State Regulatory Approaches for Distribution Planning

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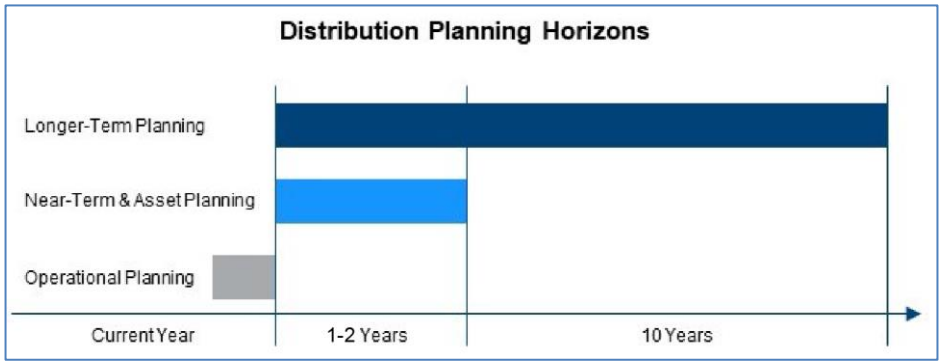
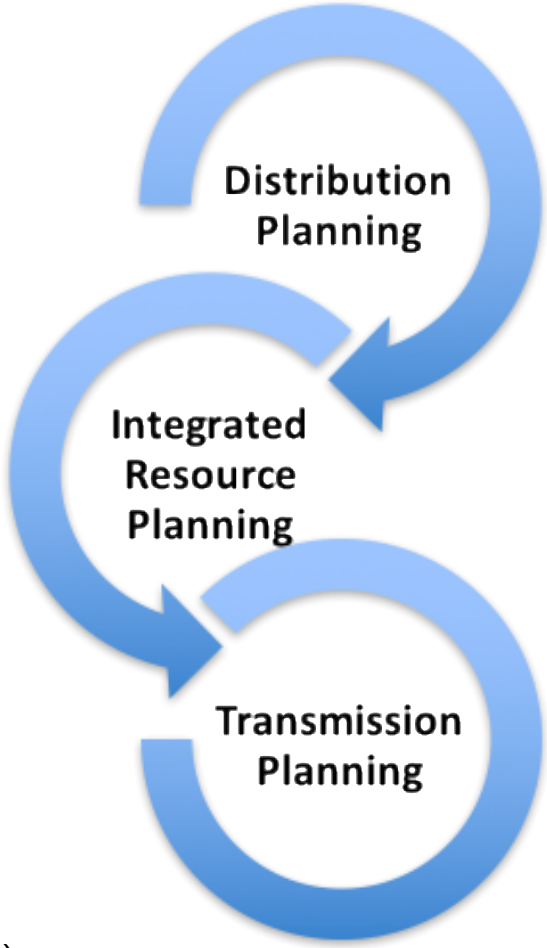
- Grid modernization and distribution planning
- Distributed energy resources (DERs) and distribution planning
- Data-related requirements
- Resources

