

Residential/Commercial DG Customer SMART SOLAR Metering Notes

DER: Distributed Energy Resource
DG: Distributed Generator (a subset of DER)
EPS: Electric Power System
IC: Interconnection Customer
PCC: Point of Common Coupling
PoC: Point of Connection
Wh: Watthour Meter (may include demand quantities of Watts and VA)

NOTES:

1. All Interval metering requires telemetry.
2. Grouped meter location and installation shall be according to National Grid's jurisdiction applicable service and tariff requirements. See ESB 750 and ESB 756 Appendix C for the MA service jurisdiction (<https://www.nationalgridus.com/ProNet/Technical-Resources/Electric-Specifications>).
 - IC installs meter socket trough grouped at service location accessible for National Grid's AMR meters (net type for load + DER and bi-directional for MA SMART DER).
 - < 60 kW applications are watthour type revenue meters and > 60 kW are interval type.
 - All kWh measured through the MA SMART meter is compensated through the MA SMART incentive rate.
3. Generator disconnect installed according to NEC and National Grid's MDPU Interconnection Tariff.
4. Inverters shall be UL 1741 or UL 1741 SA certified for parallel operation with the utility (area EPS).
5. Where existing PCC meter is inside, the IC will upgrade their service connection to change it to outside location grouped with MA SMART Solar meter.
6. Bypass meter sockets required in accordance to ESB 750 table 7.2-1.
7. Certified Inverter-based DER Interconnections <25kW may not be required to have an additional disconnecting means in accordance with ESB 756 Appendix C.
8. The following drawings are conceptual only. It is the responsibility of the customer to adhere to all applicable codes, standards and requirements.
9. For systems 25 kW and below a disconnecting or isolation means shall be required to be located between the Company meter installation and the DER device to allow for Company testing of the meter socket prior to meter installation.⁽¹⁾ This device may be located based on customer preference, although where this device is not accessible to the Company ⁽²⁾, this may cause delay with associated meter installation and testing.
10. Line side Disconnect in addition to the load side disconnect required for 480/277 Volt installations.
11. All Interval Meters will require telemetry
12. Ganged metering sockets are not allowed in this program.
13. PV and ESS will be wired to the load side of the Meter Socket.

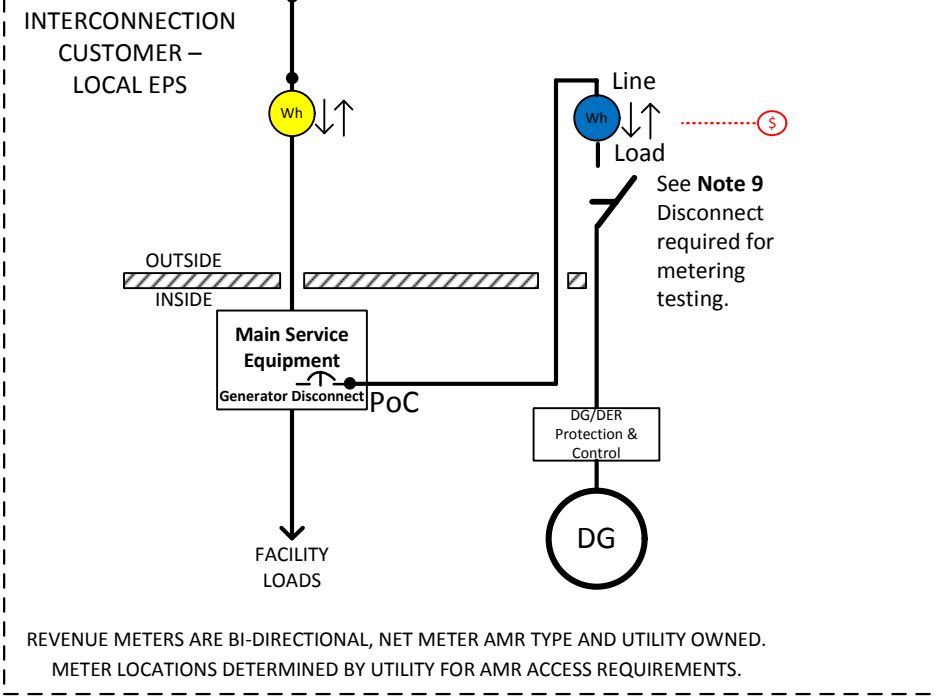
(1) The need for this disconnect is not a new requirement for testing meter socket installations. With existing load customer as well as behind-the-meter DER installations, the customer's main service or parallel power production disconnect is in a position where isolation has been available. This isolation has typically been the main service overcurrent protection device. With the inclusion of sub metering installations, the main service OCP is no longer between the circuit path between the sub meter and the connected DER device, therefore an isolation point to allow for testing is required.

(2) The Company recommends locating this outside, adjacent to the meter socket to allow for the most flexibility for meter installation and future change-outs.

RETAIL

Residential/Commercial DG Customer Behind the Meter MA SMART < 60 kW (Behind Main Service Equipment)

UTILITY – AREA EPS



This diagram is representative of one proposal and the utility may require other configurations.

- UTILITY SERVICE METER
- UTILITY PV GENERATION METER
- UTILITY STORAGE METER

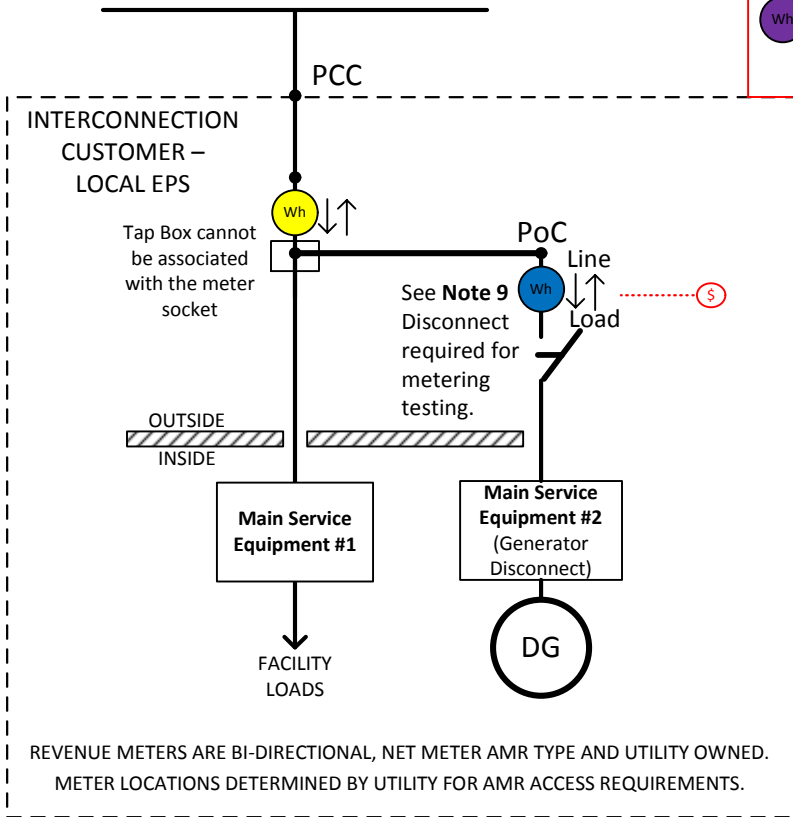
All Meters >60 kW; Bi-directional with Telemetry

REVENUE METERS ARE BI-DIRECTIONAL, NET METER AMR TYPE AND UTILITY OWNED.
METER LOCATIONS DETERMINED BY UTILITY FOR AMR ACCESS REQUIREMENTS.




RETAIL

Residential/Commercial DG Customer Behind the Meter MA SMART < 60 kW (Tap Ahead of Main Service Equipment)

UTILITY – AREA EPS



This diagram is representative of one proposal and the utility may require other configurations.

