



12300 Elm Creek Blvd • Maple Grove, Minnesota 55369-4718 • 763-445-5000 • Fax 763-445-5050 • [www.GreatRiverEnergy.com](http://www.GreatRiverEnergy.com)

**VIA E-FILING**

November 8, 2013

Dr. Burl W. Haar  
Executive Secretary  
Minnesota Public Utilities Commission  
350 Metro Square Building  
121 Seventh Place East  
Saint Paul, MN 55101-2147

**Subject: Docket E-999/CI-00-1636  
In the Matter of the Investigation into Environmental and  
Socioeconomic Costs Under Minn. Stat. §216B.2422, subd.3.**

Dear Dr. Haar,

Enclosed are the comments of Great River Energy in Docket CI-00-1636 regarding the investigation into environmental and socioeconomic costs under Minn. Stat. §216B.2422, subd.3.

We appreciate the opportunity to provide comments on this issue.

Sincerely,

Laureen L. Ross McCalib  
Manager Resource Planning

Enclosures

**STATE OF MINNESOTA  
PUBLIC UTILITIES COMMISSION**

<b>Beverly Jones Heydinger</b>	<b>Chair</b>
<b>Dr. David C. Boyd</b>	<b>Commissioner</b>
<b>Nancy Lange</b>	<b>Commissioner</b>
<b>J. Dennis O'Brien</b>	<b>Commissioner</b>
<b>Betsy Wergin</b>	<b>Commissioner</b>

**In the Matter of the Investigation into  
Environmental and Socioeconomic Costs Under  
Minn. Stat. §216B.2422, subd. 3**

**Docket No. E-999/CI-00-1636**

**1. INTRODUCTION**

Great River Energy (“GRE”) submits these comments in response to the Minnesota Public Utilities Commission’s (“Commission”) Notice of Comment Period on Motion to Update Environmental Cost Values, Docket CI-00-1636. We appreciate the Commission’s consideration of all interested parties’ perspectives on this issue. By seeking broad input from all affected stakeholders, the Commission will be able to give thoughtful and deliberate consideration to this important issue.

Great River Energy is a not-for-profit electric generation and transmission cooperative serving the wholesale power needs of 28 member distribution cooperative members in Minnesota and western Wisconsin.

Great River Energy respectfully recommends that the Commission decline to grant the motion of the Clean Energy Organizations (“CEO”) to start a new proceeding to establish and update environmental values at this time.

However, in the event the Commission elects to grant the motion, Great River Energy requests that a consultant not be engaged as recommended by the CEO until the scope has been developed through an open and transparent multi-stakeholder process. We request the Commission allow for this stakeholder process. Further, we request the Commission refer the matter to the Office of Administrative Hearings for a contested case hearing and the Commission set an 18 month deadline from the date of the Commission refers the matter to the Office of Administrative Hearings before making its final decision.

## **2. OPENING A NEW PROCEEDING IS PREMATURE**

Great River Energy and other Minnesota utilities currently consider environmental cost values in resource planning decisions. The externality values determined in earlier Commission proceedings remain used and useful today. We have not identified any new factors that suggest action should be taken immediately by the Commission. We suggest that a Commission review of Minnesota's externality values will be appropriate and informed when decisions are made at the federal level on new air or carbon regulations.

On September 20, 2013, the Environmental Protection Agency ("EPA") released its new proposed new source performance standards (NSPS) for greenhouse gas emissions (GHGs) from new fossil fuel-fired electric generating units. The proposed NSPS will set national limits on the amount of carbon that power plants to be built in the future will be allowed to emit. Issues raised at the federal level will have effects on multiple segments of the U.S. power industry. EPA's proceeding will be a well-rounded and robust discussion of all the elements of the proposed standard, including social costs.

Additionally, under President Obama's climate action plan, the President directed the EPA to issue carbon standards on modified, reconstructed and existing power plants by June 1, 2014. The goal would be to have final regulations in place for existing power plants by June 2015.

