

RUS received the attached letter from the Environmental Law and Policy Center on January 10, 2020, which was after the close of the Final Environmental Impact Statement (FEIS) 30-day review period (October 25 to November 26, 2019).

Due to the late submittal date, this letter is not addressed specifically in the ROD Appendix F, FEIS Comment Response Report.

RUS did consider climate change in FEIS Chapter 4. FEIS Section 4.4.5 estimates the potential range of greenhouse gas emissions from electricity generation sources that could have access to transmission lines from the C-HC Project. The type of and amount of electricity generation sources that could be served over the life of the C-HC Project is not known at this time. By providing an estimated range of greenhouse gas emissions between 100% coal-fired generation and 100% wind-powered generation, the FEIS provides the public and the Federal decision makers with an adequate estimate of the range of potential carbon dioxide (CO₂) emissions to make an informed decision.



ENVIRONMENTAL LAW & POLICY CENTER

Protecting the Midwest's Environment and Natural Heritage

January 10, 2020

Dennis Rankin
Environmental Protection Specialist
Rural Utilities Service, U.S. Department of Agriculture
1400 Independence Avenue SW., Room 2244, Stop 1571
Washington, DC 20250
dennis.rankin@wdc.usda.gov
comments@CardinalHickoryCreekEIS.us

RE: Comments on the FEIS for the Cardinal-Hickory Creek transmission line

Dear Mr. Rankin,

As discussed in the comments submitted on behalf of the Driftless Area Land Conservancy (DALC) and the Wisconsin Wildlife Federation (WWF) on November 25, 2019 on the Rural Utilities Service's (RUS) Final Environmental Impact Statement for the Cardinal-Hickory Creek transmission line, DALC and WWF have significant concerns regarding the analysis of greenhouse gas pollution and climate change impacts from this proposed high-voltage transmission line.

As explained in DALC/WWF's previous comments, Wisconsin Citizens Utility Board expert witness Mary Neal testified in the Public Service Commission of Wisconsin proceeding that the Cardinal-Hickory Creek line would carry electricity generated from burning fossil fuels, such as coal. The climate change impacts of providing a wider market for coal and gas plants, which would encourage increased generation from these sources, must be considered by RUS under the National Environmental Protection Act.

Moreover, Mary Neal's subsequent testimony explained that the proposed Cardinal-Hickory Creek transmission line would in many forecasts lead to only marginal amounts of new wind generation, and could in fact spur coal-fired electricity generation. See attached Supplemental Direct, Rebuttal, and Surrebuttal Testimony of Mary Neal. RUS must fully consider how the Cardinal-Hickory Creek transmission line would impact electricity markets and the subsequent greenhouse gas pollution and climate change impacts.

Thank you for your attention and consideration.

Sincerely,

Rachel Granneman, Staff Attorney
Environmental Law & Policy Center
RGranneman@elpc.org

*On behalf of the Driftless Area Land Conservancy
and Wisconsin Wildlife Federation*

35 East Wacker Drive, Suite 1600 • Chicago, Illinois 60601
(312) 673-6500 • www.ELPC.org

Harry Drucker, Chairperson • Howard A. Learner, Executive Director
Chicago, IL • Columbus, OH • Des Moines, IA • Grand Rapids, MI • Indianapolis, IN
Minneapolis, MN • Madison, WI • North Dakota • South Dakota • Washington, D.C.

**BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN**

Joint Application of American Transmission Company LLC,
ITC Midwest LLC, and Dairyland Power Cooperative, for
Authority to Construct and Operate a New 345 kV
Transmission Line from the Existing Hickory Creek
Substation in Dubuque County, Iowa, to the Existing Cardinal
Substation in Dane County, Wisconsin, to be Known as the
Cardinal-Hickory Creek Project

Docket No. 5-CE-146

**SUPPLEMENTAL DIRECT TESTIMONY OF MARY NEAL
ON BEHALF OF CITIZENS UTILITY BOARD**

1 **Q. Please state your name, business address, and occupation.**

2 A. My name is Mary Neal. I am a Senior Project Manager at MRW and Associates, 1736
3 Franklin St., Oakland, CA, 94612.

4 **Q. Are you the same Mary Neal who provided direct testimony on behalf of the Citizen's
5 Utility Board of Wisconsin "CUB" in this proceeding?**

6 A. Yes.

7 **Q. What is the purpose of your Supplemental Direct Testimony?**

8 A. The Applicants only provided a partial response to CUB data request 3-CUB-RFP-2 prior to
9 submitting my Direct Testimony. A complete response has now been provided and this
10 Supplemental Direct Testimony summarizes my analysis of this additional data.

11 Specifically, the complete response to 3-CUB-RFP-2 allows me to provide the following:

- 12 • Supplements to Figures 3-5, 9, 11, and 13 in my Direct Testimony. The supplements
13 provide summaries of all eight PROMOD futures presented in the Direct Testimony of Tom
14 Dagenais instead of just the three shown in my Direct Testimony.

- Some location data for all generation, especially the wind generators that increased their output in the PROMOD runs with the Cardinal-Hickory Creek Transmission Project (“the Project”) modeled as in-service.

Q. Did any of your analysis for this Supplemental Direct Testimony change any of your conclusions and recommendations presented in your Direct Testimony?

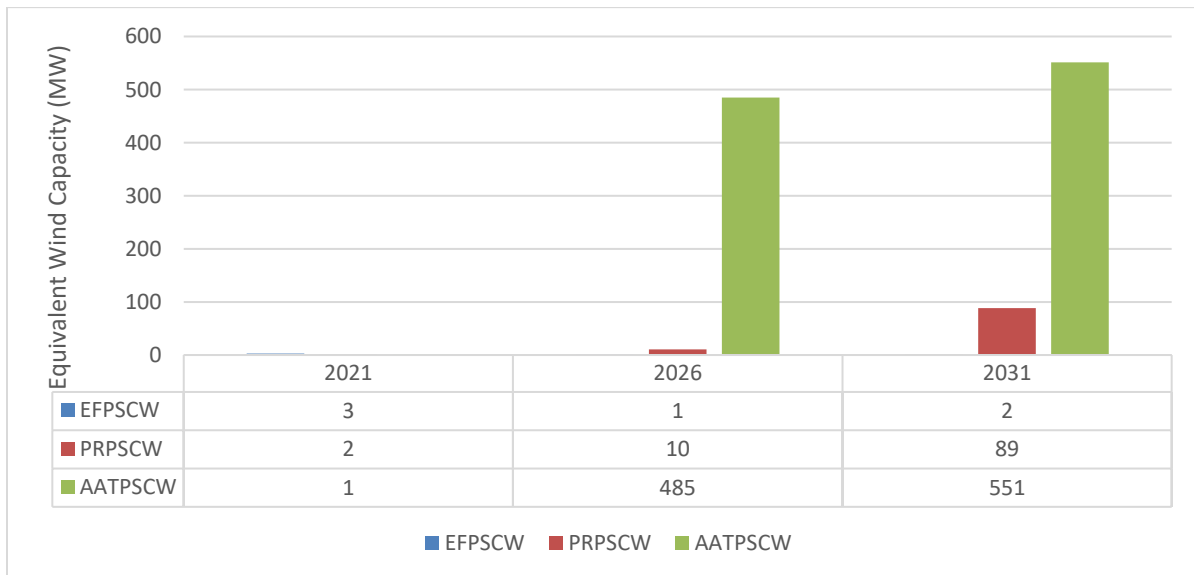
A. No. Overall, the supplemental figures showed the same patterns as the ones I noted in my Direct Testimony, and my conclusions and recommendations have not changed.

I. Supplemental Testimony Figures

Q. Please provide a supplement to Figure 3.

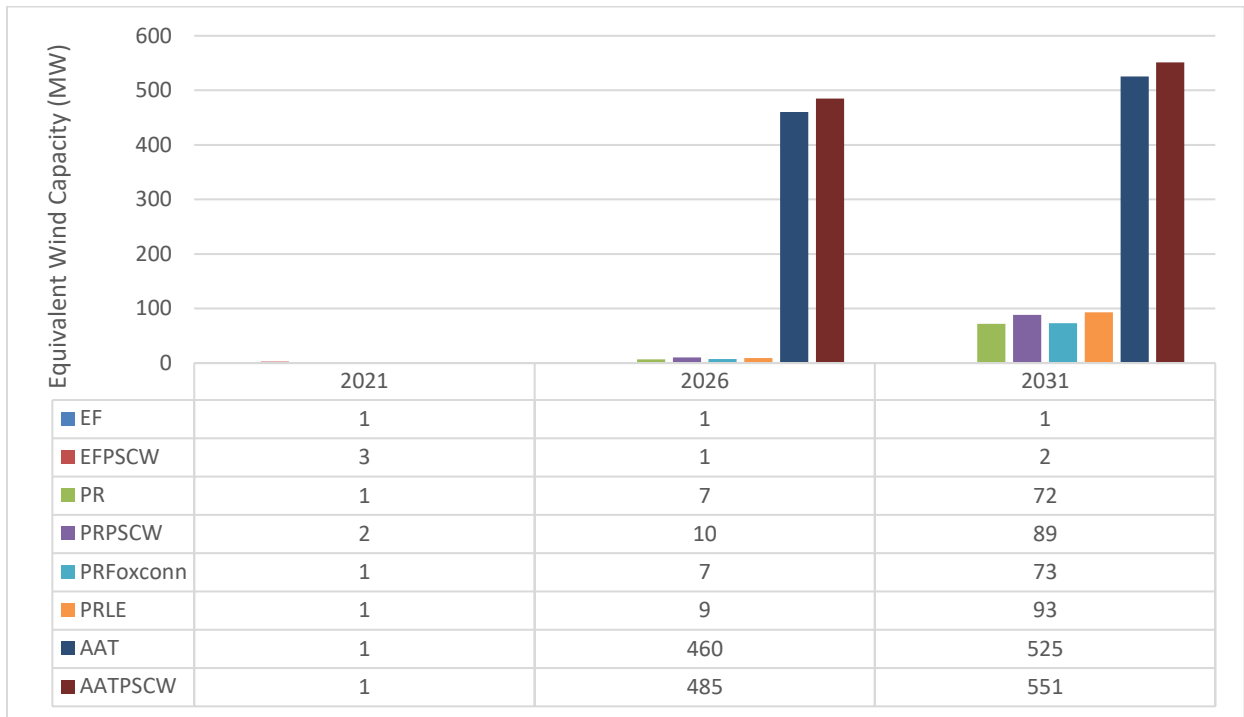
A. Figure 3 is reproduced below followed by Figure S-3. These figures show the increase in wind generation in MISO LRZs 1, 2, and 3 due to the Project. Overall, the EF futures, PR futures, and AAT futures all show similar trends.

Figure 3. Increase in wind equivalent capacity due to the Project assuming a 40% capacity factor.