-  UTILITY SERVICE METER
-  UTILITY PV GENERATION METER
-  UTILITY STORAGE METER

All Meters >60 kW; Bi-directional with Telemetry

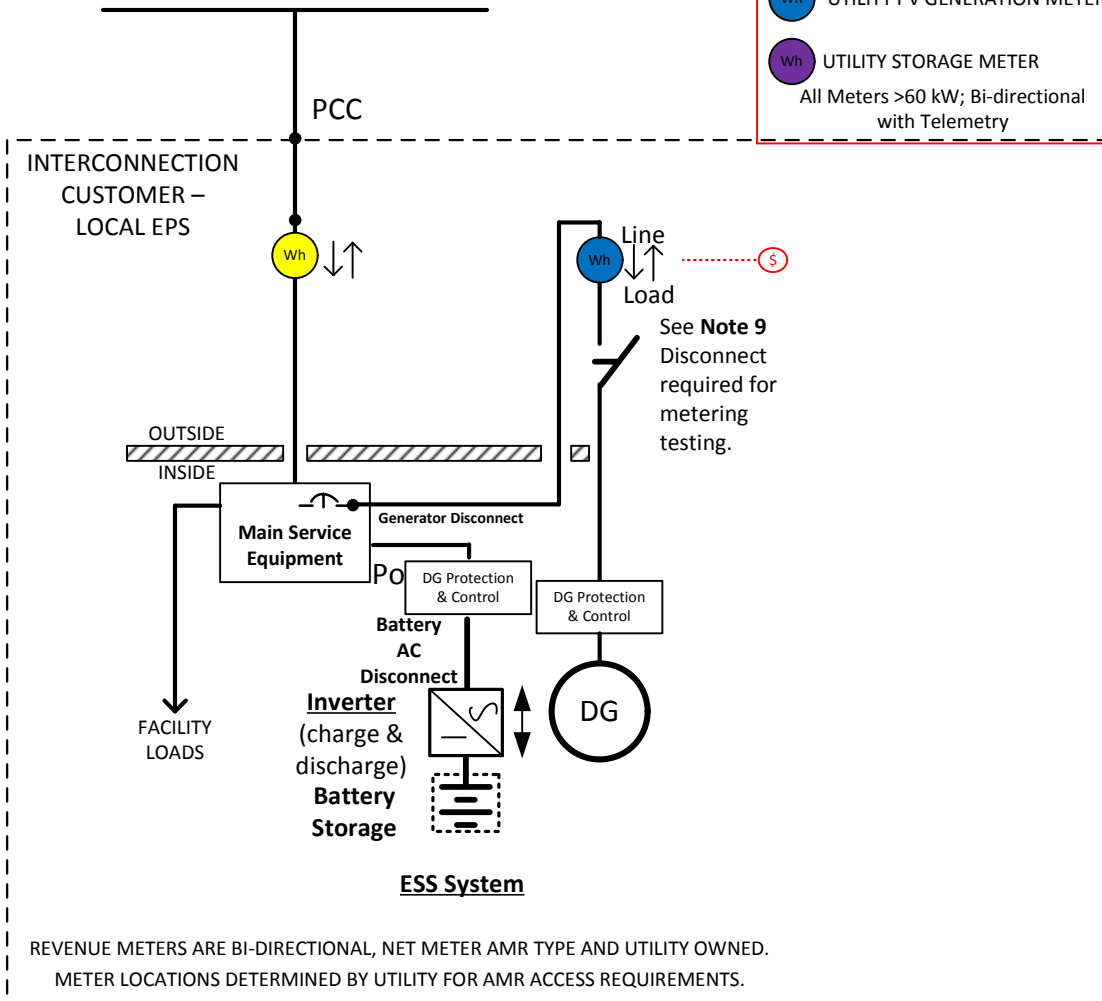
RETAIL

1c

Residential/Commercial DG Customer Behind the Meter MA SMART < 60 kW

With AC ESS SYSTEM

UTILITY – AREA EPS

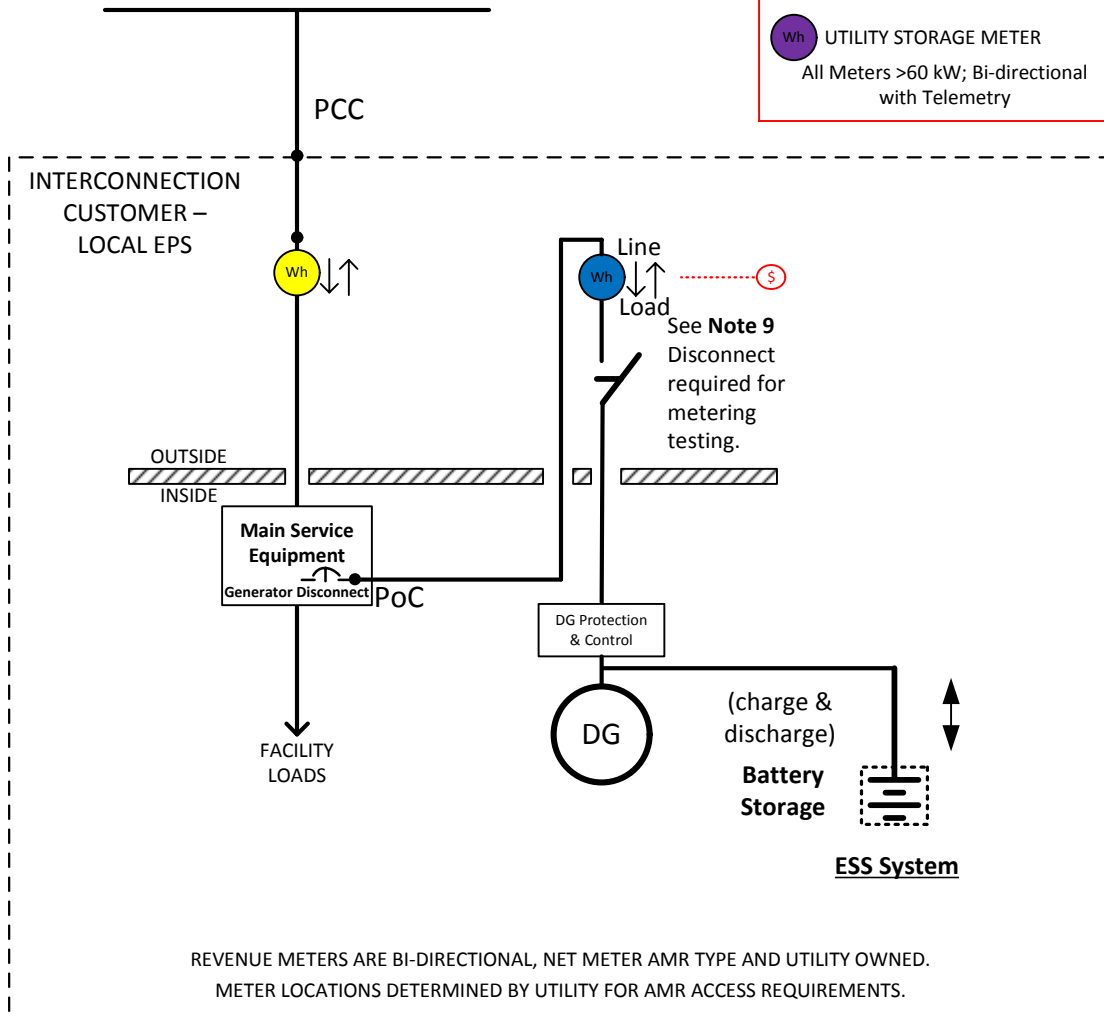


RETAIL

**Residential/Commercial DG Customer
Behind the Meter MA SMART < 60 kW**

With DC ESS SYSTEM

UTILITY – AREA EPS



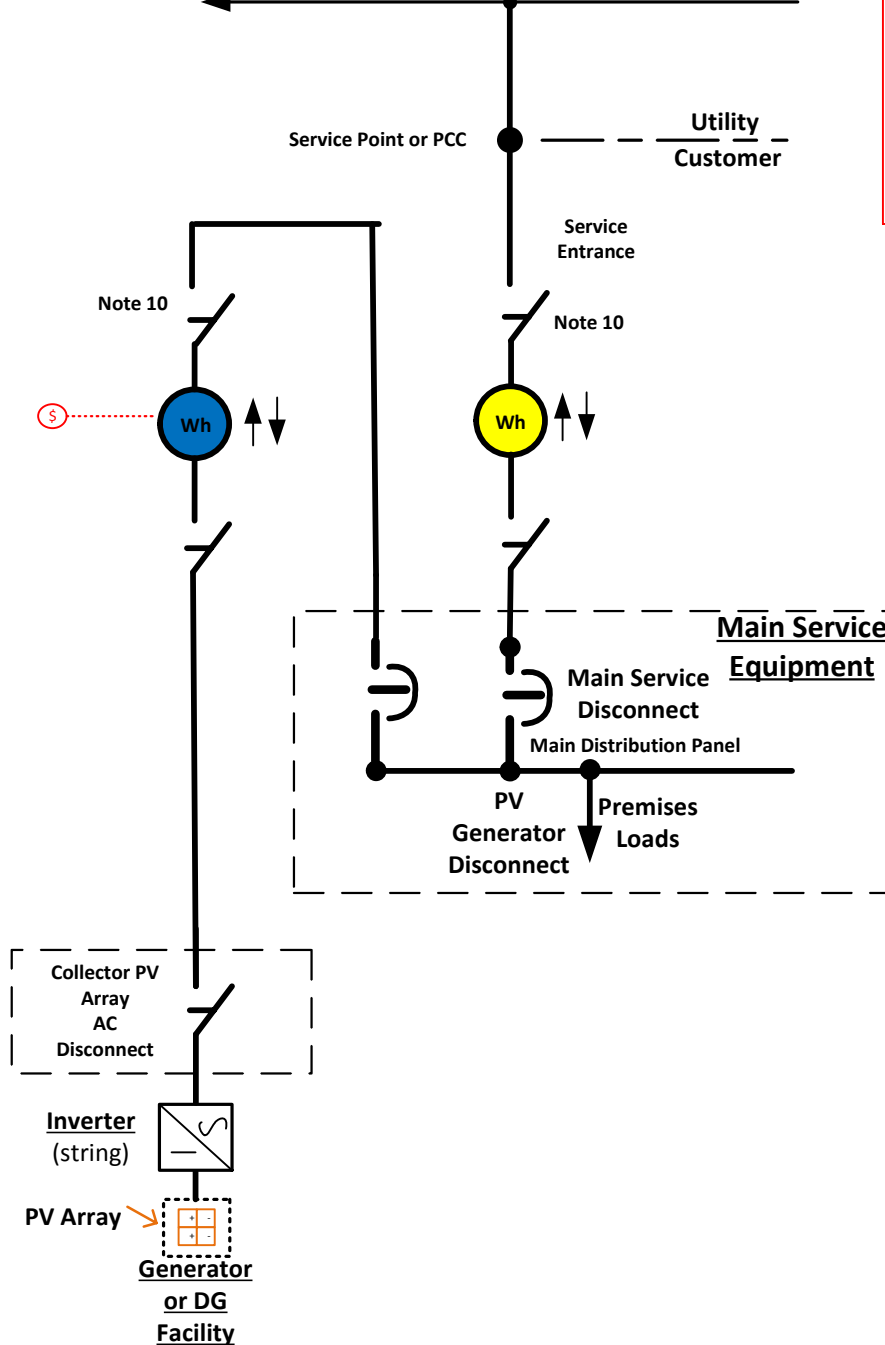
STGU AC Connection to Utility EPS 60 to 500kW

2a

Behind the Meter MA SMART

Utility's Radial Distribution
3-Phase, 4-Wire System

Secondary Metering






This diagram is representative of one proposal and the utility may require other configurations.