Both the NSPS and the regulations for existing power plants will have major impacts on utilities in the state of Minnesota. The final regulations will be a major component to a discussion on externalities. Given the work that is currently being undertaken at the federal level, it is premature to start a proceeding to establish and update environmental values in the state of Minnesota.

## **3. IN THE EVENT THE COMMISSION ELECTS TO START A NEW PROCEEDING, THE SCOPE OF THE ISSUES SHOULD BE DETERMINED THROUGH AN OPEN AND TRANSPARENT STAKEHOLDER PROCESS**

The Commission's authority to consider environmental externalities comes from MN Stat. §216B.2422, subd. 3, which reads:

*"The commission shall, to the extent practicable, quantify and establish a range of environmental costs associated with each method of electricity generation. A utility*

*shall use the values established by the commission in conjunction with other external factors, including socioeconomic costs, when evaluating and selecting resource options in all proceedings before the commission.”*

The statute indicates that the Commission must exercise judgment about the practicality of establishing and using environmental cost values. The original proceedings on externalities triggered lengthy debate on the issues. We assume a new proceeding on the issue will take a similar path.

Great River Energy requests that if the Commission elects to re-open this docket, active participation of all stakeholders be encouraged in shaping the scope of the discussion and the analysis. In our view, allowing a single group to determine the scope of the proceedings is unbalanced and will result in an outcome that may have difficulty gaining support from all stakeholders. The CEO believes that “the values established in 1996 (as amended in 2001) are no longer supported by scientific evidence.”<sup>1</sup> Other stakeholders may have different views that deserve to be heard and bear consideration by the Commission. Great River Energy believes that the CEO’s supporting study relies upon only selected research rather than the broader realm of research available. The study is included as Exhibit A in the CEO’s Motion.

The Electric Power Research Institute (“EPRI”) has had a brief chance to review the CEO sponsored study which is used to support the CEO’s Motion. EPRI’s review of the report results in questions on the study methodology and the scientific studies used to derive the results, including the very limited number of dose-response function for the long-term particulate matter (“PM”) and mortality relationship, the lack of distinction among different particle components, the lack of studies on health effects among components of PM, the calculation of mortality dose-response functions, and others. Please see Exhibit A: EPRI Comments on “Health and Environmental Costs of Electricity Generation in Minnesota.”

#### **4. IN THE EVENT THE COMMISSION ELECTS TO START A NEW PROCEEDING, THE MATTER SHOULD BE REFERRED TO THE OFFICE OF ADMINISTRATIVE HEARINGS**

An Administrative Law Judge can best weigh facts, opinions, input and viewpoints to provide a thorough and fact based recommendation to the Commission. Honoring stakeholder

---

<sup>1</sup> In the Matter of the Investigation into Environmental and Socioeconomic Costs Under Minn. Stat. §216B.2422, subd. 3, October 14, 2013, Docket No. E-999/CI-00-1636.

input and allowing full participation in any analyses conducted is the best way to reach a common conclusion. Once the study scope and study have been completed through the open stakeholder process, the Office of Administrative Hearings, through a contested case, can gather responses and viewpoints and evaluate and balance them to assist the Commission in making a decision on whether to change the use and value of externalities in resource planning.

**5. IN THE EVENT THE COMMISSION ELECTS TO START A NEW PROCEEDING, THE MATTER SHOULD BE ALLOWED 18 MONTHS FOR A FULL REVIEW OF THE ISSUE.**

Should a new proceeding be opened, Great River Energy recommends that a Commission decision be made 18 months from the date the Commission refers the case to the Office of Administrative Hearings. Developing the scope of the complex topic of externalities and externality values is not a quick process if adequate and appropriate stakeholder input is included. As stated earlier, utilities already use Commission approved externality values in resource planning decisions, so time is not of the essence. The question before the Commission is what externalities should be reviewed, and if new values should be assigned to those externalities. Eighteen months of a contested case proceeding will allow the stakeholders and the Administrative Law Judge a reasonable amount of time to evaluate these and make a complete recommendation to the Commission.

