

**Application Form for Inter-connection of Renewable Energy Facility
to the MERALCO Distribution Grid**

Name:

Address:

Contact Person:

Telephone Number:

Service Point Address:

Information Prepared and Submitted by (Name and Address):

Signature:

All applicable items must be accurately completed in order that facilities may be effectively evaluated by the Company for interconnection with the utility system.

GENERATING FACILITY

No. of Units:

Manufacturer:

Type (Synchronous/Induction/Inverter):

Fuel Source Type (Solar, Biogas, Wind, etc.):

kW Rating (95F at location)

Kilovolt-Ampere Rating (95F at location):

Power factor:

Voltage rating:

Ampere Rating:

Number of Phases:

Frequency:

Do you plan to export power: _____ Yes _____ No

If yes, maximum amount expected _____

Pre-Certification label or Type Number:

Expected Energizing and Start-up Date:

Normal Operation of Interconnection (examples: provide power to meet base load, demand management, stand-by, back-up, others (please describe):

One-line diagram attached? _____ Yes

Has the Manufacturer supplied its dynamic modelling values to the DU? _____ Yes (Note that answer here requires "Yes" for complete application. For Pre-certified Equipment, answer is Yes.)

Layout sketch showing lockable, "visible" disconnect device. _____ Yes

Company ----- Customer Name

By: _____

By: _____

Title: _____

Title: _____

Date: _____

Date: _____



Plant Parameters

Request for a Distribution Impact Study of Renewable Energy Facility for Net Metering

Section 1: General Connection Information

Note: All of the information in "Section 1: General Connection Information" must be completed in full. Failure to provide complete information may delay the processing of the study.

Date: _____ (dd/mm/yyyy) Contact Person Name: _____

Signature: _____

1. Customer Name: _____

2. Existing MERALCO SIN: _____

3. Customer Address: _____

4. Telephone / Fax / Email: _____

5. Project Name: _____

6. Project Dates: Proposed Start of Construction: _____ (dd/mm/yyyy)

Proposed In-Service: _____ (dd/mm/yyyy)

7. Project Size: Proposed Total Capacity _____ (kW)

8. Project Location: City/Town/Province: _____

9. Project Information:

	Project Contractor	Consultant
Company/Person:		
Contact Person:		
Mailing Address:		
Telephone:		
Fax:		
E-mail:		

10. Renewable Energy Technology:

- Solar (PV) (see Annex A)
- Wind - with Power Converter (see Annex A)
- Wind - Induction generator only (see Annex B)
- Biomass / Biogas (see Annex B)
- Others (Please specify.) _____

11. Generator Facility Type:

- a. Generation Facility Voltage: AC _____ volts DC _____ volts
- b. Generation Capacity: _____ kW _____ kVA
- c. Type: Rotating Generators: Synchronous Induction
 Others (Please specify.) _____
- d. Non-Rotating DC generation: Photovoltaic Arrays Batteries
 Others (Please specify.) _____

12. Location Map and Site Plan

Site plan with approximate line routings for connection to nearby MERALCO facilities. The Site Plan include roads (with street names) and lot numbers and nearby power lines.

13. Proposed Connection voltage to MERALCO's distribution system: _____ volts

Annex A

(For Solar Panels and Wind Turbines equipped with Power Converter)

Section 2: Impact Assessment Information

Note:

- (a) It is important that the requesting Customer provide ALL the information requested below, if applicable. Indicate N/A (Not Applicable) where appropriate.
- (b) In certain circumstances, MERALCO may require additional information to conduct the Impact Assessment. Should this be the case, the requesting Customer should be duly advised and ready to provide the additional information.

Date: _____ (dd/mm/yyyy)

Contact Person Name: _____

Signature: _____

1. Electric System Description

Provide a SLD of the customer loads and generating facilities including the customer's point of connection to MERALCO'S Distribution System.

- Riser Diagram (Loads and Generators)
- System Block Diagram
- DC System
- AC System
- AC and DC Grounding System
- Protection System
- Synchronization Equipment
- Equipment (e.g. Generating Unit, Solar Panels, Inverter, transformer, circuit breaker, etc.)
- Electrical circuits
- Switching facilities
- Phasing arrangements

Note: The diagram/drawing shall indicate the quantities, ratings, and operating parameters of equipment and cables.