- UTILITY SERVICE METER
- UTILITY PV GENERATION METER
- UTILITY STORAGE METER

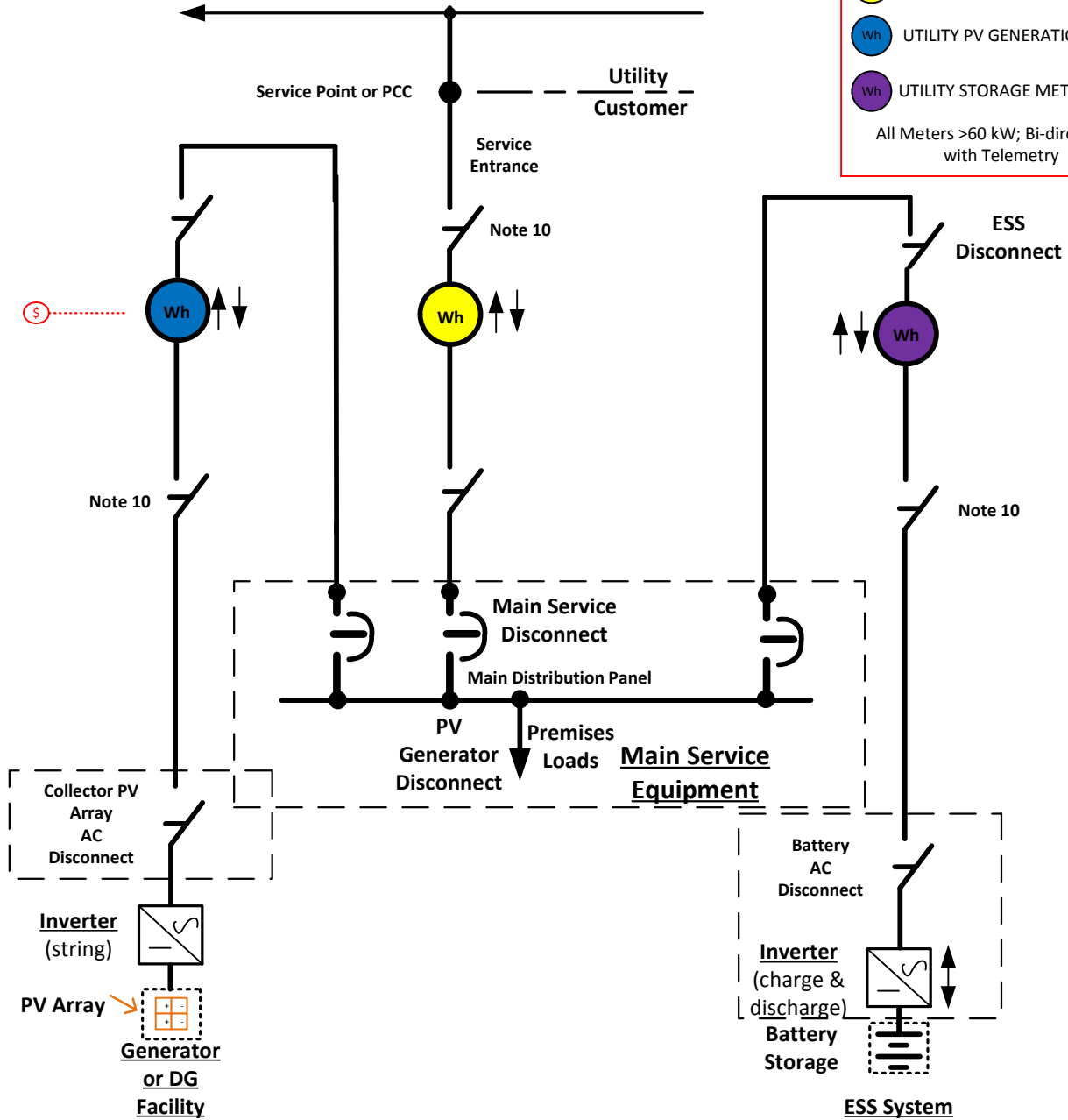
All Meters >60 kW; Bi-directional with Telemetry

Behind the Meter MA SMART
 Utility's Radial Distribution
 3-Phase, 4-Wire System
 Secondary Metering

This diagram is representative of one proposal and the utility may require other configurations.

-  UTILITY SERVICE METER
-  UTILITY PV GENERATION METER
-  UTILITY STORAGE METER

All Meters >60 kW; Bi-directional with Telemetry



DC ESS Battery + STGU Paired Connection to Utility EPS 60 to 500kW

2c

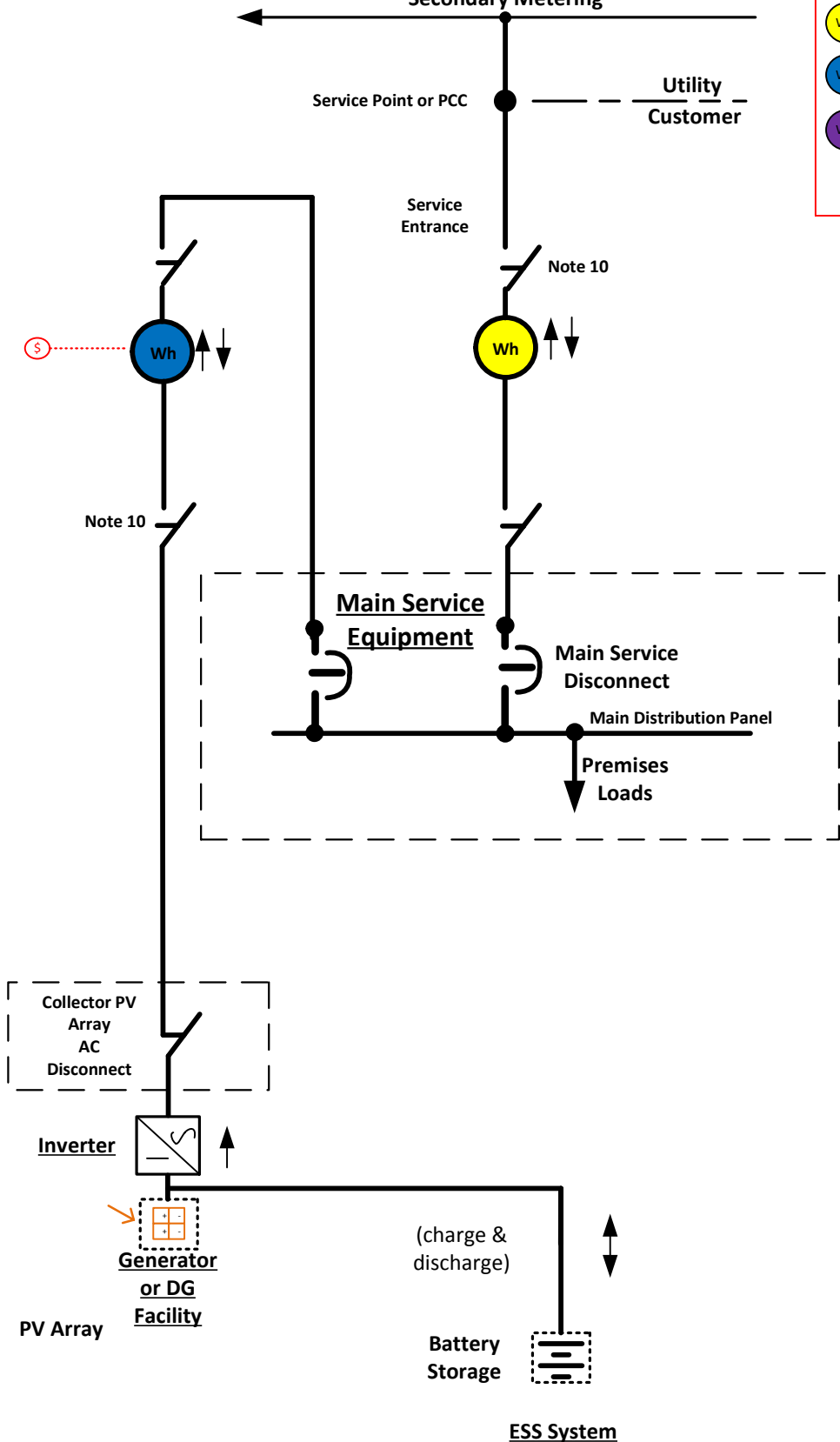
Behind the Meter MA SMART

Utility's Radial Distribution
3-Phase, 4-Wire System
Secondary Metering

This diagram is representative of one proposal and the utility may require other configurations.