14

1 *Figure S-3. Increase in wind equivalent capacity due to the Project assuming a 40% capacity factor.*



2

3 **Q. Please provide a supplement to Figure 4.**

4 A. Figure 4 is reproduced below and provides a breakdown of the increase in wind shown in

5 Figure 3 in the PRPSCW and AATPSCW futures by area. Figure S-4-1 provides the same

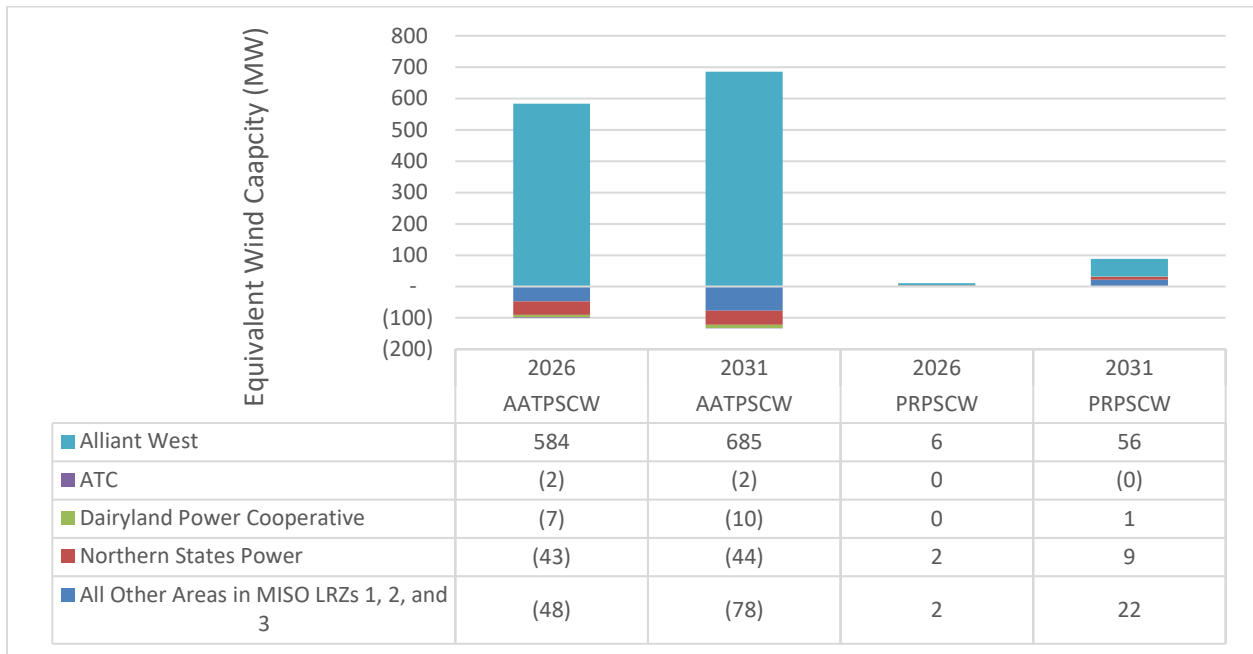
6 type of breakdown but for the AAT and AATPSCW futures. Figure S-4-2 provides the same

7 type of breakdown but for the PR future and all of its variants. Alliant West is the area with

8 the most increase in wind in all futures.

1

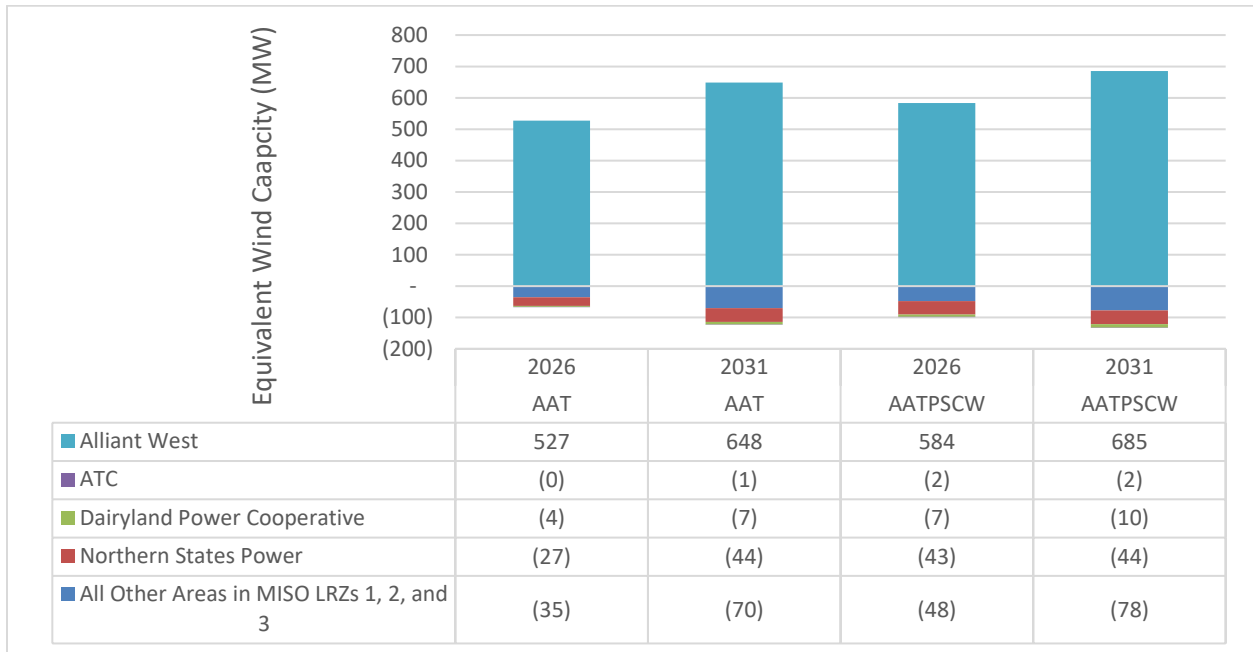
Figure 4. Increase in equivalent wind capacity due to the Project by area.



2

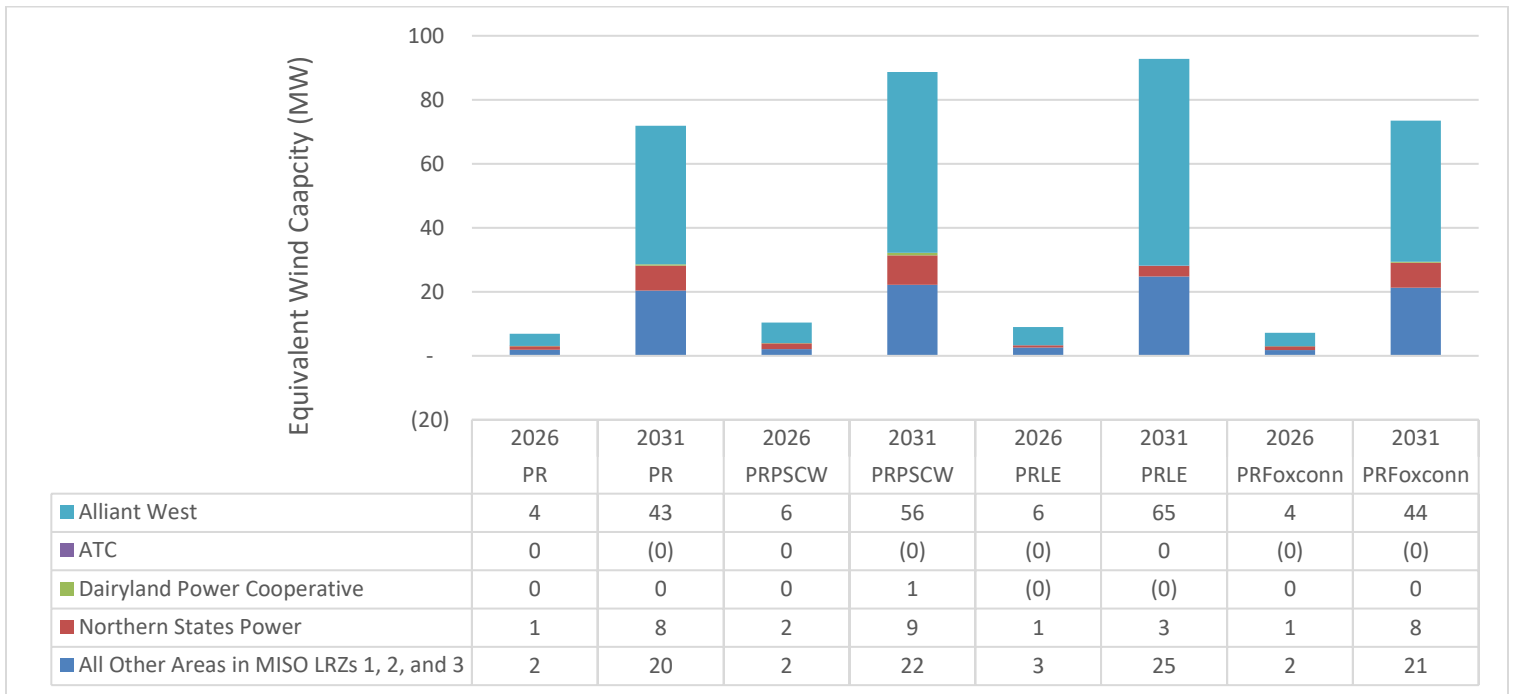
3

Figure S-4-1. Increase in equivalent wind capacity due to the Project by area.



4

Figure S-4-2. Increase in equivalent wind capacity due to the Project by area.

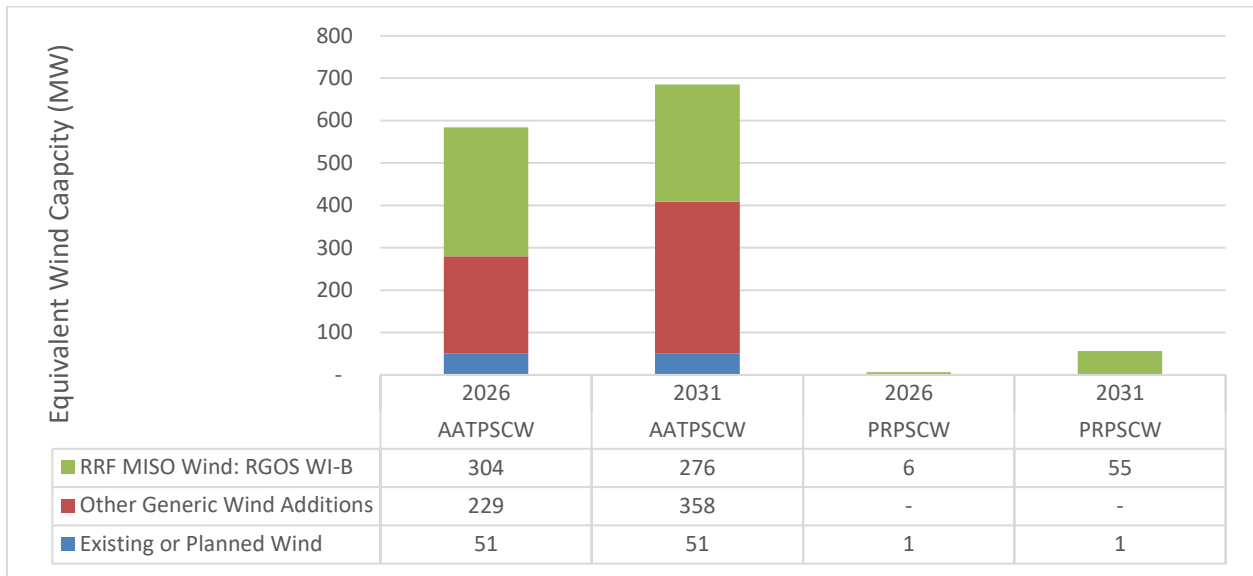


3 **Q. Please provide a supplement to Figure 5.**

4 A. Figure 5 is reproduced below and provides a breakdown of the increase in wind in the
 5 Alliant West area shown in Figure 4 by generation type. Figure S-5-1 provides the same
 6 type of breakdown but for the AAT and AATPSCW futures. Figure S-5-2 provides the same
 7 type of breakdown but for the PR future and all of its variants. Generic wind additions,
 8 especially “RRF MISO Wind: RGOS WI-B,” provide the most increase in wind in the
 9 Alliant West area in all futures.