2. Load Information : Customer and Generating Facility

- a. Updated Load Schedule (*Please attach additional sheets for the information.*)
- b. Total Connected Load: 1-phase _____ kVA _____ kW
 3-phase _____ kVA _____ kW
- c. Maximum continuous load: 1-phase _____ kVA _____ kW
 3-phase _____ kVA _____ kW
- d. Maximum start up load: 1-phase _____ kVA _____ kW
 3-phase _____ kVA _____ kW
- e. Largest motor size that would be started: _____ HP _____ kW
- f. Maximum inrush current of the motor (multiple of full load current): _____ p.u.

3. Generating Facility Fault Contribution for Faults at the connection point

All values to be at the nominal connection voltage to MERALCO's Distribution System.

Maximum Symmetrical Faults (all generators online)

- Three Phase Fault _____ kA
- Phase to Phase Fault _____ kA
- Single Phase to ground Fault _____ kA

4. Generator Facility Characteristics:

a. Number of generating units: _____

b. Rated AC Capacity of each unit:

Gross : _____ kW _____ kVA
Net : _____ kW _____ kVA

If unit outputs are different please attach additional sheets to provide the information.

c. AC Net Capacity : _____ kW _____ kVA

d. PV Panel / Module Data

- i) Manufacturer : _____
- ii) Technology : _____
- iii) Model No. : _____

- iv) Total Plant Capacity : _____ kWp DC
- v) Rated Output : _____
- vi) Operating Current : _____ Amp
- vii) Open Circuit Voltage : _____ volts
- viii) Short Circuit Current : _____ Amp
- ix) Number of Units : _____
- x) Total PV Array Area : _____
- xi) Is there lightning protection system available?
 Yes No
- xii) Grounding
 System Equipment

e. Inverter / SPC units: *(Please provide additional sheets for multiple models.)*

- i) Manufacturer / Model : _____
- ii) Technology /Type : Grid tie Off-Grid
- iii) Rated Capacity : _____
- iv) Efficiency : _____
- v) Number of Units : _____
- vi) Inverter DC input voltage : _____ volts
- vii) Inverter DC input current : _____ Amps
- viii) Inverter AC output voltage : _____ volts
- ix) Inverter AC output current : _____ Amps
- x) Number of phases : One Three
- xi) Inverter output frequency : _____ Hz
- xii) Output waveform : Square Modified Sine
 True / Pure Sine Wave
- xiii) Type of inverter : Self Commutated
 Line Commutated
- xiv) Inverter input type : Voltage source Current source
- xv) Control scheme : Voltage control Current control
- xvi) Power source for inverter control circuit:
 DC side AC side Both (AC and DC side)
- xvii) Total harmonic distortion: _____ %
(Please attach harmonic data plot/graph)
- xviii) Inverter rated power factor : _____ %

- xix) Inverter power factor adjustments range, if applicable (specify lag or lead)
from: _____ p.u. to _____ p.u.
- xx) Are power factor correction capacitors used?
- xxi) If yes, total power correction installed : _____ VAR
- xxii) Number of capacitors steps : _____
- xxiii) Grounding
 System Equipment
- xxiv) Are power factor correction capacitors automatically switched off when
inverter breaker opens?
 Yes No
- xxv) Does the inverter have surge protection available?
 Yes No
- xxvi) Does the inverter have short circuit shutdown capability?
 Yes No
- xxvii) Does the inverter have anti-islanding protection?
 Yes No
- xxviii) Is the inverter paralleling equipment and/or design pre-certified?
 Yes No
- xxix) If yes, to which standard(s), e.g. UL-1741, CSA c22.2 No. 107.1-01,
IEEE 1547: _____
- xxx) Maximum inrush current upon inverter start-up (multiple of full-load
current): _____ p.u.
- xxxi) Is the inverter test certified?
 Yes No
 If yes, please attach the test certificate.

h. Characteristics (*Please attach additional sheets to provide the information.*)

- a. Harmonic data plot / graph
- b. IV Curve/PV Curve
- c. Open circuit
- d. V curves

