Distributed Resources Engineering (DRE) Interconnection Updates

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Agenda Topics

- DRE Mission
- Interconnection Requirements and Process
- Where to find Interconnection Information
  - Templates, checklists, & diagrams
- Inverter Settings
- APS Core Equipment
- Helpful Tips
  - Elevation Plan
DRE’s Mission:

To partner with our customers to sustainably integrate DERs to the distribution grid with a focus on safety, reliability, flexibility, power quality, and customer affordability.
State Level Interconnection Rules & APS Interconnection Requirements Manual Updates/Alignment

• Formal Rules Adopted in February 2020

• APS submitted IRM Rev. 8.5 in July 2020

• APS currently working toward a submittal of Version 9.0 which aligns with the Rules as well as ACC Staff and Stakeholder Comments
ACC/APS Interconnection Requirements

• **Apply to all systems that interconnect to the grid**

• **System Categories**
  – Exporting Systems
    • PV, Battery, anything that regularly exports to the grid
  – Inadvertent Export Systems
    • Programmed Not to Export, (PV + Inverters/Battery)
  – Non-Exporting Systems
    • Separate Systems, Back Up Only

• **Screens for each track to determine if further study is needed**
  – 4 Review Tracks based on system size/category
    • Expedited (Inadvertent Export System under 20 kW)
    • Super Fast (Exporting Systems under 20 kW)
    • Fast (Systems between 20 kW and 2 MW)
    • Study Track (Systems over 2 MW)

• **APS interconnection requirements**
  – Align with Rules
  – Provide more detailed technical and safety requirements
  – Updates being made to address ACC Staff and Stakeholder Comments
Screens for Systems under 20 kW

• Screen A
  – Limits the aggregate generation that can be interconnected to a distribution line without additional study.
    • Under 15% of annual peak load, or
    • Under hosting capacity calculated for that distribution line (whichever is greater)

• Screen E
  – Limits the aggregate generation capacity on a single-phase shared secondary to under 75% of the transformer rating without additional study

• Screen F
  – Limits the current imbalance of a system connected to a single phase system that is connected to a transformer providing 120/240V secondary service to under 20% of the rating of the transformer between the two sites of the 240 V service.
General Application Review Process for Systems under 20 kW-Super Fast Track

1. Customer Application
2. Application Completeness Review (Within 7 Days)
   - Complete
   - Deficient
     - Customer/Installer Make Corrections (Within 30 Days)
3. Technical (drawing) Review and Screening (A, E, F) (Within 14 Days)
   - Pass
   - Fail
     - Customer decision to move forward with Supplemental Review, Study Track, or Withdraw application (within 30 days)
4. Customer Selects Supplemental Review
5. Customer System Modifications
   - Pass
   - Fail
6. Customer Installation
Tour of aps.com/dg
In the works

- Improvements to APS.com/dg to improve customer and installer experience
  - Content focused on:
    - Will you add PV, Battery storage, or other technology?
    - Are you a Customer or Installer?
    - Installing at a Home or Business?
Inverter Settings Submittals

- APS Required IEEE 1547-2018 Advanced Inverter Settings
- Submit inverter settings via PowerClerk as a .csv file
- Inverter Settings Agreement
- Settings and Sample Agreement on aps.com/dg
- Late Summer/early Fall 2022 implementation
APS Core Equipment

Shelly Born
Is all this equipment necessary?

- “Growth creates complexity, which requires simplicity.”
  – Mike Krzyzewski.
Why?

• OSHA NFPA 70E 250.2
  – Worker and public safety
  – True visible open point
• Potential backfeed
• Unfused
• Sealed/Locked
• Labeled
The “Utility Disconnect Switch” shall be a true visible open disconnect. The *blades, jaws and air gap* between them shall be clearly visible when the switch is in the open position.
"True Visible Open" means having the ability to clearly see the blades, the jaws, and the physical separation (air gap) between them.
The photographs depict the switch in the ON (closed) position. The blades and the jaws are in contact with each other and current can flow through the switch.

Switch handle is in the ON position.

Blades and jaws are in contact.
The photographs depict the switch in the OFF (open) position. The blades and the jaws are not in contact with each other and are separated by an air gap prohibiting the flow of current through the switch.

Switch handle is in the OFF position.

Jaws

Blades
Why?

- OSHA NFPA 70E 250.2
  - Worker and public safety
  - True visible open point
- Potential backfeed
- Unfused
- Sealed/Locked
- Labeled
What?

• Distinct purpose
Utility Disconnect
Utility Disconnect

• The Core of Interconnection Requirements
• Applies to service equipment
• Isolates customer generation from utility service equipment
Production Meters
Production Meters

• Obligation to capture all renewable production

• Data acquisition for planning the future utility infrastructure
Meter Disconnects
Meter Disconnects

• Integral to safety processes and procedures
• Applies to meter equipment
• Isolates meter from all sources of power
Moving Forward

• APS is actively engaged in working out viable solutions balancing safety and cost to reduce equipment and provide options.
Coming Soon!

• APS is in the final stages of approving and posting an alternative production meter model with test blocks that will eliminate the Meter Disconnects.
Elevation Plan

- Equipment layout based on 3 line with conduits
- Heights to disconnects and meters from grade
- Arrangement matches site plan
- Gas and Water outlets
- Fences and Gates
ESRM Guidelines - 301.3-2

APS RESERVES THE RIGHT TO DETERMINE ALL METER AND SERVICE LOCATIONS.