- Wh (Yellow circle) UTILITY SERVICE METER
- Wh (Blue circle) UTILITY PV GENERATION METER
- Wh (Purple circle) UTILITY STORAGE METER

All Meters >60 kW; Bi-directional with Telemetry






ESS Battery + Multiple STGU Paired AC Connection to Utility EPS 60 to 500kW

2d

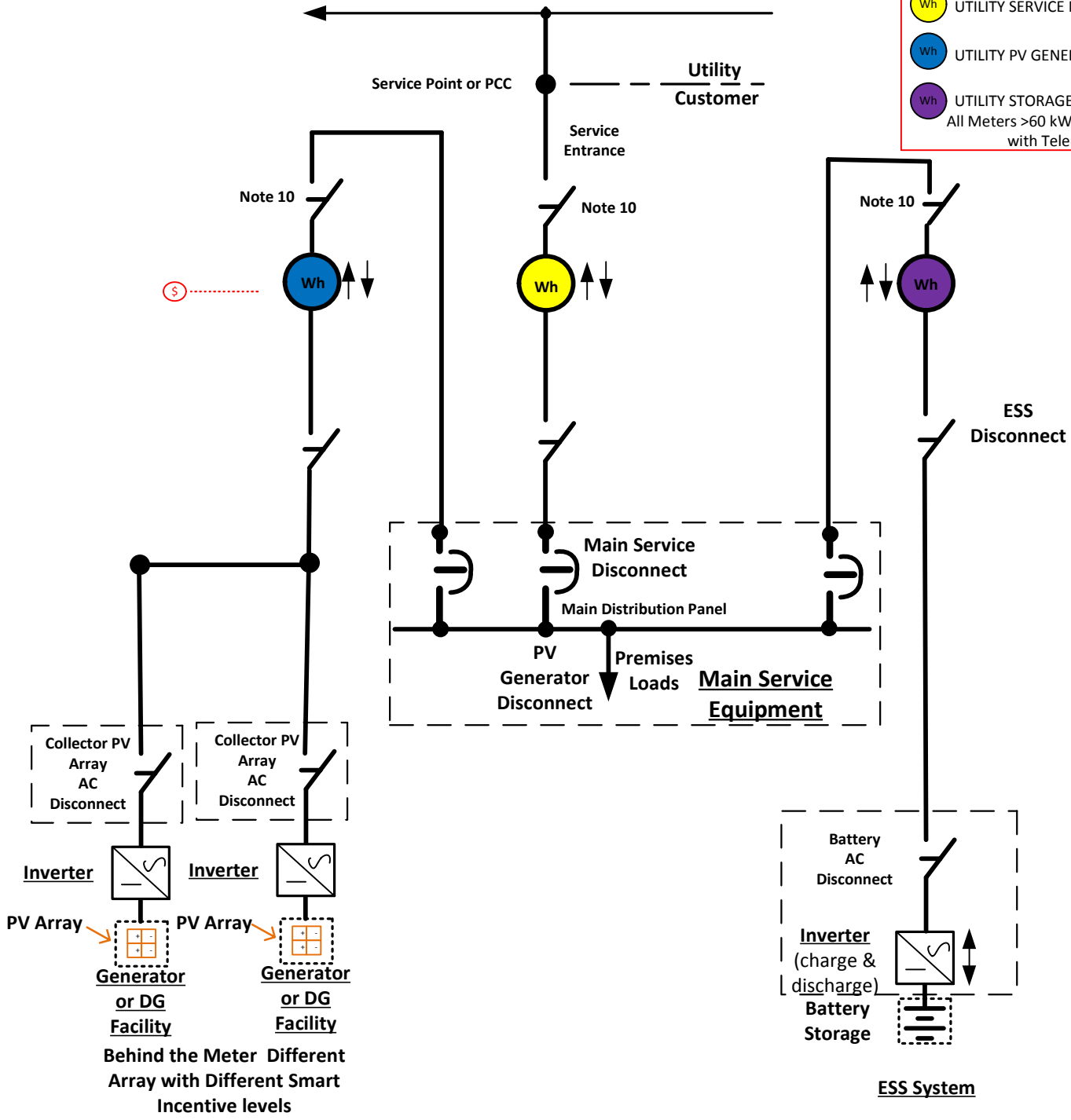
Behind the Meter MA SMART

Utility's Radial Distribution
3-Phase, 4-Wire System
Secondary Metering

This diagram is representative of one proposal and the utility may require other configurations.

-  UTILITY SERVICE METER
-  UTILITY PV GENERATION METER
-  UTILITY STORAGE METER

All Meters >60 kW; Bi-directional with Telemetry



STGU Paired AC Connection to Utility EPS 500kW and Greater

Behind the Meter MA SMART

Utility's Radial Distribution
Primary 3-Phase, 4-Wire System
Primary Metering



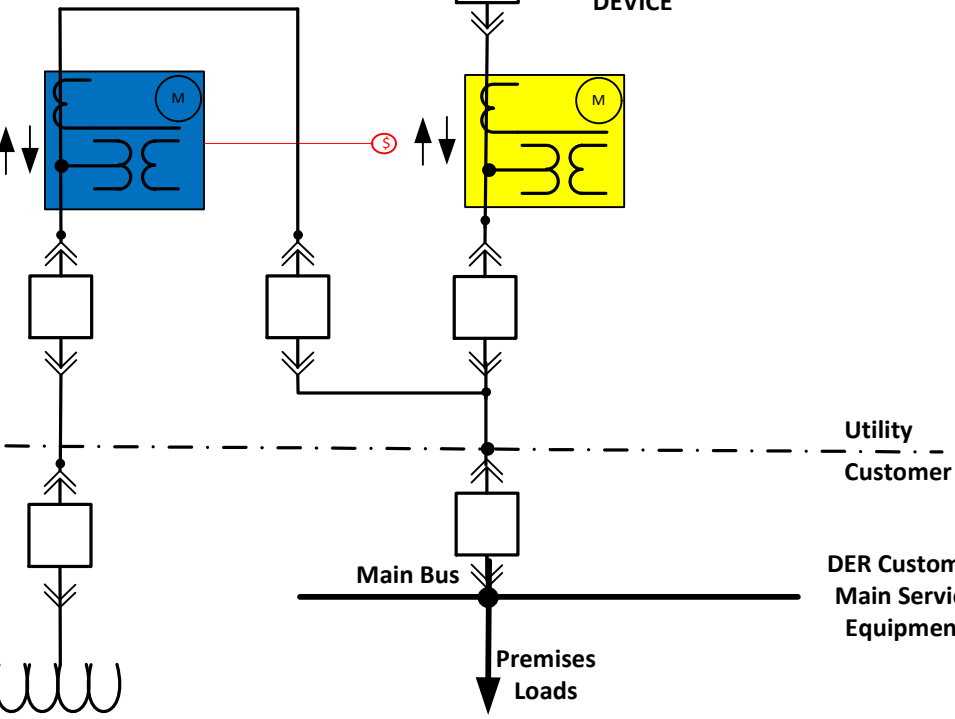
MAIN INTERRUPTING DEVICE

This diagram is representative of one proposal and the utility may require other configurations.

- M UTILITY SERVICE METER
- M UTILITY PV GENERATION METER
- M UTILITY STORAGE METER

All Meters >60 kW; Bi-directional with Telemetry

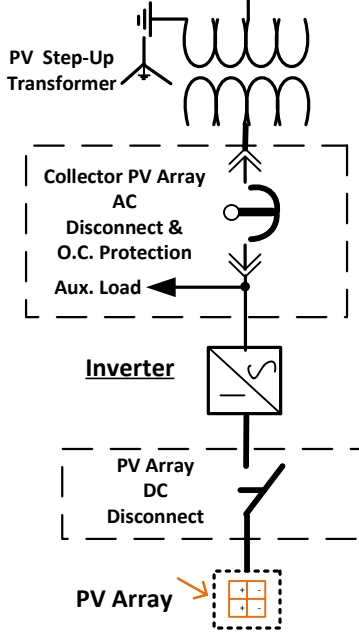
See Note 2



Utility Customer

DER Customer Main Service Equipment

Main Bus
Premises Loads



Customer's DER Facility




Behind the Meter MA SMART

Utility's Radial Distribution
Primary 3-Phase, 4-Wire System
Primary Metering

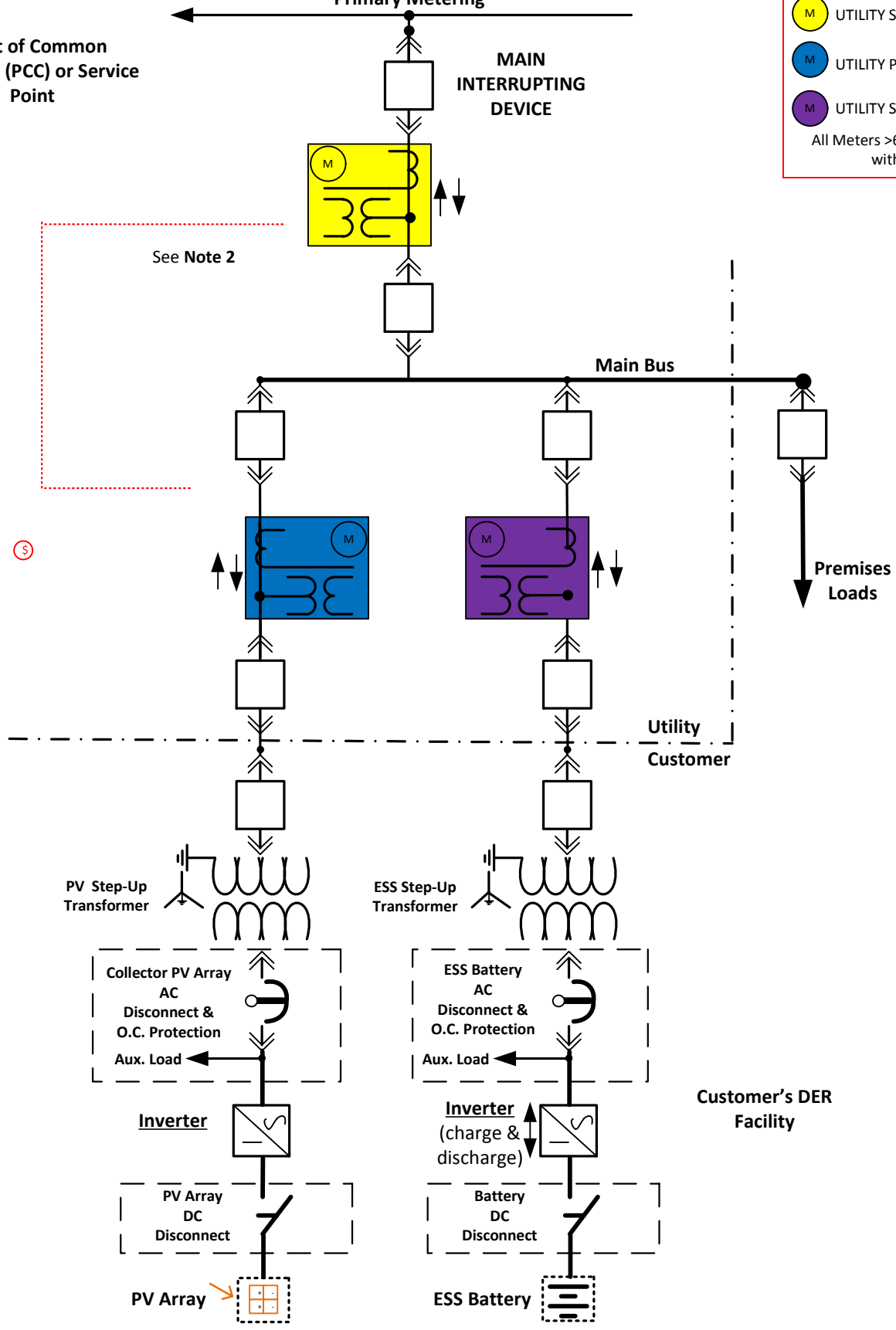
Point of Common Coupling (PCC) or Service Point

