

FAC-001-0 Facility Connection Requirements Matrix Spreadsheet

Revised: 06-09-2011

| FAC-001-0 Generation | Location of Documentation (Page) |
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| R2.1.1 Joint Studies | <ul style="list-style-type: none"> • PPL EU Document "Procedure For The Connection of Generation To The PPL EU Transmission System", dated June 10, 2009, (Attachment D.0a & D.0b) • PJM Open Access Transmission Tariff – Section IV, subpart A “Interconnection Procedures”, section 36.1.01, pp. 272-273. (Attachment D.1a) • PJM Manual 14A – Introduction to the Generation and Transmission Interconnection Process, Revision 9, Sections 2 and 3, pp. 9-20 (Attachment D.1b). |
| R2.1.2 Notification | <ul style="list-style-type: none"> • Procedures for notification of new or modified facilities are identified in PJM Manual 3A – Energy Management System Model Updates and Quality Assurance, Revision 6, Section 3, pp. 18-22. (Attachment E.1a) • In addition, the PJM Relay Subcommittee has an internal three step procedure for interconnection of facilities between Transmission Owners. The procedure is documented in "Process for Performing Relay Work (settings/design) for Interconnection Lines in the PJM System", document # 627601, 8/19/10. The process is briefly described here -- The first step of this process is to have the necessary TO's agree on the scope of work involved in this project. The second step is to ensure that the TO's mutually agree on the protective relay settings at the remote terminals. Finally, the third step is to perform commissioning of the protective systems and declare the transmission facility in service. (Attachment E.2a) • Beyond this, PJM tracks the status of new or modified RTEP projects within the transmission system monthly. An example of that status report is included. (Attachment E.3a) |
| R2.1.3 Volts, MW, MVAR | <ul style="list-style-type: none"> • PPL EU Document “Relay and Control Requirements for Parallel Operation of Generation – Revision 13 identifies the need to review voltage level (p. 84, item 1.11 under Items To Be Discussed During the Project). (Attachment F.1a) • PJM Manual 14C – Generation and Transmission Interconnection Facility Construction, Revision 5, Section 3, pp. 36-39, which also references the OATT, Part IV, subpart E, section 50.6. (Attachment F.2d) • PJM Manual 14A – Generation and Transmission Interconnection Process, Revision 9, Attachments F & G, pp. 85-97. (Attachment F.1c) |
| R2.1.4 Breaker Duty & Surge Protection | <ul style="list-style-type: none"> • PPL EU Document “Point of Contact Requirements for High Voltage Customer-Owned Facilities – Revision 1, April 2007,” pp. 24-25 indicate that breaker duty and surge protection must be considered at the interconnection substation (Attachment G.1a). <u>For generation only</u>, also included is the reference from the generator requirements document "Relay and Control Requirements for Parallel Operation of Generation -- Revision 13," p. 34, which cross references the above document. • For 200 kV and above, the PJM document V.N (PJM Insulation Coordination and Surge Protection) is also used as a guiding document. (Attachment G.1b) |
| R2.1.5 | <ul style="list-style-type: none"> • PPL EU Document “Reliability Principles and Practices – January 2004 Revision” Section H, p. 1, items 1 through 4 describes the protection criteria adhered in all situations; and also Section H, pp. 34-39. (Attachment H.1a) • In addition, the Point of Contact Requirements document (see pp. 5, 12-13, 90), sections 1.2, 2, and 8, supports the philosophy identified in the PPL EU Reliability Principles & Practices. (Attachment H.1b) |

FAC-001-0 Facility Connection Requirements Matrix Spreadsheet

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| System Protection | <ul style="list-style-type: none"> • Another guiding document is the PJM Relay Subcommittee Protective Relaying Philosophy and Design Standards, Revision 3, dated 6/1/2003. (Attachment H.1c) • Also Reference PJM OATT, Appendix 2, Section 4.9.1, p. 1795. (Attachment H.1d) |
| R2.1.6 Metering & Telecom | <ul style="list-style-type: none"> • PPL EU Document “Relay and Control Requirements for Parallel Operation of Generation – Revision 13,” section 1.5, p. 21. (Attachment I.1a) • PJM OATT, Appendix 2, Section 8, pp. 1818-1822 (Attachment I.1b) and in Section 24, pp. 198-201. (Attachment I.1c) • PJM Manual 1 – Control Center and Data Exchange Requirements, Revision 19, Section 5, pp. 33-40 (Attachment I.1d) |
| R2.1.7 Grounding & Safety | <ul style="list-style-type: none"> • PPL EU Document “Point of Contact Requirements for High Voltage Customer-Owned Facilities – Revision 1, April 2007,” pp. 18-19, sections 4.3 and 4.4, identify PPL EU grounding requirements and ground grid testing requirements. (Attachment J.1a) • Another PPL EU document providing practices on grounding is “Procedure 2-108 Ground Grid Design – dated 12/29/06.” (Attachment J.1b) • The PJM OATT also discusses safety in Appendix 2, Section 7, pp. 1814-1816. (Attachment J.1c) |
| R2.1.8 Insulation & Coordination | <ul style="list-style-type: none"> • PPL EU Document “Point of Contact Requirements for High Voltage Customer-Owned Facilities – Revision 1, April 2007,” p. 10, section 1.6, and pp. 12-13, section 2.1, identify the PPL EU insulation requirements. (Attachment K.1a) • For 200 kV and above, the PJM document V.N (PJM Insulation Coordination and Surge Protection) is used as a guiding document. (Attachment K.1b) |
| R2.1.9 Volts, Reactive Power & Power Factor | <ul style="list-style-type: none"> • PPL EU Document “Relay and Control Requirements for Parallel Operation of Generation – Revision 13 identifies the need to review voltage level on p. 84, item 1.11 under Items To Be Discussed During the Project (Attachment L.1a). Reactive Power is referenced in items 1.39 and 1.41 on p. 87. • PJM OATT, Appendix 2, Item 4.7, pp. 1792-1793 discusses Reactive Power issues for machines (Attachment L.1b) and Attachment O, Item 12, pp. 1753-1754 discusses Power Factor. (Attachment L.1c) |
| R2.1.10 Power Quality | <ul style="list-style-type: none"> • PPL EU Document “Reliability Principles and Practices – January 2004 Revision” section C, p. 3, item 19 indicates that such installation must adhere to PPL EU power quality standards. (Attachment M.1a) • Item 19 is addressed by PPL EU internal documents SPR-249, Harmonics Guidelines – Table 1, p. 1 (Attachment M.1b) and SPR-640, Flicker Guideline – Table V, p. 21 (Attachment M.1c) that describe, in detail, our power quality standards and analysis methods. • Power Quality with respect to generating facilities is also referenced in PJM OATT, Appendix 2, Article 4.9.2, p. 1795. (Attachment M.1d) |