1. The meter and main switch shall be accessible for reading and maintenance without passing through restricted areas, gates, or fences.

2. All meter and main switches shall be located three feet minimum to six feet maximum on the front corner of a residence, nearest to the point of available service, as determined by APS on an exterior wall or alternate location (subject to local inspection authority), but NOT UNDER A CARPORT, BREEZEWAY, PATIO, PORCH, OR OTHER AREA THAT CAN BE ENCLOSED WITH BUILDING EXPANSION OR FENCE.

3. The electric meter and main switch “may be” installed at an alternate location not attached to a dwelling to ensure accessibility. (subject to local inspection authority approval)

4. If overhead service is available in the rear of the property (alley or easement) the point of attachment may be on the rear of the residence. The meter & main disconnect shall be located per items #1 & #2 above. It is the customer’s responsibility to install conduit and wiring between the building in its entirety.

5. When remodeling existing residences, check with local APS office.

6. Service entrance equipment shall be utilized for its intended purpose.
ESRM Guidelines- 301.15

301.15-1 ELECTRIC, WATER AND GAS METER SEPARATION (FIGURE 1)

1. Size and dimensions of panels will vary.
2. Working clearance shall be a minimum of 36 inches wide in front of meter panel. If electric panels extend wider that the 36 inch minimum, the working clearance shall be the width of the entire assembly. Working space shall extend out from the face of the electric meter panel a minimum of 36 inches. See paragraph 301.7 for additional workspace requirements.
3. Area directly above gas meter shall remain clear of any electrical equipment.
4. For conduit system and riser requirements, refer to Section 500.
5. For Trenching Requirements, refer to Section 600.
6. Gas piping (above grade) may be located below electric panel(s), but shall not include any couplings in that area.
7. APS prohibits water valves or hose bibs to be located within the 36 inch by 36 inch safe work area in front of the electric panels. This is to prevent any grounded surfaces in the work area and to ensure the standing surfaces remain safe and dry.
8. Drain pipes or soffits are prohibited above the meter enclosures to ensure the work area standing surfaces remain safe and dry.
ESRM Guidelines- 306

- Location does not provide 24/7 access
- Non-permanent wall
Sample Elevation Plan

Area clear of all electrical equipment.
Navigating the Interconnection Process

DRE Preliminary Project Support
- Recommended for systems over 100 kW
- Pre-Application Report
  - Review of existing information regarding available feeder capacity
- Pre-Application Meeting
  - Discussion of technology/location, project scope, project development support
- Preliminary Engineering Support
- Reach out to your local APS Customer Project Rep or Commercial Renewables to initiate

Customer Submit Complete Application
- Load Meter or Temp Meter Installed
- Drawings
  - City or AHJ approved drawings

DRE Formal Application Review and Studies
- Application Review
- Drawing Review
- Technical Studies
General **Installation** Process for Systems under 20 kW

1. **Customer Installation**
2. **Customer Submit Post Installation Documentation**
3. **APS Review of Installation Documents**
   - Deficient
4. **APS Meter Set**
5. **Compliance Check/Leave PTO door hanger**
6. **Send follow up PTO communication within 2-5 days**

Customer/Installer Make Corrections (Within 30 Days)
Supplemental Review

- Generally, for systems that fail 1 or more of the technical screens
- General Supplemental Review Process:

  Failed Screen requires Supplemental Review

  OR

  Customer Requests Supplemental Review

  Customer decision to move forward with Supplemental Review, Study Track, or Withdraw application (within 30 days)

  APS Provide cost estimate and written agreement for study (Within 7 Days)

  Customer Submit Payments and Required documentation for Applicable Studies (Within 14 Days)

  APS complete Study (Within 21 Days)

  Approve

  Customer Installation

  Deficient

  Customer/Installer Make Corrections, or move to Study Track (Within 30 Days)
Study Track

- Generally, for systems over 2 MW
- Can be used for systems that do not pass technical screening requirements in Levels 1 and 2
- Studies may include (Feasibility, System Impact, Facility). APS will work with Customer on Process.
- General Study Track Process:
How to navigate the dg site...

1. Go to aps.com/dg.
2. Ignore top menus. They take you away from dg.
3. Click on Interconnection.
How to navigate the dg site...

5. Scroll down to list at lower left.
7. Scroll through list of documents on right. (Hint: may be more pages of documents. Default only shows 5.)
8. Click on Download below each file you want.
Interconnection Documents and Requirements

APS provides support to customers installing equipment that connects with our grid, such as a solar system, a home battery or other type of generator. We want everything to go smoothly for you and your installer throughout the permitting and installation process. Please review our interconnection standards below — they protect your equipment and our electrical system, and keep everyone safe.

- Residential resources (4)
  - Common requirements (3)
  - Getting started (8)
  - Business resources (5)
  - Business sample design diagrams (4)
  - Business wholesale non-FERC (3)
  - Common documents and resources (10)
  - Residential sample design requirements (5)

- APS Interconnection Requirements

- Load Side Connection Requirements

- Supply Side Connection Requirements
Plan Review & Installer Guidelines Checklist

Download

Single Phase 120-240V Fault Current AC Disco Guide

Download

Typical Wind Diagram

Download

Utility Disconnect Checklist

Download