MAIN INTERRUPTING DEVICE

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-  UTILITY SERVICE METER
-  UTILITY PV GENERATION METER
-  UTILITY STORAGE METER

All Meters >60 kW; Bi-directional with Telemetry



See Note 2

Main Bus

Premises Loads

Utility
Customer

PV Step-Up Transformer

ESS Step-Up Transformer

Collector PV Array
AC Disconnect & O.C. Protection
Aux. Load

ESS Battery
AC Disconnect & O.C. Protection
Aux. Load

Inverter

Inverter (charge & discharge)

PV Array DC Disconnect

Battery DC Disconnect

PV Array

ESS Battery

Customer's DER Facility




Behind the Meter MA SMART

Utility's Radial Distribution
Primary 3-Phase, 4-Wire System
Primary Metering

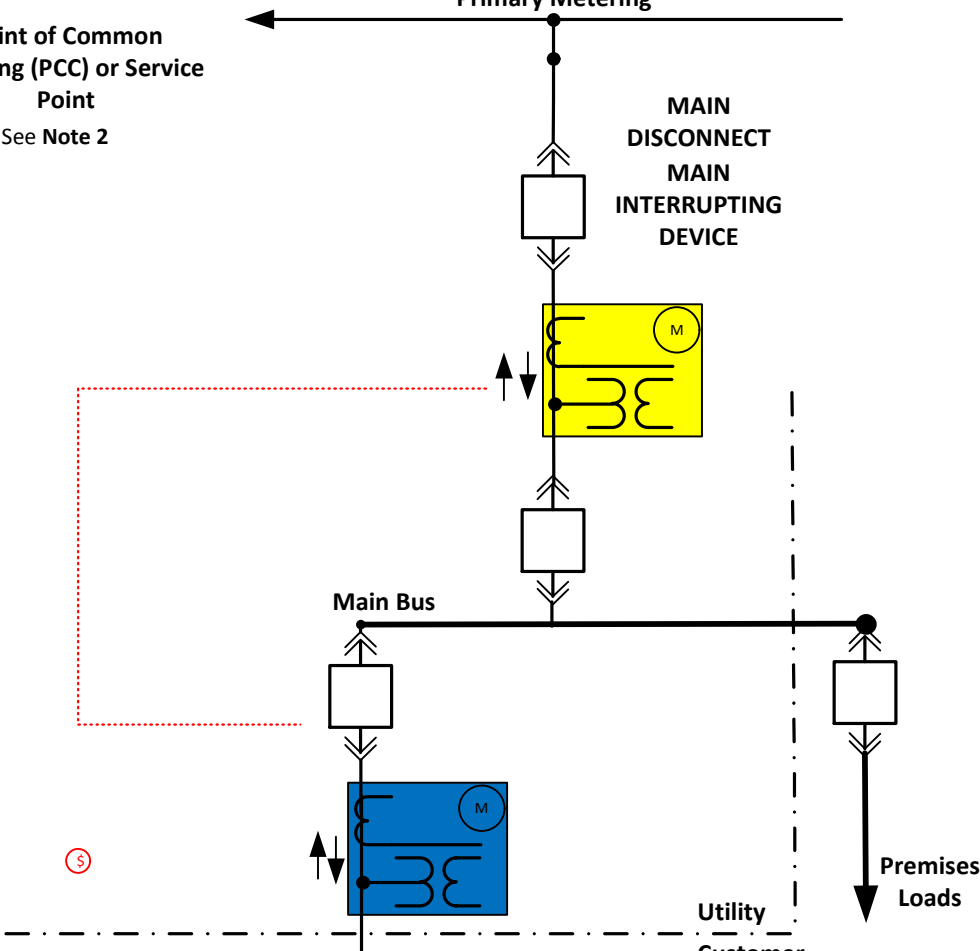
Point of Common
Coupling (PCC) or Service
Point
See Note 2

MAIN
DISCONNECT
MAIN
INTERRUPTING
DEVICE

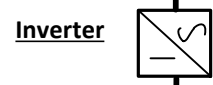
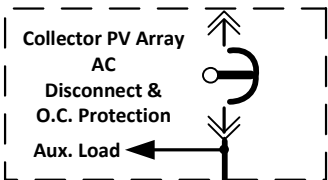
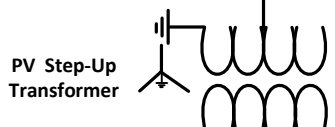
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-  UTILITY STORAGE METER

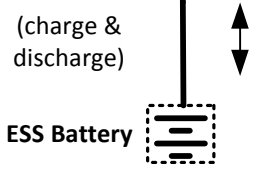
All Meters >60 kW; Bi-directional with Telemetry



(S)



Customer's DER
Facility



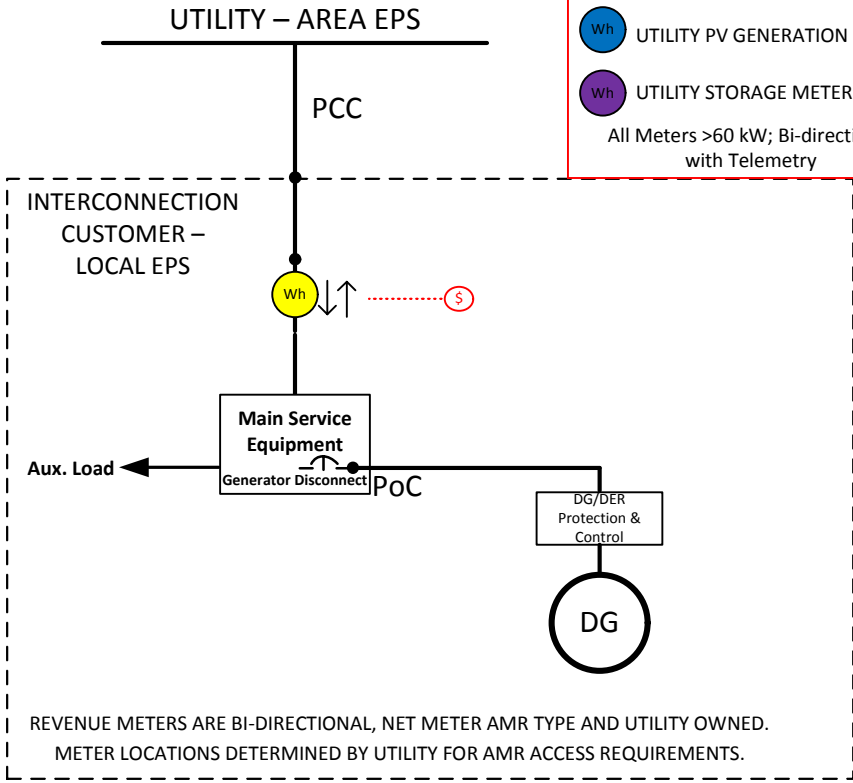
RETAIL

Residential/Commercial DG Customer Stand Alone MA SMART < 60 kW

This diagram is representative of one proposal and the utility may require other configurations.

