

This study was performed by MISO
prior to ATSI integration with PJM.

Midwest ISO

Technical Report

135 MW Co-Generation Facility-Coke/Waste Heat

**Lucas County, Ohio
MISO Queue # 39597-01**

H037



Interconnection Feasibility Study Report

July 23rd, 2008

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Executive Summary

This report presents results of the LGIP Feasibility Study performed by Midwest ISO (MISO) to evaluate the impact of interconnecting 135 MW of Co-Generation in Lucas County, Ohio, at the First Energy owned 138 KV Ironville substation. The interconnection request is identified as H037 in the MISO generation interconnection queue.

Results of the study indicate the following injection related constraints due to this interconnection request:

Injection Constraints due to H037:

No injection related constraints (TDF greater than 20%) were found for this interconnection request.

The study found a few non-injection constraints. Generators are required to make thermal upgrades on all injection and deliverability (to be performed in SIS) constraints, in addition to mitigating all stability and fault duty constraints that will be uncovered in the subsequent System Impact Study phase for the Network Resource Interconnection Service (NRIS). Non-injection constraints are not required to be mitigated for interconnection service. However, they indicate potential system limitations while delivering the full output of the generator.

It should be noted that the results of this study are subject to change depending on the assumptions made in the study and status or outcome of higher queued generation interconnection requests that were included in the study. If these assumptions change, or if higher queued projects drop out of the queue, additional analysis may be required to determine if there are impacts on the study results. The System Impact Study will further refine these results, also taking into account the outcome of the higher queued generation interconnect requests that are still under study mode.

1.0 Introduction

The purpose of this study is to assess the feasibility of interconnecting 135 MW of Co-Generation request identified as H037 in the MISO generation interconnection queue to be connected in Lucas County, Ohio. The details of the interconnection request are given below:

MISO Project #	MISO Queue#	MISO Queue Date	Control Area	County/ State	Net MW	Connection Voltage	Service Type	Service Date
H037	39597-01	5/29/08	FE	Lucas Ohio	135	138KV	NR	1/01/2011

H037 is proposing to connect to the existing 138 KV Ironville substation in First Energy's control area.

This study is a high level evaluation intended to capture any constraints that are likely to limit the ability of this generation project to interconnect to the system and has been performed to provide the customer with an idea of interconnection related issues. A more detailed System Impact Study (SIS) will be performed for interconnection of the requested generation if the customer decides to proceed further after the Feasibility Study. The Feasibility Study includes an analysis of the transmission system under summer-peak steady state conditions.

An ad hoc study group was formed by including representatives from the transmission owners in the following areas: FE, METC, AEP, and ITC.

Steady state thermal analyses were performed, both with and without the proposed generation at the POI mentioned above. The results of this analysis were then compared to determine the impact of the addition of the proposed generation. Section 2, below, describes the study methodology and the criteria used for the analysis. The model development and results of the steady-state analysis are presented in Section 3. A list of higher queued projects that were modeled in this study is given in Appendix A.

2.0 Study Assumptions and Methodology

2.1 Study Assumptions:

The following assumptions were established prior to starting the study:

- A summer peak case was developed for this analysis based on the MTEP 2007 series 2013 Summer Peak contractual dispatch base model, and updated for other higher queued generation interconnection studies in the area.
- All higher queued generation interconnection requests modeled in this study are listed in Appendix A.
- The scope of this study was limited to identifying possible thermal violations caused by the proposed interconnection at 100% of its output.
- Point of interconnection of H037:
138 KV Ironville substation in First Energy's control area

2.2 Steady State Thermal Analysis:

Steady state AC Contingency Analysis was performed using PTI's MUST tool. Power flows were monitored on all facilities with a voltage of 69 kV and above in the following systems: FE, METC and ITC control areas. 130 kV and higher voltage branches and ties were monitored in zones 251 and 252 of AEP. All thermal loadings above the facility Rate A under system intact conditions, and above facility Rate B under single (N-1) contingency conditions were flagged. Results were compared with the loadings prior to the proposed generation under the same contingency conditions and all violations with more than 3% TDFs (Transfer Distribution Factors) from H037 were selected for review by the ad hoc group.

Thermally overloaded facilities that either have a distribution factor (TDF) of at least 20% in relation to real power injected at the generator Point of Interconnection (POI) or are direct outlets of the generator are classified as injection constraints.

3.0 Model Development and Analysis

The power flow case used for the study of MISO project G942 to be connected in Lorain County, Ohio was used as the starting point for the base case development. The higher queued projects were added to the G942 case to prepare a base case for H037. All higher queued generation interconnection requests modeled in this study are listed in Appendix A.

3.1 Impact of H037 on Facility Loadings

Thermal overloads identified in system intact conditions (N-0) with pre-transfer flows and post-transfer flows are given in Table 3.1 below.

Thermal overloads identified in single (N-1) contingency analysis of the cases with and without H037 are given in Table 3.2 below.

