FIGURE ILLUSTRATES REPRESENTATIVE CONCEPTS & INTENT

- Proprietary Inverter Isolation/Control Equipment. May vary depending on technology (inside panel or separate device).
- APS does not permit backfeeding the grid with battery energy irrespective if energy to charge the battery originated from APS.
- For backup power systems, isolation/separation from the grid is required during a grid outage.
- For systems that provide load shifting/peak shaving (of customer usage), DER systems are required to shut-down during a grid outage.
- Provisions for generator not depicted.
- These conceptual drawings provide typical isolation and metering equipment only.
FIGURE ILLUSTRATES REPRESENTATIVE CONCEPTS & INTENT

- PROPRIETARY INVERTER ISOLATION/CONTROL EQUIPMENT. MAY VARY DEPENDING ON TECHNOLOGY (INSIDE PANEL OR SEPARATE DEVICE).
- APS DOES NOT PERMIT BACKFEEDING THE GRID WITH BATTERY ENERGY IRRESPECTIVE IF ENERGY TO CHARGE THE BATTERY ORIGINATED FROM APS.
- FOR BACKUP POWER SYSTEMS, ISOLATION/SEPARATION FROM THE GRID IS REQUIRED DURING A GRID OUTAGE
- FOR SYSTEMS THAT PROVIDE LOAD SHIFTING/PEAK SHAVING (OF CUSTOMER USAGE), DER SYSTEMS ARE REQUIRED TO SHUT-DOWN DURING A GRID OUTAGE
- PROVISIONS FOR GENERATOR NOT DEPICTED.
- THESE CONCEPTUAL DRAWINGS PROVIDE TYPICAL ISOLATION AND METERING EQUIPMENT ONLY.

![Diagram of AC coupled configuration A-2 with battery charged from grid (DER storage only).]
FIGURE ILLUSTRATES REPRESENTATIVE CONCEPTS & INTENT

- PROPRIETARY INVERTER ISOLATION/CONTROL EQUIPMENT. MAY VARY DEPENDING ON TECHNOLOGY (INSIDE PANEL OR SEPARATE DEVICE).
- APS DOES NOT PERMIT BACKFEEDING THE GRID WITH BATTERY ENERGY IRRESPECTIVE IF ENERGY TO CHARGE THE BATTERY ORIGINATED FROM APS.
- FOR BACKUP POWER SYSTEMS, ISOLATION/SEPARATION FROM THE GRID IS REQUIRED DURING A GRID OUTAGE
- FOR SYSTEMS THAT PROVIDE LOAD SHIFTING/PEAK SHAVING (OF CUSTOMER USAGE), DER SYSTEMS ARE REQUIRED TO SHUT-DOWN DURING A GRID OUTAGE
- PROVISIONS FOR GENERATOR NOT DEPICTED.
- THESE CONCEPTUAL DRAWINGS PROVIDE TYPICAL ISOLATION AND METERING EQUIPMENT ONLY.

AC COUPLED CONFIGURATION B-1
BATTERY CHARGED FROM
GRID OR RENEWABLE ENERGY
FIGURE ILLUSTRATES REPRESENTATIVE CONCEPTS & INTENT

- PROPRIETARY INVERTER ISOLATION/CONTROL EQUIPMENT. MAY VARY DEPENDING ON TECHNOLOGY (INSIDE PANEL OR SEPARATE DEVICE).
- APS DOES NOT PERMIT BACKFEEDING THE GRID WITH BATTERY ENERGY IRRESPECTIVE IF ENERGY TO CHARGE THE BATTERY ORIGINATED FROM APS.
- FOR BACKUP POWER SYSTEMS, ISOLATION/SEPARATION FROM THE GRID IS REQUIRED DURING A GRID OUTAGE
- FOR SYSTEMS THAT PROVIDE LOAD SHIFTING/PEAK SHAVING (OF CUSTOMER USAGE), DER SYSTEMS ARE REQUIRED TO SHUT-DOWN DURING A GRID OUTAGE
- PROVISIONS FOR GENERATOR NOT DEPICTED.
- THESE CONCEPTUAL DRAWINGS PROVIDE TYPICAL ISOLATION AND METERING EQUIPMENT ONLY.
FIGURE ILLUSTRATES REPRESENTATIVE CONCEPTS & INTENT

