

Minnesota Public Utilities Commission
Staff Briefing Papers

Meeting Date: March 19, 2009 **Agenda Item # **13B**

Company: Wisconsin Power and Light Company

Docket Nos. IP-6657/CN-07-1425

In the Matter of the Application of Wisconsin Power and Light Company for a Certificate of Need for a Large Energy Facility, a 200 Megawatt Wind Farm and a 18 mile – 161 kV Transmission Line

Issue(s): Should the Commission order a contested case hearing?

Staff: Tricia DeBleekere / Bret Eknes (651) 201-2254 / (651) 201-2236

Relevant Documents

Minnesota Rules 7829 Utility Proceeding, Practice Procedure
Minnesota Rules, Chapter 7849 - Certificate of Need for a Large Wind Energy Facility

Wisconsin Power and Light Company’s Certificate of Need ApplicationJune 27, 2008
Wisconsin Power and Light Company’s CPCN as filed with the PSC of WisconsinJuly 25, 2008
Commission Order Granting Informal Review for Certificate of Need ProceedingAugust 27, 2008
Katie V. Troe’s Request for a Contested Case Hearing (*Attached*)Email Date: January 4, 2009

*At the time of submittal of this briefing paper this comment was not yet available in eDockets.

The attached materials are workpapers of the Commission Staff. They are intended for use by the Public Utilities Commission and are based upon information already in the record unless noted otherwise.

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Statement of the Issues

Should the Commission order a contested case hearing based on the request by Katie V. Troe?

Procedural History

On January 15, 2008 the Minnesota Public Utilities Commission (Commission) granted Wisconsin Power and Light Company (WPL or the Company) exemptions to certain certificate of need filing requirements and allowed WPL to file their Wisconsin Certificate of Public Convenience and Need (CPCN) application with the Minnesota Commission in lieu of specific information requested under Minnesota Rules 7849.

On June 27, 2008 WPL submitted a certificate of need application for a 200 megawatt (MW) wind generation facility known as the Bent Tree Wind Project (Bent Tree or Project) and a 161 kilovolt (kV) radial line for Project interconnection.

On August 27, 2008 the Commission issued an Order accepting the application as complete (contingent on a compliance filing) and approving the informal certificate of need review process.

On November 10, 2008 the Commission issued a notice soliciting comments on the merits of the certificate of need application. Initial comments were requested to be submitted by January 8, 2009 and reply comments by February 5, 2009.

On January 4, 2009 a comment was received by the Office of Energy Security from Katie V. Troe on behalf of some Freeborn County residents requesting a contested case hearing on the certificate of need application.

On January 8, 2009 the Office of Energy Security provided comments on the merits of the application.

Project Background

The application for a certificate of need in this docket is for 200 MW of wind-generation including an 18 mile, 161 kV radial transmission line for project interconnection. WPL intends to develop the project in phases to a total size of approximately 400 MW, in northwest Freeborn County, Minnesota.

The Bent Tree project is a large energy facility as defined by Minnesota Statute §216B.2421, subd. 2 (1). Under Minn. Stat. §216B.243, Subd. 2, no large energy facility can be constructed in Minnesota unless the Commission grants a certificate of need. The operative certificate of need rules for this project are located in Chapter 7849.

WPL has opted to use the local review process for the siting of the 161 kV radial line, the Project's large wind energy conversion system site permit is under review in Commission docket number 08-573.

WPL's is a Wisconsin utility and does not serve Minnesota customers. WPL's petition indicates that the energy from the Bent Tree Wind facility is needed to meet the state of Wisconsin's Renewable Portfolio Standard which requires Wisconsin utilities to increase their retail sales of renewable energy to 10 percent by 2015. WPL has also submitted a Certificate of Public Convenience and Need (CPCN) with the Public Service Commission (PSC) of Wisconsin, a proceeding that is still underway with that agency.

Given the timing of receipt of the Troe comment by Staff, WPL has not had an opportunity to review or respond as of the writing of this briefing paper.

Regulatory Procedure

In the August 27, 2008 Order the Commission authorized the use of the informal comment and reply process in lieu of the formal contested case proceeding as the matter appeared to be relatively non-controversial and it was determined that the informal review process was an appropriate model to develop the record. The Minnesota Rules regarding the informal certificate of need proceeding are located in 7829.1200.

During the informal proceeding, a person may request in writing that a contested case be held on an application for a certificate of need. The request should include the issues to be addressed during the proceeding and the reasons a contested case hearing is required to resolve those issues.

Per Minnesota Rule 7829.1000, if the Commission finds that all significant issues have not been resolved to its satisfaction, the Commission shall refer the matter to the Office of Administrative Hearing for a contested case proceeding.

Contested Case Hearing Request

The informal review process allows for concerns regarding the merits of the project to be developed during the initial and reply comment period, in the Bent Tree docket comments were received through January 8 and February 5, 2009, respectively. On January 4, 2009 Katie V. Troe submitted a comment to the Office of Energy Security requesting that a contested case be held on this matter.

The Troe request for a contested case identified the lack of consideration in the certificate of need on the following items:

- 1) The cost of the radial transmission line,
- 2) whether the project was a prudent alternative once the costs of the upgraded transmission were factored into the project cost, and,
- 3) which ratepayers would bear the burden of the transmission line costs.

Staff Evaluation

WPL estimates the cost to construct the 18-mile, 161-kV radial line (18-mile radial line) to be \$7.2 million dollars¹. However, the Midwest Independent System Operator (MISO) transmission expansion plans and the generator interconnect study process may result in a more favorable (closer) interconnection point for the Project due to the potential addition of a 161 kV transmission line (Hayward-Owatonna) that would run parallel to the east side of the Project. If MISO finds this line to be prudent, it would reduce the Project's radial line to 8-miles in length and per WPL, would significantly reduce the Project's transmission associated costs.

