Grid Connection Procedure

DOE Investment Forum 04 December 2018





GENERATING PLANTS

DOE endorsement to conduct SIS (OATS Rules Section II, B13)

DIRECT CONNECTION FOR LOAD CUSTOMERS

DOE approval for direct connection (DOE DC Circular No. 2018-08-0025)



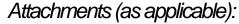




SUBMIT LETTER OF INTENT

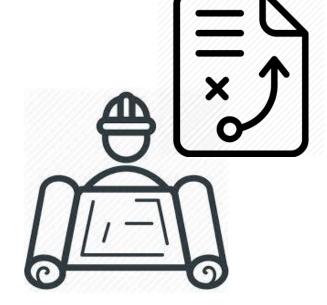
Submit LOI to NGCP as early as planning stage or at least 30 days prior to target construction with the following information:

- Facility/Substation Name or Equipment
- Target Energization



- Vicinity Map/Geographical Location
- SLD showing the Connection/Tapping Point and the location of the metering facility with distance
- Capacity of the Facility
- List of Estimated Primary Equipment to be Energized
- 5-Year Projected Demand in kW and Energy in kWh
- Transmission Service Application Form









PROCESSING OF APPLICATION

NGCP evaluates the Customer's documents

- Check the completeness of submitted documents
- Complete documents will be subjected to conduct of Technical Studies



DATA PROCESSING

NGCP conducts technical assessment

- Evaluate the effect of Customer's development to the Grid
- Check the availability and adequacy of existing NGCP facility
- Determine whether there is a need to undertake SIS

SIS – System Impact Study





SYSTEM IMPACT STUDY

NGCP conducts/reviews the Technical Studies

System Impact Study

To determine the adequacy and capability of the Grid to accommodate the new connection

Facilities Study

To determine the modification to NGCP's facilities or new facilities required by the Customer including the cost and scheduled completion date



NGCP informs the Customer on the approval of Technical Studies

SIS – System Impact Study FS – Facility Study





PRE-CONSTRUCTION STAGE AND SERVICE AGREEMENT

- Customer shall start the construction upon NGCP's approval on the proposed project and in parallel with the execution of Service Agreements
- NGCP provides the Customer the draft TSA and MSA for review and approval



- Customer shall submit the required TSA Schedules to NGCP
- Customer shall transmit to NGCP the signed TSA and MSA for finalization and notarization

TSA – Transmission Service Agreement

MSA – Metering Service Agreement





ENERGIZATION REQUEST FORM

Customer shall comply all Energization Requirements under ERF (see checklist on Technical Requirements)



ERF – Energization Request Form



ENERGIZATION REQUEST FORM

| | | REGION: | | DIST | RICT: | | | |
|--|--------------------|----------------------|------------------------|-----------------------|--------------------------|-------------|--|--|
| ADDRESS: LOAD NEW MODIFICATION | | | | | | | | |
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DOCUMENTS TO BE SUBMITTED PRIOR TO CONDUCT OF FIELD TEST

- A. Factory Test (FT) Data of Power Circuit Breaker
- B. Specification of Metering Equipment and Factory Test Report (for equipment that the applicant will provide, such as Revenue Metering Instrument Transformers) for evaluation by the Metering Services Division
- C. Protection Scheme which includes the following:
 - 1. CT Ratio
 - 2. PT Ratio
 - 3. Protection Setting
 - 4. Protective Relay Manual
- D. Factory Test Report for the Protection and Disturbance Recorder, Telecom Related Equipment (such as Power Line Carrier, Fiber Optic Terminal (FOT), Microwave Radios and Multiplexer (MW/MUX), Protection Signaling Equipment (PSE), SCADA and Microprocessor Based Substation Control (MBSC), as may be applicable.
- E. Single Line Diagram showing its Protection and Metering Facilities
- F. Three Line Diagram of the substation
- G. Detailed Schematic and of the Substation and Backwiring Diagram
- H. Test of Power Transformer
 - 1. Measurement of the no-load current and losses (Core Loss)
 - 2. Measurement of the impedance losses and voltage (Copper Loss)
 - 3. Zero sequence impedance measurement
 - 4. Measurement of oil and winding temperature rise
- I. Factory Test Data of Instrument Transformers (CT & PT) for Metering which includes Ratio And Phase Angle Test
- J. Factory Test Data of Instrument Transformers (CT & PT) for Protective Relays
- K. Design Ground Grid Resistance



