’s proposed project. On page 3, the PCA summarizes its analysis of “the technical feasibility and cost-effectiveness of technologies proposed or considered” by Minnesota Power, as required by Minn. Stat. § 216B.684(3). This summary also fails to reference any PCA analysis of alternative technologies proposed or considered by Minnesota Power. Indeed, the only reference in PCA’s Report to the natural gas alternatives considered by Minnesota Power was in a footnote: “Minnesota Power described in the filing exhibits alternatives to mercury controls that include replacing the entire unit with

natural gas-fired generation. The PUC has determined that Boswell 4 is XXXX [sic].”¹ The PCA entirely failed to consider “the environmental and public health benefits” and “the technical feasibility and cost-effectiveness” of *any* of the natural gas alternatives proposed or considered in the Petition. The PCA Report estimates the costs of pollution damages avoided by Minnesota Power’s retrofit proposal, but ignores the greater avoided pollution damages associated with the natural gas alternatives that the utility considered.

PCA concluded that the BEC4 Retrofit would avoid 1,016 tons of PM, 414 tons of SO₂, and 202 tons of mercury. PCA Report Table 7. These pollutant reductions were the basis of PCA’s determination that the BEC4 Retrofit benefits to society range from \$15 million to \$50 million.

Minnesota Power admits that the emissions of a natural gas alternative would be significantly lower. Petition, p. 67 and Appendix A, p. 15. As shown in the attached Statement of Dr. Ranajit Sahu, the greater reductions in emissions of PM for a comparable natural gas alternative would be about 1379 tons, 1121 tons of SO₂ emissions, 260 pounds of mercury, and merely 1.6 million tons of CO₂. Based on the substantially greater pollutant reductions from a natural gas alternative to the BEC4 Retrofit, the quantified benefits to society would range from \$25 to \$78 million per year for PM, SO₂ and mercury, added to CO₂ annual avoided costs that escalate from

¹ The presence of the “XXXX” at the end of the footnote suggests that the PCA failed to even to complete this short uninformative footnote. Commissioner O’Brien, during the hearing on this matter, correctly recognized that two lines in a single footnote merely acknowledging PCA’s obligation does not constitute a useful analysis: “COMMISSIONER O'BRIEN: I'm sorry, it wasn't. I'll start over again. I'm inclined to agree with you that Minnesota Power's petition asks the PCA, Minnesota Pollution Control Agency, to look at all the alternatives, including a natural gas plant, as a replacement. And the two-page [sic, line] footnote, footnote 9, is not the kind of detailed analysis that would be useful to me.” Hearing Transcript, June 6, 2013, at 14.

\$173,607, 273 in 2016 to \$305,803,636 in 2040. See, Sahu Statement, pp. 4-6 and Table 2 and Table 3. Cumulatively, from 2016-2040, the avoided cost due to CO2 reductions from a natural gas alternative amounts to a staggering \$6 billion.

On March 7, 2013, Minnesota filed its Cost Recovery Rider with the Commission. This document did not consider the costs of alternatives to Minnesota Power's preferred retrofit of BEC4.

Environmental Intervenors assert that the PCA's failure to analyze "the environmental and public health benefits" and "the technical feasibility and cost-effectiveness" of the natural gas alternatives considered by Minnesota Power plainly violated Minnesota law. Moreover, this critical omission prevented the Commission from fully considering whether alternatives to Minnesota Power's \$431.5 million project are superior in terms of environmental, health, and economic benefits.² As a consequence, the Commission's November 5, 2013 Order was arbitrary, capricious, and contrary to law, and must be reconsidered.

III. APPLICABLE LAW

A. Commission Rehearing.

Minnesota Statutes Section 216B.27 governs requests for rehearing of Commission orders. "[A]ny party to the proceeding and any other person, aggrieved by the decision and directly affected thereby, may apply to the commission for a rehearing in respect to any matters determined in the decision." Minn. Stat. §216B.27, subd. 1. The rehearing request must set forth the specific grounds on which "the decision is unlawful

² Since the PCA is the only state agency charged with conducting an independent analysis of alternatives, the Commission had no other detailed state agency analysis of Minnesota Power's alternatives.

or unreasonable.” Minn. Stat. §216B.27, subd. 2. After rehearing, the Commission “may reverse, change, modify, or suspend the original action.” Minn. Stat. §216B.27, subd. 3.