**6. CONCLUSION**

Great River Energy appreciates the Commission's request for comments on the important and complex issue of environmental values. We recommend the Commission decline to grant the motion to open a new proceeding to establish and update environmental values at this time, since externality values are already considered in utilities' resource plans and federal regulations that affect this issue are in development. We believe the Commission can and should wait for these regulations to be solidified before making a decision.

However, if the Commission elects to start a new proceeding on environmental values, we ask that the Commission find the broad scope of the proceeding requires input from multiple stakeholders, a stakeholder process be provided for, the proceedings be referred to the Office of Administrative Hearings for a full review, and an adequate timeline of 18 months be allowed for full consideration by all parties.

**Docket CI-00-1636**  
**GRE Comments**  
**Exhibit A**

**EPRI Comments on: “Health and Environmental Costs of Electricity Generation in Minnesota”**

Naresh Kumar, Ph.D., MBA

Senior Program Manager, Air Quality

Electric Power Research Institute

3420 Hillview Avenue, Palo Alto, CA 94304, USA

(650) 855-8758

Ron Wyzga, Sc.D.

Senior Technical Executive, Air Quality

Electric Power Research Institute

3420 Hillview Avenue, Palo Alto, CA 94304, USA

(650) 855-2132

Steven Rose, Ph.D.

Senior Project Manager, Energy and Environmental Analysis

Electric Power Research Institute

2000 L Street, Washington, DC 20036, USA

(650) 293-6183

Background

This study estimates the costs of air pollution associated with power plant emissions of criteria air pollutants and of greenhouse gases. The study was conducted by Andrew L. Goodkind and Stephen Polasky in the Department of Applied Economics at the University of Minnesota. They estimate the total damages from electricity generation in Minnesota to be about \$2.164 billion (in 2010 dollars), with \$877 million of these costs associated with criteria pollutants and the rest with the greenhouse gases.

The estimates of costs associated with criteria air pollutants vary, depending upon the location of the power plants. The major source of data used to estimate costs is a 2010 report by the National Research Council (NRC), “Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use.” The NRC report did not provide sufficient geographic detail to allow plant-specific estimates for Minnesota; accordingly this study used selected data from a study (Muller et al., 2011) that used the same models as the NRC study. The results allow the current study to provide estimates of the costs per ton of emissions by type of county (urban vs. rural). In the NRC report, emissions are based upon estimates for 2005. The resulting cost estimates are then compared to estimates from other studies: Levy et al. 2009, Epstein et al. 2011 and Rafaj et al. 2007. These various studies employ similar methodologies for estimating pollution damages; they did not consider infant mortality per se; and their different cost estimates are due principally to differences in the estimated emissions from power plants and from the choice of dose-response functions for the mortality–particulate matter relationship. All of the above

studies use a dose-response function derived from some publication of the Harvard 6-city study and/or from the American Cancer Society cohort study, with those estimates making use of the former being considerably larger.

The NRC study used the Air Pollution Emissions Experiments and Policy analyses (APEEP) model. The APEEP model is a reduced-form, integrated assessment model that calculates marginal damages (including adverse human health effects and ecological effects) associated with emissions of nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), ammonia, fine particulate matter (PM<sub>2.5</sub>) and total respirable particulate matter (PM<sub>10</sub>) on a dollar-per-ton basis. The damage functions relating particulate matter with air pollution mortality had the highest influence on the outcome of the study; these functions are based on the results from specific air pollution health studies. Two studies were instrumental in informing the PM mortality estimates in the NRC study: Pope et al. 2002 for all adult chronic exposure mortality to PM<sub>2.5</sub>; and Woodruff et al. 2006 for infant chronic exposure mortality to PM<sub>2.5</sub>.

