Distribution Planning Regulatory Practices in Other States

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In This Presentation

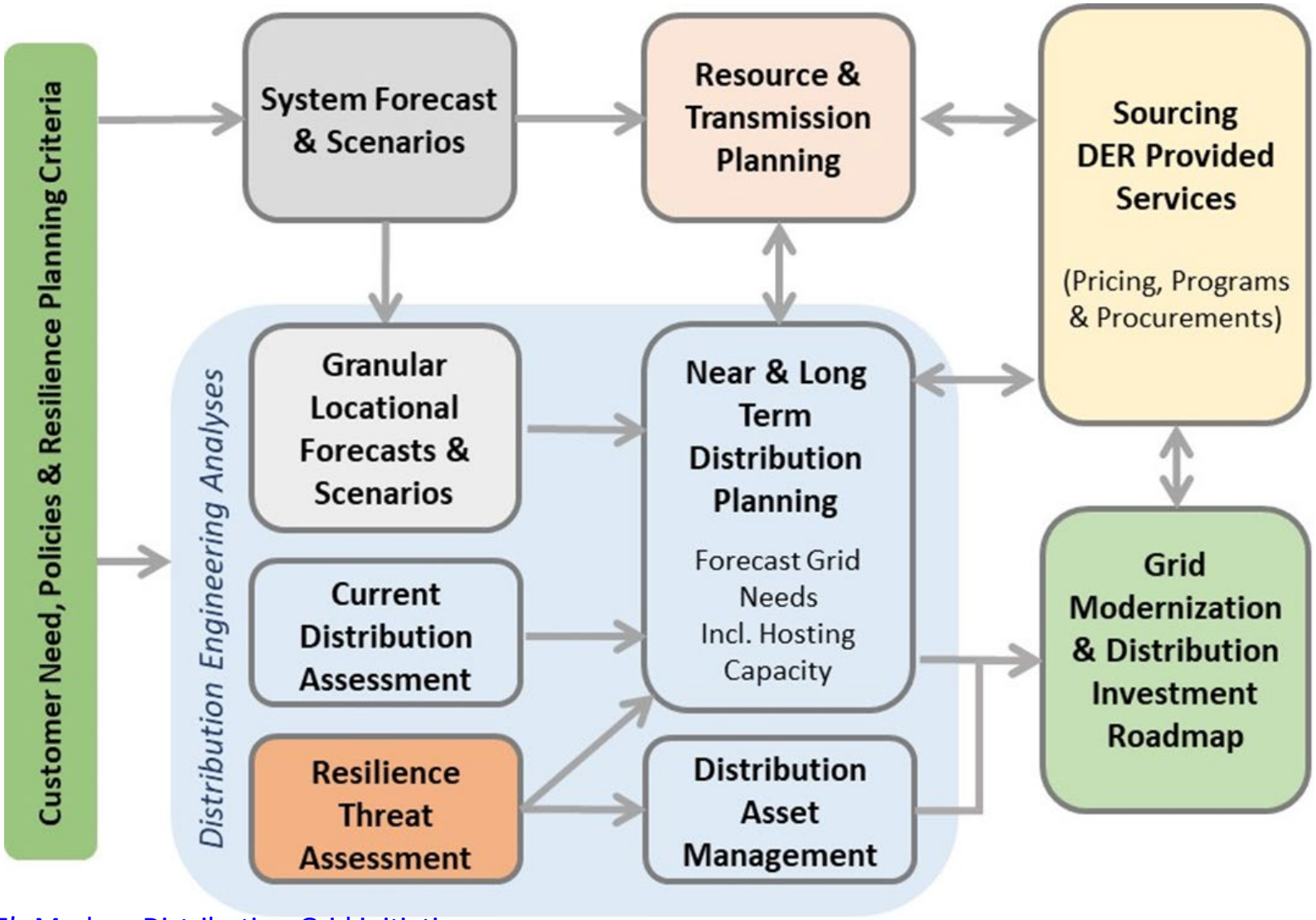
- Electricity planning and state interests, activities and considerations
- Example state objectives, requirements, and elements for distribution system plans that include distributed energy resources (DERs)
- Example state-specific approaches
- Non-wires alternatives (NWAs): state procurement strategies
- Resources for more information

Electricity Planning and State Interests, Activities and Considerations

Electricity Planning Activities

- Distribution planning - Assess needed physical and operational changes to local grid
  - Annual distribution planning process
    - Identify and define distribution system needs
    - Identify and assess possible solutions
    - Select projects to meet system needs
  - Long-term utility capital plan
    - Includes solutions and cost estimates, typically over a 5- to 10-year period, *updated every 1 to 3 years*
- Integrated resource planning (IRP) - Identify future investments to meet bulk power system reliability and public policy objectives at a reasonable cost
  - Consider scenarios for loads and DERs; impacts on need for, and timing of, utility resource investments
- Transmission planning – Identify transmission expansion needs and options

