

**DEPARTMENTAL SOP**  
**FOR PROCESSING DISTRIBUTED GENERATION APPLICATIONS**

**A. PROCESS OF APPLICATION**

1. ARE-IPPs within the context of ARE Policy 2011 are ARE based power generation companies for dedicate sale of power under granted Agreement with NTDC/ CPPA / FESCO, similarly consumer based ARE Distributed Generator (ARE-DG) up to 01 MW has an option to sell full or part of generated electricity to the grid, under this mechanism utility consumers are encouraged to generate their own electricity from ARE resources. ARE (DG) produce power for self use and for sale to bulk consumers / FESCOs under bilateral contracts as per ARE Policy 2011 (section 2.1 & 4.4.3.1 of policy). Net metering therefore shall be allowed only to those consumers who have surplus energy to sell. The load of the proposed solar/wind plant will be from 05KW up to the sanctioned load of the Distributed Generator. FESCO will appreciate if a Distributed Generator offers the sale of solar/wind power more than his sanctioned load, however for this purpose, FESCO has referred the matter to NEPRA for advice / clarification, after the receipt of clarification in this regard, SOP will be amended accordingly. The Distributed Generator as per Net Metering Regulation-2015, has an option to sell full or part of the generated electricity to the grid through net metering.

2. Any consumer ,(as per definition of Distributor Generator vide SRO No.892 dated 01.09.2015) having 3 phase 400V or 11 KV connection of domestic, commercial or industrial, can submit an application for net metering against his installed or intending to install a solar/wind power plant for 05 KW to 01 MW depending upon his premises load. Consumer is required to submit his application in FESCO’s office as detailed below with necessary documents as specified in schedule-II of Net Metering Regulations-2015.

For Load from 05KW up to 70 KW	XEN (Operation)
For Load from 71KW up to 500KW	SE (Operation)
For Load above 500 KW up to 01 MW	Chief Engineer (P&D)

3. In case of any missing information of documents, the applicant shall provide the same to the concerned FESCO’s office within seven (07) working days of being informed by the office.

4. After being satisfied that application is complete in all respect the FESCO technical committee as given below shall perform an initial review to determine whether the applicant qualifies for interconnection Facility, or may qualify subject to additional requirements. The initial review shall be completed within twenty (20) working days by the below mentioned committee.

**Load**

From 05 KW up to 70 KW  
From 71 KW up to 500KW  
From 501 KW to 01 MW

**Technical Committee**

XEN (Operation), XEN (M&T) & SDO/XEN (P&I) FESCO.  
SE (Operation), SE (M&T) & XEN (P&I)  
Chief Engineer (P&D), SE (OP), SE (M&T), SE (GSO), XEN (P&I)

5. In case, initial review reveals that the proposed facility is not technically feasible, the application will be returned to the applicant along with reasons within three (03) working days after completion of initial review.
6. If the Technical committee is satisfied that the applicant qualifies as Distributed Generator, then FESCO and the Applicant shall enter into an Agreement within ten working days as per approved format of Schedule-I of Regulations. This Agreement shall also include all terms and conditions laid down in this SOP of FESCO. FESCO SOP will be incorporated in the approved format of Agreement by adding a sentence that ***“SOP of FESCO will be considered as part of this Agreement”*** as sub para “f” in para ‘11’ of the format Agreement. Agreement signing authority and witness thereof will be as under.

Sr. No.	Signature of Agreement from FESCO side	Witnessed by
i.	Chief Engineer (P&D)	Dy. Dir. Planning & Asst: Dir. Planning
ii.	SE (Operation)	XEN (OP) & SDO (OP)
iii.	XEN (Operation)	SDO (OP) & LS