Environmental Intervenors were among the parties in this proceeding that submitted multiple rounds of comments concerning the BEC4 Petition. Environmental Intervenors argued, *inter alia*, that the Commission did not have an adequate record concerning the natural gas replacement options for BEC4 that Minnesota Power considered. The Commission rejected Environmental Intervenors’ arguments, stating in its Order that “further analysis of natural gas options is not warranted at this time.”³ Order, p. 6.

In this Request, Environmental Intervenors contend that the Order is both unlawful, unreasonable, and arbitrary and capricious. Environmental Intervenors assert that the Commission’s Order violates Minn. Stat. §216B.6851. The Commission decision was not based on the complete record that the legislature required when it enacted MERA, and the Order therefore constitutes legal error. This Request details the specific basis of Environmental Intervenors’ Request for Rehearing.

B. Minnesota Mercury Emissions Reduction Act.

Under Minn. Stat. § 216B.684, the PCA is required to evaluate the environmental and public health benefits of all options the utility proposes or considers to meet the mercury reduction requirements of MERA. The law states that the PCA:

shall . . . (2) evaluate the environmental and public health benefits of each option proposed or considered by the utility, including benefits associated with reductions in pollutants other than mercury[.]

³ The Commission also rejected Environmental Intervenors’ earlier petition in this docket for an EAW, which would have examined the health and environmental benefits of the natural gas alternatives Minnesota Power considered.

Minn. Stat. § 216B.684 (Emphasis added.) The PCA’s obligation to evaluate and environmental and public benefits for each option considered by a utility is mandatory.

Minn. Stat. § 645.44, subd. 16 (providing that “shall” is mandatory). In turn, Minn. Stat. § 216B.6851, subd. 6 states:

- (a) The agency shall review the utility's plans as provided in section 216B.684.
- (b) The Public Utilities Commission shall review and evaluate a utility's mercury emissions-reduction plans submitted under this section. In its review, the commission shall consider the environmental and public health benefits, the agency's determination of technical feasibility, competitiveness of customer rates, and cost-effectiveness of the utility's proposed mercury-control initiatives in light of the Pollution Control Agency's review under paragraph (a).

(Emphasis added.) Therefore, Commission consideration of the PCA Report is mandatory. Minn. Stat. § 645.44, subd. 16. The intent of the law is to ensure that the Commission has a full analysis available to it of the costs and benefits of different mercury reduction options before it commits ratepayers to extremely expensive retrofits such as Minnesota Power proposed here.

When the legislature specifies factors to be considered by an agency, the agency decision must consider each of these factors, and its decision must show that it did so. *Johnson v. Commissioner of Health*, 671 N.W.2d 921 (Minn. App. 2003). An agency decision need not slavishly follow the statutory formula, but if an agency decision or administrative record does not show that the agency considered statutorily mandated factors, and more to the point, if the administrative record in fact does not include evidence related to such factors, then the agency action is in violation of law and constitutes reversible error. *Citizens Advocating Responsible Development (CARD) v. Kandiyohi County Board of Commissioners*, 713 N.W.2d 817, 832 (Minn. 2006) (remand for further agency action to address failure by county commissioners to consider

mandatory environmental review factor), *citing In re Charges of Unprofessional Conduct Contained in Panel File 98–26*, 597 N.W.2d 563, 567 (Minn.1999).⁴

IV. THE PCA REPORT IS CONTRARY TO LAW BECAUSE IT FAILS TO CONSIDER THE ENVIRONMENTAL, HEALTH, AND ECONOMIC BENEFITS OF ALTERNATIVES CONSIDERED BY MINNESOTA POWER.

In MERA, the Legislature clearly voiced its intent that the Commission consider the expert opinion of the PCA with regard to the environmental and public health benefits of a utility’s proposed plan as well as alternatives. Without a full evaluation of all alternatives considered however, it simply is not possible for the Commission to determine if a utility plan is the best solution for ratepayers and the citizens of the state who are impacted by mercury emissions. Here, it is undisputed that the PCA did not evaluate the natural gas alternatives to Minnesota Power’s retrofit proposal. The statutorily mandated evaluation is not part of the Commission’s record. Nevertheless, the Commission made a decision to approve Minnesota Power’s retrofit proposal. That decision was contrary to law.