- Wh UTILITY SERVICE METER
- Wh UTILITY PV GENERATION METER
- Wh UTILITY STORAGE METER




All Meters >60 kW; Bi-directional with Telemetry

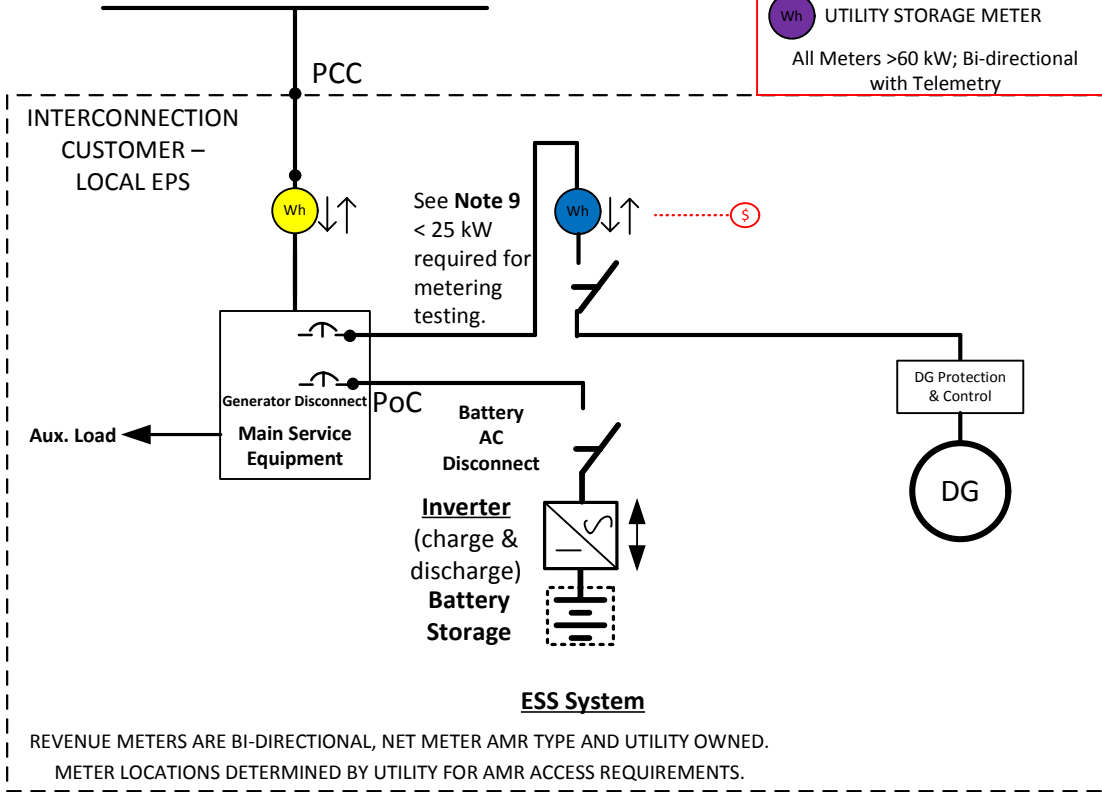


RETAIL

Residential/Commercial DG Customer
Stand Alone MA SMART < 60 kW
With AC ESS SYSTEM
UTILITY – AREA EPS

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-  UTILITY SERVICE METER
 -  UTILITY PV GENERATION METER
 -  UTILITY STORAGE METER
- All Meters >60 kW; Bi-directional with Telemetry

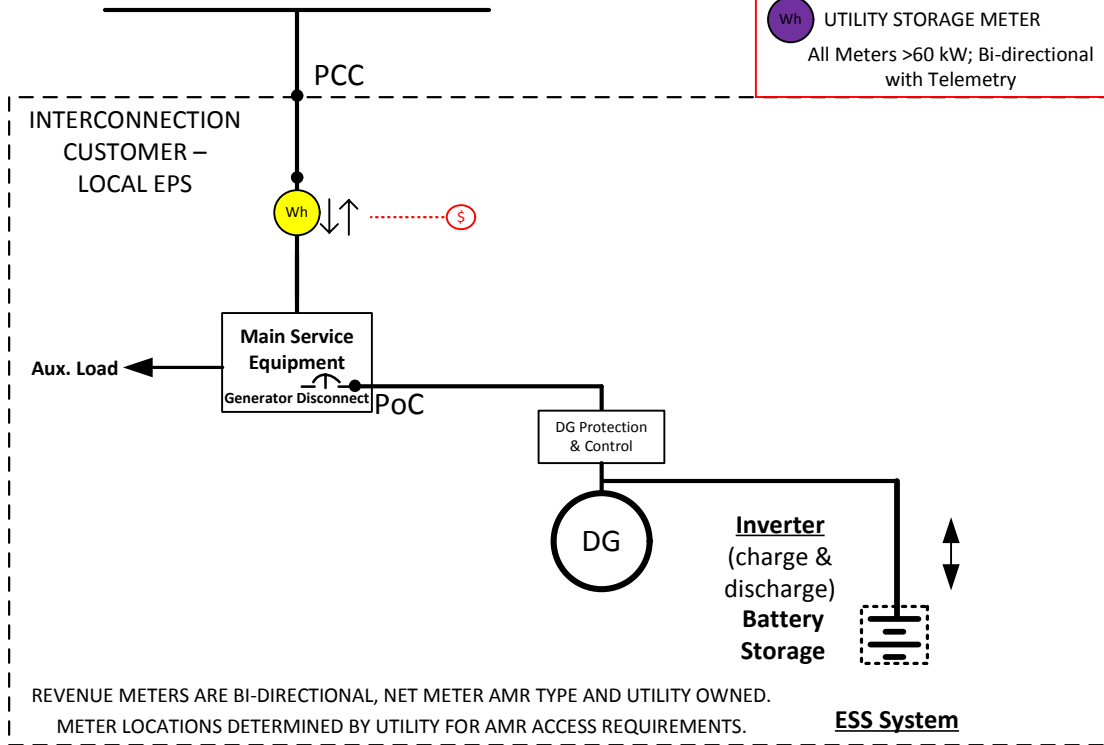


RETAIL

Residential/Commercial DG Customer
STAND ALONE MA SMART < 60 kW

With DC ESS SYSTEM

UTILITY – AREA EPS



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- UTILITY SERVICE METER
- UTILITY PV GENERATION METER
- UTILITY STORAGE METER

All Meters >60 kW; Bi-directional with Telemetry

REVENUE METERS ARE BI-DIRECTIONAL, NET METER AMR TYPE AND UTILITY OWNED.

METER LOCATIONS DETERMINED BY UTILITY FOR AMR ACCESS REQUIREMENTS.

ESS System




STAND ALONE MA SMART

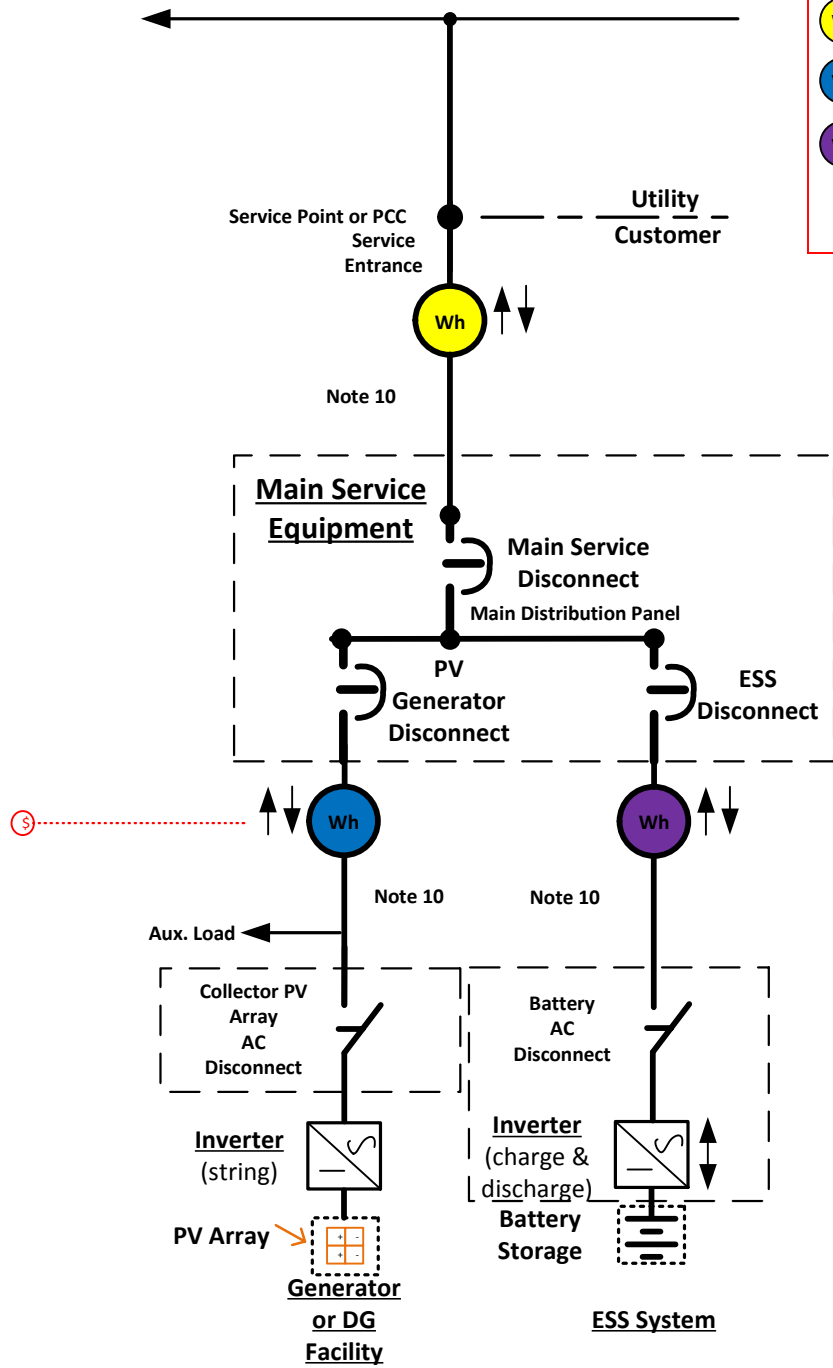
Utility's Radial Distribution

3-Phase, 4-Wire System

Secondary Metering

This diagram is representative of one proposal and the utility may require other configurations.