1

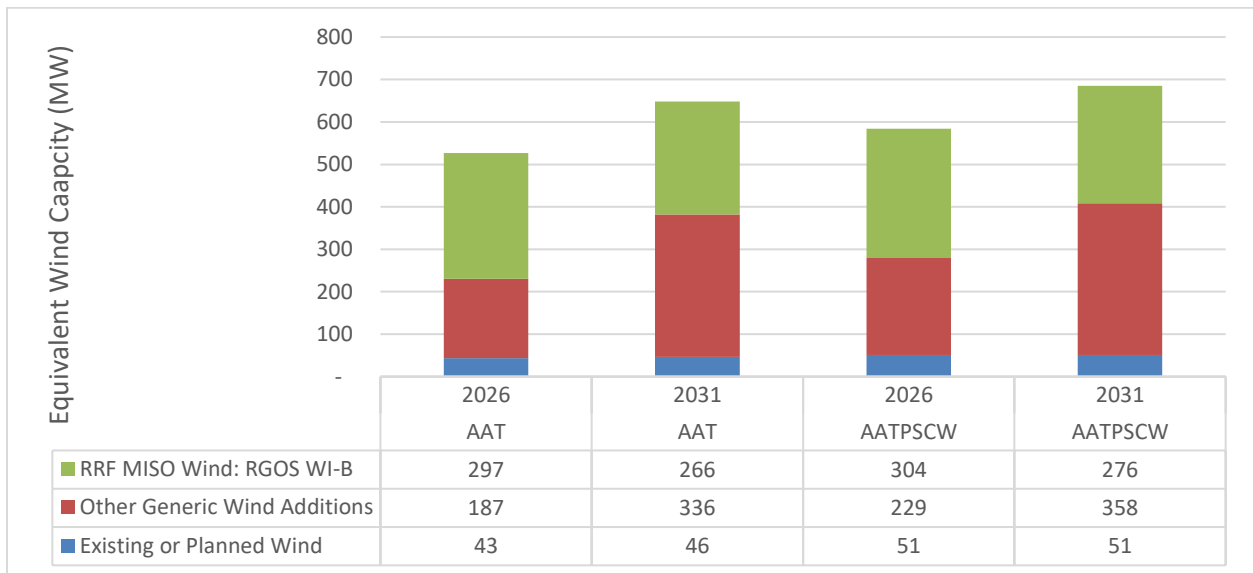
Figure 5. Increase in equivalent wind capacity in the Alliant West area due to the Project.



2

3

Figure S-5-1. Increase in equivalent wind capacity in the Alliant West area due to the Project.



4

1 *Figure S-5-2. Increase in equivalent wind capacity in the Alliant West area due to the Project.*

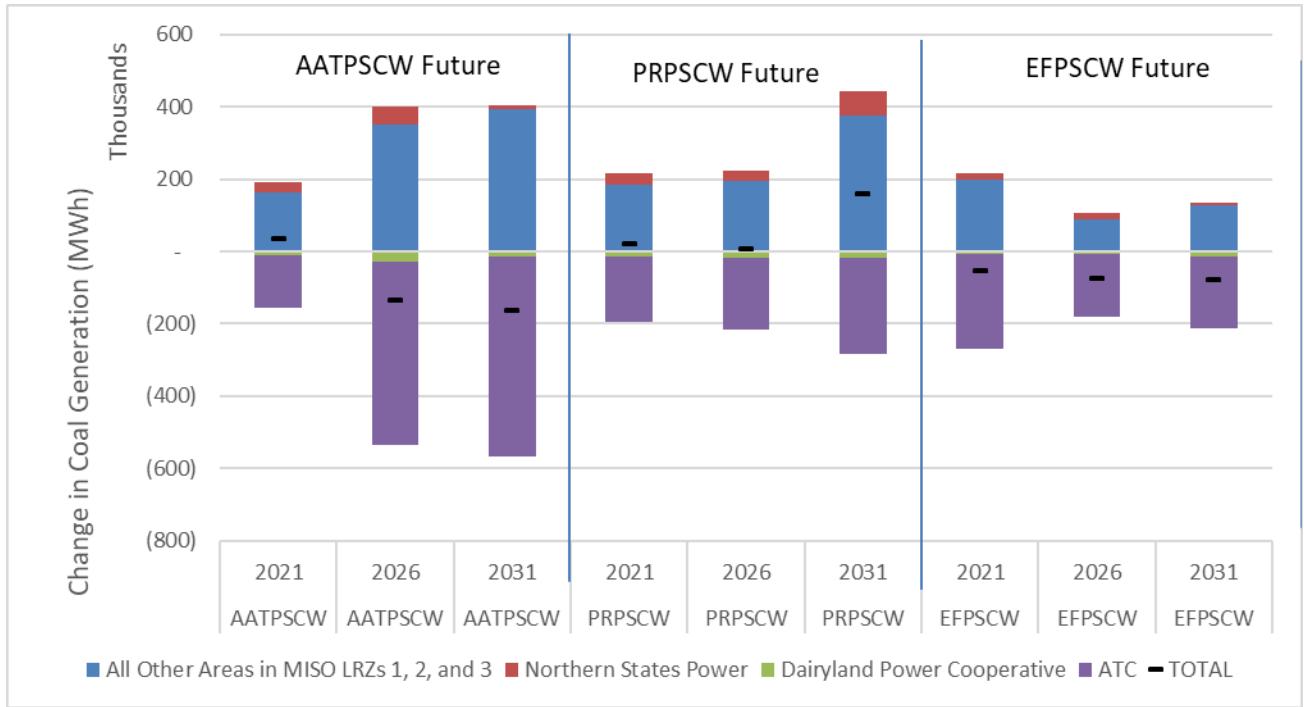


3 **Q. Please provide a supplement to Figure 9.**

4 A. Figure 9 is reproduced below and shows the increase or decrease in coal generation for
 5 MISO LRZs 1, 2, and 3 due to the Project for the PSCW futures. Figure S-9-1 provides the
 6 change in coal generation for the EF, PR, and AAT futures without the PSCW changes.
 7 Figure S-9-2 provides the change in coal generation for the PR, PRLE, and PRFoxconn
 8 futures. The EF and EFPSCW futures show very similar patterns, as do the AAT and
 9 AATPSCW futures although in 2026 coal generation decreased in the AATPSCW future
 10 but increased in the AAT future. All PRPSCW futures are similar except that in 2021, the
 11 PRPSCW future showed a slight increase in generation, while the other PR futures showed a
 12 slight decrease.

1

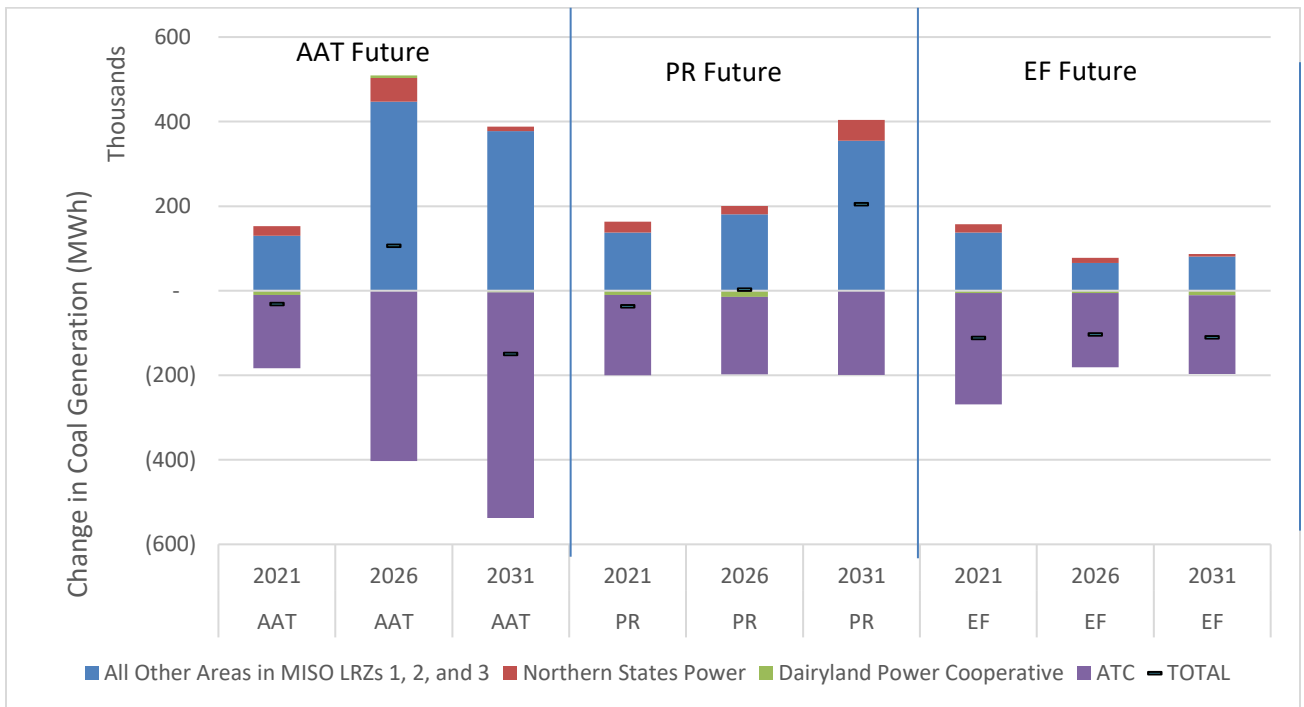
Figure 9. Change in coal generation due to the Project in MISO Zones 1, 2, and 3.



2

3

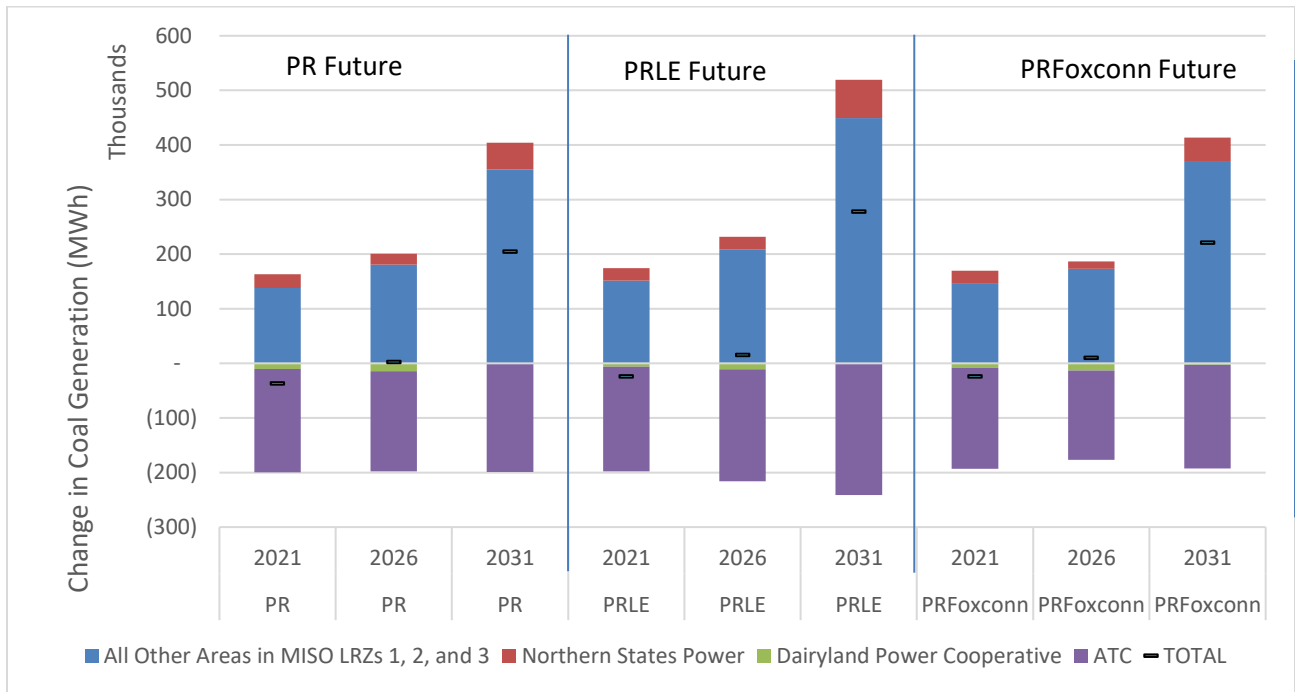
Figure S-9-1. Change in coal generation due to the Project in MISO Zones 1, 2, and 3.



4

1

Figure S-9-2. Change in coal generation due to the Project in MISO Zones 1, 2, and 3.