A. The PCA Failed to Provide the Commission with an Analysis that Evaluates the Environmental and Public Health Benefits of Each Option Proposed or Considered by Minnesota Power, as Required by Minn. Stat. § 216B.684.

Review of the PCA Report conclusively shows that the agency entirely failed to analyze the environmental, health, and economic benefits of the alternatives Minnesota Power considered and rejected in its Petition, as required by Minn. Stat. § 216B.684.

⁴ See also, *In the Matter of Universal Underwriters Life Ins. Co.*, 685 N.W.2d 44, 46 (Minn. App. 2004).⁴ When an agency is required by law to consider a report specifically applicable to its decision, it must do so. See *Handle With Care, Inc. v. Department Of Human Services*, 406 N.W.2d 518, 523 (Minn. 1987) (Agency action not reversed because mandatory report was not a precondition for a rulemaking).

Such analysis simply does not exist within the report. In particular, the Petition considered a number of natural gas alternatives to Minnesota Power's preferred alternative. The PCA Report failed to analyze any of these natural gas alternatives. Therefore, the PCA Report is defective as a matter of law. It is also true that it is legal error for the Commission to base its decision on a legally erroneous report prepared by another agency.

B. MERA Requires the Commission to Consider An Evaluation of the Benefits of Alternatives Prior to Approving a Mercury Reduction Project.

Minnesota Power was required by MERA to submit "one or more alternatives" to its preferred plan. Minn. Stat. § 216B.6851, subd. 4. The Commission, in turn, is required to "review and evaluate the utility's plans." Minn. Stat. § 216B.6851, subd. 6. Its review must "consider the environmental and public health benefits . . . in light of the Pollution Control Agency's report under [section 216B.684]." *Id.* Therefore, Commission reliance on a PCA Report that entirely fails to consider alternatives means that the Commission did not base its decision on the type of information specified by the legislature.

In plain terms the Legislature mandated that the process for choosing the best MERA compliance option for ratepayers would include evaluation of the environmental and health benefits of all alternatives considered by the utility. Here, the Commission did not have before it such an evaluation. As a matter of law its record was insufficient. Its approval was contrary to law. The Commission should reconsider its November 5, 2013 decision.

C. The Environmental and Public Health Benefits of the Natural Gas Alternatives Minnesota Power Considered Are Vastly Superior to the Retrofit Project.

Reviewing the benefits of the natural gas alternatives is not just an academic exercise. Rather, it is an important factor in the Commission's ability to execute its duty to make decisions about the state's energy future that are in the public interest. In this case, PCA determined that the "costs of the Boswell 4 plan exceed the benefits," using a \$15 million to \$50 million estimate of the health benefits from pollutant reductions. By contrast, the estimated benefits of the greater pollutant reductions associated with a natural gas plant do exceed the cost of the BEC4 project, surpassing \$170 million annually as described below. A full analysis of the environmental and public health benefits of the natural gas alternatives throws into question whether Minnesota Power's proposal serves the public interest.

There is no dispute that natural gas power plants emit far lower amounts of the pollutants than those PCA reviewed for the BEC4 Retrofit Project, including emissions from mercury, sulfur dioxide, and particulate matter. In addition, natural gas plants emit far less carbon dioxide and nitrogen oxides, among other pollutants. See, attached Statement of Dr. Ranajit Sahu. Had PCA conducted the environmental analysis MERA requires for the natural gas alternatives that Minnesota Power considered, the quantified annual benefits from avoided pollution would have been substantially higher than those attributed to the BEC4 Retrofit Project. In fact the cumulative cost benefit from the reduction in carbon pollution is nearly \$6 billion dollars. Such evidence would have made a material difference to the record before the Commission.

Dr. Sahu, in his Statement attached to this Request, shows that compared to the emissions reductions associated with the BEC4 Project, a comparable natural gas alternative would emit 140% less sulfur dioxide. A natural gas plant would emit 17% fewer tons of particulate matter. A natural gas plant emits no mercury. Sahu Statement, Table 2.