In WPL's Wisconsin CPCN application, WPL asserts that ITC-Midwest, LLC's (ITC) proposed² revision to Attachment FF to the MISO Open Access Transmission and Energy Market Tariff allows for 100%

¹ WPL's CN Application as Filed with the PSC of Wisconsin, Page 28, Section 8.1.1

² The Tariff modification to Attachment FF was accepted by the Federal Energy Regulatory Commission on August 7, 2008. See FERC Docket Nos.: ER08-763-000 and ER08-796-001.

reimbursement to the generator for network transmission system upgrades and therefore, WPL's customers would not bear the costs of the new Hayward-Owatonna line.³ The costs for the Hayward-Owatonna line would be recovered from transmission customers in the ITC pricing zone based on usage, which would include WPL's Bent Tree Project, if approved. The method by which ITC allocates costs associated with their transmission system is regulated by the Federal Regulatory Energy Commission and not the Minnesota Public Utilities Commission (see MPUC Docket 07-540).

It is Staff's understanding that costs associated with the Project's radial line (18-mile or 8-mile) would be borne by WPL customers.

WPL asserts that the location of the project was chosen because of the favorable pricing in the Midwest System Operator's (MISO) market footprint, minimal transmission system congestion, potential least-cost interconnection-related transmission upgrades, and favorable (ITC) reimbursement for transmission upgrades.⁴

Conclusion

Katie V. Troe's request for a contested case in the certificate of need proceeding lists three items that she indicates are not included in the certificate of need evaluation and as a result, warrant a contested case hearing. As broken down above, all items are discussed in the record and have been considered – as standard practice - in the evaluation of alternatives by WPL in their application and by the Office of Energy Security's Comments and Recommendations provided on January 8, 2009.

Decision Alternatives

1. Deny the request for a contested case hearing.
2. Find that the issues have not been resolved to the Commission's satisfaction and grant the request for a contested case hearing. If the request is granted the Commission may determine the scope of the contested case proceeding or have an Administrative Law Judge from the Office of Administrative Hearings determine the scope of the proceeding.
3. Make some other decision deemed more appropriate.

Staff Recommendation. Staff recommends option 1.

³ WPL's CN Application as Filed with the PSC of Wisconsin, Page 28, Section 8.1.1

⁴ WPL's CN Application as Filed with the PSC of Wisconsin, Page 15, Section 4.2

Tricia DeBleeckere

Subject: FW: Bent Tree: request for a contested hearing and feasibility study G855
Attachments: Fesibility Study G855 Bent Tree.pdf

From: Katie V Troe [mailto:kvtroe@juno.com]
Sent: Monday, March 09, 2009 8:28 AM
To: Larry.Hartman@state.mn.us; Bret
Cc: kvtroe@juno.com
Subject: Fw: Bent Tree: request for a contested hearing and feasibility study G855

Dear Mr. Bret & Mr. Larry

Thank you for your time on the phone Friday, Bret. There was some confusion between the Certificate of Need docket and the Siting docket, and I went back to my sent box to clarify for myself what I'd requested -- below is my prior email. As you can see, several days before the Certificate of Need comment deadline, I specifically requested a Contested Case for the Certificate of Need. The study I attached raises the issue of cost and whether the project is needed at that cost because the project will require substantial improvements be made to the transmission grid before it can be connected. This cost, who will pay the cost, and whether it is needed at that cost should be considered in the Certificate of Need. What I don't understand is that my Comment, sent in before the deadline, is not in the PUC docket listing online for the Certificate of Need, and it's not in the Siting docket either -- where is it?

In the Siting permit docket, there were many comments made requesting a Contested Case. We've clearly requested a Contested Case in both the Certificate of Need and Siting dockets.

I hope you both can help me with this Contested Case request and solve the mystery of my missing comment.

Thanks for your help,

Katie

Katie V Troe Mother, LLL Leader, AFC
27510 775th Ave, Clarks Grove MN 56016
507.256.4343 kvtroe@juno.com

Please note: forwarded message attached

Dear Mr. Larry Hartman, January 4, 2009

I am writing regarding Bent Tree Wind Project, located in Freeborn County.

I and the group of concerned Freeborn County residents regarding Bent Tree would like to request a contested hearing for the certificate of need and a contested hearing for the siting permit.

I have also attached a copy of the feasibility study (G855) I recently found regarding Bent Tree's ability to connect into the power grid.

Please contact me if you have any questions.

Sincerely, Katie

Katie V Troe Mother, LLL Leader, AFC
27510 775th Ave, Clarks Grove MN 56016
507.256.4343 kvtroe@juno.com

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Feasibility Study for Generation Interconnection

Midwest ISO Project:	G855
Generation Interconnection	
Queue #:	39336-01
In-service Date:	12/1/2009
County:	Freeborn
State:	Minnesota
Point of Interconnection:	Hayward 161 kV

Prepared by Midwest ISO

1/31/08

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Disclaimers

The following Feasibility Study results serve to identify probable constraints which will be verified in a System Impact Study. These results should not be used for mitigation.

1 Summary

This report contains the Feasibility Study results for one Midwest Independent System Operator (MISO) Generation Interconnection (GI) report with queue number 39336-01. The proposed generation is 200 MW of wind generation to be interconnected at the Hayward 161 kV bus in Freeborn County, Minnesota and is being studied under MISO study number G855. The purpose of this study was to identify steady state thermal violations caused by the proposed generation interconnection. The requested in-service date is December 1, 2009.

The final interconnection will depend on the findings of the Interconnection System Impact Study (ISIS) and Facility Study in the subsequent steps of the interconnection process.

