Generator Interconnection
Queue #P18
Dixon – Mendota 34.5kV
(2.5 MW Energy / .5 MW Capacity)

Feasibility / Impact Study Report

March 2007
DOCS#408033

General

FPC Services, Inc. has proposed the construction and interconnection of the P18 Dixon - Mendota 34.5 kV generating project consisting of 2.5 MW of wind generation. The proposed plant consists of 1 – 2.5 MW Clipper wind turbine generator located in Sublette, Lee County, Illinois. The wind farm interconnection is via the construction of a new radial 34.5 kV connection from the new P18 generating project to the Dixon – Mendota 34.5 kV line.

Direct Connection Requirements

Scope of Direct Connection Work

It is proposed that the P18 - 2.5 MW project, will be interconnected to the 34 kV distribution system as shown in **Figure #1.** Since connection is to a non-jurisdictional distribution facility, all direct connection work will be performed via an interconnection agreement between FPC Services, Inc. and ComEd.

Revenue Metering and SCADA Requirements

PJM Requirements: The **P18 project** will be required to install equipment needed to provide revenue metering (KWH, KVARH) and real time data (KW, KVAR) for the **P18 project's** generating resource. See PJM Manuals M-01 and M-14D.

ComEd Requirements: The **P18 project** will be responsible for the installation of equipment to provide bi-directional revenue metering (KWH, KVARH) and real time data (KW, KVAR,) for the **P18 project's** generating resource. See ComEd's Applicable Standards available on the ComED website at the attached link:

http://www.exeloncorp.com/ourcompanies/comed/comedbiz/energy_rates/our_rates_and_prices.htm

Network Impacts

P18 was studied as an injection into **Dixon – Mendota 34.5 kV line**. Project **#P18** was evaluated for compliance with reliability criteria for summer peak conditions in 2010. Potential network impacts are as follows:

Generator Deliverability
No problem identified.

Multiple Facility Contingency
No problem identified.

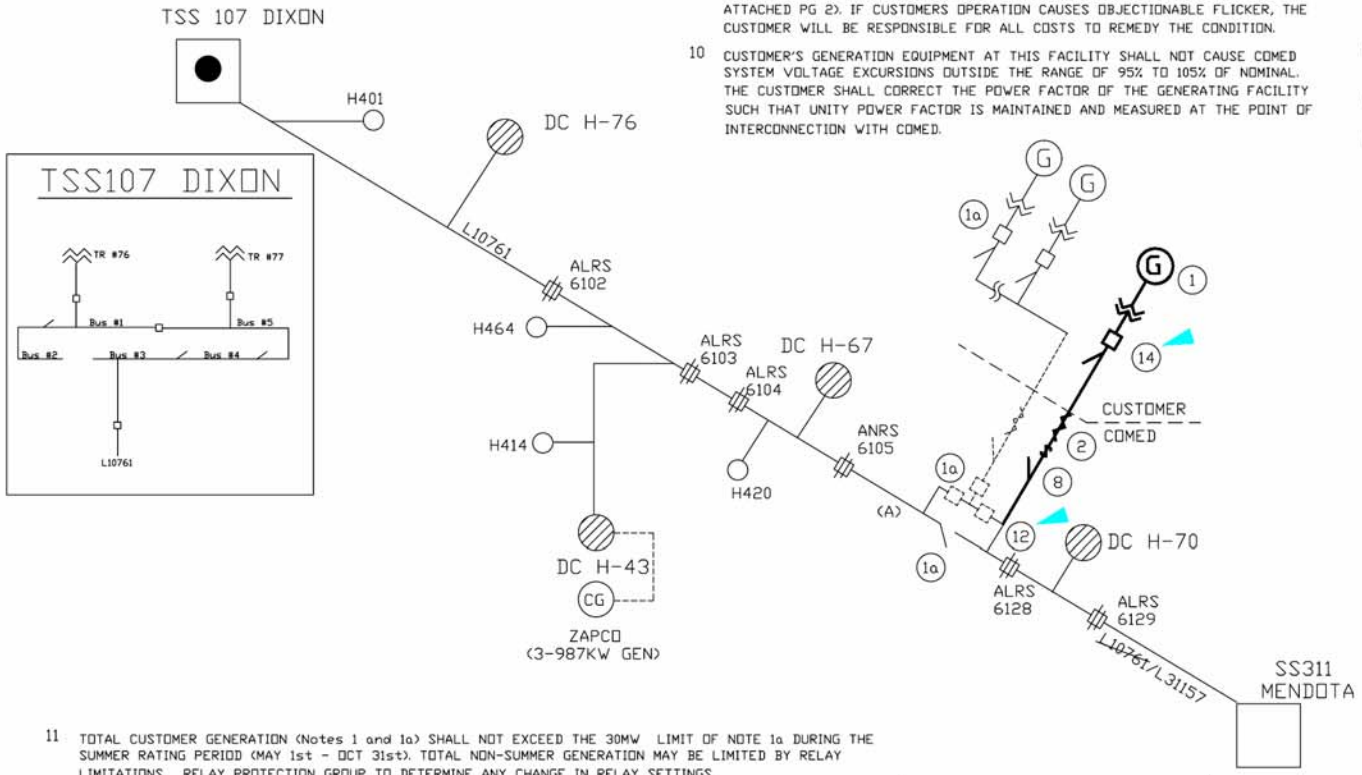
Contribution to Previously Identified Overloads
None