Planning Elements and State Requirements

Electricity system planning

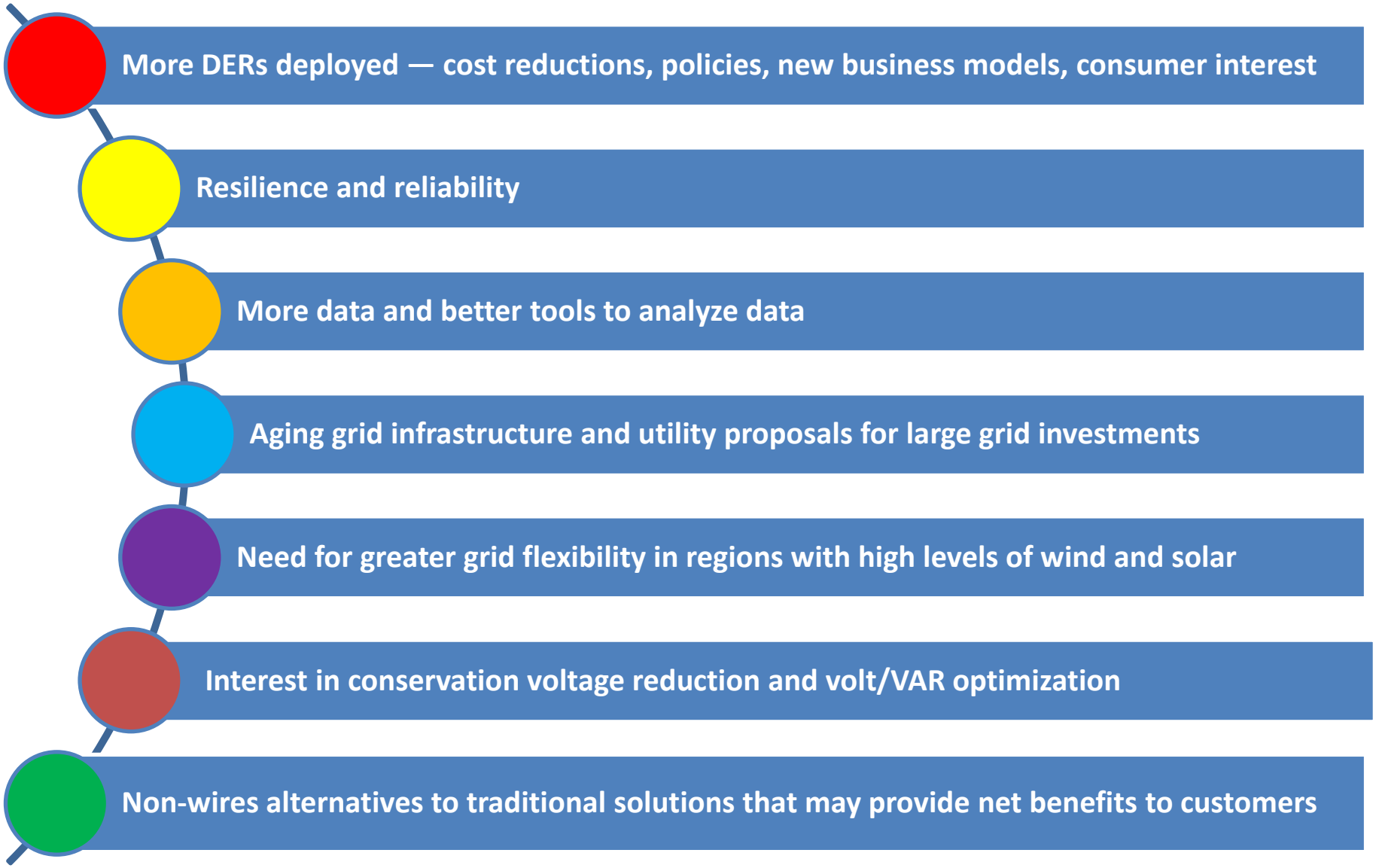


- Distribution planning - Assess needed physical and operational changes to the local grid
  - Annual process, with 1–2 year planning horizon*
    - Identify and define distribution system needs
    - Identify and assess possible solutions
    - Select projects to meet system needs
  - Longer-term utility 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 distributed resources; impacts on need and timing for investments/purchases
- Transmission planning – Identify future transmission expansion needs and options

