Investigation into Distribution System Planning

Oregon Solar Energy Industries Association

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Oregon Solar (& Storage) Energy Industries Association

Our Vision

Provide universal access to solar energy while contributing to a sustainable community.

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Outline of Presentation

- End Goals: Guiding Principles for DSP
- Solutions:
  - Planning Process
  - DSP Metrics
  - Integration of DSP with Other Planning Activities
  - Elements of a Grid Needs Assessment
  - Planning Scenarios
  - Data Needs

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End Goals: Distribution System Planning Principles

- Minimize (& monetize) over-all electric system costs (generation, transmission and distribution)
- **Maximize societal benefits** from use of Distributed Energy Resources
- **Support** electric system **decarbonization**
- Facilitate economy-wide decarbonization through beneficial electrification
- **Accommodate two-way power flows** through distribution system modernization
- **Improve** system and local area **reliability and resilience**
- **Enable customers to choose** technologies that reduce environmental damage and support other societal goals
- Create opportunities for DERs to provide reliability services

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Solutions: Transparent, Interactive & Rigorous DSP Process

Transparent

- Create a shared common understanding of distribution constraints
- Openly consider alternative best-fit solutions
- Present information in multiple formats (narrative, graphic, tabular)
- Frequent and regular updates

Interactive

- Iterative process engaging multiple stakeholders
- Increasing rigor over time
- Responsive to environmental policies and local community interests

Advanced and Rigorous

- Need for hosting capacity analysis for planning and interconnection
- Cost-effective sequencing of grid modernization
- Advanced tools for granular load forecasting and DER adoption

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Solutions: Incorporate Comprehensive Distribution System Planning Metrics into Decision Making

- System Average Interruption Duration Index
- System Average Interruption Frequency Index
- Time to interconnect from application to energization
- Cost of interconnection
- Protection of medically vulnerable customers from service interruption
- Reduction in GHG emissions
- Reduction in criteria air pollutants
- NPV of deferral of distribution system upgrades
- DER adoption rates
- Utilitization of DERs for grid services

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Solutions:
Integration of DSP with Other Planning Activities

- Bottoms-up DSP should inform top-down IRP and Transmission Plans
- Granular (circuit by circuit) load forecasting and DER adoption should inform system load profiles and bulk system operation planning
- DSPs should inform rate design (time-of-use and seasonal)
- Hosting capacity analysis should enable streamlining of interconnection process for behind-the-meter and distribution system generation and storage

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Solutions: Expand Elements of Grid Needs Assessment and Deferral Opportunities

- An annual Grid Needs Assessment should include:
  - A 10-year disaggregated load forecast using tools that include land use data such as LoadSEER
  - A 5 to 10 year DER adoption forecast using tools such as BASS diffusion modeling
  - A 5 to 10 year forecast of emerging constraints on the distribution system
  - A proposed 3 to 4 year action plan identifying conventional grid projects and capital costs
- An annual Distribution Deferral Opportunity Report should include
  - Transparent screening criteria for determining
  - A prioritized list of candidate projects for deferral
  - An action plan to procure non-wire alternatives

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Solutions: Incorporate Critical Elements of Planning Scenarios

- High load growth vs. low load growth
- Impacts of climate change on electric system performance
- Adoption rates for Electric Vehicles
- Costs of battery & other energy storage technologies
- Rate design alternatives
- Pace of fossil fuel retirements

Solutions: Capture Data Sets Needed for DSP

Demand forecast by circuit and transformer bank

DER forecast (energy efficiency, PV and battery storage) by circuit and transformer bank

Grid needs assessment

- Facility name, facility type
- Driver of constraint (demand growth, age of infrastructure)
- Distribution service needed (capacity, reliability, voltage support)
- Deficiency by year and upgrade date

Planned investments

- Cost estimates
- In-service dates
- Magnitude of deficiencies

Candidate deferral projects

- Services needed
- Magnitude of need, duration of need and number of need events

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Thank You

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