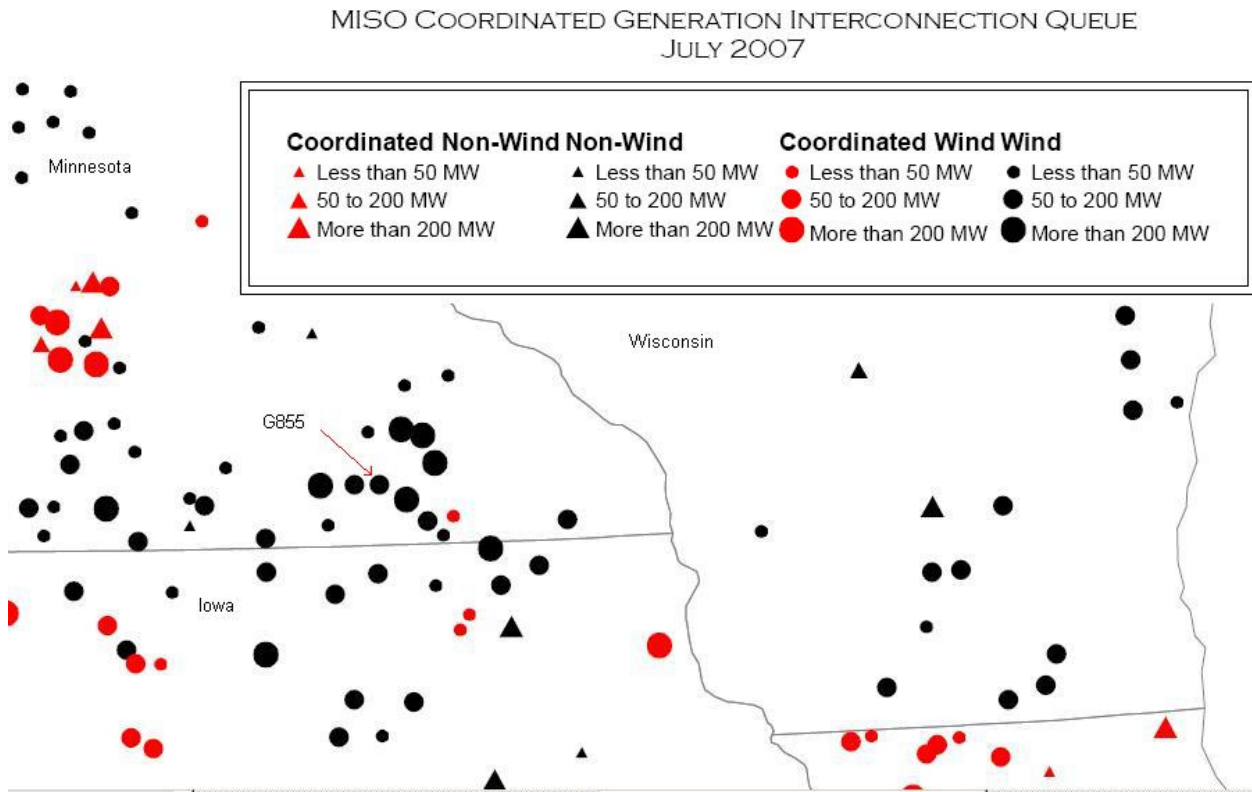


Figure 1-1: Location of G855, Freeborn County, MN (approx)

An analysis was performed by sourcing 200 MW from G855 and delivering the power to the MISO areas outside of GRE, MDU, NSP, MH, SMP, ALTW, MP, and OTP. The study identified six injection-related and numerous non-injection-related constraints associated with this generator addition. Verification and/or validation of any and all constraints will be performed in the SIS phase of the Generation Interconnection Request.

1.1 Further Study

The MISO Large Generator Interconnection Procedures indicate that the Interconnection Customer is to proceed with an Interconnection System Impact Study after the completion of the Feasibility Study. The ISIS will determine the system upgrades required to resolve

all interconnection issues and will include, but is not limited to, thermal, short circuit, voltage stability, and system protection analysis, as applicable.

1.1.1 Network Upgrades

Network upgrades are to be determined in the ISIS as required.

2 Criteria, Methodology and Assumptions

2.1 Study Criteria

All relevant MISO-adopted NERC Reliability Criteria are to be met for the voltage analysis.

2.2 Study Process

The results of this study are subject to change. The results of the study are based on data provided by the Generator and other MISO system information that was available at the time the study was performed. The study does not guarantee any delivery or deliverability to the MISO energy market. If there are any significant changes in the generator and controls data, in earlier queue Generator Interconnection requests, then the results of this study may also change significantly. Therefore, this request is subject to restudy. The Interconnection Customer is responsible for communicating any generation facility data changes in a timely fashion to MISO prior to commercial operation.

2.2.1 Base Cases

The G855 Feasibility study utilized a MAPP 2005 Series 2007 Summer Peak case.

2.2.2 Power Flow Analysis

Two cases were developed to model the system with and without the proposed generation. These cases were created using PSSE Rev 29.5.

The powerflow analysis was run on both cases using MUST DCCC.

Monitored Elements and Contingency:

- All elements 69 kV and above in the following control areas were monitored: ALTW, GRE, WAPA, MP, NSP, SMP, MPW, MEC, MHEB, SPC, DPC, and OTP.
- Thermal overloads were defined by an element loading over normal ratings under system intact conditions and emergency ratings under N-1 contingency conditions.
- The contingency analyses included single branch and selected multi-element contingencies.

2.3 Assumptions

2.3.1 Generation Facility Modeling

The G855 generation was modeled at 200 MW of real power output connected to the Hayward 161 kV substation.

3 Analysis Results

Generators that cause injection-related constraints must provide mitigation for these violations prior to interconnection. An injection constraint is a constraint that is located at

the point of interconnection and/or the distribution factor (DF) is 20% or higher. Mitigation of non-injection related constraints is optional and is provided here for informational purpose only. If not mitigated, the output of the generation may be limited or curtailed in anticipation or in the event of the given contingency.

3.1 Power Flow Analysis Results

3.1.1 Results of the DC MUST Thermal Analysis

(On the following pages.)

Midwest ISO Project G855

3.1.1.1 System Intact Constraints

Under normal system conditions (all facilities in service) the G855 study generation caused severe base case overloads on some close proximity facilities. These base case violations can be seen in Table 3-1.