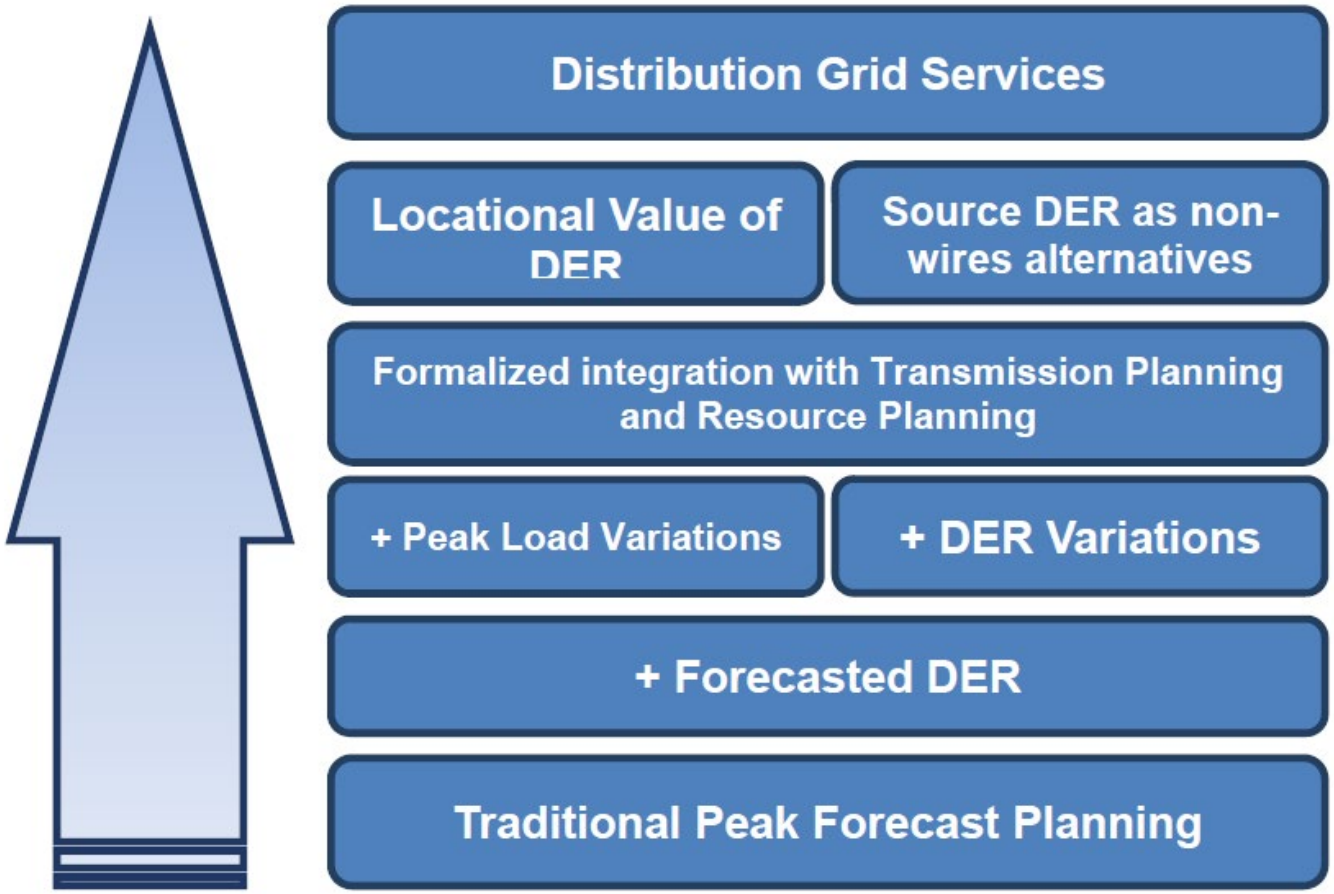
Integrated Grid Planning



See [DOE's Modern Distribution Grid initiative]

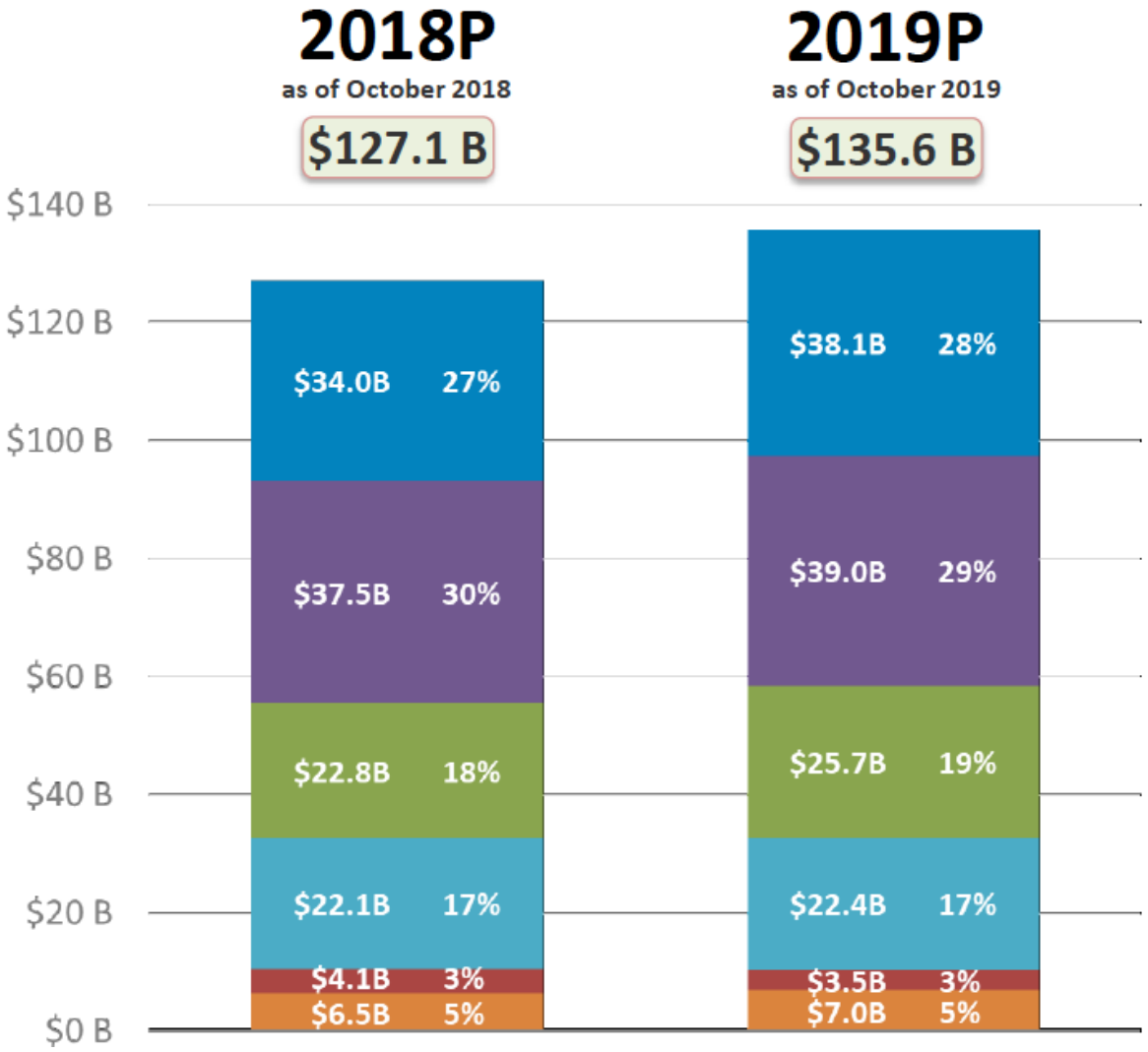
Adapted from P. De Martini, *Integrated Distribution Planning*, ICF