Considering only the economic benefits of the greater pollution reductions of PM, SO₂, and mercury, the benefits of natural gas alternatives that Minnesota Power considered range from \$25 million to \$78 million. Sahu Statement, p. 4. These avoided costs are nearly twice those PCA attributed to the BEC4 Retrofit. *Id.*

Moreover, a natural gas alternative to the BEC4 Project would result in substantial carbon dioxide reductions, emitting approximately 1,592,727 tons per year, or half as much as BEC4. Sahu Statement, Table 3. Using the federal “Social Cost of Carbon” metric that PCA has recommended be used in other Commission dockets, the annual benefit of carbon dioxide reductions from natural gas alternatives amounts to a range of \$173,607,273 million in 2016 to \$305,803,636 million in 2040. These annual benefits associated with reduced carbon dioxide emissions of a natural gas plant obviously make the avoided pollution costs of the BEC4 Retrofit look miniscule.

C. The PCA’s Failure to Provide the Commission with the Analysis Required by Law Means that the Commission’s Order Fails to Consider Mandatory Factors and Therefore Is Defective as a Matter of Law.

MERA requires that the Commission “consider the environmental and public health benefits, the agency's assessment of technical feasibility, competitiveness of customer rates, and cost-effectiveness of the utility's proposed mercury-control initiatives in light of the Pollution Control Agency's review [under section 216B.684].” Minn. Stat.

§ 216B.6851 subd 6. The language of this provision mirrors the language in Minn. Stat. § 216B.684, which specifies the contents of the PCA Report. This parallel language indicates that the legislature considers the PCA Report to be a principle evidentiary foundation for the Commission's MERA decisions. Specifically, MERA expressly requires that the PCA Report include an independent comparison of the merits of alternatives to a utility's preferred mercury control plan, separate from any alternatives analysis provided by the utility. The Commission is required to consider the merits of a utility proposal in light of the PCA's alternatives analysis. Therefore, it is clear that the legislature intends for the Commission to protect the public interest by comparing a utility's preferred option to other options – with the assistance of an independent PCA analysis of these options – to determine which option best protects the environment, public health, and ratepayers.

Here, Minnesota Power “considered” a number of mercury control options that relied on natural gas generation, yet the PCA Report completely failed to analyze the merits of these options. Further, there is no evidence in the record of any independent analysis of mercury control alternatives that complies with Minn. Stat. § 216B.684(2) and (3). As such, the Commission did not and could not have considered alternatives to Minnesota Power's preferred option in light of the information required by Minn. Stat. § 216B.684(2) and (3).

The legislature turned to the PCA to provide an independent analysis of alternatives for the Commission, but the PCA entirely failed to accomplish this duty. As such, the Commission cannot rely on the PCA Report. As a consequence of the PCA's failing, the record makes clear that the Commission did not and could not have

meaningfully considered any alternatives, except to the extent allowed by Minnesota Power's self-serving alternatives analysis. The Commission's failure to include an independent alternatives analysis within the record means that it has failed to consider a mandatory factor specified by statute and its Order is in violation of law. See *CARD* at 832. Similarly, the Commission's failure to include a complete mandatory report in the record means that it failed consider information specified by law, which also makes its Order in violation of law. See *Handle With Care* at 523.

To remedy this defect in the administrative record, the Commission must reject the PCA Report and require that the PCA provide a report that fully complies with law. After receiving a complete report, the Commission must consider the PCA's analysis of all mercury control options considered by Minnesota Power and then select the option that best protects the environment, public health, and ratepayers. A failure to undertake these actions means that the Commission will commit legal error and fail to protect the public interest.

V. CONCLUSION

For the foregoing reasons, the Commission decision to grant Minnesota Power's Petitions is not founded on the evidence required by MERA and is therefore in violation of law. Accordingly, the Environmental Intervenors request that the Commission vacate its November 5, 2013, Order and stay this proceeding pending completion by the PCA of a report in full compliance with Minn. Stat. § 216B.684(2) and (3).

Dated: November 25, 2013

Respectfully submitted,

/s/ Elizabeth I. Goodpaster

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Analysis of Benefits of Natural Gas Replacement for Boswell Unit 4

**Dr. Ranajit (Ron) Sahu
Consultant**

Introduction

From a review of the record, Minnesota Power (“MP”) considered natural gas combined cycle gas units as alternatives to the proposed retrofit of Boswell Unit 4 (“BEC4”). In my opinion, however, the environmental and health benefits of the natural gas alternatives were not fully evaluated in any of the documents or by any of the agencies or by MP to date.