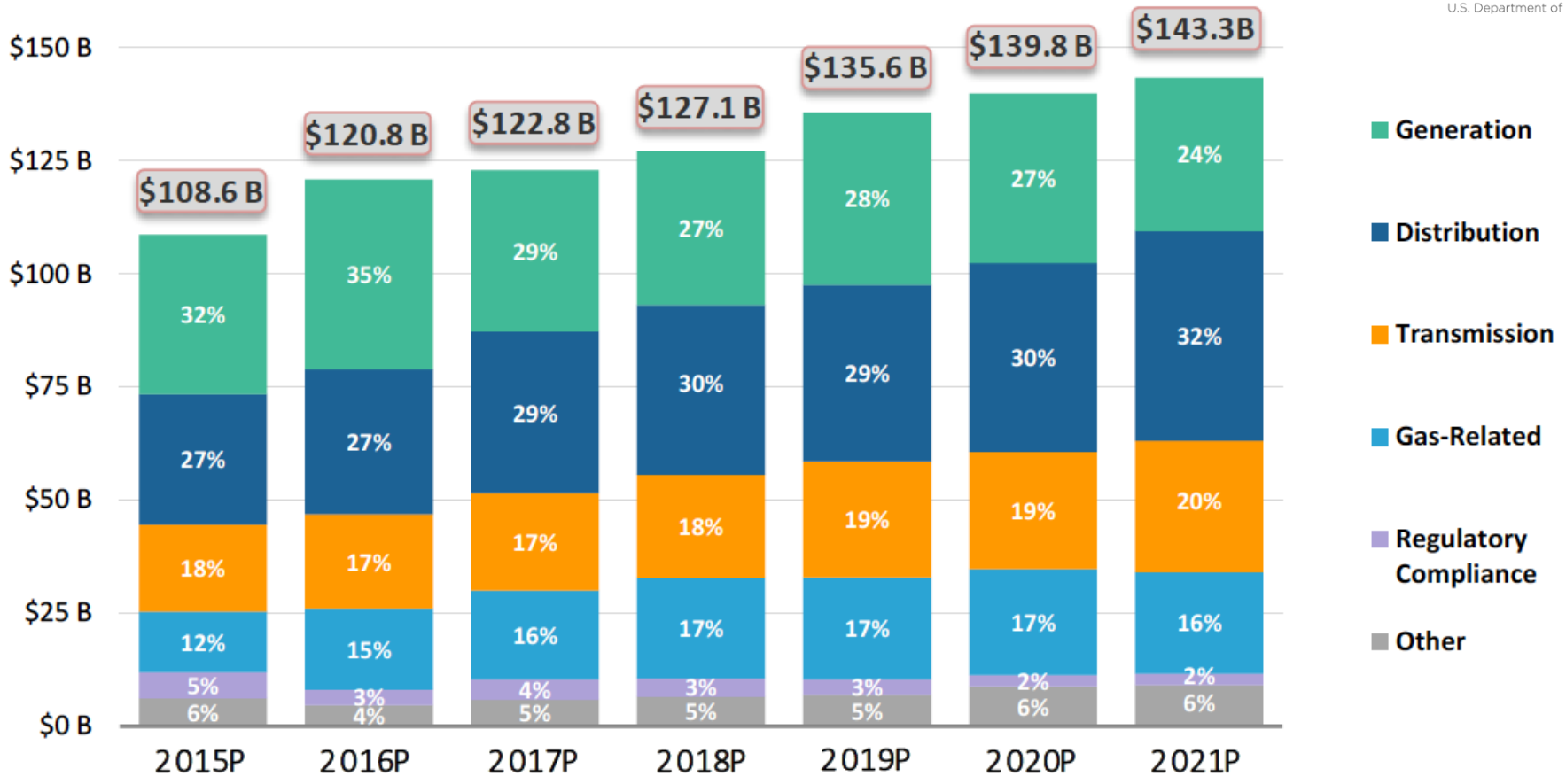


Also: energy efficiency, demand-side management, electrification and climate plans
*Operational planning addresses immediate concerns (intraday through the current year).
**Where applicable

States are responding to a variety of drivers for improved, transparent, stakeholder-engaged distribution planning.