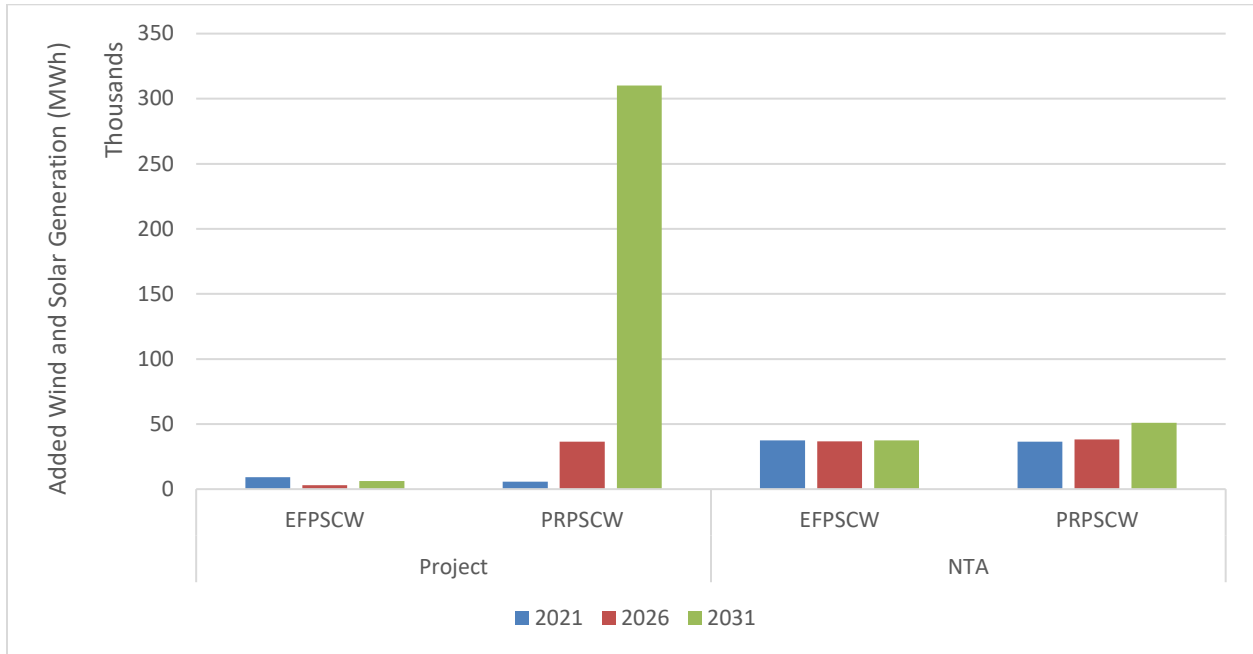


2

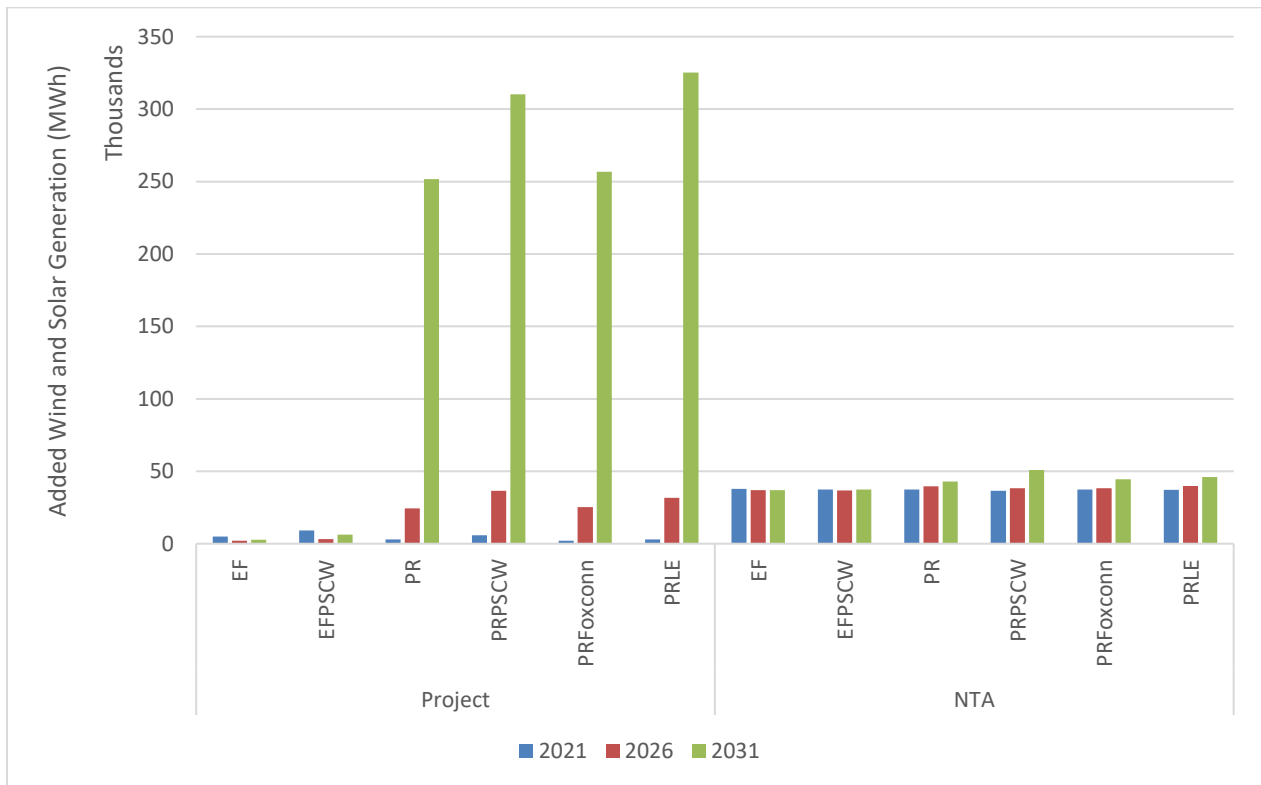
3 **Q. Please provide a supplement to Figure 11.**

4 A. Figure 11 is reproduced below and shows the increase in wind and solar generation for
5 MISO LRZs 1, 2, and 3 due to the Project and NTA for the EFPSCW and PRPSCW futures.
6 Figure S-11 provides the increase in wind and solar generation for all of the EF and PR
7 futures. Both EF futures show a larger increase in wind and solar generation with the NTA
8 than with the Project. For the PR futures, the NTA shows a higher increase in wind and solar
9 in 2021, about the same increase in 2026 and a lower increase in 2031.

1 *Figure 11. Comparison of additional renewable generation created by the Project and NTA in EFPSCW*
 2 *and PRPSCW futures.*



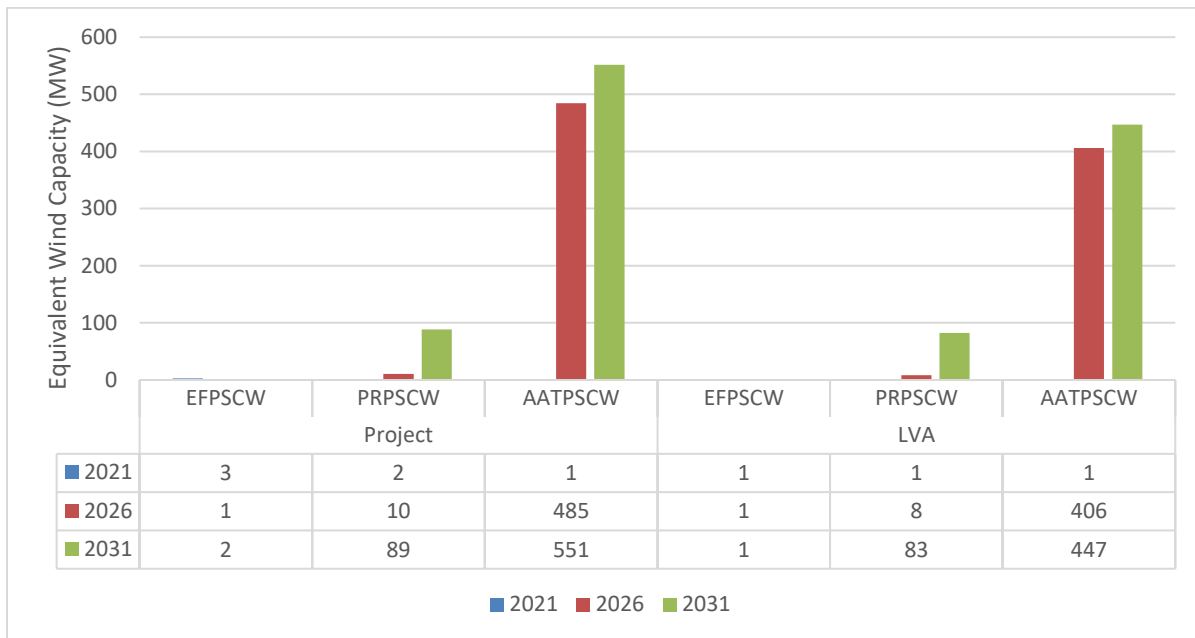
3
 4 *Figure S-11. Comparison of additional renewable generation created by the Project and NTA in all EF and*
 5 *PR futures.*



1 **Q. Please provide a supplement to Figure 13.**

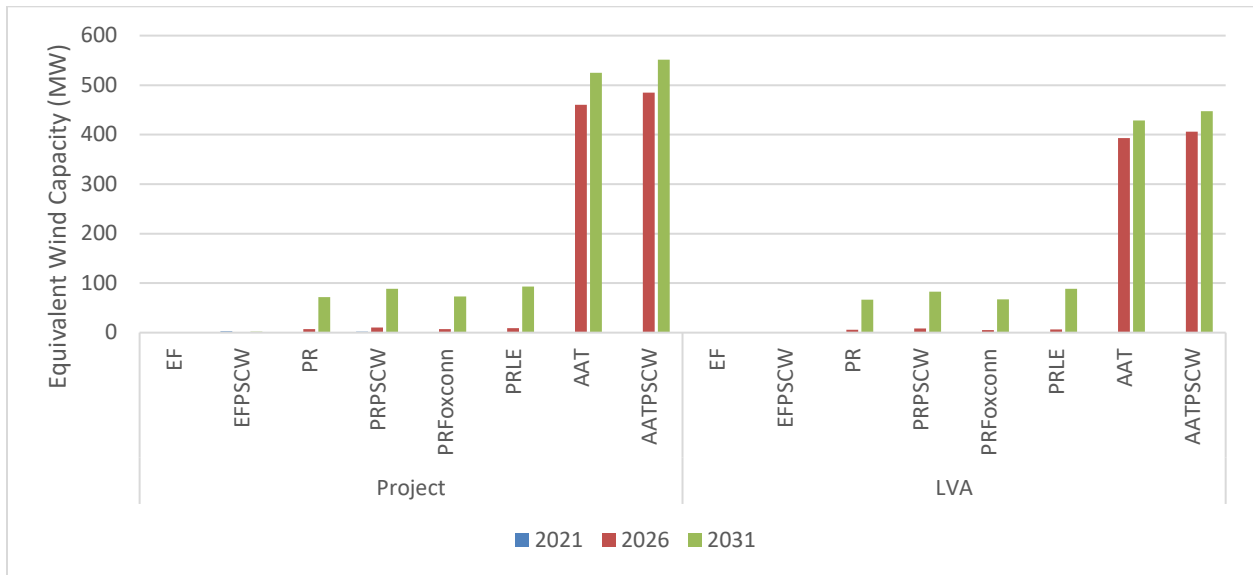
2 A. Figure 13 is reproduced below and shows the increase in wind generation for MISO LRZs
 3 1, 2, and 3 due to the Project and LVA for the PSCW futures. Figure S-13 provides the
 4 increase in wind generation for all of the futures. In all PR and AAT futures, both the Project
 5 and LVA show an increase in wind in some years, but the amount of increased wind is
 6 lower for the LVA than the Project.

7 *Figure 13. Increase in equivalent wind capacity due to the Project and LVA assuming a 40% capacity*
 8 *factor.*



9
 10

1 *Figure S-13. Increase in equivalent wind capacity due to the Project and LVA assuming a 40% capacity*
 2 *factor.*



3

4 **II. Generation Location Data**

5 **Q. Please describe what generation location data was provided in response to 3-CUB-**
 6 **RFP-2.**

7 A. A list of generating units was provided that included the state each generator was located in.

8 **Q. Your Direct Testimony discusses a generic generator labeled “RRF MISO Wind:**
 9 **RGOS WI-B.” What state was this generator and the other generic generators in the**
 10 **Alliant West area located in?**

11 A. Iowa.

12 **Q. What is the significance of the location of the generation?**

13 A. As I stated in my Direct Testimony, the cost and benefits of wind varies by location, and
 14 therefore it is important to understand the location of the increased wind generation enabled
 15 by the Project.