Case S0 = Base case (without the study generator H037)

Case S1 = Base case + H037

Table 3.1 – Thermal constraints under N-0 conditions comparing pre-transfer and post-transfer flows

Impacted Facility	Pre H037 MVA(S0)	Post H037 MVA(S1)	Rating	Post loading (S1) %	DF %
21318 02 IRONV 138 21319 02 IRONV72.0 1	196.8	216.9	204	106.3	14.9
21691 02LAKVEW 138 21581 02GRNFLD 138 1	248.5	260.5	182	143.1	8.9
21849 02OTTAWA 138 21691 02LAKVEW 138 1	338.4	350.4	278	126.1	8.9

Table 3.2 – Thermal constraints under single contingencies for G923

Impacted Facility	Pre H037 MVA(S0)	Post H037 MVA(S1)	Rating	Post loading (S1) %	S1%-S0%	Contingency	DF %
21318 02 IRONV 138 21319 02 IRONV72.0 1	250.2	268.4	212	126.6	8.6	21310 02 DIXIE 138 21311 02 DIXIE72.0 1	13.5
21691 02LAKVEW 138 21581 02GRNFLD 138 1	348.7	364.3	244	149.3	6.4	21380 02BEAVER 345 21466 02DAV-BE 345 1	11.6
21849 02OTTAWA 138 21691 02LAKVEW 138 1	439.9	455.8	339	134.4	4.6	21380 02BEAVER 345 21466 02DAV-BE 345 1	11.8

The results show that the proposed generator impacts existing steady-state thermal violations and causes new line overloads to occur. This indicates limitations on the ability of the proposed generation request to connect to the system.

4.0 Conclusion

Results of the analysis performed using the 2013 summer peak case indicates non-injection related constraints caused by the interconnection request H037.

Injection Constraints due to H037:

No injection related constraints (TDF greater than 20%) were found for this interconnection request.

Generators are required to make thermal upgrades on all injection and deliverability (to be performed in SIS) constraints, in addition to mitigating all stability and fault duty constraints that will be uncovered in the subsequent System Impact Study phase for the Network Resource Interconnection Service (NRIS). Non-injection constraints are not required to be mitigated for interconnection service. However, they indicate potential system limitations which could prevent delivery of the full output of the generator.

It should be noted that the results of this study are subject to change depending on the assumptions made in the study and status or outcome of higher queued generation interconnection requests that were included in the study. If these assumptions change, or if higher queued projects drop out of the queue, additional analysis may be required to determine if there are impacts on the study results. The System Impact Study will further refine these results, also taking into account the outcome of the higher queued generation interconnect requests that are still under study.

Appendix A: List of Higher Queued Generators

The following is a list of higher queued generator interconnection projects that were included in the base case for the H037 study:

Project	Queue date	Max MW	NR (MW)	Type	Control Area	Dispatched to
PJM_O21	5/6/2005	48	9.6	Wind	AEP	PJM East
PJM_P55	1/31/2006	600	600	Coal	AEP	PJM East
PJM_P62	1/31/2006	20	20	Coal	AEP	PJM East
G652	7/3/2006	48	9.6	Wind	FE	Non MI-OH MISO
G687	10/11/2006	750	750	Coal	MECS-CONS	Non MI-OH MISO
G689	10/12/2006	560	560	Coal	FE	Non MI-OH MISO
PJM_R49	12/6/2006	150	30	Wind	AEP	PJM East
PJM_R52	12/6/2006	300	60	Wind	DPL	PJM East
PJM_R60	1/8/2007	350	70	Wind	AEP	PJM East
PJM_R61	1/8/2007	350	70	Wind	AEP	PJM East
PJM_R87	1/29/2007	10	10	Coal	AEP	PJM East
G754	2/28/2007	50.4	10.1	Wind	FE	Non MI-OH MISO
G766	3/19/2007	300	60	Wind	MECS-CONS	Non MI-OH MISO
PJM_S35	5/7/2007	20	20	Coal	AEP	PJM East
G809	6/12/2007	193	193	Gas	MECS-CONS	Non MI-OH MISO
S72	7/30/2007	300	60	Wind	AEP	PJM East
S73	7/30/2007	200	40	Wind	AEP	PJM East
PJM_T48	9/21/2007	50	10	Wind	Dayton	PJM East
PJM_T48	9/21/2007	50	10	Wind	Dayton	PJM East
G867	9/25/2007	1563	1563	Nuclear	MECS-DECO	Non MI-OH MISO
G872	10/2/2007	863	863	Coal	MECS-CONS	Non MI-OH MISO
G905	11/2/2007	200	40	Wind	MECS-CONS	Non MI-OH MISO
G918	11/27/2007	120	24	Wind	MECS-CONS	Non MI-OH MISO
G934	12/14/2007	300	60	Wind	MECS	Non MI-OH MISO
G942	12/26/2007	24	24	Coal	FE	Non MI-OH MISO
T130	1/9/2008	300	60	Wind	AEP	PJM East
T131	1/9/2008	150	30	Wind	AEP	PJM East
T142	1/15/2008	300	60	Wind	AEP	PJM East
U1-060	4/2/2008	201	40.2	Wind	AEP	PJM East
U1-058	4/2/2008	586	586	Natural Gas	AEP	PJM East
H029	5/19/2008	804	804	Gas	FE	Non MI-OH MISO
H030	5/20/2008	200	40	Wind	MECS-CONS	Non MI-OH MISO
H037	5/29/2008	135	135	Co-Gen	FE	Non MI-OH MISO

The status of these projects can be found at the MISO Generation Interconnection queue posting that can be accessed through the following internet link:
http://www.midwestmarket.org/publish/Document/2cfe4_119157a0478_-7f650a48324a