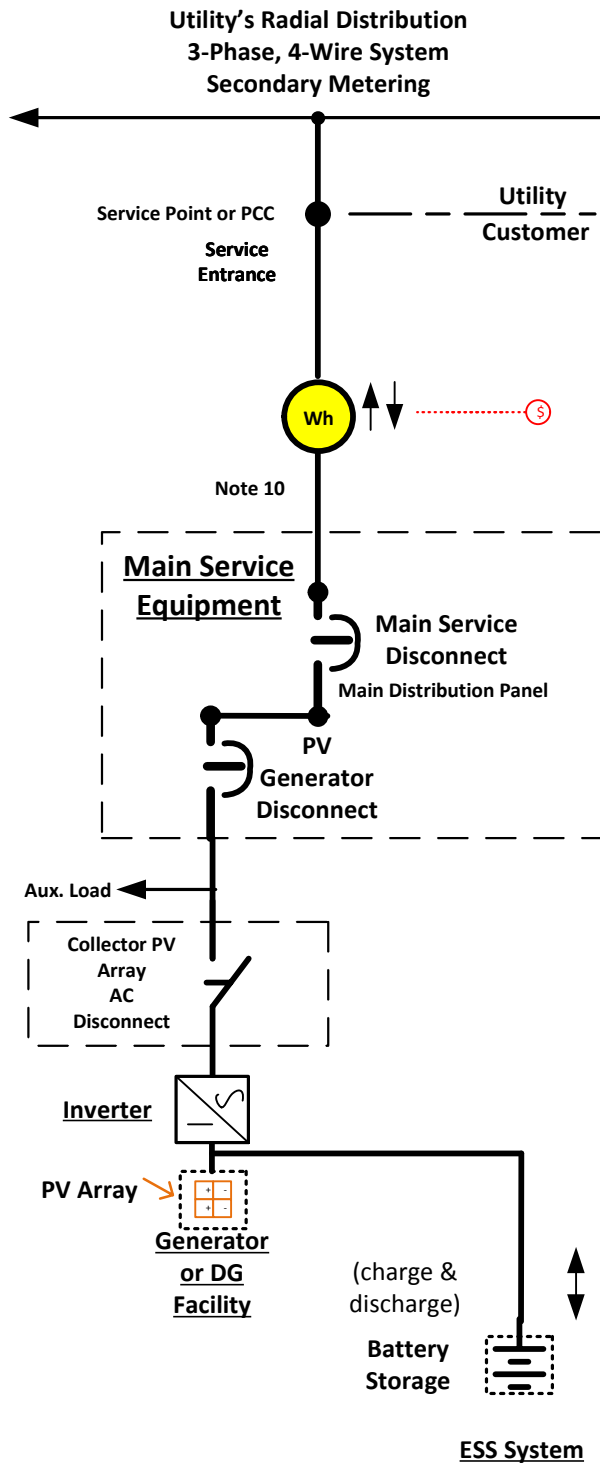
-  UTILITY SERVICE METER
 -  UTILITY PV GENERATION METER
 -  UTILITY STORAGE METER
- All Meters >60 kW; Bi-directional with Telemetry



DC ESS Battery + STGU Paired AC Connection to Utility EPS 60 to 500kW

STAND ALONE MA SMART

5c



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- Wh UTILITY SERVICE METER
- Wh UTILITY PV GENERATION METER
- Wh UTILITY STORAGE METER

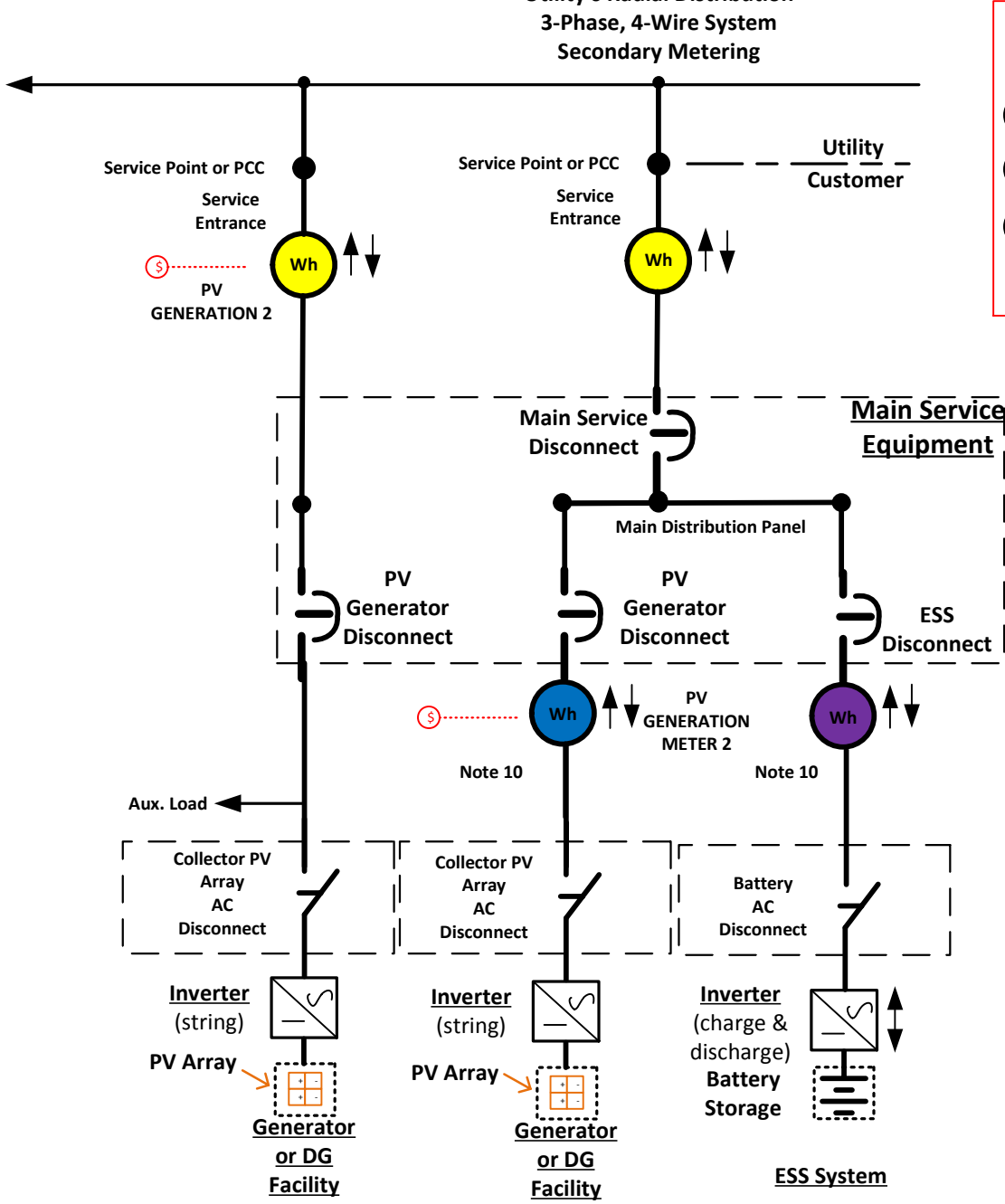
All Meters >60 kW; Bi-directional with Telemetry

AC ESS Battery + Multiple STGU's Paired AC Connection to Utility EPS 60 to 500kW

With Different Smart Incentive Rates if allowed

STAND ALONE MA SMART
Utility's Radial Distribution

5d



This diagram is representative of one proposal and the utility may require other configurations.

- Wh UTILITY SERVICE METER
- Wh UTILITY PV GENERATION METER
- Wh UTILITY STORAGE METER




All Meters >60 kW; Bi-directional with Telemetry

Stand Alone Different Array with Different Smart Incentive levels

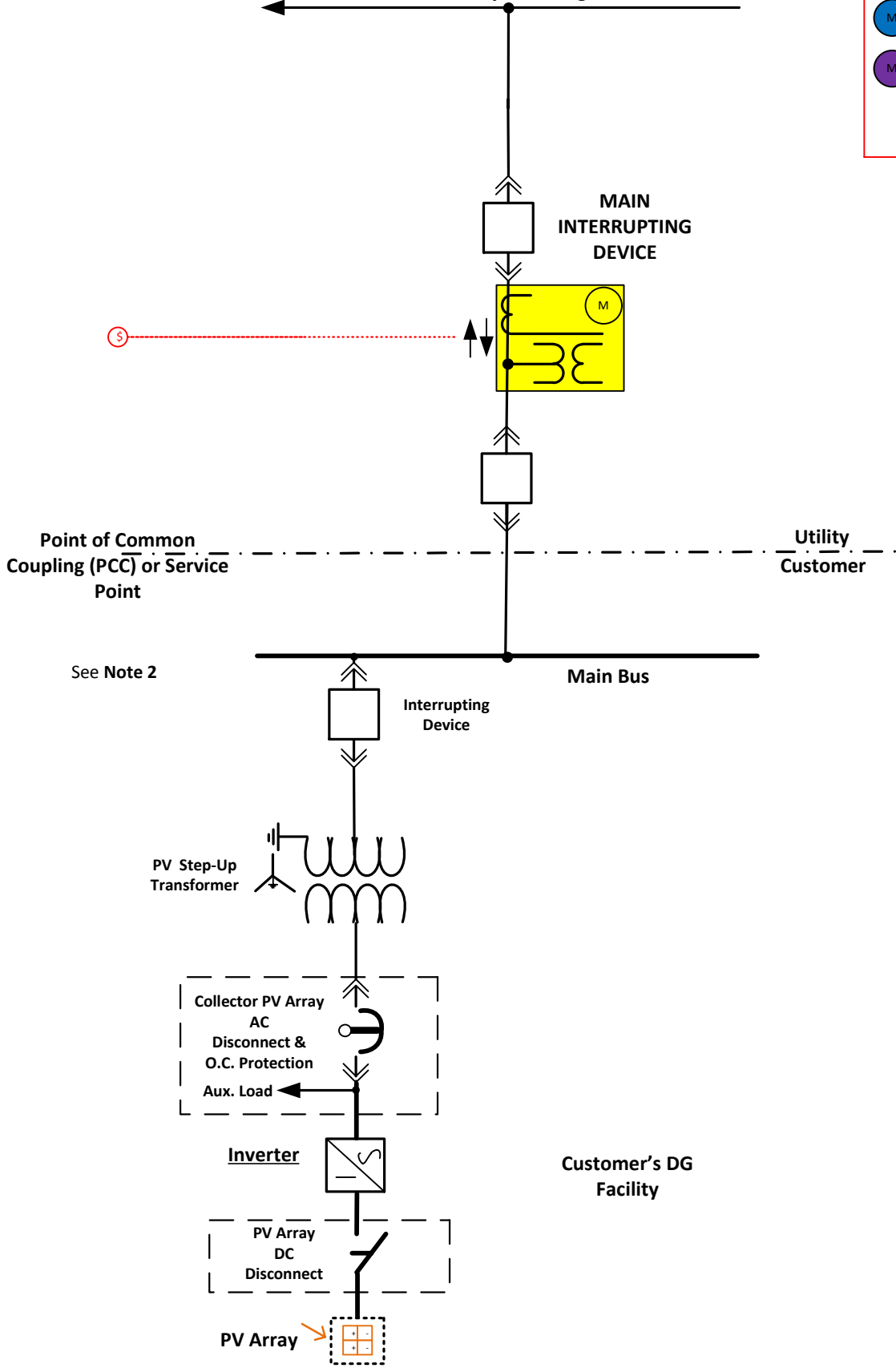
STGU AC Connection to Utility EPS 500kW and Greater
STAND ALONE MA SMART

Utility's Radial Distribution
 Primary 3-Phase, 4-Wire System
 Primary Metering

This diagram is representative of one proposal and the utility may require other configurations.