5. Interface Transformer Characteristics (if applicable)

- a. Manufacturer (if known): _____
- b. Transformer rating: _____ kVA
- c. Number of phases: One Three
- d. Nominal voltage of high voltage winding: _____ V
- e. Nominal voltage of low voltage winding: _____ V
- f. High voltage winding connection:
 Wye (3-ph) Delta (3-ph) Line-to-line (1-ph)
 Line-to-ground (1-ph) Others _____
- g. Grounding method of high voltage winding neutral (if applicable):
 Solid Ungrounded Impedance: R ____ X ____ ohms
- h. Low voltage winding connection: _____
 Wye (3-ph) Delta (3-ph) Line-to-line (1-ph)
 Line-to-ground (1-ph) Others _____
- i. Grounding method of low voltage winding neutral (if applicable):
 Solid Ungrounded Impedance: R ____ X ____ ohms
- j. Series Impedance: (%-Based on Nameplate Ratings)
- | | Unit 1 | Unit 2 | Unit 3 |
|--------------------|--------|--------|--------|
| Resistance: | _____ | _____ | _____ |
| Leakage Reactance: | _____ | _____ | _____ |
- k. Tap information:
 Number of steps/taps: above nominal tap _____ below nominal tap _____
 Minimum Tap: _____ (volts; p.u.)
 Maximum Tap: _____ (volts; p.u.)

6. Operation Information:

- Mode of operation: _____
- Annual capacity factor: _____ %
- Prospective number of annual scheduled starts/stops, and timing. _____
- Prospective maintenance schedule for 5 years operation (*Please attach.*)

7. Expected Monthly Generation, Load Consumption and Net Consumption (Energy and Demand) from the facility (12 month period) for the first year and annually for the remaining four years.

Annex B

(For Biomass, Biogas and Wind Induction RE Technologies)

Section 2: Impact Assessment Information

Note:

- (c) It is important that the requesting Customer provide ALL the information requested below, if applicable. Indicate N/A (Not Applicable) where appropriate.
- (d) In certain circumstances, MERALCO may require additional information to conduct the Impact Assessment. Should this be the case, the requesting Customer should be duly advised and ready to provide the additional information.

Date: _____ (dd/mm/yyyy)

Contact Person Name: _____

Signature: _____

1. Electric System Description

Provide a SLD of the customer loads and generating facilities including the customer's point of connection to MERALCO'S Distribution System.

- Riser Diagram (Loads and Generators)
- System Block Diagram
- AC System
- AC Grounding System
- Protection System
- Synchronization Equipment
- Equipment (e.g. Generating Unit, transformer, circuit breaker, etc.)
- Electrical circuits
- Switching facilities
- Phasing arrangements

Note: The diagram/drawing shall indicate the quantities, ratings, and operating parameters of equipment and cables.

2. Load Information : Customer and Generating Facility

a. Updated Load Schedule (*Please attach additional sheets for the information.*)

b. Total Connected Load: 1-phase _____ kVA _____ kW

3-phase _____ kVA _____ kW

c. Maximum continuous load: 1-phase _____ kVA _____ kW

3-phase _____ kVA _____ kW

d. Maximum start up load: 1-phase _____ kVA _____ kW

3-phase _____ kVA _____ kW

e. Largest motor size that would be started: _____ HP _____ kW

f. Maximum inrush current of the motor (multiple of full load current): _____ p.u.

3. Generating Facility Fault Contribution for Faults at the connection point

All values to be at the nominal connection voltage to MERALCO's Distribution System.

Maximum Symmetrical Faults (all generators online)

- Three Phase Fault _____ kA

- Phase to Phase Fault _____ kA

- Single Phase to ground Fault _____ kA

4. Generator Facility Characteristics:

a. Number of generating units: _____

Rated AC Capacity of each unit:

Gross : _____ kW _____ kVA

Net : _____ kW _____ kVA

If unit outputs are different please attach additional sheets to provide the information.

b. AC Net Capacity : _____ kW _____ kVA

c. **For Synchronous Units:** (*Please provide additional sheets for multiple models.*)