| DOC | UMENTS TO BE SUBMITTED AFTER TO CONDUCT OF FIELD TEST |
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| | |
| Α. | Power Transformer |
| | Insulation Resistance (DC) |
| | 2. Insulation Power Factor (AC) |
| | 3. Turns ratio |
| | 4. Winding resistance |
| | 5. Excitation |
| | 6. Insulating Oil tests |
| | a. Dielectric Breakdown Voltage |
| | b. Oil Power Factor |
| | c. Dissolved Gas Analysis |
| | d. Water-in-Oil / Moisture in ppm |
| | 7. Bushing tests |
| | a. Capacitance (C1 and C2) |
| | b. Percent (%) Power Factor |
| | 8. OLTC test - Tap check / Ripple test (Per phase) |
| | Calibration of Temperature Monitoring Device |
| В. | Power Circuit Breaker |
| | Insulation Resistance |
| | 2. Contact Resistance |
| | 3. Timing |
| | SF6 Gas (Moisture and Purity) – Commissioning only |
| | 5. Oil for OCB (DBV, IPF, Color) |
| C. | Current Transformer |
| | Insulation Resistance (DC) |
| | 2. Insulation Power Factor (AC) |
| | 3. Ratio and Phase Deviation (High Current at 100% or 10% rated |
| | current) |
| | Excitation/Saturation (Full tap) |
| D. | Potential Transformer |
| | Insulation Resistance (DC) |
| | Insulation Power Factor (AC) |
| | 3. Ratio and Phase Deviation |
| E. | Lightning Arrester |
| | Insulation Resistance (5KV DC) |
| | 2. Insulation Power Factor (10KV AC) |
| F. | Disconnect Switch |
| | Insulation Resistance (5KV DC) |
| | 2. Contact Resistance (High Current, at least 10% current rating) |
| G. | Station Service Transformer |
| | 1. Insulation Resistance |
| | 2. Winding Resistance |
| | 3. Turns Ratio |
| Н. | Power Cable / Bus Bar / Post Insulator |
| | 1. Insulation Resistance |
| | 2. Hi-pot (Optional) |
| | |