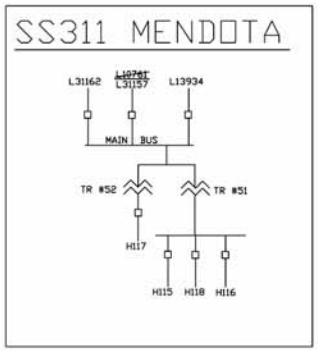
Contribution to Previously Identified System Reinforcements
None

Short Circuit
No identified problems.

Stability Analysis
No analysis required.

PD # 7P061413





(8) INSTALL 600A GANG OPERATED SWITCH

9 CUSTOMERS OPERATION MUST CONFORM TO COMED VOLTAGE LIMITATIONS (SEE ATTACHED PG 2). IF CUSTOMERS OPERATION CAUSES OBJECTIONABLE FLICKER, THE CUSTOMER WILL BE RESPONSIBLE FOR ALL COSTS TO REMEDY THE CONDITION.

10 CUSTOMER'S GENERATION EQUIPMENT AT THIS FACILITY SHALL NOT CAUSE COMED SYSTEM VOLTAGE EXCURSIONS OUTSIDE THE RANGE OF 95% TO 105% OF NOMINAL. THE CUSTOMER SHALL CORRECT THE POWER FACTOR OF THE GENERATING FACILITY SUCH THAT UNITY POWER FACTOR IS MAINTAINED AND MEASURED AT THE POINT OF INTERCONNECTION WITH COMED.

11 TOTAL CUSTOMER GENERATION (Notes 1 and 1a) SHALL NOT EXCEED THE 30MW LIMIT OF NOTE 1a DURING THE SUMMER RATING PERIOD (MAY 1st - OCT 31st). TOTAL NON-SUMMER GENERATION MAY BE LIMITED BY RELAY LIMITATIONS. RELAY PROTECTION GROUP TO DETERMINE ANY CHANGE IN RELAY SETTINGS.

(12) CUSTOMER'S GENERATION TO BE CONNECTED TO THE SOUTH 34kV FEED (L31157) INTO SS 313 SUBLETTE AS PROPOSED ON PD#7P031402. SUBSTATION NOW UNDER CONSTRUCTION.

13 Relay notes assume the customer will install one wind turbine machine connected to 34.5kV L31157 adjacent to SS 313 Sublette. Grid interconnection at any other point will require revision of relay requirements.

(14) Customer's generation protection shall comply with interconnection protection requirements detailed in the Exelon Energy Delivery Interconnection Guidelines for Generators 2 MVA or Less, Design A4, modified as follows (note assumes the use of a synchronous generator and an inverter interface):

a) Due to existing connected generation on L10761, install a SEL-2100 Logic Processor @ SS 313 Sublette configured to operate as a Transfer Trip transmitter (via Mirrored Bits over fiber) to isolate customer generation for open circuit breakers on both L10761 @ TSS 107 Dixon and on L31157 @ SS 311 Mendota for islanding protection. Initiate the SEL-2100 Logic Processor from the RDTT trip logic installed @ SS 313 Sublette on PD 7P031402. ComEd requires constant monitoring of the Transfer Trip channels via SCADA. Transfer Trip fiber optic communication circuits to be installed, maintained and repaired in a timely manner by the customer.

b) Install a SEL-2100 Logic Processor to operate as a Transfer Trip receiver (configured to use Mirrored Bits over fiber) to isolate customer generation for a transmitted Transfer Trip from SS 313 Sublette. Transfer Trip receiver device shall also be connected to monitor the status of the customer's Received Transfer Trip cutout switch and to communicate that information back to SS 313 for SCADA indication (function is designed into the SEL-2100 scheme).

NOTES :

(1) CUSTOMER IS INSTALLING 1 - 2500kW AT .90 p.f. CLIPPER INDUCTION WIND TURBINE GENERATOR.

(1a) REFER TO PD 7P031402 FOR ADDITIONAL GENERATION (30MW), LINE, RELAY AND METERING NOTES

(2) METERING TO BE COORDINTATED WITH SYSTEM METER DEPT. AND SHALL INCLUDE REGISTRATION OF GENERATOR OUTPUT.

3 MINIMUM LINE LOAD ON L10761 IS 3000 kVA AT TSS107.

4 LINE IMPEDANCE VALUES FOR 34 kV LINE L10761 ARE:
FROM TSS 107 TO TAP POINT (A) Z=6.004 + j13.509
FROM TAP POINT (A) TO SS 311 Z=2.407 + j6.161
IMPEDANCE VALUES INDICATED ARE FOR PRESENT LINE CONFIGURATIONS. COM ED SYSTEM IS SUBJECT TO CHANGE AT ANY TIME DEEMED NECESSARY BY COM ED AND WITHOUT NOTICE TO CUSTOMER.