7. After signing of the Agreement, the concerned FESCO office shall send a copy of the Agreement to the NEPRA Authority within seven (07) working days of the signing of the Agreement and shall forwarded the Application to the Authority (NEPRA) for grant of license as specified in Schedule-III along with following documents.
  - a. Agreement (Schedule-I)
  - b. Application for exemption from the requirement of section 24 of the Act as specified in Schedule-IV.
  - c. Receipt of payment of deposit of fee as specified in Schedule-V by the Authority.
  - d. Affidavit by Distributed Generator as specified in Schedule-VI.
8. Within seven (07) working days of execution of the Agreement, the concerned FESCO office shall issue the demand notice of estimate of the connection charges (as per this FESCO SOP) to the applicant for the proposed interconnection facility up to the interconnection point including the metering installation if the equipments for interconnection installation including metering system are available in FESCO store otherwise Distributor Generator (DG) will be responsible to provide the specified material to FESCO.
9. The applicant shall make the payment of demand notice issued to him on account of estimate for connection charges within twenty days of its issuance.
10. The Technical Committee mentioned in para-4 above shall install and commission the proposed interconnection facility within thirty (30) days of the payment of demand notice by the Applicant, provided that the net metering arrangement shall commence upon grant of License to the Distributed Generator in accordance with Regulation 4 of these Regulations.

**B. SOME IMPORTANT PRE-REQUISITES:-**

1. Submission of load flow study (on PSSE software) will be compulsory for all Distributed Generators having sanctioned load / capacity of more than 500 KW.
2. Distributed Generator, having sanctioned load / capacity less than 500 KW, may submit load flow study on FDRANA software.
3. When the accumulative capacity of (already allowed) Distributed Generators become 80% of loading capacity of installed distribution transformer, the Agreements with new Distributor Generator will be signed subject to the augmentation of existing distribution transformer on cost deposit basis by the new Distributed Generator.
4. The Distributed Generators being fed from distribution transformers are absolved from load flow study.
5. Manufacture's test certificate of each electrical equipment / component including PV module and the invertors shall be provided by Distributed Generator.
6. Safety inspection of Distributed Generator from appropriate Authority and necessary testing & certificate from Electrical Inspector of Punjab Government shall be obtained by Distributed Generator regarding commissioning of interconnection equipment at Distributed Generator facility for net metering.

**C. BILLING PROCEDURE**

Pursuant to Clause-14 "Billing for Net Metering" of the Alternative and Renewable Energy Distributed Generation and Net Metering Regulation 2015 for implementing net metering policy, following procedure is hereby proposed to be adopted:

1. The consumer shall receive a monthly net import/export bill indicating either net export to the grid or net import from the grid.
2. The meter reader has to capture import & export energy and other billing parameters recorded by the bi-directional meter.
3. If there are two different tariffs running in the same premises of the wind / solar Distributed Generator, then sale of energy will be on lower tariff only.
4. In case of net import bill, the Distributed Generator shall be billed for the net KWh in accordance with the consumer end applicable tariff of FESCO.
5. In case, the export energy is more than the import, the net kWh shall be credited against Distributed Generator's next billing cycle for future consumption, or shall be paid by the FESCO to the Distributed Generator quarterly in accordance with the consumer end applicable tariff of FESCO for that particular category of consumers who declared as Distributed

Generator, provided that where the Distributed Generator is to be paid, the kWh in a month will be charged at the tariff of that respective month.

6. The tariff payable by FESCO shall only be the off-peak rate of the respective consumer category during the month. The other rates such as variable charges for peak time, fixed charges, fuel price adjustment, duties / levies etc will not be payable by the FESCO.
7. Meter reading should be carried out preferably through automated means as directed by NEPRA from time to time (smart metering and hand held unit).
8.
  - i) The meter reading of Distributed Generator will be carried out by the XEN (Op) as per performa to be designed by SE (Op) mentioning therein the reason of only export unit without any import and reason of import units only without any export units. Such practice will facilitate to decide the extension/injection of illegal power other than agreed capacity, at the same time, will reflect the status of generation facility i.e. out of order or otherwise.
  - ii) XEN (Op) will also record on the reading performa a certificate that all the pasted security slips are intact and Distributed Generator is not injecting any illegal generation/managed power into the system. Illegal generation/managed power means recycling of power received from FESCO at lower tariff or generated other than solar/wind.
  - iii) Any such irregularity will be brought into the notice of the Competent Authority who will take-up the matter with NEPRA as well as, depending upon the gravity of illegal act, deferred the net-metering purchased and payment due after quarterly adjustment.