1 **Q. Does the generators' location in Iowa impact any of your conclusions or**
2 **recommendations?**

3 A. No. Although my Direct Testimony focused on the wind zone RGOS WI-B, which is in
4 Wisconsin, this zone is close to the Iowa border, and thus could still be local to the Project,
5 which connects in eastern Iowa. And as Figure 6 in my Direct Testimony shows, eastern
6 Iowa does not have as strong a history of wind development as western or central Iowa. I
7 have asked further discovery regarding the locations of the Alliant West generic generation
8 and will provide further information in subsequent rounds of testimony.

9 **Q. Does that conclude your Supplemental Direct Testimony?**

10 A. Yes.

**BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN**

Joint Application of American Transmission Company LLC,
ITC Midwest LLC, and Dairyland Power Cooperative, for
Authority to Construct and Operate a New 345 kV
Transmission Line from the Existing Hickory Creek
Substation in Dubuque County, Iowa, to the Existing Cardinal
Substation in Dane County, Wisconsin, to be Known as the
Cardinal-Hickory Creek Project

Docket No. 5-CE-146

**REBUTTAL TESTIMONY OF MARY NEAL
ON BEHALF OF CITIZENS UTILITY BOARD**

1 **Q. Please state your name.**

2 A. My name is Mary Neal.

3 **Q. Are you the same Mary Neal who prepared Direct Testimony on behalf of CUB in this**
4 **proceeding?**

5 A. Yes.

6 **Q. What is the purpose of your rebuttal testimony?**

7 A. My testimony has three specific objectives:

- 8 • Provide new information obtained on the location and operation of wind generation that was
9 analyzed in my direct and supplemental direct testimony
- 10 • Respond to certain claims by Clean Energy Organizations (“CEOs”) witnesses Michael
11 Goggin and Chad Craven, as well as MISO witness Matthew Ellis in their Direct
12 Testimonies
- 13 • Discuss the multiple adjusted production cost (“APC”) benefits analyses by intervenors in
14 this proceeding, including myself, Commission Staff witnesses Dan Grant and Alexander J.

1 Vedvik, as well as Mihir Desu, representing the Driftless Area Land Conservancy
2 (“DALC”).

3 **Q. Are you sponsoring any exhibits associated with your rebuttal testimony?**

4 A. Yes, I am sponsoring Ex.-CUB-Neal-9: Applicants’ Responses to 4-CUB/Inter-2.

5 **I. New Wind Generation Information**

6 **Q. Please briefly summarize your analysis of the impact of the Project on wind
7 generation.**

8 A. The amount of wind generation enabled by the Project varies strongly based on the assumed
9 amount of new renewable generation built in the MISO region.¹ I found no significant
10 increase in wind generation in the EF futures, only a small increase in wind generation in the
11 PR futures in 2031, and about 500 MW of equivalent wind generation increase in the AAT
12 futures in years 2026 and 2031. The vast majority of the increase derives from generic wind
13 additions in the Alliant West area, especially a unit labeled “RRF MISO Wind: RGOS WI-
14 B” (“RGOS WI-B”).

15 **Q. You indicated that the unit RGOS WI-B was likely local to the Project. Is it?**

16 A. Yes. The generic unit RGOS WI-B is assumed to interconnect at the 345 kV Hickory Creek
17 substation,² which is the Iowa terminus of the Project. I have also learned that the assumed
18 capacity of the wind interconnecting at the 345 kV Hickory Creek substation is 601 MW in

¹ The EF, PR, and AAT futures had different levels of new renewable generation in the MISO region. The EF future had the least amount of renewable generation additions and the AAT future had the largest amount of renewable generation additions.

² Ex.-CUB-Neal-9: Applicants’ Response to 4-CUB/Inter-2, part c.

1 the PR and AAT cases and 93 MW in the EF cases,³ and is assumed to have an annual
2 capacity factor of 41.6%,⁴ unless it is subject to curtailment.

3 **Q. What is the significance of this modeling assumption?**

4 A. It makes sense that the Project would provide an outlet for RGOS WI-B generation given
5 that it is interconnected at the terminus of the Project. However, to my knowledge there is
6 no plan for any such wind generation to interconnect at Hickory Creek substation.

7 Therefore, this assumption is speculative and raises many questions including:

- 8 • Are the energy cost benefits of the Project significantly reduced without RGOS WI-B or
9 if RGOS WI-B interconnects at a different point on the transmission system?
- 10 • Is the 41.6% capacity factor for wind in this area reasonable?
- 11 • Is there a wind development cost advantage for wind interconnecting at Hickory Creek
12 compared to other interconnection points nearby that may have more available capacity
13 to interconnect new generation? For instance, the Applicants assumed the NTA utility
14 solar generation interconnects at the Nelson Dewey substation in part because with the
15 retirement of the old Nelson Dewey coal plant, it was assumed that generation would be
16 more likely to interconnect there without the need for significant network upgrades.⁵

17 **Q. Do we have any analysis of the sensitivity of the benefits of the Project to the**
18 **assumption of new wind generation interconnecting at the terminus of the Project?**

19 A. To my knowledge, all we have is the EF cases compared to the PR and AAT cases since the
20 EF cases had a lower level of assumed RGOS WI-B capacity. As my previous analysis
21 showed, the Project provided no significant increase in wind generation in the EF cases.

³ Attachment 1 to Applicants' Response to 4-CUB/Inter-2, Confidential Category D and E.

⁴ Ex.-CUB-Neal-9: Applicants' Response to 4-CUB/Inter-2, part c.

⁵ Ex.-CUB-Neal-6: Applicants' Response to 3-CUB/Inter-1, part b.

1 **Q. What do you conclude from this new information?**

2 A. It reinforces my prior conclusions, and my recommendation regarding the wind-related
3 benefits of the Project stands, namely that the Commission not approve the Project on the
4 basis of anticipated wind-related benefits without one of the following:

- 5 • Direct evidence the Project is needed to support wind generation outside the area local to the
6 Project such as the Iowa and Southern Minnesota RGOS zones that have the heaviest wind
7 development; or
- 8 • An analysis of wind or other generation local to the Project, including:
 - 9 ○ Direct evidence this Project is necessary to interconnect this generation
 - 10 ○ Quantification of the costs and benefits of this new generation to Wisconsin
11 customers.

12 **II. Response to CEOs and MISO Direct Testimony**

13 **Q. Please briefly summarize the testimony of Michael Goggin on behalf of CEOs.**

14 A. Mr. Goggin’s testimony supports the Project as a means to increase the supply of “cost-
15 effective” renewable energy and decrease electricity costs in Wisconsin.⁶ For example, he
16 claims that “The Project will reduce electricity costs in Wisconsin, mostly by alleviating
17 transmission congestion to allow greater delivery of low-cost energy to Wisconsin”⁷ and
18 that the Project will “help deliver wind energy to Wisconsin.”⁸ He also claims specifically
19 that past and planned development of wind resources in Iowa, Minnesota, and the Dakotas
20 means the “benefits of and need for the Project are even greater than when MISO’s MVP

⁶ Direct-CEOs-Goggin-r-2, lines 10-13.

⁷ Direct-CEOs-Goggin-r-2, line 24 to page 3, line 1.

⁸ Direct-CEOs-Goggin-r-5, lines 10-11.

1 planning process determined it was needed and provided large net benefits.”⁹ These claims
2 mimic the claims of the Applicants that the Project will provide an outlet for wind from
3 areas of the Upper Midwest with high sustained wind speeds and low development costs.

4 **Q. Does the Applicants’ PROMOD analysis done to measure the energy cost savings of**
5 **the Project support these claims?**

6 A. No. As shown in Figures 3 and S-3 of my Direct and Supplemental Direct Testimony, the
7 PROMOD results only show an increase in wind due to the addition of the Project in some
8 futures. My Figures 4, S-4-1, S-4-2, 5, S-5-1, and S-5-2 also show that a significant fraction
9 of that wind is local to the Project, and not from the areas with the best wind resource and
10 strongest history of wind development.

11 **Q. Does Mr. Goggin claim that the Project is needed to support wind development in**
12 **Wisconsin and areas local to the Project?**

13 A. Yes. He claims southwestern Wisconsin as an area “where further wind development
14 depends on construction of the Project.”¹⁰

15 **Q. What issues do you have with this claim?**

16 A. Mr. Goggin’s own testimony argues that wind imports from states west of Wisconsin are
17 lower in cost than wind development in Wisconsin,¹¹ which undercuts his own argument
18 that the Project is needed for local development. If developing wind in other areas is more
19 cost-effective, then wind development in Wisconsin may not be needed.

20 **Q. Does Mr. Goggin claim that the Project can support solar development?**

⁹ Direct-CEOs-Goggin-r-18, lines 13-15.

¹⁰ Direct-CEOs-Goggin-r-10, lines 14-16.

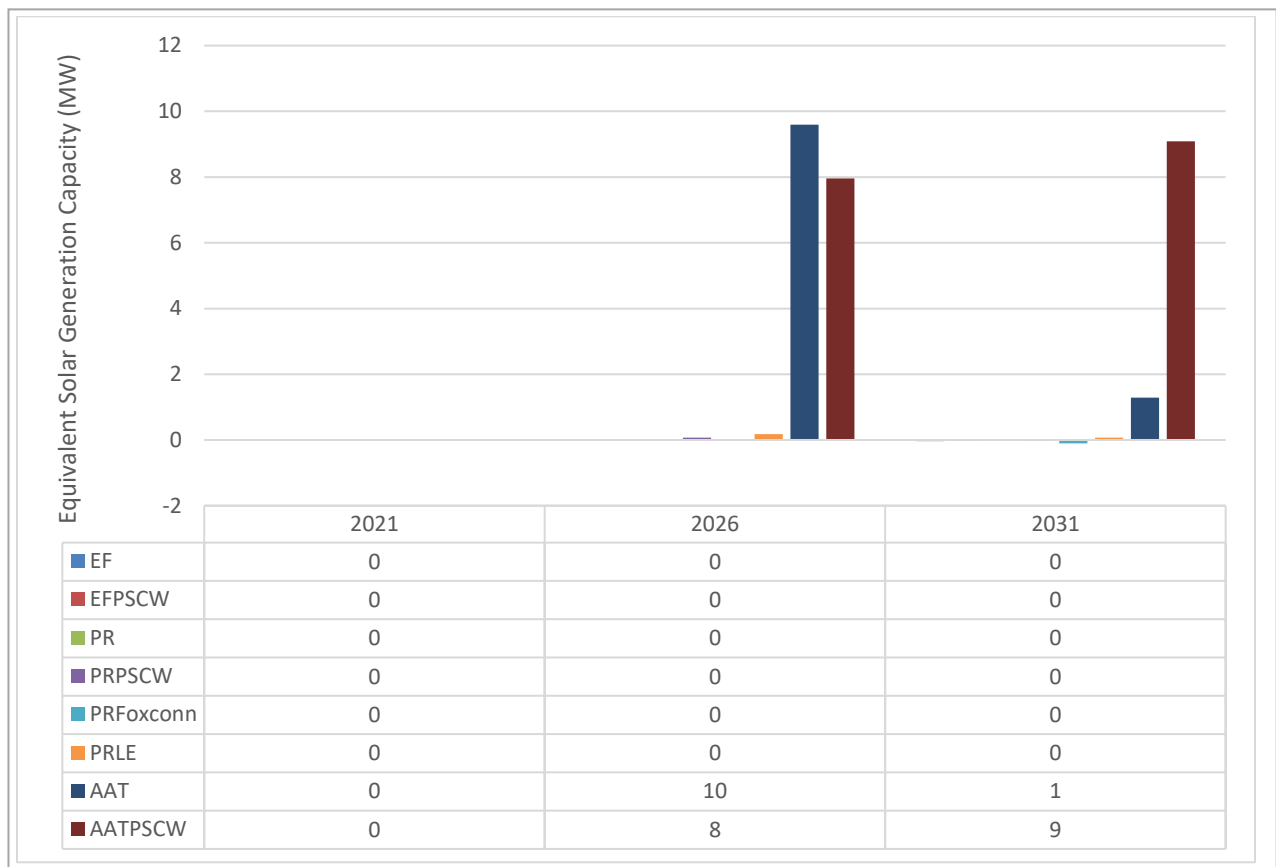
¹¹ Direct-CEOs-Goggin-r-6, line 5 to page 8, line 10.