Evolution in Distribution Planning Practices



Source: Xcel Energy, Integrated Distribution Plan, Nov. 1, 2019

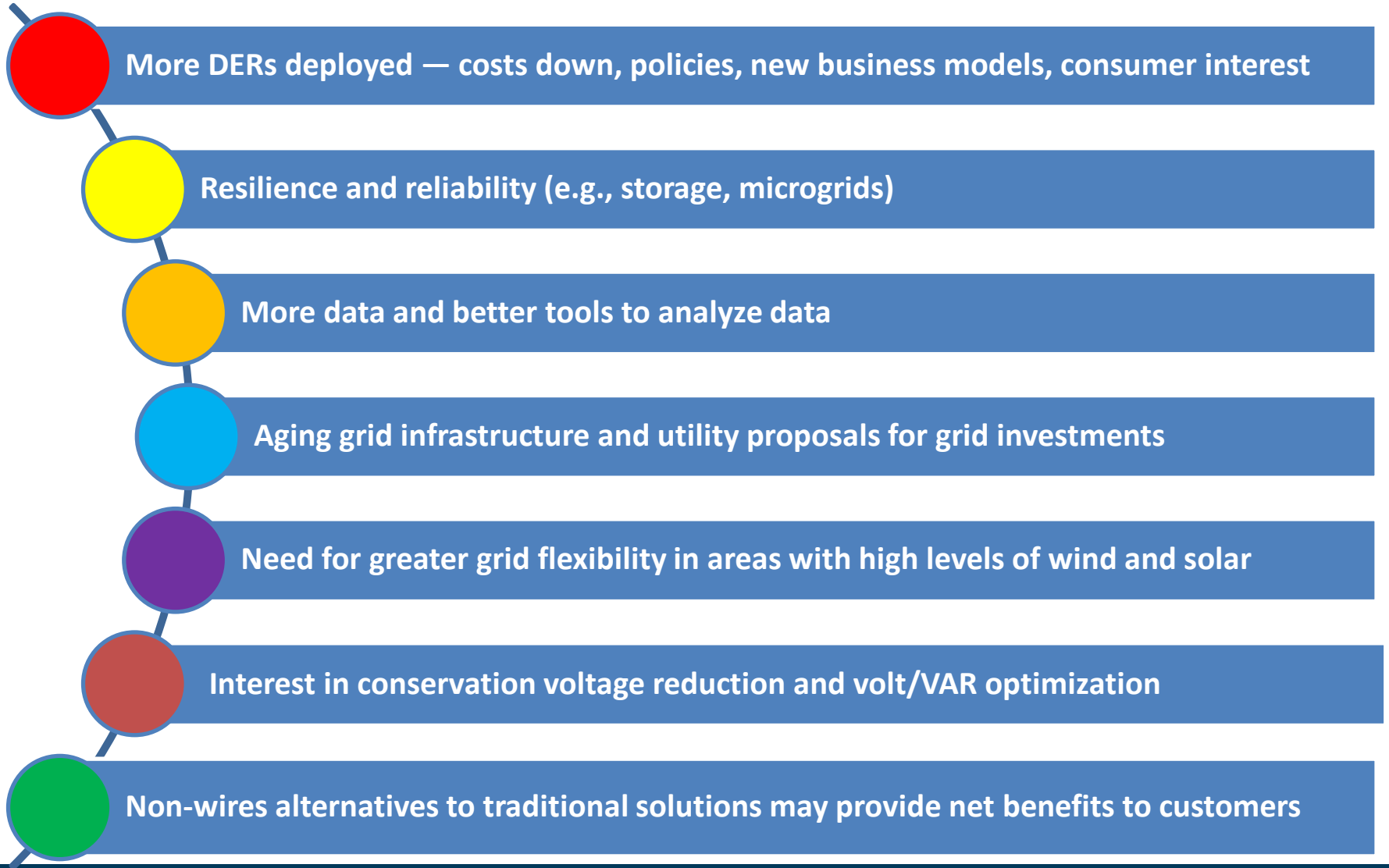
One Reason States Are Increasingly Interested in Distribution System Planning



Distribution system investments account for the largest portion (29%) of capex for U.S. investor-owned utilities: $39B (projected) in 2019

Source: Edison Electric Institute

States are responding to a variety of drivers for modernizing the distribution planning process.



Other Potential Benefits From Improved Distribution Planning

- Makes transparent utility plans for distribution system investments, holistically, before showing up individually in a rider or rate case
- Provides opportunities for meaningful PUC and stakeholder engagement
- Considers uncertainties under a range of possible futures
- Considers all solutions for least cost/risk
- Motivates utility to choose least cost/risk solutions
- Enables consumers and third-party providers to propose grid solutions and participate in providing grid services

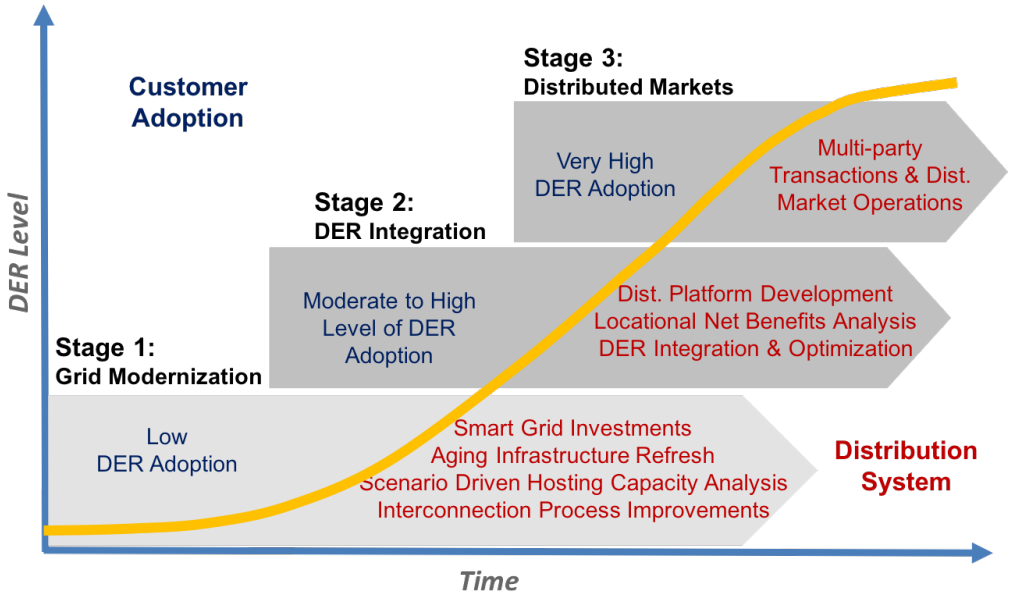
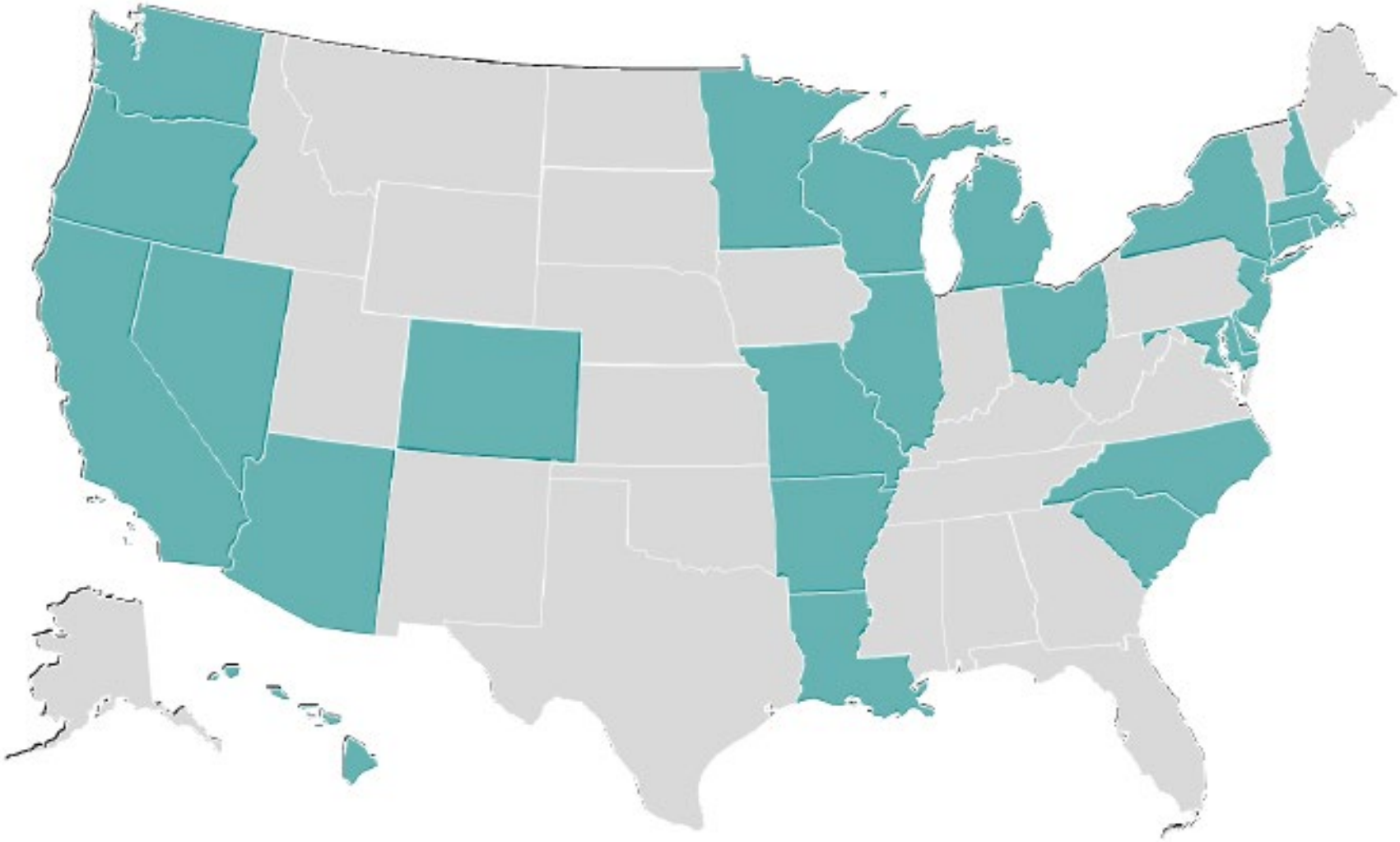