**D. DISTRIBUTED GENERATION FACILITY DESIGN AND OPERATING REQUIREMENTS:**

Pursuant to Clause-9 “Protection Requirements” of the Alternative and Renewable Energy Distributed Generation and Net. Metering Regulation 2015 for implementing net metering policy, following protection requirements are hereby proposed to be incorporated in design of the system.

**1. Installation Of DG Facility:**

- i. The applicant is required to install the DG Facility through system installer who has experience in design, supply, installation and commissioning of DG Facility.
- ii. The DG Facility should comply with the relevant IEC technical standards and safety standard / compliance.

- iii. The specification of solar grid inverter preferably shall be UL-1741 however other specifications are attached as (Annex-C) for guidance purpose.
- iv. LT circuit breaker will have the same specification as approved by Chief Engineer (D&S) NTDC.

2. **Single Line Diagram:**

The protection and control diagrams for the interconnection of the Distributed Generator shall be in accordance with Single Line Diagram as proposed at (CCT-1 to CCT-4) to be approved by the Distribution Company prior to the commissioning of the system.

Distributed Generator shall be responsible for installation of all of the equipments and protective devices to be used for the interconnection.

3. **Earthing Protection:**

- a) A minimum of two separate dedicated and interconnected earth electrodes must be used for the earthing of the solar PV system support structure with a total earth resistance not exceeding 5 ohms as below:

- i. Equipment earth (DC) &
- ii. System earth (AC)

Both equipments earth (DC) and system earth (AC) shall be checked / tested for proper earthing.

- b) **Equipment earth (DC):** All metallic parts of DG Facility such as PV modules, DCDB, generator, iron clad Switches will be connected to earth with two separate and distinct earth connections to Avoid any loss of property or Human being.
- c) Earthing shall be done in accordance with Standard Design Instructions to be issued by FESCO in consultation with Chief Engineer (D&S) NTDC.

4. **Surge Protection:**

- i. Surge protection shall be provided on the DC side and the AC side of the DG facility.
- ii. The DC surge protection devices (SPDs) shall be installed in the DC distribution box adjacent to the solar grid inverter and generator as approved by Chief Engineer (D&S) NTDC.
- iii. The AC SPDs shall be installed in the AC distribution box adjacent to the DG facility.
- iv. The SPDs earthing terminal shall be connected to earth through the above mentioned dedicated earthing system.



- v. The Lightning Arresters need to be provided for the buildings which are of more than 15 meters height.

5. **Safety Measures For Maintenance**

The Distributed Generator shall provide LT Breaker of proper capacity at load side on consumer premises as an interconnection's facility disconnection switch that will open with the visual break and capable of being locked in open position to enable line man to disconnect the installation so as to provide a safe zone for maintenance works. The switch shall be accessible at all time to the FESCO personnel, however this disconnection switch will be in addition to and separate from the breaker being proposed and operated through reverse power relay as mentioned in para E- (v).

6. **Provision Of Relays And Testing**

An inverter will have an inbuilt AC under / over voltage relay, AC over / under frequency relay and over current / earth fault relay. Anti islanding protections relay which trips the breaker on grid failure and thus prevents any solar/wind power injection to the Grid when there is no power in Grid. These relays shall be tested by the respective officers during service connection and routine inspections. Necessary protection arrangements shall be made when there is no grid supply on single/two/three phases. The inspection authority shall ensure the proper functioning of protection before commissioning. The applicant's installation shall be disconnected in the event of such exigencies to prevent accident or damage to men and equipments.

7. **Work As Per Design And Single Line Diagram**

The installation work has to be carried out as per the approved drawings and as per standards.