1 A. Yes. He claims that the Project will help facilitate the delivery of more cost-effective solar
 2 generation to Wisconsin, citing sources that show Wisconsin’s solar resource “is about 10-
 3 20% lower” and land costs are 2-3 times higher than regions farther west in MISO.¹²

4 **Q. What issues do you have with this claim?**

5 A. As summarized in Figure 1 below, Applicants’ PROMOD results do not show any
 6 significant increase in solar generation facilitated by the Project.

7 *Figure 1. Increase in solar generation in MISO Zones 1, 2, and 3 due to the Project.¹³*



8
 9 In addition, I know of no studies that show that the benefits of the solar resource in

¹² Direct-CEOs-Goggin-r-9, lines 3-7.

¹³ Attachments to 3-CUB-RFP-2, CONFIDENTIAL Category D, E. Increase in solar generation in MWH converted to equivalent capacity in MW, assuming a 15% capacity factor.

1 the Upper Midwest justify the cost of building large transmission lines to export it to other
2 regions as is the case with wind generation, which is much more geographically variable.

3 **Q. Does Mr. Goggin estimate the amount of wind delivered by the Project?**

4 A. Yes. He estimates the Project will deliver 1,200 MW of wind capacity and that this is likely
5 to be a low estimate.¹⁴

6 **Q. Will the Project conservatively deliver 1,200 MW of wind generation to Wisconsin?**

7 A. No. Based on the Applicants' PROMOD results, the Project will deliver at most 551 MW of
8 additional wind generation, assuming the AAT future and a 40% capacity factor.¹⁵

9 **Q. What do CEOs witness Chad Craven and MISO witness Matthew Ellis claim
10 regarding MISO generation interconnection studies?**

11 A. Both witnesses cite MISO generation interconnection studies as justification for the
12 Project.¹⁶

13 **Q. What is your response?**

14 A. The Applicants listed generation interconnection benefits of the Project only qualitatively.
15 Neither the Applicants nor the witnesses cited above have actually quantified the benefits
16 the Project will provide to interconnecting generators. The consequence of rejecting the
17 Project will not directly cause any generator to be unable to interconnect. The consequence
18 of rejecting the Project is that MISO must study or restudy interconnecting generators and
19 quantify the operating restrictions or network upgrades necessary to maintain bulk system
20 grid reliability with the interconnecting generation, but without the Project in service. This is

¹⁴ Direct-CEOs-Goggin-r-21, lines 1-13.

¹⁵ Based on the AATPSCW future in year 2031, which was the largest increase of all the runs analyzed. See Figure S-3 of my Supplemental Direct Testimony.

¹⁶ Direct-MISO-Ellis-31, lines 11-17; Direct-CEOs-Craven-3, lines 15-19; and Direct-CEOs-Craven-5, lines 11-18.

1 exactly the type of analysis that would quantify the benefits of the Project and should be
2 performed prior to the approval of a large transmission line.

3 **III. APC Benefits Analyses**

4 **Q. Please define APC.**

5 A. The APC for a given region is the sum of production costs of electric generation within the
6 region and the cost of imports to the region net of the cost of exports from the region.

7 **Q. What APC analyses were performed for the ATC zone and presented in Direct
8 Testimony in this proceeding?**

9 A. To my knowledge, there were three:

- 10 • I quantified ATC APC Savings in Figures 2, 8, and 12 of my Direct Testimony. Figures
11 2 and 8 show the savings due to the Project, whereas Figure 12 shows the savings due to
12 the Low Voltage Alternative.
- 13 • Mihir Desu calculates APC savings in the ATC zone due to the Project in 2031 in his
14 Table 5.¹⁷
- 15 • Ex.-PSC-Grant-4 shows the gross present value of energy cost savings of the Project
16 using what Mr. Grant terms the “APC method.”

17 **Q. Please clarify exactly what you label as ATC APC Savings in Figures 2, 8, and 12 of
18 your Direct Testimony.**

19 A. These figures represent differences between the subtotals under “Cost of Generation
20 Supply” in the “Customer Benefit” tabs of the Applicants’ cost-benefit model workpapers.¹⁸
21 If the cases with the Project have lower total “cost of generation supply” than comparable

¹⁷ Direct-DALC/WWF-Desu-40.

¹⁸ Att. 1 to 01-DALC-ATC-33, CONFIDENTIAL Category C.

1 “No Action” alternative cases, the APC ATC savings is assumed to be positive and vice
2 versa. The labeling in the workpapers indicate the “Cost of Generation Supply” is an APC in
3 that it represents production cost in the ATC zone plus the cost of imports minus the cost of
4 exports.

5 **Q. Are all the APC analyses you listed the same?**

6 A. No. Based on close scrutiny of Mr. Desu’s Table 5, I believe his analysis derives from the
7 same source and uses the same method as mine. However, Staff’s results are different. I do
8 not know all the reasons for the difference. I plan to review this topic further and report my
9 findings in surrebuttal testimony.¹⁹

10 **Q. Does anything in Staff witnesses Vedvik’s or Grant’s testimonies regarding**
11 **Applicants’ PROMOD modeling change your concerns regarding the internal**
12 **congestion-related benefits of the Project?**

13 A. No, if anything, the Staff testimony supports my concern. Mr. Grant performed a sensitivity
14 analysis of the energy cost savings benefits of the Project to the assumed percentage of
15 internal FTR recovery, which Applicants assume is 85%.²⁰ He found the energy cost savings
16 benefits were very sensitive to this assumption. This is because such a large portion of the
17 total energy cost savings benefits were found to be from internal congestion savings in
18 PROMOD.

19 **Q. Does that conclude your Rebuttal Testimony?**

20 A. Yes.

¹⁹ CUB requested workpapers related to this issue on May 10, 2019. Commission staff responded on May 21, but given the large amount of data provided and close proximity to the holiday weekend, there was insufficient time to analyze the data before the deadline for rebuttal testimony.

²⁰ Direct-PSC-Grant-36, line 11 to page 39, line 2.

**BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN**

Joint Application of American Transmission Company LLC,
ITC Midwest LLC, and Dairyland Power Cooperative, for
Authority to Construct and Operate a New 345 kV
Transmission Line from the Existing Hickory Creek
Substation in Dubuque County, Iowa, to the Existing Cardinal
Substation in Dane County, Wisconsin, to be Known as the
Cardinal-Hickory Creek Project

Docket No. 5-CE-146

**SURREBUTTAL TESTIMONY OF MARY NEAL
ON BEHALF OF CITIZENS UTILITY BOARD**

1 **Q. Please state your name.**

2 A. My name is Mary Neal.

3 **Q. Are you the same Mary Neal who prepared Direct, Supplemental Direct, and Rebuttal**
4 **Testimony on behalf of CUB in this proceeding?**

5 A. Yes.

6 **Q. What is the purpose of your Surrebuttal testimony?**

7 A. My testimony has the following objectives:

8 • Respond to the rebuttal testimonies of the Applicants and Clean Energy Organizations

9 (“CEOs”) regarding the following topics:

- 10 ○ Internal congestion benefits of the Project
- 11 ○ The quantification of wind related benefits of the Project
- 12 ○ The location of the increased wind enabled by the Project
- 13 ○ Modeling of a revised NTA by Applicant witness Mr. Dagenais
- 14 ○ Some additional clarifications

- 1 • Respond to staff witness Dr. Grant’s Supplemental Testimony, which presents an analysis of
- 2 how the Project’s benefits vary with the location of generic wind additions in the vicinity of
- 3 the Project
- 4 • Provide some additional findings regarding differences in adjusted production cost (“APC”)
- 5 calculations by myself and Dr. Grant as described in my rebuttal testimony
- 6 • List some closing thoughts for the Commission’s consideration

7 **Q. Please summarize your findings with regard to the Project.**

8 A. Nothing in the rebuttal testimony has changed my primary conclusions that contrary to

9 Applicants’ claims, the benefits conferred to Wisconsin customers by the Project are largely

10 dependent upon speculative modeling input assumptions and are therefore not robust.

11 Moreover, there are also viable alternatives to the Project the Commission should consider.

12 **I. Internal Congestion Savings**

13 **Q. Please briefly summarize your analysis of the internal congestion savings attributable**

14 **to the Project.**

15 A. In my direct testimony I stated that internal congestion savings generated by the Project

16 “may just be an artifact of PROMOD modeling that may never materialize”¹ and

17 recommended that the Commission disregard these benefits “unless the Applicants can

18 show adequate evidence the internal congestion in PROMOD is not just a modeling artifact

19 and that the Project is a cost-effective way to reduce congestion within the ATC zone.”²

20 **Q. Why are the internal congestion-related benefits significant to Applicants’ analysis of**

21 **energy cost savings?**

¹ Direct-CUB-Neal-17, lines 2-3.

² Direct-CUB-Neal-18, lines 10-13.

1 A. Without internal congestion-related benefits almost all the Applicants' PR futures³ do not
2 show positive net energy cost savings benefits, meaning the energy cost savings do not
3 exceed the cost of the Project. This is shown in Figures 2 and 8 of my Direct Testimony.

4 **Q. Have you reviewed the Applicants response to your testimony regarding internal**
5 **congestion savings?**

6 A. Yes. Applicant witnesses Dagenais and Pfeifenberger object to my conclusions regarding
7 the internal congestion savings estimates produced by the Applicants' PROMOD modeling.

8 **Q. Do you have a response to Mr. Dagenais criticisms?**

9 A. Yes. In his rebuttal testimony, Mr. Dagenais stated "Ms. Neal is wrong ... market
10 congestion can and does have a real and substantial effect on the cost of delivered power to
11 load-serving entities."⁴ Mr. Dagenais reiterated the Applicants' claim that "the Project will
12 reduce this congestion and impact load-serving entities' congestion charges and FTR
13 revenues."⁵ Mr. Dagenais further argued that the Applicants have adequately demonstrated
14 that the congestion-related savings of the Project are "real and significant" and that the
15 Commission should accept this as fact.⁶

16 Mr. Dagenais misconstrues my testimony as meaning that I do not believe
17 transmission congestion can have real-world impacts on power markets. This is not my
18 testimony. The questions raised in my direct testimony are whether it is reasonable to
19 assume congestion will worsen in the ATC zone and whether this congestion can be cost-
20 effectively reduced by the Project to create benefits for Wisconsin consumers.

21 **Q. Can you please clarify what you mean by "artifact of PROMOD modeling?"**

³ The exception is the low energy variant of the PR future.

⁴ Rebuttal-Applicants-Dagenais-19, lines 21-22.

⁵ Rebuttal-Applicants-Dagenais-20, lines 5-6.

⁶ Rebuttal-Applicants-Dagenais-20, lines 6-8.

1 A. Yes. Models are best used to assess problems that exist in reality; when a model shows a
2 problem that does not exist or does not yet exist, close scrutiny of the model is required to
3 assess whether it is something likely to occur or if the modeled case is not realistic.

4 With respect to the Project specifically, whether and to what extent the Project
5 provides internal congestion related benefits requires analyzing whether congestion existing
6 in the base cases (i.e. the problem) is reduced when compared to model results that include
7 the addition of the Project. Internal congestion is sensitive to (among other things) type,
8 amount, and interconnection locations of new generation. Different assumed inputs for new
9 generation within PROMOD will result in more or less congestion in the model results,
10 depending on the exact configuration. As such, the base case internal congestion costs may
11 be higher simply by selecting different locations to interconnect new generation or varying
12 the amounts at different locations, under each of the generation futures.