Limiting Elements	Post Gen MW ¹	Normal Rating MW	Loading %	Pre Gen MW ²	Impact	TDF %	FCITC
34018 HAZLTON3 345 34093 ARNOLD 3 345 1	1047.9	923.0	113.5	1009.7	38.2	19.10	-454
34093 ARNOLD 3 345 64352 TIFFIN 3 345 1	974.1	956.0	101.9	941.7	32.4	16.20	88
34572 ADAMS_S5 161 69526 BVR CRK5 161 1	227.9	223.0	102.2	206.1	21.8	10.90	155
69526 BVR CRK5 161 69527 HARMONY5 161 1	231.3	223.0	103.7	212.5	18.8	9.40	112
63730 HAMPTON5 161 63774 SHEFFLD5 161 1	282.3	202.0	139.8	267.1	15.2	7.60	-857
69547 ROCHSTR5 161 69549 WABACO 5 161 1	260.3	201.0	129.5	248.8	11.5	5.75	-831

Table 3-1: System Intact constraints for G855

¹ The Post Gen MW refers to the loading after the generator has been turned on.

² The Pre Gen MW refers to the loading before the generator has been turned on.

Midwest ISO Project G855

3.1.1.2 Injection Constraints

Seven thermal limited facilities have been identified as meeting the MISO conditions for being injection related constraints. Table 3-2 lists the affected facilities. The injection constraints will be verified in the System Impact Study and if verified will require mitigation.

Limiting Element	Post Gen Post Cont MW ³	Post Gen Pre Cont MW	Emergency Rating MW	Contingency ⁴	Pre Gen Post Cont MW	TDF %	FCITC
34018 HAZLTON3 345 771 G771 345 1	1117.7	908.3	956.0	60105 PR ISLD3 345 61950 BYRON 3 345 1	1066.0	25.85	-426
34018 HAZLTON3 345 771 G771 345 1	1118.1	908.3	956.0	905	1066.5	25.80	-428
34137 TRIBOJI5 161 66563 SPENCER5 161 1	254.8	179.4	209.0	NSP	203.5	25.65	21
34018 HAZLTON3 345 771 G771 345 1	1052.1	908.3	956.0	61950 BYRON 3 345 63032 PL VLLY3 345 1	1004.9	23.60	-207
34018 HAZLTON3 345 34093 ARNOLD 3 345 1	1182.9	1047.9	923.0	60105 PR ISLD3 345 61950 BYRON 3 345 1	1136.4	23.25	-918
34018 HAZLTON3 345 34093 ARNOLD 3 345 1	1183.2	1047.9	923.0	905	1136.8	23.20	-922
62234 LKMARN 7 115 62237 KENRICK7 115 1	186.8	143.1	158.4	NSP	140.5	23.15	77
62232 DKTAHGT7 115 62237 KENRICK7 115 1	176.1	132.4	158.4	NSP	129.8	23.15	124
62323 PNLPTNP869.0 62342 PENELOP869.0 1	109.3	67.5	66.2	NSP	64.8	22.25	6
62342 PENELOP869.0 62343 PENELTP869.0 1	113.9	72.1	66.2	NSP	69.4	22.25	-14
34018 HAZLTON3 345 34093 ARNOLD 3 345 1	1134.2	1047.9	923.0	61950 BYRON 3 345 63032 PL VLLY3 345 1	1091.0	21.60	-778

Table 3-2: Injection constraints for G855

³ The Post Gen Post ContMW refers to the post-contingent loading after the generator has been turned on. The Post Gen Pre ContMW refers to the base case loading after the generator has been turned on. The Pre Gen Post ContMW refers to the post-contingent loading before the generator has been turned on.

⁴ See Appendix A for contingency definitions

Midwest ISO Project G855

3.1.1.3 Non-Injection Constraints

Numerous thermally limited facilities have been identified as meeting the MISO conditions for being non-injection related constraint. These limits indicate that the margin of the transmission system to operate under contingency conditions is reduced by the amount of proposed generation seeking to deliver power to the MISO market. The non-injection constraints will be verified in the System Impact Study. Table 3-3 identifies the non injection related constraints.

Limiting Element	Post Gen Post Cont MW	Post Gen Pre Cont MW	Emergency Rating MW	Contingency	Pre Gen Post Cont MW	TDF %	FCITC
34093 ARNOLD 3 345 64352 TIFFIN 3 345 1	1088.7	974.1	956.0	905	1049.3	19.70	-474
34093 ARNOLD 3 345 64352 TIFFIN 3 345 1	1088.3	974.1	956.0	60105 PR ISLD3 345 61950 BYRON 3 345 1	1048.9	19.70	-472
60786 DUNDAS 869.0 60787 NOFIELD869.0 1	88.0	50.5	52.8	NSP	49.0	19.50	19
34093 ARNOLD 3 345 64352 TIFFIN 3 345 1	1046.5	974.1	956.0	61950 BYRON 3 345 63032 PL VLLY3 345 1	1009.9	18.30	-295
61948 BYRON 5 161 63070 PL VLLY5 161 1	568.4	152.9	448.7	825 1	533.1	17.65	-478
61948 BYRON 5 161 61950 BYRON 3 345 1	506.2	66.6	448.0	825 1	471.1	17.55	-132
34572 ADAMS_S5 161 69526 BVR CRK5 161 1	278.5	227.9	223.0	825 1	245.0	16.75	-131
69547 ROCHSTR5 161 69549 WABACO 5 161 1	278.7	260.3	221.0	NSP	246.4	16.15	-157
34572 ADAMS_S5 161 69526 BVR CRK5 161 1	253.7	227.9	223.0	825 2	221.8	15.95	8
34572 ADAMS_S5 161 69526 BVR CRK5 161 1	238.3	227.9	223.0	NSP	206.8	15.75	103
69543 ALMA 5 161 69549 WABACO 5 161 1	230.6	212.2	223.0	NSP	199.1	15.75	152
61948 BYRON 5 161 63070 PL VLLY5 161 1	533.6	152.9	448.7	MAPP-9	502.8	15.40	-351
60105 PR ISLD3 345 60236 REDROCK3 345 2	1344.4	656.8	1165.0	900	1313.9	15.25	-976
60110 WILMART7 115 60650 WILMART869.0 2	92.6	62.8	70.0	NSP	62.1	15.25	52
63032 PL VLLY3 345 63070 PL VLLY5 161 2	505.6	296.4	500.0	63032 PL VLLY3 345 63070 PL VLLY5 161 1	475.2	15.20	163
63032 PL VLLY3 345 63070 PL VLLY5 161 1	505.6	296.4	500.0	63032 PL VLLY3 345 63070 PL VLLY5 161 2	475.2	15.20	163
60110 WILMART7 115 60650 WILMART869.0 1	92.0	62.4	70.0	NSP	61.7	15.15	55
60110 WILMART7 115 60650 WILMART869.0 3	92.0	62.4	70.0	NSP	61.7	15.15	55
69526 BVR CRK5 161 69527 HARMONY5 161 1	280.3	231.3	223.0	825 1	251.2	14.55	-194
69526 BVR CRK5 161 69527 HARMONY5 161 1	241.4	231.3	223.0	NSP	213.0	14.20	70
69526 BVR CRK5 161 69527 HARMONY5 161 1	255.9	231.3	223.0	825 2	228.5	13.70	-40
64203 NW FTDG5 161 64230 POMEROY5 161 1	208.7	185.9	173.0	NSP	182.0	13.35	-67
34570 ADAMS_N5 161 69547 ROCHSTR5 161 1	300.8	184.9	221.0	825 1	276.5	12.15	-457
34570 ADAMS_N5 161 69547 ROCHSTR5 161 1	228.6	184.9	221.0	34014 ADAMS 5 161 60102 ADAMS 3 345 1	204.3	12.15	137
34016 EMERY 5 161 63774 SHEFFLD5 161 1	347.3	305.2	307.0	825 1	325.4	10.95	-168
63730 HAMPTON5 161 63774 SHEFFLD5 161 1	324.4	282.3	202.0	825 1	302.5	10.95	-918