Figure from [De Martini and Kristov](), for Berkeley Lab

State Legislative and Regulatory Activities (1)



Distribution system planning activities in 25 states

Source: EPRI, *Modernizing Distribution Planning: Benchmarking Practices and Processes as They Evolve*. November 2019

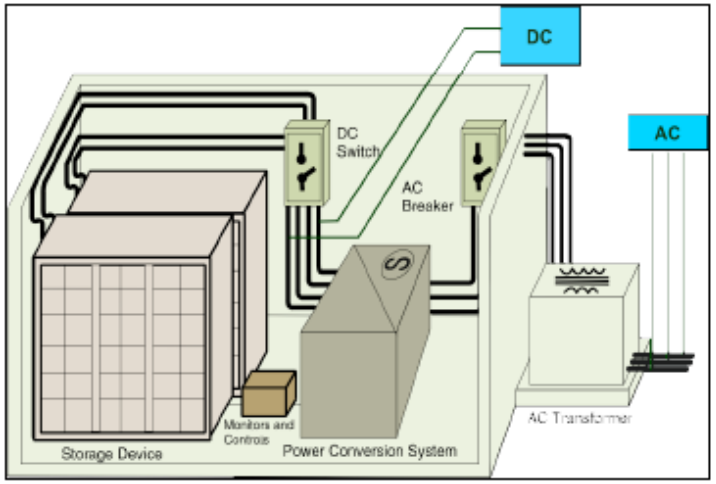
State Legislative and Regulatory Activities (2)

Common Components	Range of Requirements
Data Sharing and Transparency	Share a broad range of data including feeders, substations, operating voltages/ratings, load assumptions/forecasts, etc.
Hosting Capacity	Defining methods and tools, sharing maps, leveraging in planning and interconnection analysis. The granularity requested varies from requiring a node-level to feeder-level analysis. The frequency of updates ranges from monthly to annually.
Non-Wires Alternatives (NWAs)	Develop screening processes or criteria that can be used to identify when a grid need should be reviewed as a potential for NWAs. The consideration and assessment of NWAs in the investment plans varies by state – from being required to evaluate a NWA on every infrastructure investment to infrastructure projects of $1 million or greater.
Distribution System Plan Requirements	Provide annual documentation of the planning process and outline their distribution system investment plans to provide the scale of grid needs over a 5-year period. Some utilities are also required to define changes to the planning process in order to better incorporate DER.
Locational Value	Discussions are still in the early stages on this as is a longer-term component of the overall efforts. Some states like CA and NY are beginning to develop methods to assess locational value.

Source: EPRI, *Modernizing Distribution Planning: Benchmarking Practices and Processes as They Evolve*, November 2019

Some Considerations for Establishing a Regulatory Process for Distribution Planning

- Statutory requirements, regulatory precedents
- Priorities, phasing, related proceedings
- What's worked elsewhere, tailored to your state
- Recognize differences across utilities
- Regulatory clarity with built-in flexibility
- Quick wins, early benefits for consumers
- Long-term, cohesive view to achieve goals
- Pilots vs. full-scale approaches (including economy of scale, rate impacts)



Source: Sandia National Laboratories

Example State Objectives, Requirements and Planning Elements

Distribution Planning Objectives: Examples

- **Michigan**: Safety, reliability and resiliency, cost-effectiveness and affordability, and accessibility (order in U17990 and U-18014 dockets)
- **Nevada**: "reductions or increases in local generation capacity needs, avoided or increased investments in distribution infrastructure, safety benefits, reliability benefits and any other savings the distributed resources provide to the electricity grid for this State or costs to customers of the electric utility or utilities." (SB 146)
- **Minnesota** Stat. § 216B.2425: "…enhancing reliability, improving security against cyber and physical threats, and by increasing energy conservation opportunities by facilitating communication between the utility and its customers through the use of two-way meters, control technologies, energy storage and microgrids, technologies to enable demand response, and other innovative technologies." Commission objectives (8/30/18 order in Docket 18-251):
  - Maintain and enhance the safety, security, reliability, and resilience of the electricity grid, at fair and reasonable costs, consistent with the state's energy policies.
  - Enable greater customer engagement, empowerment, and options for energy services.
  - Move toward the creation of efficient, cost-effective, accessible grid platforms for new products and services, with opportunities for adoption of new distributed technologies.
  - Ensure optimized use of electricity grid assets and resources to minimize total system costs.

Example State Filing Requirements*

- Distribution system plans

  California, Delaware, Indiana, Hawaii, Maine, Maryland, Michigan, Minnesota, Nevada, New York, Rhode Island, Virginia

- Grid modernization plans

  California, Hawaii, Oregon, Massachusetts, Minnesota, Ohio

  - Utilities in several other states are filing grid modernization plans on their own (GA, NC, SC, TX).

- Requirements for hosting capacity analysis

  California, Minnesota, Nevada, New York

- Requirements to consider non-wires alternatives

  CA, CO, DC, HI, MD, ME, MN, NV, NY, RI

- Benefit-cost handbook or guidance

  Maryland, Nevada, New York, Rhode Island

*This list is growing and not all-inclusive.

Procedural Elements

- Frequency of filing
  - Typically annual or biennial
  - Every 3 years in MI (initially) and NV
  - *Considerations:* alignment with utility distribution capital planning, IRP filing cycle, workload, making/tracking progress on goals & objectives
- Planning horizon
  - 3 year action plan — NV (+ 6-year forecasts), DE (+ 10-year long-range plan)
  - 5 years – NY, CA (+ 10-year grid modernization vision), HI (+ long-term plan – to 2045), MI (+ 10-15 year outlooks), MN (+ 10-year Distribution System Modernization and Infrastructure Investment Plan)
  - 5-7 years - Indiana
  - *Considerations:* short- and long-term investments, coordination with IRP, distribution planning is granular (location-specific)

Procedural Elements (cont.)