-  UTILITY SERVICE METER
-  UTILITY PV GENERATION METER
-  UTILITY STORAGE METER

All Meters >60 kW; Bi-directional with Telemetry



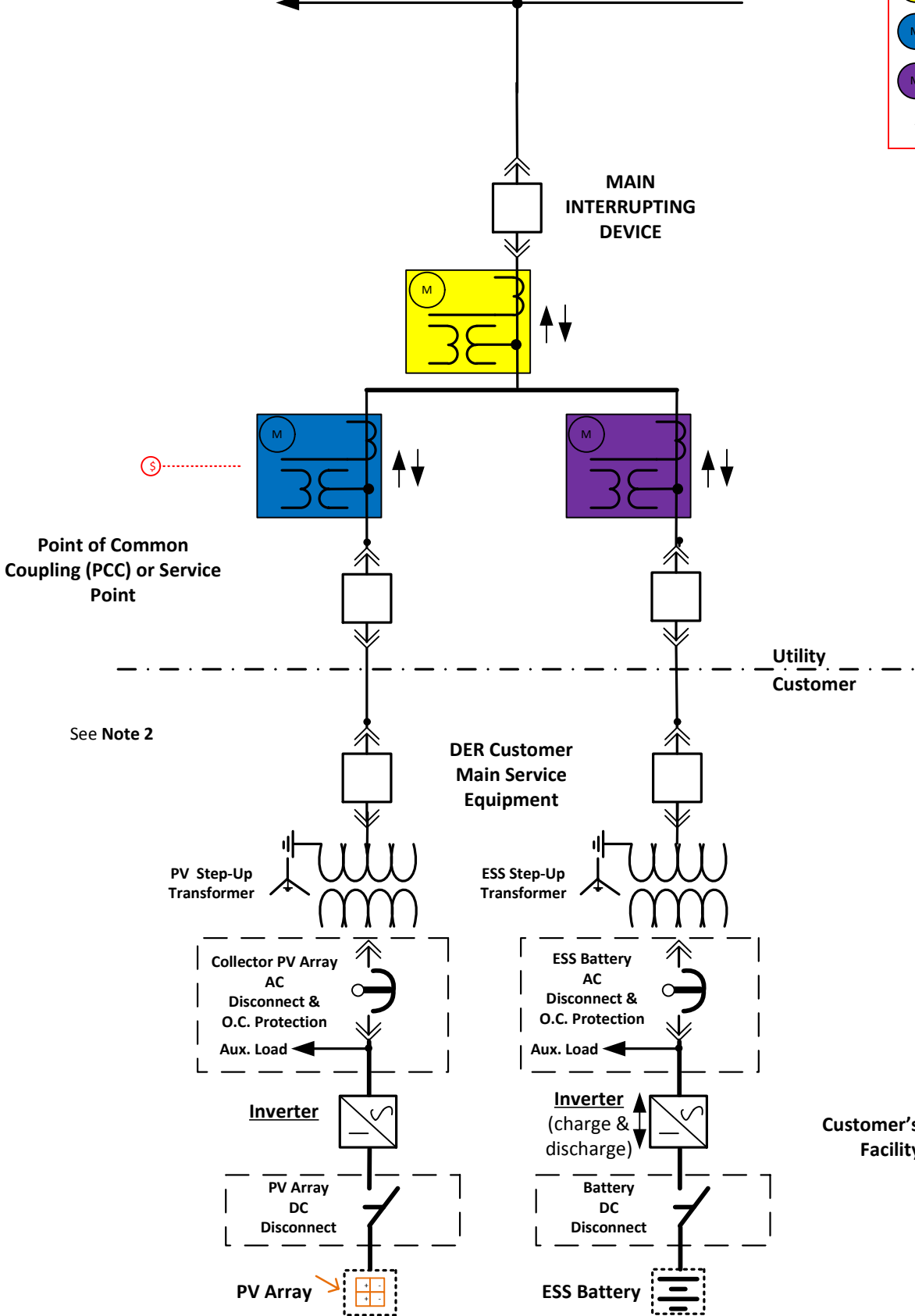
STAND ALONE MA SMART

Utility's Radial Distribution
Primary 3-Phase, 4-Wire System
Primary Metering

This diagram is representative of one proposal and the utility may require other configurations.

- M UTILITY SERVICE METER
- M UTILITY PV GENERATION METER
- M UTILITY STORAGE METER

All Meters >60 kW; Bi-directional with Telemetry



Customer's DER Facility

DC ESS Battery + STGU Paired AC Connection to Utility EPS 500kW and Greater

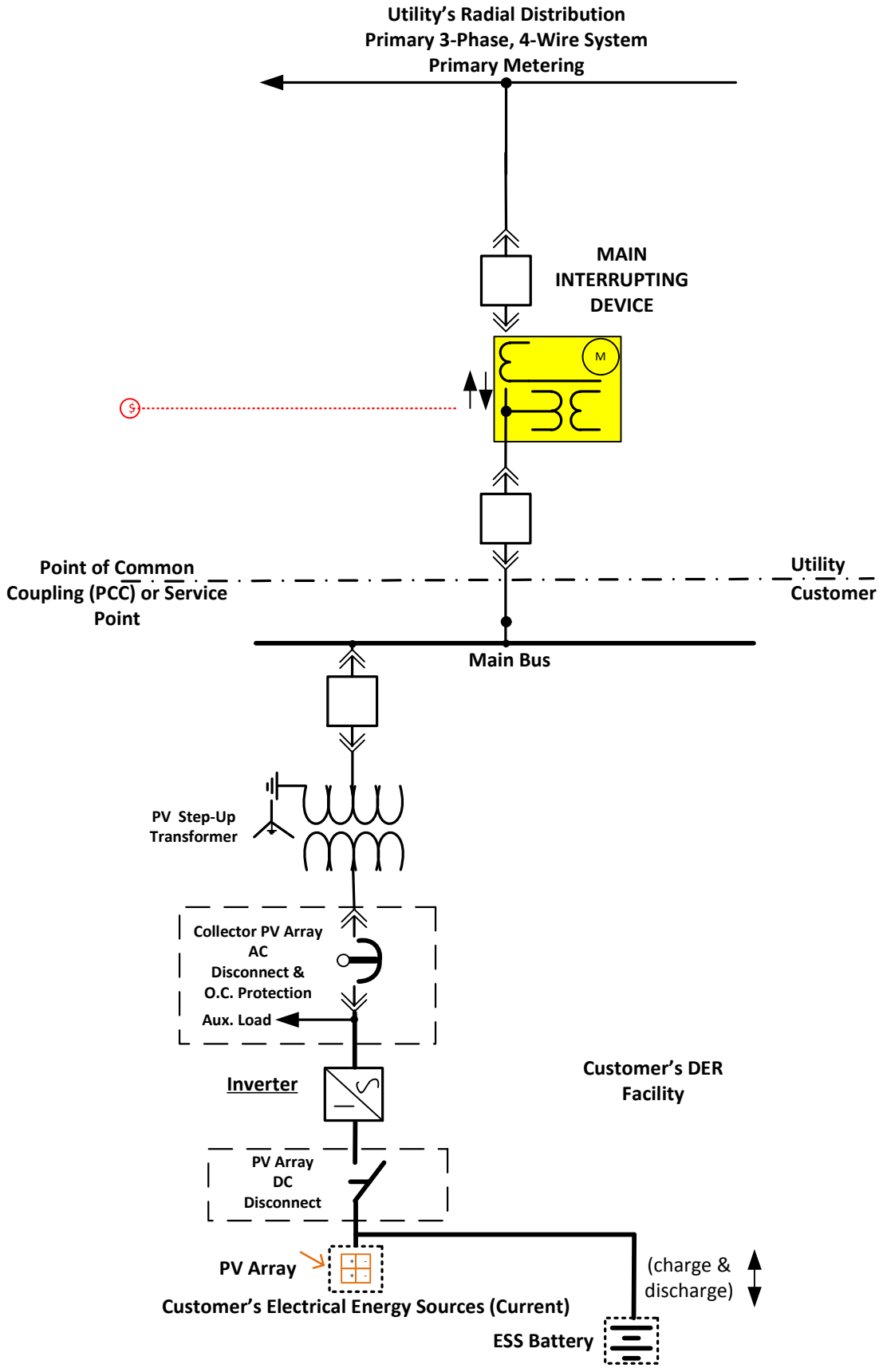
STAND ALONE MA SMART

6c

This diagram is representative of one proposal and the utility may require other configurations.

- M UTILITY SERVICE METER
- M UTILITY PV GENERATION METER
- M UTILITY STORAGE METER

All Meters >60 kW; Bi-directional with Telemetry



Customer's DER Facility

ESS Battery (charge & discharge)