Midwest ISO Project G855

63730 HAMPTON5 161 63774 SHEFFLD5 161 1	306.0	282.3	202.0	825 2		285.2	10.40	-800
69543 ALMA 5 161 69551 ELK MND5 161 1	210.6	196.8	190.3	NSP		189.9	10.35	4
60236 REDROCK3 345 60238 REDROCK7 115 9	492.0	474.0	448.0		960	471.3	10.35	-225
34016 EMERY 5 161 63774 SHEFFLD5 161 1	328.9	305.2	307.0	825 2		308.2	10.35	-12
34016 EMERY 5 161 64252 FLOYD 5 161 1	266.5	255.9	238.0	NSP		246.4	10.05	-84
34570 ADAMS_N5 161 69547 ROCHSTR5 161 1	233.6	184.9	221.0	825 2		213.6	10.00	74
63730 HAMPTON5 161 63774 SHEFFLD5 161 1	323.6	282.3	202.0	60102 ADAMS 3 345 740 G740 345 1		304.4	9.60	-1067
34016 EMERY 5 161 63774 SHEFFLD5 161 1	346.5	305.2	307.0	60102 ADAMS 3 345 740 G740 345 1		327.3	9.60	-211
60719 LAFAYET869.0 62079 LAFAYTT869.0 1	51.9	31.9	40.7	NSP		32.8	9.55	83
60938 FTRIDGL869.0 62077 SCHLTP 869.0 1	59.4	39.5	40.7	NSP		40.4	9.50	3
62077 SCHLTP 869.0 62079 LAFAYTT869.0 1	56.8	36.9	40.7	NSP		37.8	9.50	31
34091 ARNOLD 5 161 34093 ARNOLD 3 345 1	496.8	52.3	448.0	34093 ARNOLD 3 345 64352 TIFFIN 3 345 1		477.8	9.50	-314
63730 HAMPTON5 161 64239 FRANKLN5 161 1	220.3	181.7	202.0	825 1		201.6	9.35	4
69547 ROCHSTR5 161 69549 WABACO 5 161 1	376.5	260.3	221.0	60105 PR ISLD3 345 61950 BYRON 3 345 1		357.9	9.30	-1472
69547 ROCHSTR5 161 69549 WABACO 5 161 1	377.1	260.3	221.0		905	358.5	9.30	-1478
60787 NOFIELD869.0 62256 CSTL RK869.0 1	61.2	43.7	52.8	NSP		42.6	9.30	110
34021 LANSINGW 161 69523 GENOA 5 161 1	252.1	240.2	223.0	NSP		233.7	9.20	-116
69543 ALMA 5 161 69549 WABACO 5 161 1	329.0	212.2	223.0		905	311.2	8.90	-991
69543 ALMA 5 161 69549 WABACO 5 161 1	328.4	212.2	223.0	60105 PR ISLD3 345 61950 BYRON 3 345 1		310.6	8.90	-984
63730 HAMPTON5 161 64239 FRANKLN5 161 1	204.1	181.7	202.0	825 2		186.4	8.85	176
34016 EMERY 5 161 64252 FLOYD 5 161 1	301.3	255.9	238.0	825 1		283.9	8.70	-528
69523 GENOA 5 161 69527 HARMONY5 161 1	245.9	238.2	245.3	NSP		228.6	8.65	193
34087 DYSART 5 161 64269 WASHBRN5 161 1	394.4	109.0	276.0	34018 HAZLTON3 345 34093 ARNOLD 3 345 1		377.8	8.30	-1227
34016 EMERY 5 161 64252 FLOYD 5 161 1	288.0	255.9	238.0	825 2		271.5	8.25	-406
63730 HAMPTON5 161 64239 FRANKLN5 161 1	220.9	181.7	202.0	60102 ADAMS 3 345 740 G740 345 1		204.7	8.10	-33
34020 HAZL S 5 161 34135 DUNDEE 5 161 1	546.1	343.7	167.0	34018 HAZLTON3 345 34093 ARNOLD 3 345 1		531.2	7.45	-4889
60108 WILMART3 345 60192 BLUE LK3 345 1	1395.6	1236.0	1281.0	60105 PR ISLD3 345 61950 BYRON 3 345 1		1380.7	7.45	-1338
60108 WILMART3 345 60192 BLUE LK3 345 1	1390.3	1236.0	1281.0		905	1375.4	7.45	-1267
64355 CRLRIDG5 161 64360 SB PIC 5 161 1	482.6	157.8	335.0	64350 HILLS 3 345 64352 TIFFIN 3 345 1		467.9	7.35	-1808
64353 TIFFIN 5 161 64355 CRLRIDG5 161 1	501.0	176.2	335.0	64350 HILLS 3 345 64352 TIFFIN 3 345 1		486.3	7.35	-2059
34009 WINBAGO5 161 60120 BLUEETA5 161 1	250.5	60.7	200.0	60108 WILMART3 345 60331 LKFLDXL3 345 1		236.0	7.25	-497
34009 WINBAGO5 161 60120 BLUEETA5 161 1	268.7	60.7	200.0		49	254.2	7.25	-748
34009 WINBAGO5 161 60120 BLUEETA5 161 1	221.5	60.7	200.0	ALTW-26D		207.0	7.25	-97
69523 GENOA 5 161 69527 HARMONY5 161 1	265.4	238.2	245.3	825 1		251.0	7.20	-79
64352 TIFFIN 3 345 64353 TIFFIN 5 161 1	505.1	174.8	300.0	64350 HILLS 3 345 64352 TIFFIN 3 345 1		490.8	7.15	-2669