Since MP has not conducted such an evaluation and since the various agencies (the MPCA, the DOC, the PUC, etc.) appear not to have done so either, I provide in this report my technical analysis of the type of natural gas combined cycle natural gas plant that MP should have fully evaluated as a replacement for BEC4, the associated emissions profile of such a plant, and the benefits of its pollutant reductions. As I demonstrate in this statement, the much greater cost benefits of avoided pollution from a combined cycle natural gas plant replacement for BEC4 are very clear.

A Proper Natural Gas Replacement Option For BEC4 Has Numerous Advantages

It is without question that the natural gas combined cycle plant of the size of BEC4 (i.e., in the range of 400 to 500 MW) is technically feasible. Nor is there any question that such a replacement would be environmentally beneficial, since natural gas emissions would be far smaller than emissions from BEC4.¹ This includes emissions of mercury, which would be

¹ In fact, MP reaffirms this itself when it states that

“Replacing BEC4 with a natural gas resource or combination of resources is an alternative to installing new emission controls, since natural gas generation results in emission of less mercury, SO₂, PM and other pollutants....” **See Letter to Mr. Haar of the MPUC dated August 31, 2012**, “In the Matter of Minnesota Power’s Boswell Energy Center Unit 4 Environmental Retrofit Project - Mercury Emission Reduction Plan Petition, Docket No. E015/M-12-920,” (hereafter “Plan Petition”), p. 67.

MP also notes that

“[T]here are other benefits that natural gas resources like a combined cycle or reciprocating engine can bring to Minnesota Power customers. Compared to a large baseload coal resource, like BEC4, a combined cycle or reciprocating engine has more flexible operation and can follow wind generation better than a large coal unit, especially the reciprocating engine alternative. The

essentially zero, thereby meeting and exceeding the MERA goal. It would also reduce emissions of particulate matter, metals, sulfur dioxide, nitrogen oxides, carbon monoxide, acid gases, other organic and semi-organic hazardous air pollutants, and greenhouse gases. Not only would emissions from the power plant stack be reduced. Fugitive particulate matter from coal-handling operations at the plant and coal-dust emissions from coal transport to the plant would also be eliminated, in addition to propulsion-driven emissions from truck and rail.

Just considering the emissions from the power plant stack and neglecting fugitive emissions for now, Table 1 below shows the emission rates than can be expected from a natural gas unit.

Table 1 - Annual Emissions from a Roughly 400 MW Combined Cycle Gas Plant [0,1,2,3]				
<i>Pollutant</i>	<i>Basis</i>	<i>Units</i>	<i>Source</i>	<i>Max. Annual Emissions (tons/yr)</i>
PM10/PM2.5	9.8	lb/hr	[0]	39.8
NOx	20.2	lb/hr	[0]	82.1
SO2	3.40E-03	lb/MMBtu	[4]	34.6
CO	12.3	lb/hr	[0]	50.0
VOC	2.10E-03	lb/MMBtu	[4]	21.3
Lead	0		[4]	0
Fluoride	0		-	0
H2SO4	4.9	lb/hr	[0]	19.9
CO2e	1000	lb/MWh	[5]	1.8E+06
Hg	0		-	0

[0] From: Pioneer Valley Energy Center PSD Permit, Westfield, MA. EPA Final PSD Permit No.: 052-042-MA15

[1] Neglecting emissions from support sources such as the auxiliary boiler, emergency generator, fire pump, and cooling tower

[2] Neglecting emissions during startup and shutdown

[3] Size of reference unit = 431 MW
2500 MMBtu/hr

[4] AP-42, Section 3.1, Stationary Gas Turbines

[5] Survey of Combined Cycle Combustion Turbine Greenhouse Gas Emission Rates, WA. State Dept. of Commerce, Nov. 2012

combined cycle is also a more efficient resource, meaning it takes less fuel than BEC4 to generate 1 MWh of energy. The greater fuel efficiency of a combined cycle equates to less fuel consumption by volume and less emissions such as mercury, SO2, NOx and carbon when compared to a large coal unit such as BEC4.” See Appendix A to the Plan Petition, p. 15.