One reason states are increasingly interested in distribution planning

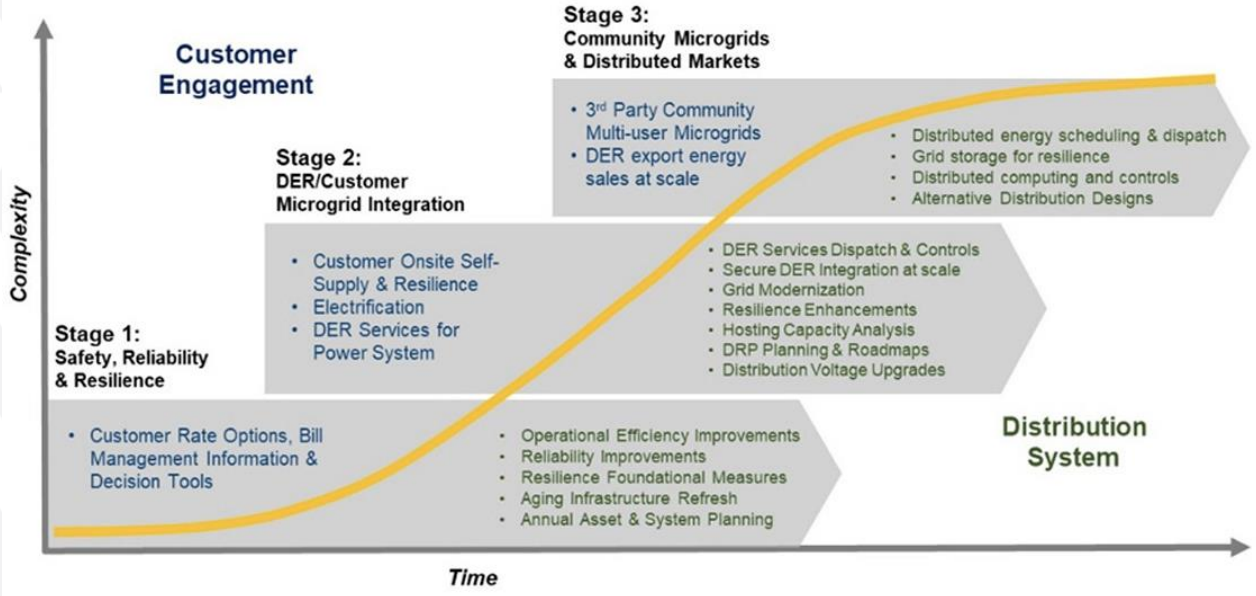


Distribution system investments account for the largest portion (32%) of capex for U.S. investor-owned utilities: $46.4B (projected) in 2021.

Source: Edison Electric Institute

Other potential benefits from improved distribution planning processes

- Makes transparent utility plans for distribution system investments holistically, before showing up individually in a rider request or rate case
- Provides opportunities for meaningful PUC and stakeholder engagement
  - Can improve outcomes — more data, community input, review
- 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 3rd party providers to propose grid solutions and participate in providing grid services



Source: DOE 2021

States with distribution planning requirements

	California	Colorado	Delaware	District of Columbia	Florida	Hawaii	Illinois	Indiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Nevada	New Hampshire	New Jersey	New York	Ohio	Oregon	Pennsylvania	Rhode Island	Texas	Utah	Vermont	Virginia	Washington
Distribution system plan requirement	●	●	●	●		●	●	●	●	●	●	●	●	●	●		●		●		●			●	●	●
Grid modernization plan requirement	●					●					●		●				●	●								
Hosting capacity analysis/mapping requirement	●	●				●					●	●	●	●	●		●		●							
Non-wires alternatives / locational value requirements	●	●	●	●		●			●			●	●	●	●		●				●					
Storage Mandates or Targets	●						●		●		●			●		●	●		●						●	
Benefit-Cost Methodology / Guidance	●						●			●				●			●				●					
Storm hardening requirements					●					●															●	
Required reporting on poor-performing circuits and improvement plans		●	●		●		●			●	●		●			●	●	●	●	●	●	●	●	●		●

Berkeley Lab and Pacific Northwest National Laboratory

Distribution plans may be incorporated in integrated resource plans or integrated grid plans. Grid modernization plans may be filed in combination with distribution plans. This list is not all-inclusive.

Example state requirements*

- Distribution system plans

  California, Colorado, Delaware, DC, Hawaii, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, Nevada, New York, Oregon, Rhode Island, Vermont, Virginia, Washington

- Grid modernization plans

  California, Hawaii, Massachusetts Minnesota, New York, Ohio

  - Utilities in other states have filed grid modernization plans absent requirements (e.g., GA, NC, SC, TX).

