Grid Connection Procedure

DOE Investment Forum
04 December 2018

NGCP
BRIDGING POWER & PROGRESS

GENERATING PLANTS

DOE endorsement to conduct SIS

(OATS Rules Section II, B13)

DIRECT CONNECTION FOR LOAD CUSTOMERS

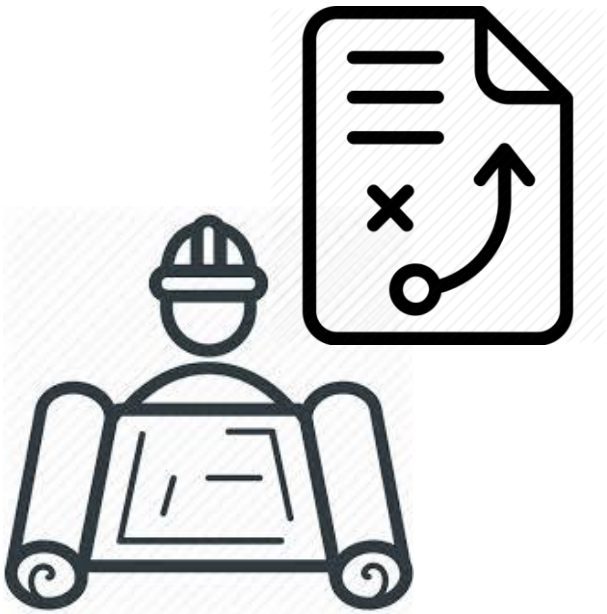
DOE approval for direct connection

(DOE DC Circular No. 2018-08-0025)

1 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



Attachments (as applicable):

- *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*

***LOI** – Letter of Intent*
***SLD** - Single Line Diagram*

2 PROCESSING OF APPLICATION

DATA PROCESSING

NGCP evaluates the Customer's documents

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

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*

3 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*

4 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*

5 ENERGIZATION REQUEST FORM

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

***ERF** – Energization Request Form*

ENERGIZATION REQUEST FORM

NATIONAL GRID CORPORATION OF THE PHILIPPINES

REGION: _____ DISTRICT: _____

ENERGIZATION REQUEST FORM
System Operations

PROJECT/COMPANY: _____
ADDRESS: _____
DATE FILED: _____

LOAD NEW ☐ MODIFICATION ☐

GENERATOR NEW ☐ MODIFICATION ☐

NGCP CONNECTION POINT:
SUBSTATION: _____
TRANSMISSION LINE: _____

CUSTOMER'S ASSET TO BE ENERGIZED (Attached detailed SLD and Site Layout)
GENERATOR : _____

SUBSTATION/
SWITCHYARD: _____
Substation Equipment (inidicate location): _____

TRANSMISSION
LINE: _____
Line Structure (indicate pole number) _____

APPLICANT'S AUTHORIZED
REPRESENTATIVE

[NAME OF REPRESENTATIVE] _____
Designation Date of Energization

DATE RECEIVED: _____ DATE RELEASED: _____

Head, Power Network Planning
Head, Network Operation
Head, SCADA/EMS
Head, Network Telecom
Head, Network Protection
Head, System Integration & Operations Management

Approved by:

Head, Visayas System Operations

APPROVED ☐ WITH CONDITION/S ☐ DISAPPROVED ☐

Evaluation: (use separate sheet if necessary)

Recommendation/s: (use separate sheet if necessary)

FM-OP-RRA-06B.5 Rev. 0

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

DOCUMENTS TO BE SUBMITTED AFTER TO CONDUCT OF FIELD TEST

A. Power Transformer
1. 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)
9. Calibration of Temperature Monitoring Device

B. Power Circuit Breaker
1. Insulation Resistance
2. Contact Resistance
3. Timing
4. SF6 Gas (Moisture and Purity) – Commissioning only
5. Oil for OCB (DBV, IPF, Color)

C. Current Transformer
1. Insulation Resistance (DC)
2. Insulation Power Factor (AC)
3. Ratio and Phase Deviation (High Current at 100% or 10% rated current)
4. Excitation/Saturation (Full tap)

D. Potential Transformer
1. Insulation Resistance (DC)
2. Insulation Power Factor (AC)
3. Ratio and Phase Deviation

E. Lightning Arrester
1. Insulation Resistance (5KV DC)
2. Insulation Power Factor (10KV AC)

F. Disconnect Switch
1. 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

H. Power Cable / Bus Bar / Post Insulator
1. Insulation Resistance
2. Hi-pot (Optional)

I. Grounding System
1. Earth / Soil Resistance
2. Ground Grid Integrity @ 300A AC

J. Capacitor Bank
1. Capacitance
2. Insulation Resistance

K. 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 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
2. Load Capacity

6 WESM REGISTRATION

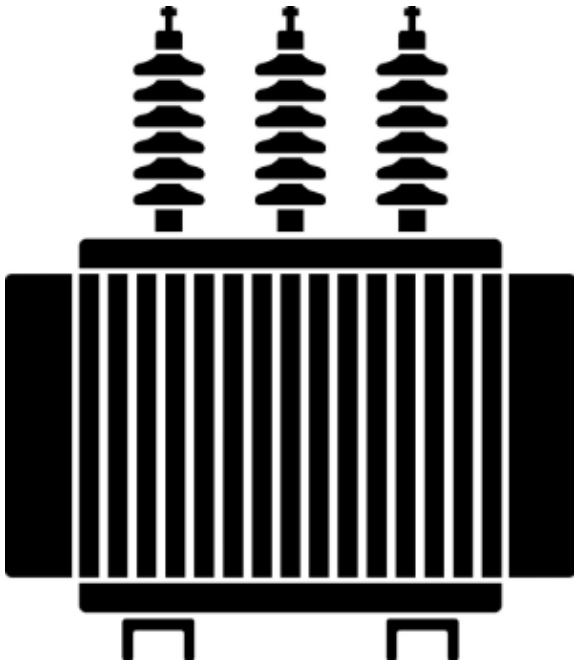
Customers must register to WESM for New Connection to the Grid

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*

7 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 Form*
CATC *– Certificate of Approval to Connect*

NGCP

BRIDGING POWER & PROGRESS