Finally, in its 2013 IRP MP correctly states that

“[A]n existing coal unit emits just over one ton of CO2e per MWh; a natural gas unit, approximately one-half ton CO2e per MWh... Minnesota Power’s 2013 Integrated Resource Plan (IRP), Appendix E, p. 3.

Based on the emissions shown in Table 1, it is also without question that the natural gas combined cycle plant would automatically meet not only MERA but also the requirements of the Federal MATS rule.² The benefits of replacing BEC4 with a natural gas plant are also much greater than proceeding with MP's proposed improvement project. MPCA has estimated the benefits of reduced emissions in its review of the BEC4 Retrofit project.³ I will use the results from MPCA's work and provide an approximate sense of the benefits of replacing BEC4 with a natural gas unit. For reasons that I will describe below, my estimate of the benefits is underestimated compared to the benefits analysis discussed in the MPCA report.

Table 2 below shows the emission rates and maximum annual emissions⁴ for SO₂, PM, and mercury, just from BEC4, under three scenarios: using emission rates for 2011; using emission rates after installation of the BEC4 Project, and if a natural gas unit of the same size is installed, replacing BEC4.

Table 2 - Comparison of Emission Rates Per Table 2 of PCA Analysis and Including Natural Gas						
BEC4 Capacity	5615	MMBtu/hr	[1]			
	Emission Rates			Maximum Annual Emissions		
	SO ₂ (lb/MMBtu)	PM (lb/MMBtu)	Mercury (lb/TBtu)	SO ₂ (tpy)	PM (tpy)	Mercury (lb/yr)
BEC4 2011 Performance [1]	0.049	0.060	5.280	1205.1	1475.6	259.7
BEC4, After Proposed Project [1]	0.030	0.012	0.600	737.8	295.1	29.5
Natural Gas Replacement [Table 1]	3.40E-03	0.00392	0	83.6	96.4	0
Emissions Reductions Due to BEC4 Project				467.3	1180.5	230.2
Emissions Reductions Due to Gas Replacement				1121.5	1379.2	259.7
Increase in Emissions Reductions Due to Gas				140%	17%	13%

[1] Review of MP's BEC4 Improvement Plan, MPCA, March 1, 2013, Table 2

² Compare the emission rates in Table 1, for example, with those shown for SO₂, PM and Mercury in Table 2 of PCA's March 1, 2013 Report reviewing MP's BEC4 Improvement Plan.

³ Review of MP's BEC4 Improvement Plan, MPCA, March 1, 2013.

⁴ I note that the MPCA analysis, without explanation, does not use maximum annual unit performance (i.e., heat input) for BEC4 in its estimate of emissions reduction and resulting benefits – instead, using 2011 actual heat input levels. See, for example, Table 1 of the MPCA report. Since the operating permit for BEC4 does not restrict operations at levels greater than what was accomplished in 2011, I believe it is appropriate to use maximum annual heat input values, as I have done in Table 2.

In its benefits analysis, the MPCA concludes that the overall annual benefit of the BEC4 Project, due to avoided mortality alone from just SO₂ and PM reductions will be in the range of \$14 to \$31 million.⁵ In addition, MPCA estimates that the additional annual benefits due to mercury reduction would be in the range of \$370,000 to \$19 million.⁶ MPCA estimated these benefits using the emission reduction values of 414 tons/year for SO₂, 1016 tons/year for PM (for a combined total annual reduction of 1430 tons/year for SO₂ and PM), and 202 lb/year for mercury.⁷

Table 2 above shows that the maximum annual emissions benefit for a natural gas replacement option. It would result in a reduction of approximately 1121.5 tons/year for SO₂, 1379.2 tons/year for PM (for a combined total annual reduction of 2500.7 tons/year), and 260 lb/year for mercury.