- i. Applicant shall notify the FESCO in writing that installation of DG facility is complete as per single line diagram and requirement of the FESCO.
- ii. However, in case applicant has already installed the DG Facility, he will be bound to modify the installation as per design before his application is processed.

E. **PROTECTION AGAINST INJECTION OF LOWER TARIFF POWER AND GENERATION OTHER THAN SOLAR / WIND**

The reverse power relay will be installed immediately before the interconnection point towards the load side as shown in logic diagram for the connection of solar / wind plant (CCT-1 to CCT-04).

The following installation shall be secured and sealed and will be accessible to the authorized representative of FESCO only:-

1. Solar PV module terminals and cables up to the DC inverter terminal to protect against the injection of the DC power produced other than solar energy.
2. AC output terminals of the inverter and cable up to the interconnection point to protect against the injection of any AC power into the system other than solar / wind energy.
3. Complete circuit including dedicated CT/PT for reverse power relay up to the breaker of export / import metering panel including interconnection point shall be secured and sealed.
4. Reverse power relay and its input / output cables shall also be secured.
5. The main breaker with / before metering panel shall also be sealed and its resetting / closure will be carried out by authorized representative of FESCO in order to ensure that its tripping cause was not due to reverse power relay or any unauthorized act.

**F. EXPORT / IMPORT BILLING AND BACKUP METERS**

1. A single bi-directional service connection meter shall be installed to measure import and export (KWh) energy. For existing service connections, the uni-directional service connection meter shall be replaced with a bi-directional service connection meter.
2. Bi-directional service connection meter accuracy and facilities shall be the same as applicable to the standard uni-directional meters for the relevant type of service connection and tariff.
3. The backup export/import meters, when the DG Facility is more than 20 KWp shall also be installed at the cost of Distributed Generator after paying the Demand Notice issued by FESCO, however, due to non availability of export/import meters in FESCO, consumer shall provide the specified meters from the approved manufacturer of NTDC/FESCO.

**G. ENERGIZATION / SYNCHRONIZATION OF DG FACILITY**

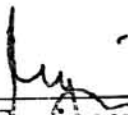
1. If the installation of Distributed Generator satisfies all the above conditions the synchronization of the DG Facility shall be carried out by the standing committee within 03 working days from the issue of approval for synchronizing and commissioning.
2. The Applicant/ consumer shall be present at the time of synchronization of the installation.
3. At the time of commissioning, the meters installed shall be jointly inspected and sealed on behalf of both the parties and shall be interfered / tested or checked only in the presence of the representatives of the consumer.
4. The standing committee will issue synchronization certificate to the applicant of DG Facility after synchronization and commissioning.
5. DG will be responsible for providing approved auto synchronizing relay for synchronizing solar / wind power with FESCO system.

**H. PERIODICAL INSPECTIONS:**

1. The bi-directional energy meters are to be tested as per schedule by M&T staff for at least once in 4-months.
2. The inverter functionality of every installation is to be checked by M&T staff once in 06 months.
3. Periodical test reports/inspection reports shall be submitted to the concerned authorities including SE (OP), Chief Engineer (P&D) and C.E/CCO etc.


**I. TERMS OF AGREEMENT.**

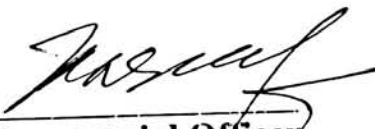
1. The term of this Agreement will be Three (03) years with effect from commissioning of Distributed Generation Facility, however, DG may terminate the Agreement upon Thirty (30) days written notice.
2. This Agreement will be extendable with the mutual written consent of the parties.
3. Distribution Company (FESCO) shall not terminate the Agreement in any event without prior approval of NEPRA.

  
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**Chief Engineer (P&D)**  
(Member)

  
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**Chief Engineer (Op)**  
(Member)

  
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**SE (TS) FESCO**  
(Member)

  
\_\_\_\_\_  
**Director (MT&CM)**  
(Member)

  
\_\_\_\_\_  
**Chief Commercial Officer**  
(Convener)