- PROPRIETARY INVERTER ISOLATION/CONTROL EQUIPMENT. MAY VARY DEPENDING ON TECHNOLOGY (INSIDE PANEL OR SEPARATE DEVICE).
- APS DOES NOT PERMIT BACKFEEDING THE GRID WITH BATTERY ENERGY IRRESPECTIVE IF ENERGY TO CHARGE THE BATTERY ORIGINATED FROM APS.
- FOR BACKUP POWER SYSTEMS, ISOLATION/Separation FROM THE GRID IS REQUIRED DURING A GRID OUTAGE
- FOR SYSTEMS THAT PROVIDE LOAD SHIFTING/PEAK SHAVING (OF CUSTOMER USAGE), DER SYSTEMS ARE REQUIRED TO SHUT-DOWN DURING A GRID OUTAGE
- PROVISIONS FOR GENERATOR NOT DEPICTED.
- THESE CONCEPTUAL DRAWINGS PROVIDE TYPICAL ISOLATION AND METERING EQUIPMENT ONLY.
FIGURE ILLUSTRATES REPRESENTATIVE CONCEPTS & INTENT
- PROPRIETARY INVERTER ISOLATION/CONTROL EQUIPMENT. MAY VARY DEPENDING ON TECHNOLOGY (INSIDE PANEL OR SEPARATE DEVICE).
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- PROVISIONS FOR GENERATOR NOT DEPICTED.
- THESE CONCEPTUAL DRAWINGS PROVIDE TYPICAL ISOLATION AND METERING EQUIPMENT ONLY.
FIGURE ILLUSTRATES REPRESENTATIVE CONCEPTS & INTENT
- PROPRIETARY INVERTER ISOLATION/CONTROL EQUIPMENT. MAY VARY DEPENDING ON TECHNOLOGY (INSIDE PANEL OR SEPARATE DEVICE).
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- FOR SYSTEMS THAT PROVIDE LOAD SHIFTING/PEAK SHAVING (OF CUSTOMER USAGE), DER SYSTEMS ARE REQUIRED TO SHUT-DOWN DURING A GRID OUTAGE
- PROVISIONS FOR GENERATOR NOT DEPICTED.
- THESE CONCEPTUAL DRAWINGS PROVIDE TYPICAL ISOLATION AND METERING EQUIPMENT ONLY.

AC COUPLED CONFIGURATION B-5
BATTERY CHARGED FROM GRID OR RENEWABLE ENERGY
FIGURE ILLUSTRATES REPRESENTATIVE CONCEPTS & INTENT
- PROPRIETARY INVERTER ISOLATION/CONTROL EQUIPMENT MAY VARY DEPENDING ON TECHNOLOGY (INSIDE PANEL OR SEPARATE DEVICE).
- APS DOES NOT PERMIT BACKFEEDING THE GRID WITH BATTERY ENERGY IRRESPECTIVE IF ENERGY TO CHARGE THE BATTERY ORIGINATED FROM APS.
- FOR BACKUP POWER SYSTEMS, ISOLATION/SEPARATION FROM THE GRID IS REQUIRED DURING A GRID OUTAGE
- FOR SYSTEMS THAT PROVIDE LOAD SHIFTING/PEAK SHAVING (OF CUSTOMER USAGE), DER SYSTEMS ARE REQUIRED TO SHUT-DOWN DURING A GRID OUTAGE
- PROVISIONS FOR GENERATOR NOT DEPICTED.
- THESE CONCEPTUAL DRAWINGS PROVIDE TYPICAL ISOLATION AND METERING EQUIPMENT ONLY.