- Stakeholder engagement requirements
  - *Before plan is filed:* Varies from one timely meeting required (MN) to significant upfront input through working groups (e.g., CA, DC, HI, MI, NY)
  - *After plan is filed:* Opportunity to file comments
- Confidentiality for security or trade secrets — for example:
  - Level of specificity for hosting capacity maps
  - Peak demand/capacity by feeder
  - Values for reliability metrics
  - Contractual cost terms
  - Bidder responses to RFPs
  - Proprietary model information

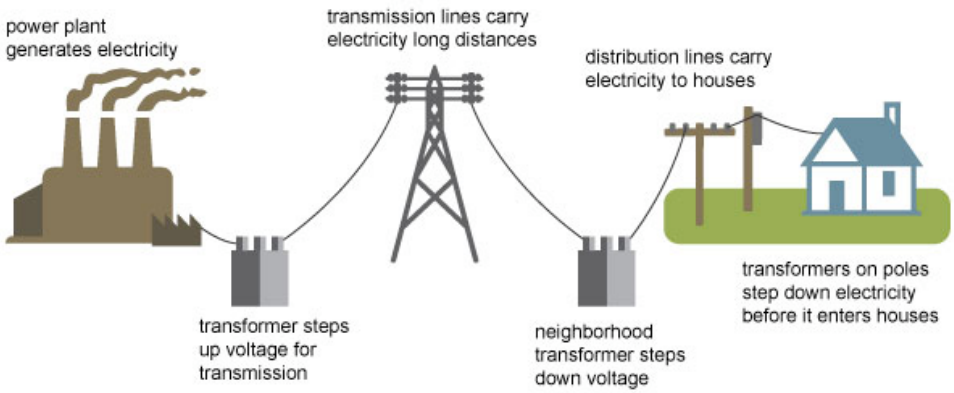


Figure: U.S. Energy Information Administration

Substantive Elements of Distribution Plans Considering DERs

- Baseline information on current state of distribution system
  - Such as system statistics, reliability performance, equipment condition, historical spending by category
- Description of planning process
  - Load forecast – projected peak demand for feeders and substations
  - Risk analysis – N-0 (normal overload) and N-1 (contingency risk of overload on adjacent feeder or transformer)
  - Mitigation plans – with risk thresholds
  - Budget for planned capacity projects
    - Asset health analysis and system reinforcements
    - Upgrades needed for capacity, reliability, power quality
    - New systems and technologies
    - Ranking criteria (e.g., safety, reliability, compliance, financial)
- Distribution operations — vegetation management and event management

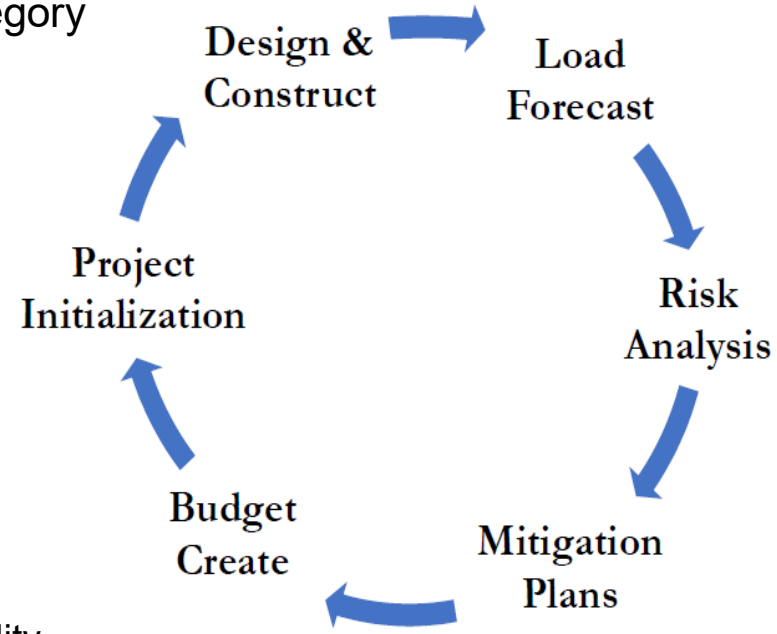


Figure: Xcel Energy, Integrated Distribution Plan, Nov. 1, 2019

Substantive Elements (cont.)

- DER forecast
  - Types and amounts
- NWA analysis
- Hosting capacity analysis*
  - Including maps
- Grid modernization strategy
  - May include request for certification for major investments
- Action plan
- Additional elements may include:
  - Long-term utility vision and objectives
  - Ways distribution planning is coordinated with integrated resource planning
  - Customer engagement strategy
  - Summary of stakeholder engagement
  - Proposals for pilots

*See Extra Slides for hosting capacity analysis use cases and drivers.

Example State-Specific Approaches

Michigan (1)

- PSC initially ordered utilities (in rate cases) to file 5-year distribution investment & maintenance plans "to increase visibility into the needs of maintaining the state's system and to obtain a more thorough understanding of anticipated needs, priorities, and spending."
  - Commission consolidated all 3 utility filings into Case No. U-20147 (April 2018)
- Following comments on draft plans, utilities filed final plans:
  - DTE Electric (2018), Consumers Energy (2018), Indiana Michigan (2019)
- PSC 2018 Staff Report - Distribution Planning Framework for an "open, transparent, and integrated electric distribution system planning process"
  - PSC Order on staff recommendations: "*framework … is to be used as a guide for the next iterations of distribution plans…." "Unconventional solutions, including targeted EE, DR, energy storage, and/or customer-owned generation, that could displace or defer investments in a cost-effective, reliable, and timely manner should be considered and evaluated."*

Michigan PSC webpage on distribution system planning

Michigan (2)

- Sept. 2019 order in docket U-20147:
  - Utilities must file their next distribution investment and maintenance plans by June 30, 2021.
  - PSC staff will examine the value of resilience (and its role in cost-benefit methodologies for rate cases and alignment of distribution plans with IRPs) for the next phase of distribution plans. Staff will file a summary of the stakeholder process—including discussions on the value of resilience—for input into distribution plans by April 1, 2020.
  - Utilities will "continue to develop detailed distribution plans over a five-year period, but also include in the plan their vision and high-level investment strategies 10 and 15 years out. This approach is consistent with the planning horizons used in IRPs."
- Stakeholder workshops – June-November 2019
- MPSC Staff report on stakeholder workshops – April 1, 2020
- Commission is reviewing Staff's report and will provide guidance to the electric companies to prepare their next distribution plans.

Michigan (3)