13 Consequently, estimates of internal congestion-related benefits may be amplified
14 simply because the base case is modeled in such a way that it starts off with more
15 congestion. This would produce a systematic modeling bias in favor of the Project. This is
16 an example of what I mean when I say that the results presented by the Applicants may be
17 an “artifact” of PROMOD modeling.

18 **Q. Have Applicants provided evidence of congestion within the ATC zone?**

19 A. Yes. Mr. Dagenais provided evidence of existing congestion in the ATC zone, especially in
20 Southwest Wisconsin.⁷

21 **Q. Does this adequately demonstrate that the congestion in the ATC zone modeled in**
22 **PROMOD is the existing congestion in Southwest Wisconsin?**

⁷ Rebuttal-Applicants-Dagenais-19, line 22 to Rebuttal-Applicants-Dagenais-20, line 4.

1 A. No. If relief of the existing congestion were the cause of the benefits, I would expect to see
 2 that reflected in the EF future in 2021, but this case does not show much congestion. The
 3 table below summarizes the differences in load-weighted average marginal congestion costs
 4 between generation and load nodes in the ATC zone in different modeled futures and years.
 5 Specifically, I provide results for the EF, PR, and AAT runs with changes requested by the
 6 PSCW staff for the base cases and the Project cases.

7 *Table 1. Load-weighted average differences in hourly marginal congestion costs in generation and load nodes in ATC zone.*
 8 *Based on data from Applicant PROMOD results. Units are \$/MWh.⁸*

	2021	2021	2021	2026	2026	2026	2031	2031	2031
	Base	CHC	Change	Base	CHC	Change	Base	CHC	Change
EF-PSCW	\$0.17	\$0.06	\$0.10	\$0.25	\$0.11	\$0.14	\$0.48	\$0.19	\$0.29
PR-PSCW	\$0.36	\$0.10	\$0.26	\$0.89	\$0.40	\$0.49	\$2.62	\$1.32	\$1.30
AAT-PSCW	\$0.40	\$0.10	\$0.30	\$1.92	\$0.92	\$1.01	\$3.93	\$1.58	\$2.35

9
 10 Larger differences in marginal congestion costs indicate worsening congestion in the
 11 ATC zone. In the base case in the EF future in 2021, the difference is only \$0.17/MWh, but
 12 this increases to \$3.93/MWh in 2031 in the AAT future. This increased congestion creates
 13 larger opportunities for the Project to provide internal congestion-related benefits by
 14 reducing the marginal cost differentials. The reduction in differential in the EF case in 2021
 15 is only \$0.10/MWh, but this grows to \$1.30/MWh in the PR future and \$2.35/MWh in the
 16 AAT future in 2031.

17 **Q. What would be necessary to show the increase in congestion in the ATC zone in the**
 18 **PROMOD results is credible?**

19 A. To establish that the modeled internal congestion-related benefits are credible, one would
 20 need to understand the increase in congestion in the ATC zone modeled in the PR and AAT

⁸ Att. 1 to 01-DALC-ATC-33, CONFIDENTIAL Category C.

1 futures, and assess whether such an increase is likely or could be avoided, such as through a
2 different configuration of generation in the ATC zone. For instance, selecting different
3 locations to interconnect new generation or varying the amounts at different locations could
4 reduce the internal congestion. Then there would be no need for the Project to reduce the
5 congestion. However, Applicants have not provided any explanation of the internal
6 congestion increases, but instead have simply constructed cases that increase congestion and
7 claim the Project will reduce it.

8 **Q. If Applicants provided a reasonable explanation for the increase in congestion,**
9 **supported by evidence, would that be sufficient for you to recommend the Commission**
10 **accept Applicants' estimates of the internal congestion-related benefits of the Project?**

11 A. No. As argued in my direct testimony, I recommend the Commission use a two-prong
12 approach when evaluating the Project's ability to provide internal congestion-related
13 benefits.⁹ I have only discussed the first prong: it should be established whether the
14 congestion is a real problem and not a consequence of how generation is modeled in
15 PROMOD, and hence not an artifact of the model. The second prong is that the Commission
16 must determine whether the Applicants have sufficiently demonstrated that the Project is a
17 cost-effective way to relieve this congestion. Other transmission reinforcement could reduce
18 the congestion, such as smaller upgrades distributed throughout the ATC zone, including
19 network upgrades to interconnect new generation. Such upgrades could cost much less than
20 a new 100-mile 345 kV line but provide the same or better internal congestion-related
21 benefits as the Project.

⁹ Direct-CUB-Neal-18, lines 10-13.

1 **Q. Have Applicants provided adequate evidence that the Project is a cost-effective way to**
2 **reduce congestion within the ATC zone?**

3 A. No. They have failed to address this issue in rebuttal testimony. The Project has been
4 optimized to allow Wisconsin to access wind west of Wisconsin and has not been optimized
5 to relieve congestion within the ATC zone. And there is substantial evidence the Project is
6 not cost effective at reducing ATC zone congestion. The LVA costs less to construct, but
7 creates more internal congestion-related benefits than the Project in all the Applicants' PR
8 and AAT futures as shown in Figure 12 of my Direct Testimony. Applicants have stated this
9 is because the Project creates congestion east of the Eden substation in Wisconsin, meaning
10 it actually increases ATC zone congestion in some circumstances.

11 **Q. In his rebuttal testimony Mr. Pfeifenberger states that PROMOD tends to understate**
12 **congestion costs, stating that while market “simulations typically consider planned**
13 **generation outages and, in most cases, a random distribution of unplanned generation**
14 **outages, they do not generally reflect any transmission outages, planned or**
15 **unplanned.”¹⁰ Do you agree?**

16 A. No. My experience is that market simulations such as PROMOD can account for the effects
17 of transmission outages. I have seen this in modeling in other Wisconsin proceedings. If
18 Applicants have not done so in the PROMOD modeling in this case, then they should.
19 Moreover, Applicants added Insurance Value benefits to the Project. These represent the
20 economic value of lower energy prices than would otherwise have occurred during
21 emergency events because the Project is in service. Emergency events could include the
22 effect of outages.

¹⁰ Rebuttal-Applicants-Pfeifenberger-41, lines 18-20.

1 **Q. Mr. Pfeifenberger further argues that the market simulations performed by Dr. Grant**
2 **confirm that the Project provides significant congestion-related benefits to Wisconsin**
3 **customers.¹¹ How do you respond?**

4 A. It is not clear what Mr. Pfeifenberger is referring to. I have not made an in-depth analysis of
5 Dr. Grant’s results as I have with Applicants’ results, but I have reviewed his Ex.-PSC-
6 Grant-4, summarizing the results of several PROMOD runs. I note that the runs with the
7 “Wisconsin renewables” show reduced benefits of the Project. This supports my claim that a
8 different configuration of generation within the ATC zone could reduce the benefits of the
9 Project. Therefore, I disagree that Dr. Grant’s analysis confirms that the Project will provide
10 significant congestion-related benefits to Wisconsin customers.

11 **Q. Overall, what is your conclusion and recommendation regarding the internal**
12 **congestion-related benefits of the Project?**

13 A. My conclusions and recommendation remain unchanged from my Direct Testimony,
14 namely that the Commission disregard the estimated internal congestion-related benefits of
15 the Project unless the Applicants can show adequate evidence the internal congestion in
16 PROMOD is not just a modeling artifact and that the Project is a cost-effective way to
17 reduce congestion within the ATC zone.

18 **II. Quantification of Wind-Related Benefits**

19 **Q. How do Applicants and CEOs witnesses respond to your analysis of the wind-related**
20 **benefits of the Project shown in the Applicants’ PROMOD results?**

21 A. A common claim was that PROMOD, as used by the Applicants, understates the benefits of
22 the Project. The claims can be summarized as follows:

¹¹ Rebuttal-Applicants-Pfeifenberger-42, lines 17-19.

- 1 • PROMOD only captures a reduction in wind curtailment caused by adding the
- 2 Project, and such wind curtailment would only occur in times of severe market
- 3 congestion¹²
- 4 • A more significant wind-related benefit would be the ability of the Project to allow
- 5 more wind resources to be constructed, and that a capacity expansion analysis would
- 6 be necessary to evaluate this benefit¹³
- 7 • Applicants have not performed an analysis of how the Project would impact capacity
- 8 expansion or attempted to quantify any increase in the amount of wind generation
- 9 that could be developed economically if the Project is constructed¹⁴

10 **Q. Do you have any comments regarding the Applicants' rebuttal?**

11 A. None of the Applicants' or intervenor arguments show the wind-related benefits of the line
12 outweigh the costs and that they are robust. At most they have only suggested that a
13 different analysis (adding wind with the line), if properly constructed could show such
14 benefits. However, the Applicants have not done this analysis.

15 **Q. Could Applicants have done such an analysis?**

16 A. Yes. Applicants could have analyzed the constraints causing wind curtailment and operating
17 restrictions for existing and planned new wind development and analyzed how the Project
18 relieves those constraints and increases wind production. They could then add the Project
19 with the wind to a production cost model, such as PROMOD, to quantify the benefits of this
20 additional wind to Wisconsin customers. The fact they never did makes no sense to me

¹² Rebuttal-Applicants-Dagenais-67, line 16 to Rebuttal-Applicants-Dagenais-68, line 2; Rebuttal-Applicants-Pfeifenberger-11, lines 4-6; Rebuttal-CEOs-Goggin-p-11, lines 7-9.

¹³ Rebuttal-CEOs-Goggin-p-9, line 19 to Rebuttal-CEOs-Goggin-p-10, line 2; Rebuttal-CEOs-Goggin-p-11, lines 9-11; Rebuttal-Applicants-Pfeifenberger-11, lines 6-8.

¹⁴ Rebuttal-Applicants-Smith-17, lines 1-8.

1 considering the additional wind is supposed to be the main benefit of the line per the
2 Application narrative.

3 **Q. Should the Commission accept that if they did such an analysis the results would show**
4 **robust support for the Project?**

5 A. No. Based on the evidence, I do not recommend the Commission presume that the results of
6 such an analysis would be favorable to the Project for three primary reasons. First, we do
7 have the PROMOD analysis results, which did measure a reduction in wind curtailment.
8 Second, and more importantly, I agree with arguments by Mr. Desu on behalf of
9 WWF/DALC that a capacity expansion analysis with and without the line may reduce the
10 benefits of the Project and not increase it.¹⁵ Third, I do not expect wind generation additions
11 beyond those modeled in the AAT case would significantly increase the benefit of the
12 Project.

13 **Q. Please explain why the PROMOD results indicate that a new analysis of wind-related**
14 **benefits may not show robust support for the Project.**

15 A. As run by the Applicants, PROMOD did measure a reduction in wind curtailment due to the
16 addition of the Project. I analyzed this reduction and presented the results in my Direct and
17 Supplemental Direct Testimonies. What this showed was that the wind-related benefits were
18 not that significant except perhaps in the AAT cases. Though this is not the only way of
19 analyzing the wind-related benefits of the line, it is one way and does not show robust wind-
20 related benefits of the Project.

21 **Q. Please explain why a capacity expansion analysis with and without the line may show**
22 **reduced benefits of the Project.**

¹⁵ Direct-DALC/WWF-Desu-23, line 4 to Direct-DALC/WWF-Desu-31, line 22.

1 A. As Mr. Desu also argues, performing a capacity expansion analysis with and without the
2 Project is not equivalent to putting the Project with additional wind into the system and then
3 just taking it out. Instead, the capacity expansion should be optimized with the Project and
4 without it. Without the Project, I would still expect renewable development to proceed, but
5 in different locations than with the Project. For instance, instead of wind development west
6 of Wisconsin, there could be more solar development within Wisconsin closer to load
7 centers such that it does not require large new transmission lines to interconnect it. A model
8 such as PROMOD could then quantify the energy cost savings benefits of each of these
9 optimized cases. Applicants have not done this analysis, and I would not presume such an
10 analysis would be favorable to the Project.