i) Manufacturer / Model: _____

ii) Generation facility voltage: _____ Volts

- iii) Rated Current: _____ A
- iv) Rated Power Factor of generating unit(s): _____ p.u.
- v) Power factor operating range if applicable (specify Lag or Lead):
_____ p.u to _____ p.u.
- vi) Sequence Impedances
 - Positive sequence : _____ (r) + j _____ (x) p.u. ;
_____ (r) + j _____ (x) ohms
 - Negative sequence : _____ (r) + j _____ (x) p.u. ;
_____ (r) + j _____ (x) ohms
 - Zero sequence : _____ (r) + j _____ (x) p.u. ;
_____ (r) + j _____ (x) ohms
 - Unsaturated reactances on: _____ kVA base, _____ V base
 - Direct axis synchronous Reactance, X_d _____ p.u. _____ ohms
 - Direct axis transient Reactance, X_d' _____ p.u. _____ ohms
 - Direct axis subtransient Reactance, X_d'' _____ p.u. _____ ohms
 - Quadrature synchronous Reactance, X_q _____ p.u. _____ ohms
 - Quadrature transient Reactance, X_q' _____ p.u. _____ ohms
 - Quadrature subtransient Reactance, X_q'' _____ p.u. _____ ohms
- vii) Time Constants:
 - Direct axis open circuit transient, T'_{do} _____ second
 - Direct axis open circuit subtransient, T''_{do} _____ second
 - Quadrature open circuit transient, T'_{qo} _____ second
 - Quadrature open circuit subtransient, T''_{qo} _____ second
- viii) Exciter PT Ratio _____
- ix) Earth Resistivity _____ ohms-meters
- x) Leakage reactance, x_l _____ p.u. _____ ohms
- xi) Armature resistance, r_a _____ p.u. _____ ohms
- xii) Provide a plot of generator capability curve (kW output vs. kVAR)
- xiii) Generator Inertia constant (on machine base)
 - H = _____ seconds (generator only)
 - H = _____ seconds (generator and turbine)
- xiv) Grounding
 - System Equipment

d. For Induction Units: (Please provide additional sheets for multiple models.)

- i) Manufacturer / Model: _____
- ii) Generation Facility Voltage: _____ Volts
- iii) Rated Current: _____ A
- iv) Rated Design power factor: _____ p.u.
- v) Power factor operating range if applicable (specify Lag or Lead):
_____ p.u to _____ p.u.
- vi) Unsaturated reactances on: _____ kVA base, _____ V base
 Direct Axis synchronous Reactance, X_d _____ p.u.
 Direct Axis transient Reactance, X_d' _____ p.u.
 Direct Axis subtransient reactance, X_d'' _____ p.u.
- vii) Time constants:
 Direct axis open circuit transient, T' _____ second
 Direct axis open circuit subtransient, T'' _____ second
- viii) Actual Power factor at point of connection (after p.f. correction):
 - Full Output: _____ p.u.
 - No Output: _____ p.u.
- ix) Generator full reactive power requirements:
 - Full Output: _____ kVAR
 - No Output: _____ kVAR
- x) Total power correction installed: _____ VAR
 - Number of regulating steps: _____
 - Power factor correction switched per step: _____ VAR
 - Power factor correction capacitors are automatically switched off when generator breaker opens: _____
- xi) Maximum starting inrush current (multiple of full load current): _____ p.u.
- xii) Generator inertia constant (on machine base).
 H = _____ seconds (generator only)
 H = _____ seconds (generator and turbine)
- xiii) Grounding
 System Equipment

e. Characteristics (*Please attach additional sheets to provide the information.*)

- a. Capability curve
- b. Short circuit curve
- c. Open circuit saturation curve
- d. V curves

5. Interface Transformer Characteristics (*if applicable*)

- a. Manufacturer (if known): _____
- b. Transformer rating: _____ kVA
 - c. Number of phases: One Three
- c. Nominal voltage of high voltage winding: _____ V
- d. Nominal voltage of low voltage winding: _____ V
- e. High voltage winding connection:
 - Wye (3-ph) Delta (3-ph) Line-to-line (1-ph)
 - Line-to-ground (1-ph) Others _____
- f. Grounding method of high voltage winding neutral (if applicable):
 - Solid Ungrounded Impedance: R _____ X _____ ohms
- g. Low voltage winding connection: _____
 - Wye (3-ph) Delta (3-ph) Line-to-line (1-ph)
 - Line-to-ground (1-ph) Others _____
- h. Grounding method of low voltage winding neutral (if applicable):
 - Solid Ungrounded Impedance: R _____ X _____ ohms
- i. Series Impedance: (%-Based on Nameplate Ratings)

	Unit 1	Unit 2	Unit 3
Resistance:	_____	_____	_____
Leakage Reactance:	_____	_____	_____
- l. Tap information:
 - Number of steps/taps: above nominal tap _____ below nominal tap _____
 - Minimum Tap: _____ (volts; p.u.)
 - Maximum Tap: _____ (volts; p.u.)

6. Operation Information:

- Mode of operation: _____
- Annual capacity factor: _____ %
- Prospective number of annual scheduled starts/stops, and timing. _____
- Prospective maintenance schedule for 5 years operation (*Please attach.*)

7. Expected Monthly Generation, Load Consumption and Net Consumption (Energy and Demand) from the facility (12 month period) for the first year and annually for the remaining four years.