Since the MPCA benefits analysis does not break out the benefits in reduced mortality separately for SO₂ and PM, I have scaled MPCA's benefits using the total SO₂ plus PM annual emissions reductions and also the increase in mercury reductions. Using the values above, since the total SO₂ and PM annual emissions reductions for the natural gas replacement option are approximately 2500.7 tons/year (as opposed to the MPCA's BEC4 improvement reduction of 1430 tons/year), the range of benefits just due to these two pollutants alone rises to \$24.5 to \$54 million per year. Similarly, the scaled benefits due to mercury reduction rises to the range of approximately \$475,000 to \$24.4 million using the reduction due to the natural gas option of 260 lb/year as opposed to the MPCA assumption of a 202 lb/year reduction due to the BEC4 Project. Combining the SO₂ plus PM and the mercury benefits, I arrive at a range of approximately \$25 to \$78 million per year for the natural gas option.

My analysis above only focuses on SO₂, PM, and mercury. Of course, as noted in discussion (and Table 1) above, a natural gas replacement will not only reduce the emissions of these three pollutants but it will also reduce emissions of all of the other pollutants in Table 1 above, including NO_x, CO, VOCs, lead, fluorides, sulfuric acid mist, and greenhouse gases. Since the MPCA benefits analysis (and my scaled analysis therefrom) only quantifies benefits due to SO₂,

⁵ Review of MP's BEC4 Improvement Plan, MPCA, March 1, 2013, Table 9.

⁶ Review of MP's BEC4 Improvement Plan, MPCA, March 1, 2013, see discussion on p. 26.

⁷ Review of MP's BEC4 Improvement Plan, MPCA, March 1, 2013, Table 7.

PM, and mercury, it is clear that benefits from a natural gas replacement option will be considerably greater than those just due to estimated reductions from these three pollutants.

Greenhouse gas emissions are an important example of emissions that MPCA would have to have considered with a natural gas plant option; the agency would need to have quantified benefit of reduced carbon dioxide emissions associated with a natural gas replacement of BEC4. Using the recently updated Federal Social Cost of Carbon estimate (3% discount, 95th percentile, as recommended), the avoided cost to society of CO2 emissions begins at \$173,607,273 (2007) million in 2016, rising to \$305,803,686 million (2007) in 2040. Cumulatively, this is nearly \$6 billion in cost impacts due to the high carbon emissions from a retrofit BEC4, all avoided with a natural gas plant replacement.

TABLE 3 Avoided Costs of CO2 Emissions -- Natural Gas Combined Cycle Replacement		
	Size of Power Plant =	400
	Annual Maximum MWh =	3504000
	Avoided CO2 Emissions Due to Natural Gas =	1000
	=	1592727
Year	Social Cost of Carbon[1] (in 2007 \$/mton)	Avoided Cost of CO2 Emissions (in 2007 \$/yr)
2016	109	173,607,273
2017	109	173,607,273
2018	109	173,607,273
2019	109	173,607,273
2020	129	205,461,818
2021	129	205,461,818
2022	129	205,461,818
2023	129	205,461,818
2024	129	205,461,818
2025	144	229,352,727
2026	144	229,352,727
2027	144	229,352,727
2028	144	229,352,727
2029	144	229,352,727
2030	159	253,243,636
2031	159	253,243,636
2032	159	253,243,636
2033	159	253,243,636
2034	159	253,243,636
2035	176	280,320,000
2036	176	280,320,000
2037	176	280,320,000
2038	176	280,320,000
2039	176	280,320,000
2040	192	305,803,636
Cumulative 2016-2040 (in 2007 \$)		5,842,123,636

[1] Taken from
 Technical Support Document:
 Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, May 2013.
http://www.whitehouse.gov/sites/default/files/omb/inforeg/social_cost_of_carbon_for_ria_2013_update.pdf

In addition, as I noted earlier, PM reductions will occur not just from the stack as assumed in all of the estimates above but also from reductions in fugitive PM emissions if BEC4 is replaced

with a natural gas plant. Clearly, the station will not handle as much coal and, as a result, all of the fugitive PM emissions due to coal transportation to BEC4, and all of the coal handling PM fugitive emissions (such as at the coal piles, the various conveyers that move the coal around, etc.) will also be proportionally reduced. My analysis does not include these additional benefits.

Finally, the operating costs of a natural gas combined cycle plant, including fuel and other operating costs are significantly lower than the corresponding operating costs of any coal unit, including BEC4. Thus, the replacement gas plant would likely be dispatched more and would be better utilized than BEC4 into the future.