FAC-001-0 Facility Connection Requirements Matrix Spreadsheet

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| R2.1.11 | <ul style="list-style-type: none"> • PPL EU does not own Generating facilities. However, the PPL EU Document “Relay and Control Requirements for Parallel Operation of Generation – Revision 13,” PPL EU does require the developer to provide information on ratings of all equipment for review. Such requirements are noted in several locations within the document, three are provided for reference; p. 15, section 1.41; p. 74, section 8.2.1; p. 86, section 1.25. (Attachment N.1a) |
| Equip. Ratings | |
| R2.1.12 | <ul style="list-style-type: none"> • Because PPL EU does not own Generation, it does not provide “synchronizing” equipment. However, PPL EU does require “synchrocheck” facilities be available to ensure proper closing angles are observed. This is documented in PPL EU Document “Relay and Control Requirements for Parallel Operation of Generation – Revision 13,” p. 45, item 6 (Attachment O.1a) and p. 72, highlighted text. (Attachment O.1b) |
| Synchronization | <ul style="list-style-type: none"> • PJM Manual 14D – Generator Operational Requirements, Revision 19, Section 7, p. 62 also discusses synchronizing requirements for the generator. (Attachment O.1c) |
| R2.1.13 | <ul style="list-style-type: none"> • PPL EU Document “Reliability Principles and Practices – January 2004 Revision” section C, p. 4. (Attachment P.1a) |
| Maintenance | <ul style="list-style-type: none"> • PJM OATT, Appendix 2, Article 5.3.1, p. 1803 (Attachment P.1b) discusses this issue. |
| R2.1.14 | <ul style="list-style-type: none"> • PJM Manual 14D – Generation Operational Requirements, Revision 19, Section 7, pp. 49-53. (Attachment Q.1a) |
| Operation Issues | <ul style="list-style-type: none"> • Beyond this, protection systems are utilized at generating facilities to ensure voltage and frequency remain within acceptable limits. This is described in PPL EU Document “Relay and Control Requirements for Parallel Operation of Generation – Revision 13,” pp. 43-44. (Attachment Q.1b) |
| | <ul style="list-style-type: none"> • In addition, the PJM OATT, Attachment O, Appendix 2, Article 4.8, p. 1794 discusses requirements for an over- or under-frequency condition. (Attachment Q.1c) |
| R2.1.15 | <ul style="list-style-type: none"> • PPL EU documents identify the need for inspection of electrical equipment by qualified entities as noted in PPL EU Document “Relay and Control Requirements for Parallel Operation of Generation – Revision 13,” pp. 32, 79, 84. (Attachment S.1a) |
| Inspection Requirements | <ul style="list-style-type: none"> • In addition, the PJM OATT, Attachment O, Appendix 2, Article 5.4, p. 1804 discusses the need for facility inspections. (Attachment S.1b) |
| R2.1.16 | <ul style="list-style-type: none"> • “Clarifying Procedure – Development of Operating Instructions For Facilities Connected to the PPL EU Transmission System,” dated June 10, 2009, describes the PPL EU internal procedure for creating a document that describes communications during normal and emergency operating conditions. By applying the procedure, a T&D Operations “Operating Instructions (OI)” for each specific facility is created. The resulting OI document describes normal and emergency procedures, responsibility for equipment, contact information, switching & blocking methods, and other information on the status of equipment. (Attachment T.0a) |
| Normal & Emergency Operating | <ul style="list-style-type: none"> • PJM Manual 13 – Emergency Operations, Revision 44, Section 1, pp. 7-9. (Attachment T.1a) |
| | <ul style="list-style-type: none"> • PJM Manual 14D – Generator Operational Requirements, Revision 19, Section 7, pp. 50-55. (Attachment T.1b) |
| | <ul style="list-style-type: none"> • PJM OATT, Attachment O, Appendix 2, Article 6, p. 1809-1813. (Attachment T.1c) |
| | <ul style="list-style-type: none"> • PPL EU Document “Relay and Control Requirements for Parallel Operation of Generation – Revision 13,” sections 1.12 and 1.13, pp. 27-30. (Attachment T.1d) |