DURING LOAD CURTAILMENT MODE, ENERGY STORAGE EXPORT ONLY FLOWS THROUGH THE LOAD CURTAILMENT CIRCUIT. THE PROTECTED LOAD PANEL ONLY RECEIVES ENERGY STORAGE EXPORT IN THE EVENT OF A GRID OUTAGE.
FIGURE ILLUSTRATES REPRESENTATIVE CONCEPTS & INTENT

- PROPRIETARY INVERTER ISOLATION/CONTROL EQUIPMENT. MAY VARY DEPENDING ON TECHNOLOGY (INSIDE PANEL OR SEPARATE DEVICE).
- APS DOES NOT PERMIT BACKFEEDING THE GRID WITH BATTERY ENERGY IRRESPECTIVE IF ENERGY TO CHARGE THE BATTERY ORIGINATED FROM APS.
- FOR BACKUP POWER SYSTEMS, ISOLATION/Separation FROM THE GRID IS REQUIRED DURING A GRID OUTAGE
- FOR SYSTEMS THAT PROVIDE LOAD SHIFTING/PEAK SHAVING (OF CUSTOMER USAGE), DER SYSTEMS ARE REQUIRED TO SHUT-DOWN DURING A GRID OUTAGE
- PROVISIONS FOR GENERATOR NOT DEPICTED.
- THESE CONCEPTUAL DRAWINGS PROVIDE TYPICAL ISOLATION AND METERING EQUIPMENT ONLY.

DURING LOAD CURTAILMENT MODE, ENERGY STORAGE EXPORT ONLY FLOWS THROUGH THE LOAD CURTAILMENT CIRCUIT. THE PROTECTED LOAD PANEL ONLY RECEIVES ENERGY STORAGE EXPORT IN THE EVENT OF A GRID OUTAGE.
FIGURE ILLUSTRATES REPRESENTATIVE CONCEPTS & INTENT
- PROPRIETARY INVERTER ISOLATION/CONTROL EQUIPMENT. MAY VARY DEPENDING ON TECHNOLOGY (INSIDE PANEL OR SEPARATE DEVICE).
- APS DOES NOT PERMIT BACKFEEDING THE GRID WITH BATTERY ENERGY IRRESPECTIVE IF ENERGY TO CHARGE THE BATTERY ORIGINATED FROM APS.
- FOR BACKUP POWER SYSTEMS, ISOLATION/Separation FROM THE GRID IS REQUIRED DURING A GRID OUTAGE
- FOR SYSTEMS THAT PROVIDE LOAD SHIFTING/PEAK SHAVING (OF CUSTOMER USAGE), DER SYSTEMS ARE REQUIRED TO SHUT-DOWN DURING A GRID OUTAGE
- PROVISIONS FOR GENERATOR NOT DEPICTED.
- THESE CONCEPTUAL DRAWINGS PROVIDE TYPICAL ISOLATION AND METERING EQUIPMENT ONLY.
FIGURE ILLUSTRATES REPRESENTATIVE CONCEPTS & INTENT

- PROPRIETARY INVERTER ISOLATION/CONTROL EQUIPMENT. MAY VARY DEPENDING ON TECHNOLOGY (INSIDE PANEL OR SEPARATE DEVICE).
- APS DOES NOT PERMIT BACKFEEDING THE GRID WITH BATTERY ENERGY IRRESPECTIVE IF ENERGY TO CHARGE THE BATTERY ORIGINATED FROM APS.
- FOR BACKUP POWER SYSTEMS, ISOLATION/SEPARATION FROM THE GRID IS REQUIRED DURING A GRID OUTAGE
- FOR SYSTEMS THAT PROVIDE LOAD SHIFTING/PEAK SHAVING (OF CUSTOMER USAGE), DER SYSTEMS ARE REQUIRED TO SHUT-DOWN DURING A GRID OUTAGE
- PROVISIONS FOR GENERATOR NOT DEPICTED.
- THESE CONCEPTUAL DRAWINGS PROVIDE TYPICAL ISOLATION AND METERING EQUIPMENT ONLY.

NOTE:
THE PROTECTED LOAD PANEL COULD BE A SEPARATE LOAD PANEL AS SHOWN IN THE DIAGRAM OR COULD BE THE ENTIRE MAIN PANEL.
1. All Customer equipment shall be installed and maintained by the Customer in accordance with the local A-HJ, NEC and APS. If no jurisdictional authority is responsible, a Letter In-Lieu of Electrical Clearance shall be required following completion of all work.

2. DER systems with storage utilized to serve a Customer back-up load panel will require an Automatic Disconnect Switch (ADS) to isolate the Customer back-up load panel in the event of a system outage. The Customer is responsible for selecting and installing any devices required to affect this transfer. The ADS may be integrated into a DER storage system, inverter/battery charger or may be a separate device. APS recommends installing an ADS system compliant with UL 1006.