Against all of the advantages of a natural gas alternative discussed above, no reason stated or implied in the record by MP or the agencies, justifies the reluctance to require analysis of the natural gas option. The MPCA's position that it could not possibly evaluate a gas option because it could not analyze the environmental impact without knowing where such a replacement gas option would be located, is inappropriate.⁸ Nothing prevented the MPCA from making the

⁸ See testimony of Mr. Kohlasch of the MPCA before the MPUC at the June 6, 2013 Hearing, relevant portions of which are reproduced below.

“MR. KOHLASCH:We included all benefits that would result from the multi-pollutant reduction strategy that was put forth in the plan by Minnesota Power. And that the cost drivers for the benefits are driven because of the particulate matter reductions that we'll be seeing by this plan.

I want to also highlight our thinking on why we did not do an environmental assessment of the natural gas alternatives provided.....And we looked back to the Department of Commerce's findings for the retirement of Boswell 4 and replacement with natural gas as not being a cost-effective option. In our light of looking at that, those natural gas retirement and replacement alternatives were not realistic. Also, when we looked at the details of those alternatives as presented, they were not tangible. They did not provide us with enough information on exactly what kind of power plant, where it would be, its emission rates, its emissions.....When we looked at the information that was provided, the finding from the Department of Commerce that retirement of Boswell 4 and replacement with natural gas had already been determined as not cost-effective, that is why we did not continue on with the environmental assessment as required....” June 6 Hearing Transcript, p. 33-34.

“COMMISSIONER O'BRIEN: You said that you looked at what the Department of Commerce did with respect to a gas plant. Did you look critically at that? Did you examine their cost assumptions as part of your charge to evaluate options?

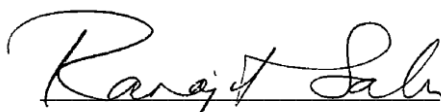
MR. KOHLASCH: We did not because the kind of cost evaluation is the traditional purview and authority of the Department of Commerce when looking at the cost-effectiveness. And when we

assumption (and then allowing Minnesota Power to suggest alternative locations, if so desired) that the replacement plant would be located at the same location as BEC4, namely at the BEC site itself. Regardless of where the replacement gas unit would be located, there would be significant emissions reductions at BEC4 itself with such a replacement, since emissions of all pollutants (including particulate matter and mercury, which drive the health benefits in MPCA's analysis to date) attributable to BEC4 would become zero at the BEC4.

Conclusion

In conclusion, it is clear that the current record is exceedingly deficient because it lacks a transparent analysis of a combined cycle natural gas replacement option for BEC4, to be located at the BEC and/or any alternative location of MP's choice so that all of the agencies and the public have a chance to properly review and assess this option.

Dated: November 25, 2013



Dr. Ranajit Sahu
Consultant to Environmental Intervenors

looked at the costs that were presented, they were -- for the natural gas they were higher than the cost to retrofit and they were bolstered by the Department of Commerce's finding." June 6, 2013 Hearing Transcript, p. 38.

"Now another question. Does the agency have the capacity to do a 216B.684 assessment on a gas plant that a utility does not want to build?"

MR. KOHLASCH: No. And that is essentially the situation that was presented with us because we do not have enough information in alternatives on a natural gas plant at this point in time to do the environmental assessment as required. We would need more information about the details about that facility, including its size, its type of operation, where it's going to be will be critically important on the environmental analysis. Because as has been discussed in general with us, the location of a replacement natural gas facility may not be in Minnesota, it may be in another state, which means we'll have to be analyzing for the environmental costs that will be borne by someone else receiving a new natural gas plant in comparison to the benefits received by retiring Boswell 4. Now, we would need much more detail from Minnesota Power on a viable, tangible alternative for a natural gas plant for us to do an analysis." June 6, 2013 Hearing Transcript, p. 39.

"MR. KOHLASCH: Madam Chair and Commissioner O'Brien, we do use that authority to ask for additional information. However, in this case, because of the status of a decided-upon IRP that had indicated that Boswell 4 should remain as a coal-fired power plant, we did not see it in our authority to tell Minnesota Power to go back and produce a specific tangible natural gas alternative plant that goes against what we understood was in the IRP." June 6, 2013 Hearing Transcript, p. 61-62.