| 1. Earth / Soil Resistance 2. Ground Grid Integrity @ 300A AC J. Capacitor Bank 1. Capacitance 2. Insulation Resistance RK. Reactor 1. Insulation Resistance (5KV DC) 2. Insulation Power Factor (10KV AC) 3. Winding Resistance 4. Insulating Oil Tests a. Dielectric Breakdown Voltage b. Insulation of Temperature Monitoring Device L. Protective Relays 1. Transmission Line Protection a. Distance Protection - Maximum Impedance Reach and Coordination time - Characteristic Test - Transfer Trip Test - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic/slope test) b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance 2. Load Capacity | | |
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| 2. Insulation Power Factor (10KV AC) 3. Winding Resistance 4. Insulating Oil Tests a. Dielectric Breakdown Voltage b. Insulation Power Factor 5. Calibration of Temperature Monitoring Device L. Protective Relays 1. Transmission Line Protection a. Distance Protection - Maximum Impedance Reach and Coordination time - Characteristic Test - Transfer Trip Test - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | K. Reactor | |
| 3. Winding Resistance 4. Insulating Oil Tests a. Dielectric Breakdown Voltage b. Insulation Power Factor 5. Calibration of Temperature Monitoring Device L. Protective Relays 1. Transmission Line Protection a. Distance Protection - Maximum Impedance Reach and Coordination time - Characteristic Test - Transfer Trip Test - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | Insulation Resistance (5KV DC) | |
| 4. Insulating Oil Tests a. Dielectric Breakdown Voltage b. Insulation Power Factor 5. Calibration of Temperature Monitoring Device L. Protective Relays 1. Transmission Line Protection a. Distance Protection - Maximum Impedance Reach and Coordination time - Characteristic Test - Transfer Trip Test - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | | |
| a. Dielectric Breakdown Voltage b. Insulation Power Factor 5. Calibration of Temperature Monitoring Device L. Protective Relays 1. Transmission Line Protection a. Distance Protection - Maximum Impedance Reach and Coordination time - Characteristic Test - Transfer Trip Test - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | Winding Resistance | |
| b. Insulation Power Factor 5. Calibration of Temperature Monitoring Device L. Protective Relays 1. Transmission Line Protection a. Distance Protection - Maximum Impedance Reach and Coordination time - Characteristic Test - Transfer Trip Test - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | Insulating Oil Tests | |
| 5. Calibration of Temperature Monitoring Device L. Protective Relays 1. Transmission Line Protection a. Distance Protection - Maximum Impedance Reach and Coordination time - Characteristic Test - Transfer Trip Test - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | a. Dielectric Breakdown Voltage | |
| L. Protective Relays 1. Transmission Line Protection a. Distance Protection - Maximum Impedance Reach and Coordination time - Characteristic Test - Transfer Trip Test - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | b. Insulation Power Factor | |
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| - Maximum Impedance Reach and Coordination time - Characteristic Test - Transfer Trip Test - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test - End-to-end test - End-to-end test - Directional Earth fault (67G) - pick up - trip time test - Over-voltage (pick-up, characteristic) 2. Bus Protections - Pick-up test - Parameter Check - Transformer & Reactor Protection - Differential Relay (Pick-up, Characteristic/slope test) - Back-up over-current (pick-up and operating time characteristic) - Electromechanical Relays (Functional testing) - (pick-up, characteristic) - Electromechanical Relays (Functional testing) - (pick-up, characteristic) - Feeder Protection - Over-current - Differential Relay (Pick-up, Characteristic) - Capacitor Bank (Pick-up test) - Feeder Protection - Over-current - Differential Cover-current - Differential Relays (Functional testing) - Capacitor Bank (Pick-up test) - Re-closer - Capacitor Bank (Pick-up Relay (ALD) M. Battery Bank - Inmpedance | Transmission Line Protection | |
| - Characteristic Test - Transfer Trip Test - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | a. Distance Protection | |
| - Transfer Trip Test - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | Maximum Impedance Reach and Coordination time | |
| - Parameter Check and Phase Angle b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | - Characteristic Test | |
| b. Current/Line Differential Protection - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | - Transfer Trip Test | |
| - Pick-up test - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | - Parameter Check and Phase Angle | |
| - Bias Characteristic Test - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | b. Current/Line Differential Protection | |
| - End-to-end test c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | - Pick-up test | |
| c. Re-closer Relay d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | - Bias Characteristic Test | |
| d. Fault Locator e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | - End-to-end test | |
| e. Directional Earth fault (67G) - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | c. Re-closer Relay | |
| - pick up - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | d. Fault Locator | |
| - trip time test f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | e. Directional Earth fault (67G) | |
| f. Over-voltage (pick-up, characteristic) 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | - pick up | |
| 2. Bus Protections a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | - trip time test | |
| a. Pick-up test b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | f. Over-voltage (pick-up, characteristic) | |
| b. Parameter Check 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | 2. Bus Protections | |
| 3. Transformer & Reactor Protection a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | a. Pick-up test | |
| a. Differential Relay (Pick-up, Characteristic/slope test) b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | b. Parameter Check | |
| b. Back-up over-current (pick-up and operating time characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | Transformer & Reactor Protection | |
| characteristic) c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | a. Differential Relay (Pick-up, Characteristic/slope test) | |
| c. Electromechanical Relays (Functional testing) d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | b. Back-up over-current (pick-up and operating time | |
| d. Over-fluxing (59F) / Over-voltage (59V) - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | , | |
| - (pick-up, characteristic) 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | , , | |
| 4. Capacitor Bank (Pick-up test) 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | • , , • , , | |
| 5. Feeder Protection a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | " 1. | |
| a. Over-current b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | | |
| b. Re-closer c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | | |
| c. Fault Locator d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | | |
| d. Under-frequency Relay (ALD) M. Battery Bank 1. Impedance | | |
| M. Battery Bank 1. Impedance | c. Fault Locator | |
| 1. Impedance | d. Under-frequency Relay (ALD) | |
| • | • | |
| 2. Load Capacity | 1. Impedance | |
| | 2. Load Capacity | |





WESM REGISTRATION

Customers must register to WESM for New Connection to the Grid

For new generating plants and load connection, WESM registration is a pre-requisite for the issuance of CATC



Generating Plants shall secure COC pursuant to existing ERC guidelines on licensing of generation facilities

WESM – Wholesale Electricity Spot Market
 COC – Certificate of Compliance
 CATC – Certificate of Approval to Connect

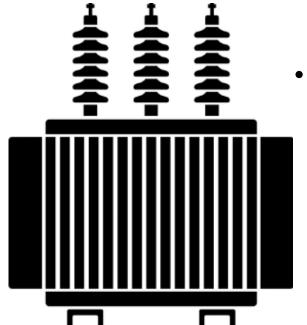




EVALUATION OF FACILITIES

NGCP evaluates the Customer's submitted documents

 NGCP approves the ERF if the documents are in order and passed the minimum criteria based on Standards



Energization of Customer's new facility shall commence after the Customer has signed/conformed the CATC

ERF – Energization Request FormCATC – Certificate of Approval to Connect





BRIDGING POWER & PROGRESS

