

# Reliability Objectives of DER

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# Distribution System Reliability

- Reliability is measured most commonly by the following major indexes
  - SAIFI – System Average Interruption Frequency
  - SAIDI – System Average Outage Duration
  - CAIDI – Customer Average Outage Duration
  - MAIFI – Momentary Interruption Frequency
  - ASAI – Average System Availability
- DER should be designed to improve these indices to be viable as an alternative to system upgrades

# DER Support of Reliability

- SAIFI / MAIFI
  - Customer protection systems should prevent DER outages from becoming system outages
  - Reactive support should help reduce momentary system disturbances and support voltage ride through of DER equipment
- SAIDI
  - Start-up response times and availability should correlate to existing backup distribution facilities
- CAIDI
  - Response times should be similar to backup distribution facilities switching times
- ASAI
  - Backup systems should be in place to ensure appropriate level of availability of DER systems

# DER Reliability Targets

- SAIDI / CAIDI
  - Typical top quartile performance of distribution systems is less than 60 minutes
  - This is a combination of distribution switching and crew response times
  - Remote control switching response times are generally expected to be 10 minutes or less
- ASAI
  - Typical top quartile performance of distribution systems is approximately 99.985 availability

# DER Reliability Targets

- SAIFI
  - Top quartile performance is less than once per year (13 to 16 months between interruptions)
- MAIFI
  - Top quartile performance is less than twice a year
- DER should have protection systems and reactive compensation systems in place to avoid creating outages or voltage excursions that could degrade system performance.
- Where multiple DER applications are sited in a common area, feeder level reactive support could be designed in coordination with the DER implementations

# Summary

- For DER to meet distribution reliability expectations installations should:
  - Provide switching response times of 10 minutes or less in response to system events
  - Provide average availability of 99.985% based on top quartile performance statistics of distribution systems
  - Have reactive compensation systems to support voltages during system or DER events either individually or in combination with other DER applications
  - Have protections systems that avoid introducing outages on the distribution system for faults on the DER system