3. The output of multiple DER generationinverters shall be combined before connecting to the dedicated DER kWh meter such that each billing meter is to have only one dedicated DER kWh meter and associated disconnect switch used to isolate the entire system. DER systems with storage installed in conjunction with a DER generation system or in a stand-alone application shall include an associated meter socket and disconnect switch as shown.

4. The utility AC disconnect switch shall be connected between the Electric Service Entrance Section (SES) and DER system as shown. A Customer-fused disconnect switch required for residential and commercial DER systems, with a short circuit rating greater than 10 kA, shall be connected between the SES and utility AC disconnect switch.

Utility AC disconnect switch, NEMA 3R or better, shall be visual open in accordance with Section 8.2 of the APS Interconnection Requirements with provisions for locking the door closed and locking the operating handle (blades) open with an APS lock only.

5. For systems with DER generation and storage, a DER/ESS/PV meter disconnect switch shall be connected between the DER kWh meter and the protected load panel as shown. DER meter disconnect switch, NEMA 3R or better, shall be visual open in accordance with Section 8.2 of the APS Interconnection Requirements with provisions for locking the door closed and locking the operating handle (blades) open with an APS lock only. Additionally, label as required per NEC 2017, Article 404.8(C), exception “WARNING, LOAD SIDE TERMINALS MAY BE ENERGIZED BY BACKFEED.”

6. For systems with DER generation and storage, a PV meter disconnect switch shall be connected between the PV kWh meter and the Electric Service Entrance Section as shown. PV meter disconnect switch, NEMA 3R or better, shall be visual open in accordance with Section 8.2 of the APS Interconnection Requirements with provisions for locking the door closed and locking the operating handle (blades) open with an APS lock only.

7. The SES, utility AC disconnect switch(es), production meter socket(s) and DES/ESS/PV meter disconnect switch(es) shall be grouped together within a maximum distance of 10’ with no obstructions and Readily Accessible per APS Requirements.

EXCEPTION: If conditions prohibit grouping the utility AC disconnect switch(es), production meter socket(s) and DER/ESS/PV meter disconnect switches within 10’ of the SES, the production meter socket(s) and associated AC disconnect switch(es) may be remotely located; however, APS approval is required. The remote location must be Readily Accessible location per APS Requirements. The SES shall have signage indicating an interconnected generator, specific location of the AC disconnect switch, and the DER meter socket, as applicable.

The utility AC disconnect switch(es), DER/ESS/PV meter disconnect switch(es), and production meter socket(s) shall be a minimum 36” from any natural gas vent in accordance with the APS ESRM, Section 301.15.

If the SES is upgraded, a new SES may require relocation. Consult an APS Design representative.

8. Customer shall provide the following to APS:

A. Site plan indicating location of the SES, utility AC disconnect switch(es), DER/ESS/PV meter disconnect switch(es), and production meter socket(s).

B. Three line diagram including interconnection of the SES.

C. Manufacturer data including model number and specifications for the following equipment:
   1. Inverter (must comply with UL1741/UL1741SA latest version)
   2. Production meter sockets
   3. Meter disconnect switch(es)
   4. Utility AC disconnect switch(es)
   5. Customer-fused disconnect switch(es), if installed (separate from utility AC disconnect switch(es))
   6. Supply side tap apparatus & compliance information (Refer to Section 8.1F of the APS Interconnection Requirements)

Specifications shall include all ratings, NEMA enclosure codes (3R or better), and short-circuit ratings (AC disconnect for supply side taps shall be equal to or greater than the SES rating).

9. Additional requirements apply for systems 1000kW and greater. Refer to Section 11 and 12 of the APS Interconnection Requirements.

10. Labeling requirements per Section 8.6 of the APS Interconnection Requirements.

11. Voltage may be present on the inverter side of the ESS Production Meter(s) for battery backup systems when the load side/inverter side meter disconnect switch is opened and locked open. In these instances, APS would consider eliminating the line side/utility side meter disconnect switch if the back fed breaker located within the Protected Load Panel is Readily Accessible per APS Requirements, located within 10’ of the ESS Production Meter(s) and includes locking provisions per OSHA LOTO requirements with an APS Padlock.