#### Summary of EPRI Comments

- For greenhouse gases, the study recommends an estimate of \$36 per ton of CO<sub>2</sub> emitted in 2015, with a range of \$11 to \$55. These values are based on U.S. government (USG) estimates that have yet to be publically vetted or peer reviewed. Among other things, the uncertainty and sensitivity of the USG estimates have not yet been fully characterized, and there are technical issues regarding inputs and implementation. In addition, the Goodkind and Polasky application of these estimates does not consider GHG emissions increases that might occur elsewhere in response to potential reductions in Minnesota fossil generation. Such changes would result in lower GHG reductions on net and would affect GHG reduction benefit calculations.
- For the criteria pollutants, the health effects analyses contained within the report do not consider a sufficiently comprehensive cross-section of the literature. If they had used a full range of dose-response functions from different studies in the literature, the authors would have found damages ranging from zero onwards. Use of only one or two dose-response functions can be very misleading, as it ignores the uncertainty associated with these estimates.
- The authors do not consider differential toxicity of PM components when estimating damages from PM, although there is increasing evidence that different components of PM can have different health impacts. This issue was also acknowledged in the NRC report, although their study also suffered from the same drawback in not considering differential toxicity of PM components.

- The reduced form models, like the APEEP model used in the study, are not appropriate for calculating marginal impacts of emissions from different sources because of the non-linear chemistry in the atmosphere. A more appropriate choice would have been to use a more sophisticated model like the Community Multiscale Air Quality (CMAQ) model developed by the U.S. Environmental Protection Agency.
- The report did not consider uncertainty in a rigorous manner. A formal sensitivity analyses should have included consideration of alternative dose-response functions derived from additional studies, more discussion of the relative toxicity of different components, and use of different air quality models to calculate the marginal damages associated with emissions from a source. A range of estimated damages would be more useful in terms of informing public policy.

#### Detailed EPRI Comments

The detailed comments below apply only to the damages associated with criteria pollutants.

EPRI has several observations on that aspect of the report including the study methodology and the scientific studies used to derive the results:

1. This study considered a very limited number of dose-response functions for the long-term PM and mortality relationship. There are over 65 cohort study papers that could have been used by the authors. Of these, at least 30 papers are from independent studies worldwide, and some 12 are from independent US studies. The authors selected only one of these for their analysis; if they had chosen alternative papers, they could have achieved very different results. For example, if they had used dose-response functions from the Veterans' study (Lipfert et al. 2000; Lipfert et al. 2006; Lipfert et al. 2009) or the most recent results from the study of a Medicare cohort (Greven et al. 2011), there would have been no statistically significant damages associated with premature mortality. We do not argue that these papers should necessarily be used in place of what the study used (i.e., Pope et al. 2002), but rather that the entirety of results from the literature should be considered in the analyses of this study and in the sensitivity analyses, especially if such a study is to be used to inform policy. It should also be noted that many of the published papers present several alternative dose-response functions based upon different datasets or assumptions; hence the choice of only one dose-response function from one study can be misleading.
2. With respect to PM, the health effects studies used in the analysis make no distinction among different particle components, an issue that is acknowledged but not considered in the NRC

report. A recent update (Jerrett et al, 2007) of the Pope et al. 2002 study distinguishes differences in health effects between the sulfate and non-sulfate components of PM with the sulfate component (for which power plants are typically the largest contributor) showing significantly less impact. Other studies, such as the EPRI-supported Veterans Study (See for example, Lipfert et al. 2009), also find differences in health effects among components of PM; yet these studies are not mentioned or considered in the report. EPRI's ARIES (Aerosol Research Inhalation and Epidemiology Study) project, although dealing with acute responses to air pollutants, provides additional evidence that different components of PM demonstrate different health responses and that the components are not equally toxic.