5 MAXIMUM AVAILABLE FAULT CURRENT IS 2990A 3 PHASE SYM AT 34.5kV AT POINT (A).
MAX. FAULT CURRENT w/SS311 OUT IS 1170A 3 PHASE
MAX. FAULT CURRENT w/TSS107 OUT IS 1820A 3 PHASE

6 BACKUP IMPEDANCE :
At TSS 107 (2 Transf.) = j3.243
At TSS 107 (1 Transf.) = j5.461
At SS 311 = j4.882

7 CUSTOMER RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH REQUIRED WORK.

Date	Revision	By
2/22/07	REVISED RELAY NOTES	DM/DRS
1/26/07	REVISED CONNECTION POINT	DM/JP
1/12/07	ADD RELAY NOTES	DM/JP

PROJECT DIAGRAM
EED DISTRIBUTION CAPACITY PLANNING

PD TITLE:	FPC SERVICES 2.5 MW WIND GENERATOR, SUBLETTE L31157 QUE P18		
Planner:	D. MUELLER / D. LIPETRI	Date:	7/9/06
PD#:	7P061413	Program Code:	86
Region:	NORTHWEST	ITN:	TBD
Reply to SER#:	N/A	Planning Area:	N22
Project ID#:	TBD	ROY:	N/A
Service Date:	12/31/2006	Page:	1 of 2
Manager:	F. Luedtke/ JMP	Date:	01/03/2007

FLICKER CURVES

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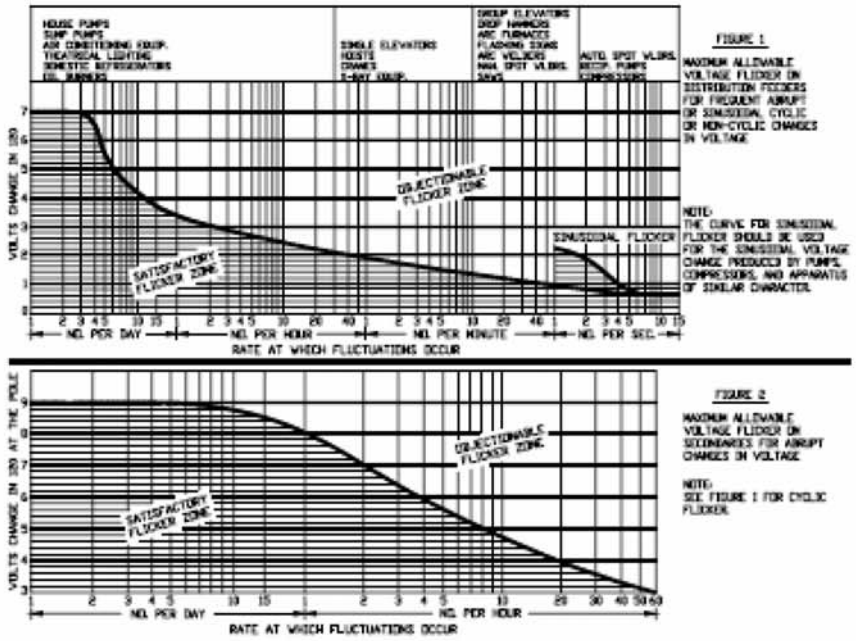

NOTES :

(14) Continued:

c) Synchronizing Relay Device #25 (RFRS item 1): assumed to be a characteristic of the inverter controller.

d) Voltage transformers (RFRS items 2 & 3): may be incorporated in the inverter controller circuitry.

e) Under/over frequency relay and under/over voltage relay (RFRS items 4 & 5): may be incorporated in the inverter controller. Shall be capable of conforming to IEEE 1547 sections 4.2.4 and 4.2.3. Clearing times shall be adjusted to coordinate with ComEd reclosing practices.

f) Customer's inverter shall cease to act as a source of energy to the grid for a detected failure of any of the inverter's protective functions (i.e., similar to the operation of a microprocessor relay's "relay failure" relay output). As an alternative, back-up relaying may be employed; however, the failure of both primary and backup devices shall cause the inverter to cease to provide energy.

Note: the Exelon Energy Delivery Interconnection Guidelines for Generators 2 MVA or Less document is available at:
<http://www.exeloncorp.com/ourcompanies/peco/pecobiz/energy_rates/our_rates_and_prices.htm>

15 The ComEd 34kV system is a wye-connected unigrounded system rated @ 200kV BIL. The customer is to be aware that the installation of 150kV BIL rated equipment without adequate protection could result in damage to this equipment.

16 Relay and Communications specs will be issued for this project

Date	Revision	By
2/22/07	REVISED RELAY NOTES	DM DRS
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