Deliverability Study Report for Project G519

1. Project Description

MISO Interconnection Queue Number	38491-01
Requested Maximum Output level (MW)	600
County	Itasca
State	MN
Control Area / Transmission Owner	MP

2. Introduction

Generator interconnection projects have to pass Generator Deliverability Study to be granted Network Resource Interconnection Services (NRIS). Interconnection projects that had not filed an Interconnection Agreement (IA) by 9/1/2004 are studied in their interconnection queue order to determine their deliverability.

For projects that have already signed IA but are still waiting for the deliverability study results, this report will be attached to its IA or System Impact Study report. If the generator is determined as not fully deliverable and wants to pursue full deliverability, the customer has to submit a new interconnection to MISO to do so.

For projects that are still in study mode, this report is attached to its system impact study report. If the generator is determined as not fully deliverable, the customer can choose either to change his project to an Energy Resource (ER) project or proceed with the system upgrades that will make the generator fully deliverable.

Since Generator Deliverability Study is to ensure Resource Adequacy during system peak condition, wind generators are tested at 20% of its maximum output level, and this is the maximum level that can be used to meet Resource Adequacy under Module E of the Midwest ISO Transmission and Energy Market Tariff (TEMT), unless the generator owner can demonstrate that the generator's capacity factor during SUMMER PEAK is greater than 20%.

3. Study Methodology

MISO Generator Deliverability Study whitepaper describing the algorithm can be found at "http://www.midwestmarket.org/publish/Document/3e2d0_106c60936d4_-767f0a48324a"

4. Determining the MW restriction

If one facility is overloaded based on the assessed "severe yet credible dispatch" scenario described in the study methodology, and the generator under study is in the

"Top 30 DF List" (see white paper for detail), part or all of its output is not deliverable. The restricted MW is calculated as following:

(MW restricted) = (worst loading – MW rating) / (generator sensitivity factor)

If the result is larger than the maximum output of the generator, 100% of this generator's output is not deliverable.

The generator is also responsible for any NEW base case (pre-shift) overload or NEW "severe yet credible dispatch overload" where the generator is not in the "Top 30 DF List", if the generator's DF is greater than 5%. Please see white paper for detail. The formula above also applies to these situations.

5. Study Result

☒ This generator is determined to be fully deliverable (600 MW). No constraints found.

Deliverability of G519 is contingent upon the following planned transmission project to go in service:

Baxter – Southdale 115 kV project

☐ This generator is not fully deliverable due to the following constraint(s):

6. Conclusion

☒ 600 MW from this generator is deliverable based on MISO Generator Deliverability Study result.

The full deliverability of G519 is contingent upon the in-service of the Baxter – Southdale 115 kV project

☐ This generator is not fully deliverable without system upgrade. The following upgrades are necessary to make it fully deliverable (600 MW):

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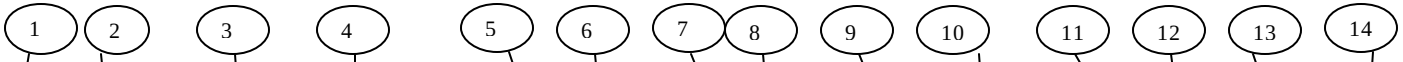
7. Appendix B: How to read the generator deliverability study result.

A typical deliverability result looks like the following table (Flow and output are all in MW):



	A	B	C	D	E	F	G	
1	Branch	Contingency	MW rating	preShift Loading	Add. flow from Top 30 List	ER flow adjustment	Worst loading	
2	18403 5SHAW G9 161 18038 5C-37A 161 1	18401 8SHAWNEE 500 18406 8MARSHAL 500 1	342.6	347.8	1.72	0	349.52	
3	Gen #	Gen	Pgen	Pmax	Sensitivity	(add.) flow contribution	NR/ER	
4	32936	OLBEN G122.0	580.1	585	6.0%	0.29	NR	
5	31890	VIAD 1 34.5	0	25	5.7%	1.42	NR	

1. The name of the branch that is limiting.
2. The bus number in the "deliverability case".
3. The name of the contingency.
4. Bus name.
5. Branch MW rating, estimated by MUST. Although the first screening was done using DC algorithm by MUST, all violations were then checked using full AC powerflow and using branch MVA rating.
6. Generator initial output in "deliverability case".
7. The branch loading before generator output adjustment.
8. Maximum MW output capacity from this bus in this deliverability case.
9. The generator's sensitivity on the limiting branch. The sink is all MISO generation when MUST calculates this number.
10. Total incremental MW flow on branch by adjusting generator output levels: NRs in the "Top 30 DF List" are run up to their Pmax; Offline NRs outside of the "Top 30 DF List" but with 20% line rating impact are run up to their Pmax; ERs with larger than 5% sensitivity (contributing flow only) are turned down to 0MW. Please refer to the MISO generator deliverability procedure for detail. (In the example shown, E2 = SUM(F4:F5))
11. Total branch flow from impact of ER units. This number is already included in calculating the number in 10. Please refer to the MISO generator deliverability procedure for detail.

12. This generator's additional contribution on the branch flow by running it up to Pmax. If this is an ER with positive sensitivity, the contributions is from turning off the generator.
13. (worst loading) = (pre-shift loading) + (flow adjustment). G2 = D2 + E2.
14. The status of this generator: Network Resource (NR) or Energy Resource (ER).