3. Another issue is that the methods used to calculate the mortality dose-response functions may be flawed. A recent paper (Greven et al. 2011) suggests that these methods may overestimate the damages. Greven et al. corrected the methodology of one of the earlier studies of Greven's colleagues and found that there was no longer any change in life expectancy associated with a change in fine particulate levels. This methodological issue clearly needs to be addressed and mentioned in this study.
4. The Woodruff et al. 2006 study was limited to California residents and locations where PM<sub>2.5</sub> has a different composition than most rest of the U.S. (e.g., there are no coal-fired power plants in the areas studied in California). In addition, the results of the Woodruff et al. study were not statistically significant for total infant mortality, only respiratory mortality. It also did not adjust for maternal smoking thereby limiting the study's potential usefulness in this analysis.
5. The APEEP model suffers from drawbacks like any other reduced-form model. Although it allows for faster computation of thousands of different scenarios, it may not accurately predict the marginal impact from a source category because of the use of reduced form PM and ozone transformation functions. The chemistry in the atmosphere behaves non-linearly and one needs full chemistry models (e.g., the Community Multi-scale Air Quality or the so called CMAQ Model) to accurately determine marginal impact of emissions from a source category to ambient air quality. Although the use of CMAQ model would give a more accurate marginal impact, one should not apply that marginal impact to all of the emissions from a source (as was done in this study) because the marginal impact will change as emissions are reduced further and further.
6. The report failed to consider uncertainty in a rigorous manner, e.g., by conducting formal sensitivity analyses or providing ranges of impact (the authors of the NRC report specifically note that these analyses were not included). It would have been more instructive if the study

had considered uncertainty in more detail, especially for those elements of the study which most strongly influenced the results. This would have included consideration of alternative dose-response functions derived from additional studies, more discussion of the relative toxicity of different components, the use of different air quality models to calculate the marginal damages associated with emissions from a source, and providing a range of estimates of the estimated costs associated with the various technologies considered. A range of estimated damages would be more useful in terms of informing public policy.

7. The study is based upon 2005 emissions estimates; emissions have likely been reduced significantly since that date and further reductions and changes in composition are likely in the future.
8. The authors use a value of \$6 million in estimating the damages for lost life. A range of values is possible and thus it is unclear which value is the most appropriate to use when estimating impact. The attachment of values to mortality risk is fraught with difficulty and controversy. Most estimates are based on changes in risk to a healthy or younger (40 years of age) population. Pope et al. 2009 estimated about a 6-month reduction in life due to fine particulate exposure; this estimate is most likely an overestimate because changes in life expectancy over time are greatly influenced by changes in neonatal mortality, an issue not considered by Pope et al. or Laden et al. In addition, Murray and Nelson 2000 and Murray and Lipfert 2010, 2012 suggest that any effects of pollution on acute mortality are only a matter of days, a result that could influence the length of life shortening in the studies considered here as well.

### References

- Epstein, Paul R., Jonathan J. Buonocore, Kevin Eckerle, Michael Hendryx, Benjamin M. Stout III, Richard Heinberg, Richard W. Clapp, Beverly May, Nancy L. Reinhart, Melissa M. Ahern, Samir K. Doshi, Leslie Glustrom, 2011. "Full cost accounting for the life cycle of coal." *Annals of the New York Academy of Sciences*, 1219, pg. 73-98.
- Greven, S., Dominici, F., Zeger, S. 2012 "An Approach to the Estimation of Chronic Air Pollution Effects Using Spatio-Temporal Information," *Journal of the American Statistical Association*.
- Jerrett, M., Newbold, K.B., Burnett, R.T., Thurston, G., Lall, R., Pope, C.A., Ma, R., DeLuca, P., Thun, M., Calle, J., Krewski, D. 2007., "Geographies of uncertainty in the health benefits of air quality improvements," *Stoch Environ Res Risk Assess.* 21:511-522.
- Laden, Francine, Joel Schwartz, Frank E. Speizer, Douglas W. Dockery, 2006. "Reduction in Fine Particulate Air Pollution and Mortality: Extended Follow-up of the Harvard Six Cities Study." *American Journal of Respiratory and Critical Care Medicine*, 173(6), pg. 667-672.

Lepeule, Johanna, Francine Laden, Douglas Dockery, Joel Schwartz, 2012. "Chronic Exposure to Fine Particles and Mortality: An Extended Follow-up of the Harvard Six Cities Study from 1974 to 2009." *Environmental Health Perspectives*, 120(7), pg. 965-970.