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60109 WILMART5 161 60120 BLUEETA5 161 1	262.3	54.2	240.0		49	248.1	7.10	-114
60109 WILMART5 161 60110 WILMART7 115 5	244.0	54.2	187.0	60108 WILMART3 345 60331 LKFLDXL3 345 1		229.9	7.05	-609
60109 WILMART5 161 60110 WILMART7 115 5	262.2	54.2	187.0		49	248.1	7.05	-867
60109 WILMART5 161 60120 BLUEETA5 161 1	244.0	54.2	240.0	60108 WILMART3 345 60331 LKFLDXL3 345 1		229.9	7.05	143
60109 WILMART5 161 60110 WILMART7 115 5	215.0	54.2	187.0	ALTW-26D		201.0	7.00	-200
62667 ST BONI7 115 63021 ST BONI869.0 1	86.7	73.0	70.0	NSP		73.2	6.75	-47
69523 GENOA 5 161 69527 HARMONY5 161 1	250.0	238.2	245.3	825 2		236.6	6.70	130
64203 NW FTDG5 161 64205 FT.DODG5 161 1	169.8	159.6	167.0	NSP		156.6	6.60	158
69507 SENECA 5 161 69523 GENOA 5 161 1	381.5	359.0	334.0	825 1		368.5	6.50	-531
64250 BLKHAWK5 161 64252 FLOYD 5 161 1	225.2	145.0	193.0	740 G740 345 771 G771 345 1		212.3	6.45	-299
34087 DYSART 5 161 34089 VINTON 5 161 1	310.5	65.9	276.0	34018 HAZLTON3 345 34093 ARNOLD 3 345 1		297.7	6.40	-339
64250 BLKHAWK5 161 64252 FLOYD 5 161 1	244.8	145.0	193.0	34018 HAZLTON3 345 771 G771 345 1		232.1	6.35	-616
34089 VINTON 5 161 34091 ARNOLD 5 161 1	302.8	58.3	276.0	34018 HAZLTON3 345 34093 ARNOLD 3 345 1		290.1	6.35	-222
69507 SENECA 5 161 69523 GENOA 5 161 1	374.6	359.0	334.0	825 2		362.0	6.30	-444
34285 ALDEN J869.0 34286 ALEAWST869.0 1	56.4	38.1	44.0	NSP		44.3	6.05	-5
69507 SENECA 5 161 69523 GENOA 5 161 1	385.7	359.0	334.0	60102 ADAMS 3 345 740 G740 345 1		373.7	6.00	-662
64250 BLKHAWK5 161 64252 FLOYD 5 161 1	203.9	145.0	193.0	34016 EMERY 5 161 63774 SHEFFLD5 161 1		192.6	5.65	7
34020 HAZL S 5 161 34135 DUNDEE 5 161 1	447.4	343.7	167.0	34093 ARNOLD 3 345 64352 TIFFIN 3 345 1		436.4	5.50	-4898
34091 ARNOLD 5 161 34111 FAIRFAX5 161 1	458.5	275.8	304.0	34093 ARNOLD 3 345 64352 TIFFIN 3 345 1		448.4	5.05	-2859
34018 HAZLTON3 345 34020 HAZL S 5 161 2	417.8	213.6	335.0	34018 HAZLTON3 345 34093 ARNOLD 3 345 1		408.2	4.80	-1525
63716 BURT 5 161 63719 HOPE 5 161 1	257.6	204.1	208.0	34016 EMERY 5 161 63774 SHEFFLD5 161 1		248.1	4.75	-844
60108 WILMART3 345 60192 BLUE LK3 345 1	1309.6	1236.0	1281.0	61950 BYRON 3 345 63032 PL VLLY3 345 1		1300.1	4.75	-402
63716 BURT 5 161 63719 HOPE 5 161 1	253.6	204.1	208.0	63730 HAMPTON5 161 63774 SHEFFLD5 161 1		244.1	4.75	-760
34020 HAZL S 5 161 34135 DUNDEE 5 161 1	392.7	343.7	167.0	64350 HILLS 3 345 64352 TIFFIN 3 345 1		383.4	4.65	-4654
34129 LIBERTY5 161 34135 DUNDEE 5 161 1	334.4	222.6	167.0	34018 HAZLTON3 345 34093 ARNOLD 3 345 1		325.1	4.65	-3400
34106 PCI 5 161 34109 BERTRAM5 161 1	194.2	29.1	138.0	34093 ARNOLD 3 345 64352 TIFFIN 3 345 1		185.0	4.60	-1022
61906 MAPLE LF 161 63430 CASCADE 161 1	420.0	289.0	332.0	34570 ADAMS_N5 161 69547 ROCHSTR5 161 1		410.8	4.60	-1713
61906 MAPLE LF 161 61948 BYRON 5 161 1	433.6	302.7	332.0	34570 ADAMS_N5 161 69547 ROCHSTR5 161 1		424.5	4.55	-2033
63716 BURT 5 161 63719 HOPE 5 161 1	218.9	204.1	208.0	825 1		209.8	4.55	-40
64220 WRIGHT 5 161 64312 WALL LK5 161 1	181.1	110.8	173.0	34018 HAZLTON3 345 34093 ARNOLD 3 345 1		172.0	4.55	22
34028 LORE 5 161 34129 LIBERTY5 161 1	291.2	182.1	223.0	34018 HAZLTON3 345 34093 ARNOLD 3 345 1		282.3	4.45	-1333
69507 SENECA 5 161 69508 GRANGRAE 161 1	204.9	186.5	201.0	825 1		196.1	4.40	111
34107 BEVERLY5 161 34111 FAIRFAX5 161 1	344.7	188.9	240.0	34093 ARNOLD 3 345 64352 TIFFIN 3 345 1		336.1	4.30	-2235
34106 PCI 5 161 34107 BEVERLY5 161 1	301.3	145.6	138.0	34093 ARNOLD 3 345 64352 TIFFIN 3 345 1		292.8	4.25	-3642
34129 LIBERTY5 161 34135 DUNDEE 5 161 1	319.2	222.6	167.0	34093 ARNOLD 3 345 64352 TIFFIN 3 345 1		310.8	4.20	-3424

