

ACC Interconnection Rules Workshop Interconnection Technical Topics

Scott Bordenkircher, Director
APS T&D Technology Innovation and Integration
April 13, 2016



Agenda

- Introduction
- Technical Topic Discussion
 - Utility Disconnect Switches
 - Network Service Considerations
 - Advanced Inverters
 - Microgrids
 - Energy Storage
- Questions

Introduction

- Safety and reliability are paramount
- These technologies are just the tip of the iceberg
- Current technologies and standards are constantly changing

Utility Disconnect Switches

- The Utility Disconnect Switch is adjacent to the customer's Service Entrance for the purpose of isolating the generating facility from the grid
- APS requires a visual open and lockable disconnect switch as part of our Switching and Tagging Procedure
- First responders use visual open disconnects when responding to fire/electrical hazards
- Utilizing circuit breakers in lieu of a visual open and lockable disconnect does not qualify or establish a safe work area

Network Service Considerations

- Network Service provides extra-high availability power to large customers such as hospitals and high rises
- Network Service is especially susceptible to current imbalance, reverse power flow, and voltage imbalance; all of which interconnected generation can produce
- Interconnected generation over 10kW is only considered after detailed engineering review and is subject to APS approval due to enhanced risk

Advanced Inverters

- Advanced inverters modernize the AC/DC interconnection
- Core of APS Solar Partner Program research
- Multiple functions like: voltage regulation, over-frequency protection, and scalable power output
- IEEE 1547a-2014 provides the technical requirements – UL specs not final
- Hawaii and Germany require advanced inverters for all interconnections to mitigate grid impacts

Microgrids

- A microgrid is an electrical system that can island and reconnect (in parallel) to the grid
- Customers have installed Behind-the-Meter (BTM) microgrids in the form of backup generation for decades following APS's standard non-FERC (Federal Energy Regulatory Commission) interconnection procedures
- APS interconnection procedures take into account multiple methods for connection (i.e. open-transition & parallel) with varying requirements

Energy Storage

- APS has standard 1-line diagrams for BTM interconnection of energy storage
- APS recently revised the BTM solar with battery backup template to accommodate changes in metering technology
- Act as both a load and a source
- Grid-tied energy storage would follow the FERC or non-FERC interconnection process depending on the application and circumstances
- Stationary battery storage will need to comply with UL 9540 when released (sometime in 2016)

Questions?