Levy, Jonathan I., Lisa K. Baxter, Joel Schwartz, 2009. "Uncertainty and Variability in Health -Related Damages from Coal-Fired Power Plants in the United States." *Risk Analysis*, 29(7), pg. 1000-1014.

Lipfert, F.W, Perry, H.M., Miller, J.P., Baty, J.D., Wyzga, R.E. Carmody, S.E. 2000. "The Washington University-EPRI Veterans Study: Preliminary Results", *Inhalation Toxicology*, 12 (Suppl. 4) 41-73.

Lipfert, FW, Baty,JD, Miller, JP, Wyzga, RE, 2006. "Constituents and Related Air Quality Variables as Predictors of survival in a Cohort of U.S. Military Veterans" *Inhalation Toxicology*, 18: 645-657.

Lipfert FW, Wyzga RE, Baty JD, Miller JP: Air pollution and survival within the Washington University-EPRI veterans cohort: risks based on modeled estimates of ambient levels of hazardous and criteria air pollutants. *J Air Waste Manag Assoc*; 2009 Apr;59(4):473-89.

Murray CJ, Lipfert FW. 2010. Revisiting a Population-Dynamic Model of Air Pollution and Daily Mortality of the Elderly Population in Philadelphia. *J Air Waste Manag Assoc*. 60:611-629.

Murray CJ, Nelson CR. 2000. State-space modeling of the relationship between air quality and mortality. *J. Air Waste Manage. Assoc* 50:1075-1080.

Muller, Nicholas Z., Robert Mendelsohn, William Nordhaus, 2011. "Environmental Accounting for Pollution in the United States Economy." *American Economic Review*, 101, pg. 1649-1675.

Murray CJ, Lipfert FW. 2012. A new time-series methodology for estimating relationships between elderly frailty, remaining life expectancy, and ambient air quality. *Inhal Toxicol* 24:89-98.

Murray CJ, Lipfert FW. 2010. Revisiting a Population-Dynamic Model of Air Pollution and Daily Mortality of the Elderly Population in Philadelphia. *J Air Waste Manag Assoc*. 60:611-629.

Murray CJ, Nelson CR. 2000. State-space modeling of the relationship between air quality and mortality. *J. Air Waste Manage. Assoc* 50:1075-1080.

National Research Council, 2010. "Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use." Washington: National Academies Press.

Pope, C. Arden III, Richard T. Burnett, Michael J. Thun, Eugenia E. Calle, Daniel Krewski, Kazuhiko Ito, George D. Thurston, 2002. "Lung Cancer, Cardiopulmonary Mortality, and Long -term Exposure to Fine Particulate Air Pollution." *JAMA*, 287(9), pg. 1132-1141.

Pope, CA, Ezzati, M. Dockery, DW. 2009 "Fine particulate air pollution and life expectancy in the United States., *New England Journal of Medicine*, 360(4):376-386.

Rafaj, Peter and Socrates Kypreos, 2007. "Internalisation of external cost in the power generation sector analysis with Global Multi-regional MARKAL Model." *Energy Policy*, 35(2), pg. 828-843.

Woodruff TJ, Parker JD, Schoendorf KC. Fine particulate matter (PM<sub>2.5</sub>) air pollution and selected causes of postneonatal infant mortality in California. *Environ Health Perspect*. 2006;114:786-790.

STATE OF MINNESOTA  
BEFORE  
THE MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of the Investigation into Environmental and Socioeconomic Costs Under Minn.  
Stat. §216B.2422, subd.3  
Docket No. E-999/CI-00-1636

**CERTIFICATE OF SERVICE**

Donna Boe certifies that on November 8, 2013, she served the attached Comments of Great River Energy in Docket No. E-999/CI-00-1636 via e-filing to the Minnesota PUC.

/s/ Donna Boe  
Donna Boe  
Executive Assistant  
GREAT RIVER ENERGY