11 **Q. Please explain your assertion that additional wind in the AAT case would not**
12 **significantly increase the Project's benefits as measured in PROMOD.**

13 A. Mr. Dagenais claims that it is not surprising that I did not observe a substantial increase in
14 wind generation because a lot of wind generators in the MISO queue were not included in
15 the Applicants' PROMOD runs.¹⁶ This could easily be misinterpreted to mean that if a lot of
16 additional wind were included that *all* the modeled futures would show increased benefits.
17 This is not the case. The AAT future includes substantial generic wind additions that
18 substitute for additional wind that may be interconnected in the future. My review of the
19 AAT case suggests that even with the Project included, this case still has substantial wind
20 curtailment:

¹⁶ Rebuttal-Applicants-Dagenais-68, lines 16-18.

- 1 • Some wind generators reduce their output after the Project is included, as shown in
2 Figure 4 in my Direct Testimony and Figure S-4-1 in in my Supplemental Direct
3 Testimony.
- 4 • The unit RRF RGOS WI-B remains curtailed in some hours in 2031 in the AAT
5 cases with the Project.¹⁷

6 Therefore, in the AAT cases, additional wind would also add to the wind curtailment and
7 would not be likely to create significant benefits for Wisconsin.

8 **III. Wind Benefits-Location of Increased Wind**

9 **Q. In your Direct and Rebuttal Testimonies, you describe some concerns regarding the**
10 **location of a generation unit labeled RRF RGOS WI-B. How did Applicants respond**
11 **to your concerns?**

12 A. Mr. Dagenais states that “while the location of this particular RRF unit may not perfectly
13 reflect where additional wind is being sited, it does generally reflect the view of MISO
14 stakeholders that additional wind is being and will continue to be developed west of
15 Wisconsin.”¹⁸

16 **Q. Please respond.**

17 A. Mr. Dagenais’ argument implies that as long as generation is sited west of Wisconsin, the
18 Project will provide benefits. However, the location where wind generation is developed
19 west of Wisconsin is important because the wind resource west of Wisconsin is variable.
20 The best resource is in the area with the highest sustained wind speed, which corresponds to

¹⁷ The annual capacity factor is 40.9% and not the maximum 41.6%. Attachment 1 to 3-CUB-RFP-2, CONFIDENTIAL Category D, E; Att. 1 to 04-CUB-INT-02 CONFIDENTIAL Category D, E; Ex.-CUB-Neal-9: Applicants’ response to 4-CUB/Inter-2, part c, i.

¹⁸ Rebuttal-Applicants-Dagenais-69, lines 17-20.

1 the areas with the most wind development in Western Iowa and Southwest Minnesota. The
2 best resource is not located near Hickory Creek substation in Northeastern Iowa where RRF
3 RGOS WI-B interconnects.¹⁹ Thus, it was concerning to me that the Applicants' PROMOD
4 results showed the ability to reduce wind curtailment in this local area and not the area with
5 the best wind resource.

6 **Q. Did Applicants perform PROMOD runs that test the sensitivity of the Project's**
7 **benefits to the location of wind interconnection?**

8 A. No, but Dr. Grant on the Commission Staff did and provided results in Supplemental
9 Testimony.

10 **Q. What did Dr. Grant's analysis show?**

11 A. I will not repeat all the details of Dr. Grant's analysis, but overall the results show that
12 moving or removing the wind from the terminus of the Project at Hickory Creek either
13 modestly increases the benefits or does not change the benefits significantly.

14 **Q. How do you respond?**

15 A. Although Dr. Grant's analysis alleviates any concern that including RRF RGOS WI-B at the
16 terminus of the Project biases the PROMOD modeling in favor of the Project, more analysis
17 would be required to fully understand the results. I do not know the driver of the increase in
18 benefits or the lack of change in the benefits. Plausible explanations include: a) without RRF
19 RGOS WI-B, the Project enabled wind generation increases from other geographic areas; if
20 those areas include wind rich locations in the Upper Midwest, this would support the
21 Project, or b) it is another instance, as with the LVA, where even with reduced wind

¹⁹ See also Supplemental Direct-PSC-Grant-sc-3, lines 1-7, which discusses northeast Iowa as having the lowest wind resource in the state.

1 enablement, the benefits increase due to changes in congestion patterns. Unfortunately, I
2 have not had time to conduct an analysis of the wind output in these new PROMOD runs.

3 **Q. Are there other important limitations of Staff's analysis?**

4 A. Yes. My initial analysis of the wind-related benefits of the Project focused on the
5 Applicants' PROMOD runs. The runs presented in Dr. Grant's Supplemental Direct
6 Testimony include other changes to the generation in Wisconsin, namely the addition of
7 renewable generation within Wisconsin. I have not analyzed how those changes also change
8 the wind enabled by the Project.

9 **Q. Overall, what do you conclude about the location of the wind enabled by the Project?**

10 A. I still recommend the Commission not approve the Project on the basis of anticipated wind-
11 related benefits, stemming from wind development in areas with the best wind resource,
12 unless those benefits are quantified and brought to the Commission for its review.

13 Alternatively, if the Applicants wish to justify the Project on the basis of supporting
14 generation development in other locations, the Applicants should quantify the costs and
15 benefits of this generation to Wisconsin and show it compares favorably to alternatives,
16 including alternatives that provide access to the best wind resource in the Upper Midwest.

17 **IV. Revised NTA**

18 **Q. In his rebuttal testimony Mr. Dagenais models a revised NTA that is only utility-scale**
19 **solar.²⁰ Do you agree with his conclusion that this modeling demonstrates that utility-**
20 **scale solar is not a viable alternative to the Project?**

21 A. No. In this revised NTA modeling, Mr. Dagenais changes his methodology. He adds the
22 revised NTA to the base case and models the benefits of the Project with this new base case.

²⁰ Rebuttal-Applicants-Dagenais-46, line 12 to Rebuttal-Applicants-Dagenais-48, line 3.

1 This new analysis does not indicate whether the revised NTA would have net benefits and
2 be a viable alternative to the Project, but instead just reanalyzes the benefits of the Project.

3 **Q. How should the net benefits of the NTA be estimated?**

4 A. Mr. Dagenais' prior methodology would be sufficient. Under this prior methodology, the
5 base case would be modeled and then the base case would be modeled with the revised
6 NTA in order to estimate the net benefits of the revised NTA as an alternative to the Project.

7 **Q. What do you recommend regarding the revised NTA analysis?**

8 A. The revised NTA analysis does not really provide any information regarding the viability of
9 solar as an alternative at all. Therefore, I recommend the Commission disregard this
10 analysis, and continue to recommend utility solar within Wisconsin be considered a viable
11 alternative to building this Project.

12 **V. Additional Clarifications**

13 **Q. In his rebuttal testimony Mr. Dagenais responds to your recommendation that the**
14 **Commission not approve the Project on the basis of anticipated wind-related benefits**
15 **without direct evidence by stating: "Given the testimony that the Applicants, the**
16 **Clean Energy Organizations, and MISO have submitted regarding the Project's**
17 **'wind-related benefits,' it is not clear what additional evidence would satisfy Ms. Neal**
18 **in this regard..." Do you have any comments regarding Mr. Dagenais statement?**

19 A. Yes, I wish to provide additional detail to my recommendation. As stated earlier in my
20 testimony regarding the importance of the location of the wind-related benefits, I am
21 recommending that the Commission not approve the Project on the basis of anticipated
22 wind-related benefits, stemming from wind development in areas with the best wind
23 resource, unless those benefits are quantified and brought to the Commission for its review.

1 Alternatively, if the Applicants wish to justify the Project on the basis of supporting
2 generation development in other locations, the Applicants should quantify the costs and
3 benefits of this generation to Wisconsin and show it compares favorably to alternatives,
4 including alternatives that provide access to the best wind resource in the Upper Midwest.

5 **Q. In her Rebuttal Testimony, Dr. Smith expresses some confusion regarding your use of**
6 **“equivalent” capacity in your analysis of wind-related benefits.²¹ Can you elaborate on**
7 **your use of “equivalent” capacity when evaluating the Project’s effect on wind**
8 **generation?**

9 A. Yes. Figures 3 and S-3 in my Direct and Supplemental Direct Testimony show changes in
10 total energy generation (MWh). This is explained in my Direct Testimony.²² Instead of
11 using MWh on the y-axis I chose to use equivalent capacity because people more typically
12 think of generator sizes in MWs than MWhs.

13 As an example to be very clear what equivalent capacity means: if a column in the
14 chart reads 500 MW of equivalent capacity, I found that the Project increased wind
15 generation equivalent to the amount of MWhs produced by 500 MW of generation at a
16 40% annual capacity factor.

17 **VI. APC Calculation Methodologies**

18 **Q. In your rebuttal testimony, you mention planning to review differences between your**
19 **analysis and Dr. Grant’s analysis of the APC benefits of the Project.²³ Have you**
20 **reviewed this further?**

21 A. Yes.

²¹ Rebuttal-Applicants-Smith-14 to 15.

²² Page 10, lines 1-8.

²³ Rebuttal-CUB-Neal, lines 5-9.

1 **Q. Did you definitively resolve the cause of the differences?**

2 A. No. Dr. Grant has built up his own spreadsheets to analyze the APC benefits of the Project
3 that are too difficult to compare directly to the Applicants' calculations without more time.

4 But I can still offer some possible explanations:

- 5 • The results are based on different PROMOD runs. My analysis was of Applicants'
6 PROMOD results. Dr. Grant's results show the results of his own runs.
- 7 • Dr. Grant focused on replicating APC as calculated in Applicant workpapers labeled
8 "DPC-XCEL WI APC," which were used to calculate the APC benefits in the DPC
9 and NSP zones. The APC in these spreadsheets is not the same as what is termed
10 "Cost of Generation Supply" in the "Customer Benefit" tabs of the Applicants'
11 "CBM" workpapers, which form the basis of what I termed "ATC APC" in Figures
12 2, 8, and 12 of my Direct Testimony.

13 **Q. Do you have any changes to make to your testimony due to this issue?**

14 A. No.

15 **VII. Closing Thoughts**

16 **Q. Do you have any additional comments at this time?**

17 A. Yes. I believe that there are two important narratives for the Commission to consider when
18 making the decision whether to approve the Project.

19 First, as the Applicants have described, planning for this Project dates back years.
20 The narrative supporting the MVP portfolio at the time of its approval was that many states
21 had renewable portfolio standards, but in order to meet them, they needed access to Upper
22 Midwest wind. Upper Midwest wind had no economically viable renewable competitors at
23 that time. That is not the case today; utility-scale solar can now offer competitively-priced

1 renewable energy. Even in Wisconsin, which does not have the best solar resource of the
2 continental U.S., can cost-effectively support solar development. And the solar resource,
3 while it does vary geographically, does not vary as much as the wind resource across the
4 Midwest. This creates a choice for meeting renewable energy goals: utilities can build wind
5 turbines far from load where there is still a rich wind resource plus long transmission lines
6 or they can build solar arrays closer to load with much shorter transmission lines. Battery
7 storage technology is also emerging with the potential to facilitate higher penetrations of
8 renewable resources, which could also change the need for new large transmission lines.
9 Because of these changes in technology, we can no longer rely on the outdated narrative
10 supporting the MVP portfolio. There are alternatives now that did not exist when MISO
11 approved the portfolio, and they should be carefully considered.

12 Second, nothing terrible will happen if the Project is not approved and constructed
13 per the proposed schedule. Even according to Applicants' own analysis there is no reliability
14 need that could not be addressed through more modest investments,²⁴ and Commission Staff
15 has found upcoming additions of solar generation in Wisconsin will provide reliability
16 benefits and a targeted build alternative could relieve the worst contingencies.²⁵ Renewable
17 development in MISO will continue, though there may be more study needed of some
18 interconnection requests, and there may be adaptation to the lack of the Project such as more
19 solar development within Wisconsin as opposed to imports from outside Wisconsin.

20 Therefore, I encourage the Commission to carefully consider the evidence provided in this
21 proceeding and not be swayed against arguments for further analysis due to timing concerns.
22

²⁴ Ex.-Applicants-Application, pages 48-50.

²⁵ Direct-PSC-Rohankar-14, lines 4-11.

1 Q. Does that conclude your Surrebuttal Testimony?

2 A. Yes.