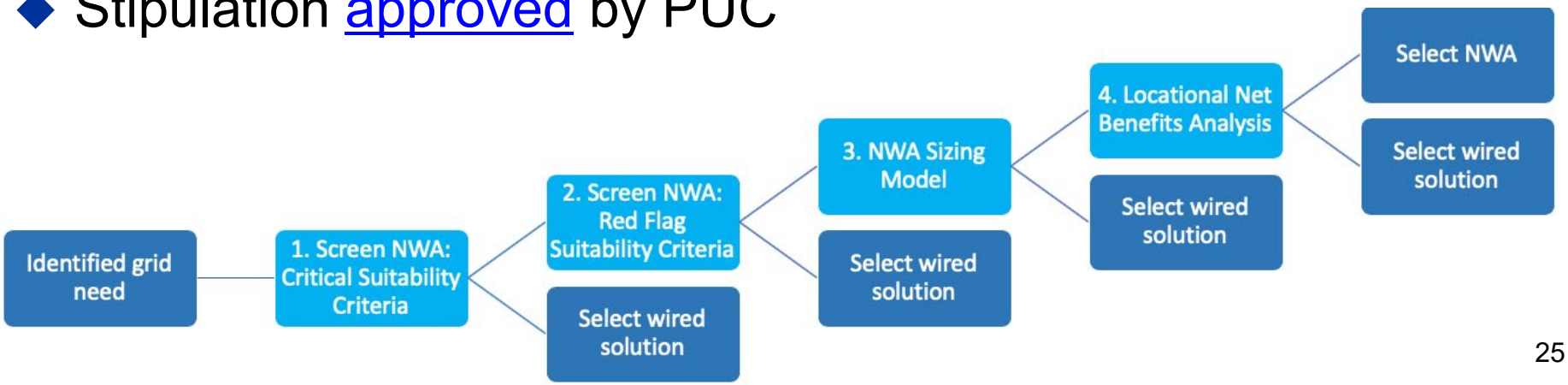
- *Michigan Statewide Energy Assessment* by PSC staff (September 2019) recommends utilities:
  - *"**better align electric distribution plans with integrated resource plans** to develop a cohesive, holistic plan and optimize investments considering cost, reliability, resiliency, and risk. As part of this effort, Staff, utilities, and other stakeholders should **identify refinements to IRP modeling parameters related to forecasts of distributed energy resources** (e.g., electric vehicles, on-site solar), **reliability needs with increased adoption of intermittent resources**, and the **value of fuel security and diversity of resources** in IRPs. A framework should also be developed to evaluate **non-wires alternatives** such as targeted energy waste reduction and demand response in IRPs and distribution plans."*
  - *"work with Staff and stakeholders to propose a **methodology to quantify the value of resilience, particularly related to DERs**. In addition, the value of resilience should be considered in future investment decisions related to energy infrastructure in future cases."*

Nevada (1)

- SB 146 (2017) requires utilities to file distributed resource plans (DRPs) to evaluate locational benefits and costs of distributed generation, energy efficiency, storage, electric vehicles and demand response technologies.
  - DRP identifies standard tariffs, contracts or other mechanisms for deploying cost-effective distributed resources that satisfy distribution planning objectives.
  - DRP is filed with IRP every 3 years and covers utility's 3-year IRP action plan
- PUC adopted temporary planning regulations in 2018 and permanent regulations in 2019 (D-17-08022)
  - 6-year forecast of net distribution system load (down to feeder level) and distributed resources
  - Hosting capacity analysis and public access to utility's online distribution maps/data
  - Grid Needs Assessment compares traditional and DER solutions for forecasted T&D system constraints
  - *"A utility may recover all costs it prudently and reasonably incurs in carrying out an approved DRP, in the appropriate separate rate proceeding."*

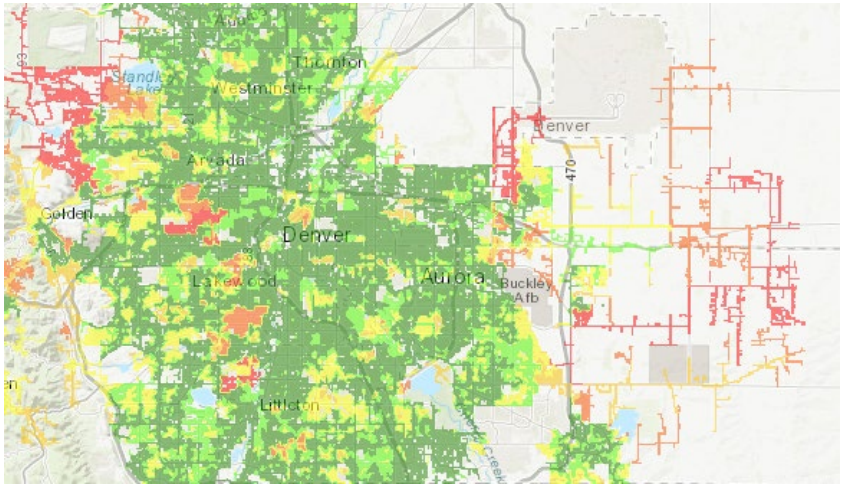
Nevada (2)

- NV Energy filed its 1st DRP in April 2019 (Docket D-19-04003)
  - Distribution system and distributed resource load forecast
  - Hosting capacity analysis
  - Grid Needs Assessment identifying distribution system constraints
  - NWA analysis
    - Utility's suitability/screening tool identified 10 distribution system projects and 107 transmission projects for NWA analysis
  - Locational net benefit analysis
    - Considered 8 costs and benefits; identified 3 projects with similar estimated costs for traditional solutions and NWA
- Stipulation approved by PUC



Colorado (1)

- SB 19-236 (2019) requires PUC to promulgate rules establishing filing of a distribution system plan (DSP), including:
  - Methodology for evaluating costs and net benefits of using DERs as NWAs
  - Threshold for size of new distribution projects
  - Requirements for DSP filings, including:
    - Consideration of NWAs for new developments (>10,000 residences)
    - Load forecasts from beneficial electrification programs
    - Forecast of DER growth
    - Planning process for cyber and physical security risks
    - Proposed cost recovery method
    - Anticipated new investments in distribution system expansion
    - Economic impacts of NWAs
    - Estimated year when peak demand growth merits analysis of new NWAs
  - Consider public interest and ratepayer benefits from NWAs
  - Benchmarks or accountability mechanisms

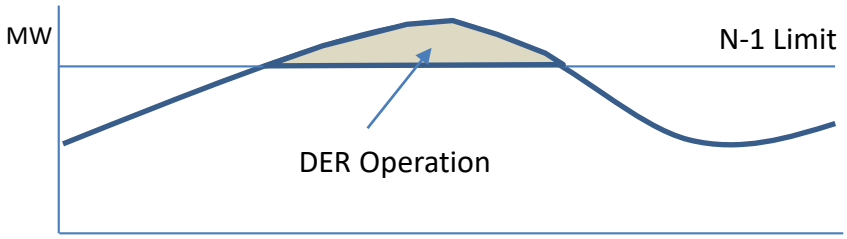


Xcel Energy hosting capacity map (Denver area)

Colorado (2)

- In Proceeding No. 17M-0694E, initiated through Decision No. C17-0878 (Oct. 26, 2017), the Commission examined implementation of an Integrated Distribution System Planning process and invited comments on:
  - "…initial regulatory steps that the Commission should take to ensure that investor-owned electric distribution systems have the capability to handle increased penetration of distributed generation, storage, and certain load building technologies such as electric vehicles."
  - Stakeholder engagement, including Distribution System Planning work group
- Pre-rulemaking proceeding underway (No. 19M-0670E)
  - Decision No. C19-0957 seeks comments and information on initial regulatory steps to meet requirements of SB 19-236
  - Series of informational workshops

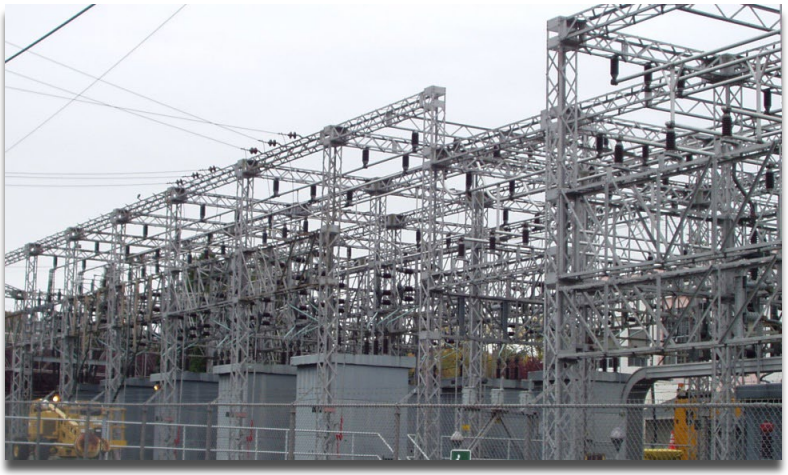
Non-wires Alternatives: State Procurement Strategies