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69507 SENECA 5 161 69508 GRANGRAE 161 1	227.3	186.5	201.0	740 G740 345 771 G771 345 1	219.1	4.10	-441
69507 SENECA 5 161 69508 GRANGRAE 161 1	210.7	186.5	201.0	60102 ADAMS 3 345 740 G740 345 1	202.6	4.05	-40
34028 LORE 5 161 34129 LIBERTY5 161 1	275.7	182.1	223.0	34093 ARNOLD 3 345 64352 TIFFIN 3 345 1	267.6	4.05	-1101
64256 UNIONTP5 161 64285 BUTLER 5 161 1	190.3	104.8	181.0	740 G740 345 771 G771 345 1	182.3	4.00	-33
64239 FRANKLN5 161 64285 BUTLER 5 161 1	197.0	111.5	181.0	740 G740 345 771 G771 345 1	189.1	3.95	-205
34021 LANSINGW 161 69523 GENOA 5 161 1	342.5	240.2	223.0	69523 GENOA 5 161 69527 HARMONY5 161 1	334.6	3.95	-2825
64239 FRANKLN5 161 64285 BUTLER 5 161 1	217.9	111.5	181.0	34018 HAZLTON3 345 771 G771 345 1	210.2	3.85	-758
64256 UNIONTP5 161 64285 BUTLER 5 161 1	211.2	104.8	181.0	34018 HAZLTON3 345 771 G771 345 1	203.5	3.85	-584
64258 LUNDQST5 161 64261 DR NE 5 161 1	206.6	91.2	195.0	34018 HAZLTON3 345 34093 ARNOLD 3 345 1	199.4	3.60	-122
34129 LIBERTY5 161 34135 DUNDEE 5 161 1	269.0	222.6	167.0	64350 HILLS 3 345 64352 TIFFIN 3 345 1	262.1	3.45	-2757
34091 ARNOLD 5 161 34111 FAIRFAX5 161 1	353.0	275.8	304.0	64350 HILLS 3 345 64352 TIFFIN 3 345 1	346.1	3.45	-1220
69543 ALMA 5 161 69551 ELK MND5 161 1	238.9	196.8	190.3	60105 PR ISLD3 345 61950 BYRON 3 345 1	232.2	3.35	-1251
69543 ALMA 5 161 69551 ELK MND5 161 1	240.0	196.8	190.3	905	233.3	3.35	-1284
34028 LORE 5 161 34129 LIBERTY5 161 1	227.0	182.1	223.0	64350 HILLS 3 345 64352 TIFFIN 3 345 1	220.4	3.30	79
34018 HAZLTON3 345 34019 HAZLTON5 161 1	289.2	149.0	224.0	34018 HAZLTON3 345 34093 ARNOLD 3 345 1	282.6	3.30	-1776
34107 BEVERLY5 161 34111 FAIRFAX5 161 1	270.1	188.9	240.0	64350 HILLS 3 345 64352 TIFFIN 3 345 1	263.7	3.20	-741
34106 PCI 5 161 34107 BEVERLY5 161 1	226.7	145.6	138.0	64350 HILLS 3 345 64352 TIFFIN 3 345 1	220.4	3.15	-2616
60803 MIESTAP869.0 62238 MIESVIL869.0 1	35.4	29.7	31.6	NSP	29.2	3.10	77

Table 3-3: Non-Injection Constraints for G855

4 Conclusion

This Feasibility Study identified seven injection and numerous non-injection constraints caused or aggravated by the addition of G855. In order to connect, G855 needs to address all injection, stability, and short circuit issues to be identified in the System Impact Study. The System Impact Study will identify all upgrades required for this interconnection.

5 Appendix A: Higher Queued Generation

Wind Generator Modeling for the CS-5 models

This study did not model the wind farm collector system and the padmount transformer at the generator terminals. In general, the wind generators were modeled at a 34.5 KV bus followed by a step up transformer. It was assumed that the wind farms consisting of typical induction wind generators will not absorb reactive power from the MISO transmission grid and will maintain a unity power factor at the point of interconnection. Wind generators with dynamic reactive capability were modeled with the QMIN/QMAX capability of the generator.

In order to model this generator at the full 200 MW, not all of the higher queued projects were modeled. This was necessary in order to maintain a solvable, working model, as there is much more proposed generation near the G855 point of interconnection than transmission outlet capacity. The full impact of these higher queued projects on the constraints for this generator will need to be examined in the System Impact Study.

