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# Distributed Energy Resource Integration on the Utility Grid

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## Agenda

1. What is a Distributed Energy Resource?
2. Interconnection vs. Integration
3. Existing Integration Parameters
4. Evolving Considerations



## Distributed Energy Resources (DER)

- What is DER?
  - Broad definition = any generation, storage, or otherwise load managing resource connected to the distribution grid.
- Includes
  - Solar PV
  - Wind
  - Natural gas or other fossil generation
  - Storage (battery, flywheel, compressed air, hydro, etc. )
  - Energy / load management systems
  - Other demand response



## Interconnection vs. Integration

- Interconnection – simpler concept, merely implies the DER is connected and able to interact with the grid. Does not define level of interaction.
  - Interconnection focused on safety, do no harm.
- Integration – much broader and deeper meaning. Implies fully using the capabilities of the resource to support the grid, customers, etc. However, also introduces complexity in grid operations.
  - Integration capabilities need to and will continue to evolve.



## Traditional DER Interconnection Parameters

- Safe operation
- Do no harm to the grid
  - Maintain reliability
  - Steady state and dynamic
- Fairly calculate and recover cost of interconnection
  - Existing appropriate policies in place
  - What needs to be technically done to interconnect is more straight forward than who should pay
  - Need to continue to adapt policies



## Evolving DER Integration Considerations

- Speed of connection
  - Increased number of interconnection requests
  - Connection timeline expectations increasing
- Active vs. passive management – (Driven by system needs, markets, policies, etc.)
  - Passive – low penetration, simple controls & default settings (mostly safety & reliability related), no real-time visibility, communication, or control.
  - Active – higher penetration, more robust controls & default settings, real-time visibility, communication, and control. Market and policy drivers.
- Can we count on DER to be available when needed?
  - If DER does not function as anticipated, how does this affect reliability expectations?
- Next level of services – integrated microgrid, resiliency, etc.



## Size Does Matter

### Examples of Interconnection Applications

- 5-10 KW residential solar PV
- 2 MW community solar PV on 12 KV distribution system
- 50 MW solar PV or wind on 69 KV sub-transmission system
- 100 MW solar PV on 161 KV radial transmission system





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