Source: E3

Considering Non-Wires Alternatives

- Non-wires alternatives (NWA) are options for meeting distribution (and transmission) system needs related to load growth, reliability and resilience.
  - Large DER (e.g., storage) or portfolio of DERs that can meet the specified need
- Objectives: Provide load relief, address over- or under-voltage, reduce interruptions, enhance resilience, or meet generation needs
- Potential to reduce utility costs
  - Defer or avoid infrastructure upgrades
  - Implement solutions *incrementally,* offering a flexible approach to uncertainty in load growth and potentially avoiding large upfront costs for load that may not show up



- Typically, utility issues a competitive solicitation for NWA for specific distribution system needs and compares these bids to planned traditional grid investments (e.g., distribution substation transformer) to determine the lowest reasonable cost solution, including implementation and operational risk assessment.

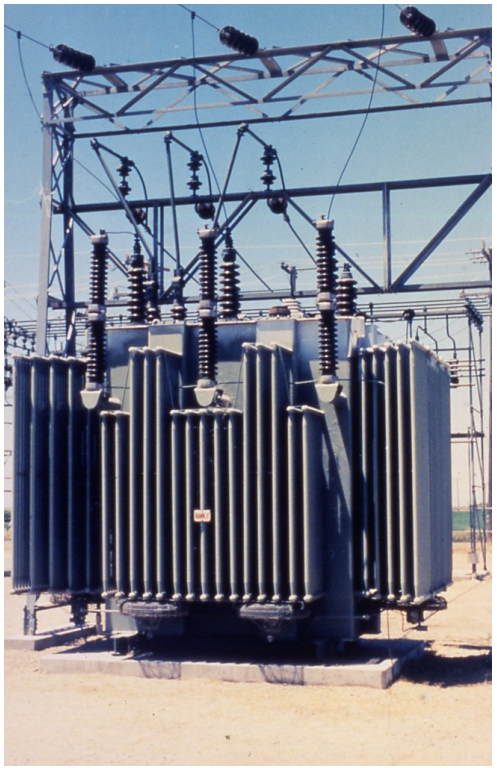
DER Procurement Strategies: New York (1)

- As part of their annual capital planning process, each utility must routinely identify candidate projects (load relief, reliability) for non-wires alternatives, post information to websites and issue RFPs.
- In 2017, utilities jointly provided suitability criteria for NWA projects and described how criteria will be applied in their capital plans.

Criteria	Potential Elements Addressed	
Project Type Suitability	Project types include Load Relief and Reliability*. Other categories currently have minimal suitability and will be reviewed as suitability changes due to State policy or technological changes.	
Timeline Suitability	**Large Project**	36 to 60 months
	Small Project	18 to 24 months
Cost Suitability	**Large Project**	≥ $1M
	Small Project	≥ $300k

DER procurement strategies: New York (3)

- May 2017 supplemental filing describes procurement process to award contracts; also see Joint Utilities NWA process
- RFP response requirements include:
  - Proposed solution description
  - Project schedule and acquisition plan
  - Detailed costs associated with proposed solution
  - Risks, challenges and community impacts
  - Professional background and experience
- All NWA opportunities on REV Connect website
  - Example NWA: Rochester Gas & Electric plans to use targeted efficiency near Station 51 to reduce peak demand that would otherwise be met with traditional upgrades



DER Procurement Strategies: New York (2)

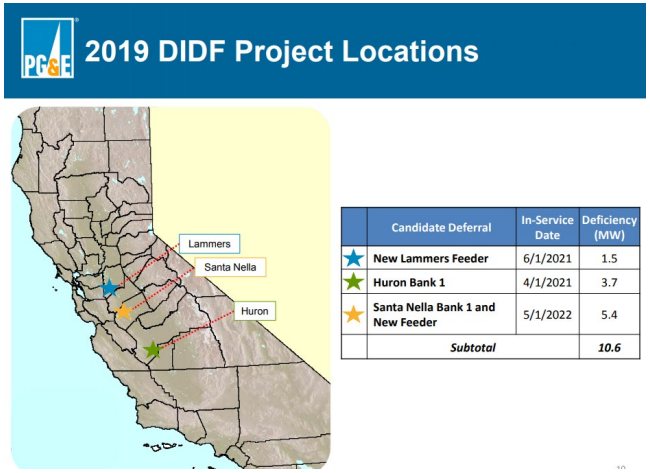
Projects, Needs and Default Solutions:
Example Consolidated Edison RFPs for Non-Wires Alternatives

Project (RFP year)	Need	Default Solution
Hudson Network (2017)	Amount: 7.1 MW Location: West 50th St. Substation Overload period: 1-8 pm (5 pm peak) When: 2021 (summer)	Feeder upgrades to reduce potential overloads
Columbus Circle Network (2017)	Amount: 4 MW Location: West 42nd St. No. 2 Substation Overload period: 2–7 pm (6 pm peak) When: 2021 (summer)	Feeder upgrades to reduce potential overloads
West 42nd Street Load Transfer Project (2017)	Amount: 42 MW (total, varies by year) Location: W. 42nd St. No. 1 Substation Overload period: 9 am–7 pm (2–3 pm peak) When: 2021–2027 (starting May 2021)	Transfer 55 MW of load from W. 42nd St. No. 1 Substation to Astor Substation before summer 2021

Sources: Con Edison 2017a, Con Edison 2017b, and Con Edison 2017c

DER procurement strategies: California

- Distribution Investment Deferral Framework decision (Feb. 2018) created annual process for consideration of DERs
  - *"The central objective…is to identify and capture opportunities for DERs to cost-effectively defer or avoid traditional IOU investments that are planned to mitigate forecasted deficiencies of the distribution system."*
  - Utilities file two reports annually:
    1) Grid Needs Assessment (example GNA) is main driver for Distribution Resources Plan
    2) Distribution Deferral Opportunity Report (DDOR)



Source: PG&E presentation on 2019 RFO for local distribution capacity relief in 3 areas