Queue #		POI Data				Generator Data	
		CA	County	State	Point of Interconnect	Pmax	Fuel Type
G540	38596-01	ALTW	Worth	IA	Adams - Lime Creek 161 kV line	80	Wind
G548	38612-02	ALTW	Worth	IA	Adams - Lime Creek 161 kV line	80	Wind
G551	38622-01	ALTW	Howard	IA	Riceville - Rice 69 kV line	100	Wind
G552	38623-01	ALTW	Emmet	IA	Maple Hill 69 kV substation	50.4	Wind
G576	38698-01	GRE	Rock	MN	Magnolia - Split Rock 161 kV line	40	Wind
G584	38715-03	GRE	Pipestone	MN	Buffalo Ridge 34.5 kV substation	2.5	Wind
G586	38716-02	NSP	Lincoln	MN	Yankee 34.5 kV substation	30	Wind
G587	38716-03	NSP	Sibley	MN	Gibbon - Cornish 69 kV line	20	Wind
G589	38729-01	ALTW	Black Hawk	IA	Hazelton 345 kV substation	750	Coal
G595	38761-01	ALTW	Hancock	IA	Hancock 161 kV substation	150	Wind
G602	38766-01	NSP	Lincoln	MN	Nobles County 161 kV substation	31.5	Wind

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G604	38775-01	ALTW	Steele	MN	Steele Court - River Point 69 kV	47.5	Wind
G613	38800-01	GRE	Redwood	MN	Redwood 69 kV substation	16.8	Wind
G617	38818-01	NSP	Blue Earth	MN	Amboy - Willow Creek 69 kV line	49.5	Wind
G619	38821-01	OTP	Otter Tail	MN	Tamarac 41 kV substation	50	Wind
G620	38824-01	NSP	Goodhue	MN	Kenyon - Dodge 69 kV line	18.9	Wind
G621	38825-01	NSP	Pipestone	MN	Woodstock 69 kV substation	20	Wind
G626	38832-02	NSP	Brown	MN	Morgan - Sleepy Eye 69 kV line	31.5	Wind
G628	38839-01	ALTW	Brown	MN	Comfrey - Mountain Lake 69 kV	31.5	Wind
G631	38845-01	GRE	Nobles	MN	Adrian - Adrian Tap 69 kV line	18.9	Wind
G632	38845-02	ALTW	Nobles	MN	Adrian Municipal - Rushmore 69 kV line	18.9	Wind
G633	38845-03	ALTW	Nobles	MN	Elk - Magnolia 161 kV line	18.9	Wind

Additional generation added

G362	37894-02	GRE	Mower	MN	Pleasant Valley 161 kV substation	200	Wind
G740	39126-01	ALTW	Howard	IA	Adams 345 kV substation	300	Wind
G771	39164-02	ALTW	Howard	IA	Hazelton 345 kV substation	200	Wind

6 Appendix B: Contingencies Definitions

Contingency 49

Open Line From Bus 'WILMART3 345' to Bus 'LKFLDXL3 345' ckt 1

Open Line From Bus 'LKFLDXL3 345' to Bus 'LAKEFLD3 345' ckt 1

End

Contingency '900 ' // 900 Defined as multi-circuit, tower

Open Line From Bus 'PR ISLD3 345' to Bus 'BLUE LK3 345' ckt 1

Open Line From Bus 'PR ISLD3 345' to Bus 'REDROCK3 345' ckt 1

End

Contingency '905 ' // 905 Defined as multi-circuit, tower

Open Line From Bus 'PR ISLD3 345' to Bus 'BYRON 3 345' ckt 1

// A OPENS B tower

Open Line From Bus 'PR ISLD3 345' to Bus 'REDROCK3 345' ckt 2

// B OPENS A tower

End

Contingency '960 ' // 960 Defined as multi-circuit

Open Line From Bus 'PARKERS7 115' to Bus 'CEDARLK7 115' ckt 1 // A OPENS B tower

Open Line From Bus 'PARKERS7 115' to Bus 'BASCRK 7 115' ckt 1 // B OPENS A tower

End

Contingency 'NSP ' // NSP Defined as multi-circuit, tower

Open Line From Bus 'BLUE LK3 345' to Bus 'WILMART3 345' ckt 1 // A OPENS B tower

Open Line From Bus 'HYLNDLK7 115' to Bus 'DEANLAK7 115' ckt 1 // B OPENS A tower

End

Contingency '825 1' //Contingency 825 defined as multi-terminal

Open Line From Bus 'BYRON 3 345' to Bus 'PL VLLY3 345' ckt 1 // A OPENS B C D E

Open Line From Bus 'PL VLLY3 345' to Bus 'ADAMS 3 345' ckt 1 // B OPENS C D E

Open Line From Bus 'ADAMS 3 345' to Bus 'ADAMS 5 161' ckt 1 // C OPENS B D E

Open Line From Bus 'ADAMS 5 161' to Bus 'ADAMS_N5 161' ckt 1 // D OPENS B C E

Open Line From Bus 'ADAMS 5 161' to Bus 'ADAMS_S5 161' ckt 1 // E OPENS B C D

End

Contingency '825 2'

Open Line From Bus 'PL VLLY3 345' to Bus 'ADAMS 3 345' ckt 1

Open Line From Bus 'ADAMS 3 345' to Bus 'ADAMS 5 161' ckt 1

Open Line From Bus 'ADAMS 5 161' to Bus 'ADAMS_N5 161' ckt 1

Open Line From Bus 'ADAMS 5 161' to Bus 'ADAMS_S5 161' ckt 1

End

Contingency MAPP-9

Open Line From Bus 'BYRON 3 345' to Bus 'PL VLLY3 345' ckt 1

Open Line From Bus 'PL VLLY3 345' to Bus 'ADAMS 3 345' ckt 1

End

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Contingency 'ALTW-26D'

Open Line From Bus 'LKFLDXL3 345' to Bus 'WILMART3 345' ckt 1

Open Line From Bus 'LKFLDXL3 345' to Bus 'LGS 12Y 1.0' ckt 1

Open Line From Bus 'LKFLDXL3 345' to Bus 'LGS 34Y 1.0' ckt 1

Open Line From Bus 'LKFLDXL3 345' to Bus 'LGS 56Y 1.0' ckt 1

End