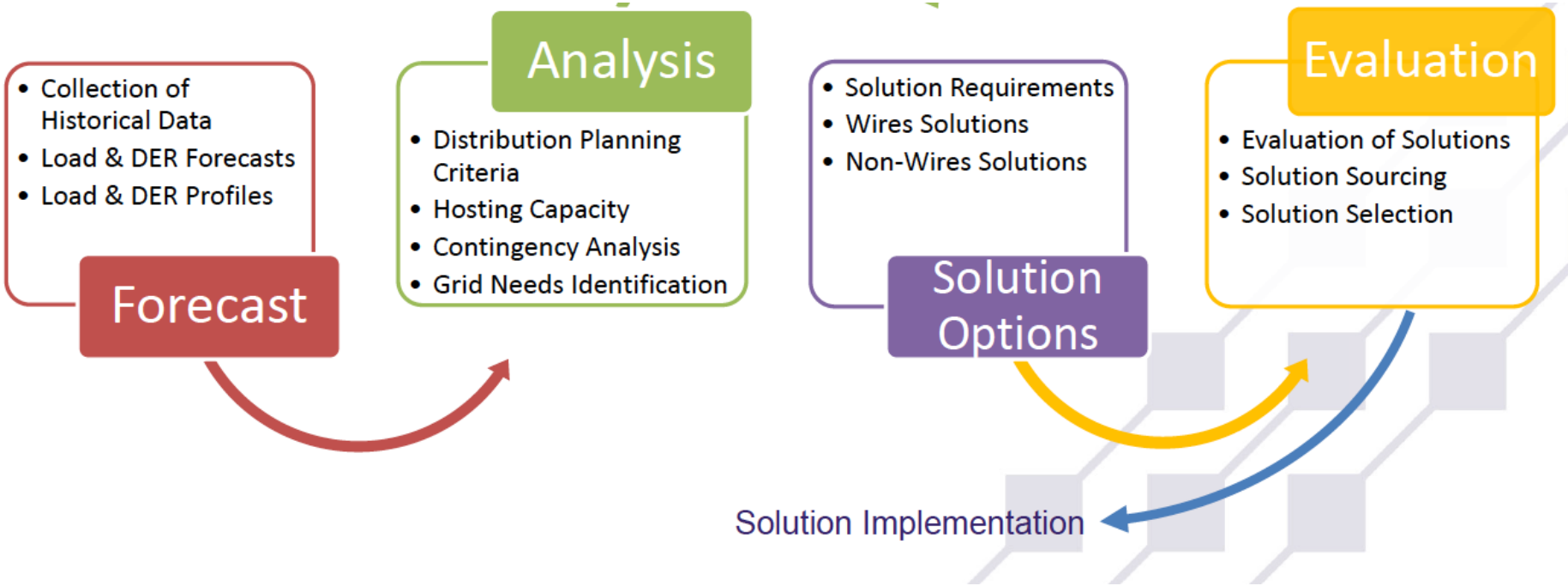
  - Recommend deferral projects for competitive annual solicitations
    - Examples: SCE, PG&E, SDG&E
  - May 2019 update modifies requirements
    - GNA and DDOR in consolidated filing with specific $/MWh and locational net benefit analysis values for prioritizing projects
    - Additional requirements for GNA narrative and datasets
    - Additional project-specific data required for planned investments and candidate deferral project shortlist

Hawaii

- Order No. 34281 provided guidance for a holistic, scenario-based grid modernization strategy to inform review of discrete projects submitted by utility
- Hawaiian Electric Companies' (HECO) Integrated Grid Planning incorporates procurement *into planning itself*, not after planning
- Integrated Grid Planning process (Order 35569)
  1. Develop forecasts and assumptions that will drive planning
  2. Collectively identify needs for G,T & D
  3. Identify solutions that can be achieved through procurement, pricing and program options
  4. Evaluate and optimize resource and T&D solutions, submit 5-year plan to PUC with proposed investments, pricing and programs

- Allows a variety of distributed and grid scale resources to provide power generation and ancillary services
- Stakeholder council, technical advisory panel, ad-hoc working groups

Hawaii's Advanced Distribution Planning Process



Source: HECO presentation to Puerto Rico Energy Bureau, Jan. 10, 2020

Resources for More Information

U.S. Department of Energy's (DOE) Modern Distribution Grid guides

Schwartz, Lisa. 2020. "PUC Distribution Planning Practices." Distribution Systems and Planning Training for Southeast Region. March 12, 2020. Lawrence Berkeley National Laboratory

Alan Cooke, Juliet Homer, Lisa Schwartz, *Distribution System Planning – State Examples by Topic*, Pacific Northwest National Laboratory and Berkeley Lab, 2018

Juliet Homer, Alan Cooke, Lisa Schwartz, Greg Leventis, Francisco Flores-Espino and Michael Coddington, *State Engagement in Electric Distribution Planning*, Pacific Northwest National Laboratory, Berkeley Lab and National Renewable Energy Laboratory, 2017

Berkeley Lab's Future Electric Utility Regulation reports

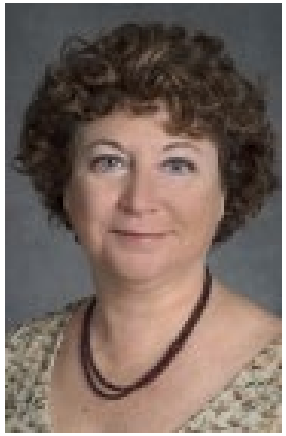
Berkeley Lab's research on time- and locational-sensitive value of DERs

Summary of Electric Distribution System Analyses with a Focus on DERs, by Y. Tang, J.S. Homer, T.E. McDermott, M. Coddington, B. Sigrin, B. Mather, Pacific Northwest National Laboratory and National Renewable Energy Laboratory, 2017

J.S. Homer, Y. Tang, J.D. Taft, D. Lew, D. Narang, M. Coddington, M. Ingram, A. Hoke. *Electric Distribution System Planning with DERs — Tools and Methods* (forthcoming)

T. Woolf, B. Havumaki, D. Bhandari, M. Whited and L. Schwartz. *Benefit-Cost Analysis for Utility-Facing Grid Modernization Investments: Trends, Challenges and Considerations*. Lawrence Berkeley National Laboratory (forthcoming)

Contact



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Extra Slides

State drivers for hosting capacity analysis

	Hosting Capacity
Hawaii *Key Driver: Legislative Mandates & regulatory requirements from Commission*	• Locational Value Maps available online • Integrated Interconnection Queue for all areas, including those currently exceeding hosting capacity • Customers can check the status of their interconnection application online
California *Key Driver: Distribution Resource Planning Proceedings*	• Goal is to streamline the interconnection review process. • Replaces interconnection screens in some instances • Interconnection Capacity Analysis (ICA) 2.0 maps expand analysis to include output values such as alternate circuit configurations and storage ICA with high accuracy and monthly updates
New York *Key Driver: Reforming the Energy Vision*	• Hosting Capacity maps are provided to guide solar PV developers to locations with lower expected interconnection costs • Goal is to eventually build to an integrated value assessment tool
Minnesota *Key Driver: Regulatory & legislative mandates for renewable generation, emission reduction and fossil fuel reduction*	• Focus on planning and incorporating lessons learned from other jurisdictions • Xcel published visual hosting capacity maps and allow for formal request for interconnection on-site and for pre-application data request

Source: ICF, for DOE

Use Cases for Hosting Capacity

Use Case	Description	CA IOUs	NY IOUs	HI	APS	Xcel	Pepco
Utility Interconnection Analysis	HCA as a utility tool for evaluating interconnection applications (SIS), (dependency: interconnection)				●		
Distribution Planning Tool	HCA as a tool to enable greater DER integration by identifying potential future constraints and proactive upgrades (dependency: locational value, forecasting)	●		●			
Interconnection Technical Screen	Use of HCA as a means to automate technical screens as part of the state interconnection process (dependency: interconnection)	●		●			●
Development Guide	HCA to identify areas with potentially lower interconnection costs	●	●	●		●	●
Dynamic Hosting Capacity	Identify impacts to the system from DER dispatch in real time based on the as-switched system (dependency: locational value)						

Source: ICF, for DOE