- Hosting capacity analysis/maps

  California, Colorado, Hawaii, Massachusetts, Michigan, Minnesota, Nevada, New Hampshire, New York, Oregon

- NWA/locational value

  CA, CO, DE, DC, HI, ME, MI, MN, NV, NH, NY, RI

- Benefit-cost handbook/guidance

  CA, DC (draft), IL, MD, NV, NY, RI, SC

- States using or considering adopting NSPM framework

  - AR, CO, CT, DC, MD, MI, MN, MO, NH, NJ, RI, PA, WA

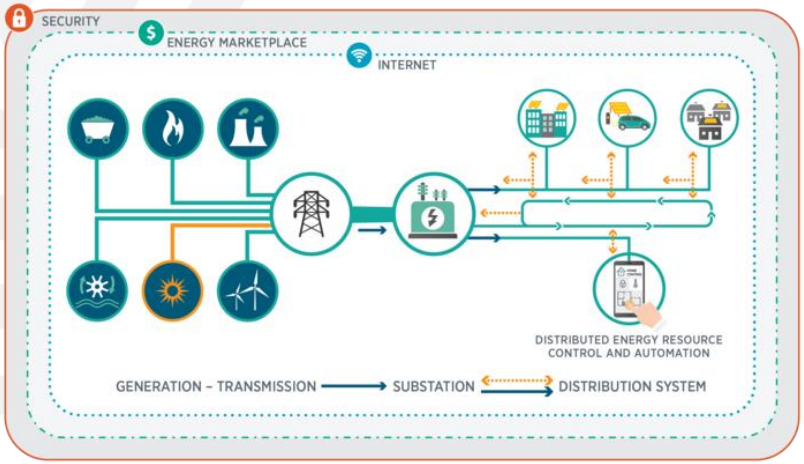


Figure: U.S. Department of Energy

***This list is not all-inclusive.**

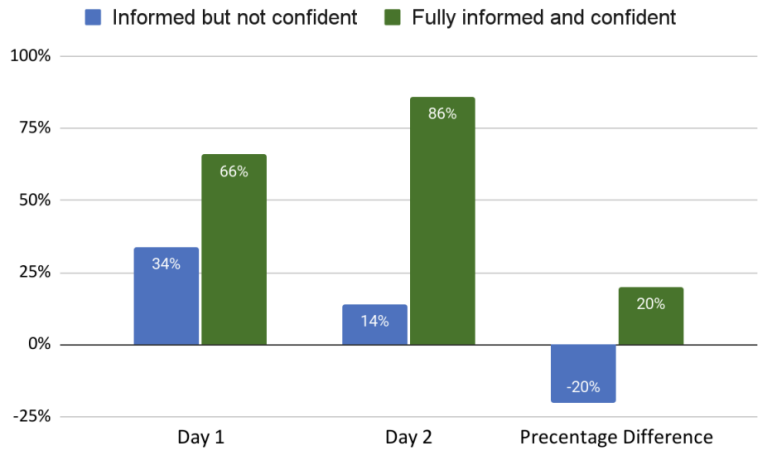
Procedural elements (1)

- Frequency of filing
  - Typically annual or biennial
  - Every 3 years (e.g., NV)
  - *Considerations:* alignment with utility distribution capital planning, IRP filing cycle, workload, making and tracking progress on goals and objectives
- Planning horizon
  - 2-4 year action plan – OR (+ 5-10 year roadmap for investments, tools and activities)
  - 3 year action plan — NV (+ 6-yr forecasts), DE (+ 10-yr long-range plan)
  - 5 years – NY, CA (+ 10-yr grid modernization vision), HI (+ plan to 2045), MI (+ 10-15 yr outlooks), MN (+ 10-yr Modernization & Infrastructure Investment Plan)
  - 5-7 years – Indiana
  - *Considerations:* short- and long-term investments, coordination with IRP, granularity of distribution planning

See *Extra Slides* for Confidentiality provisions

Procedural elements (2)

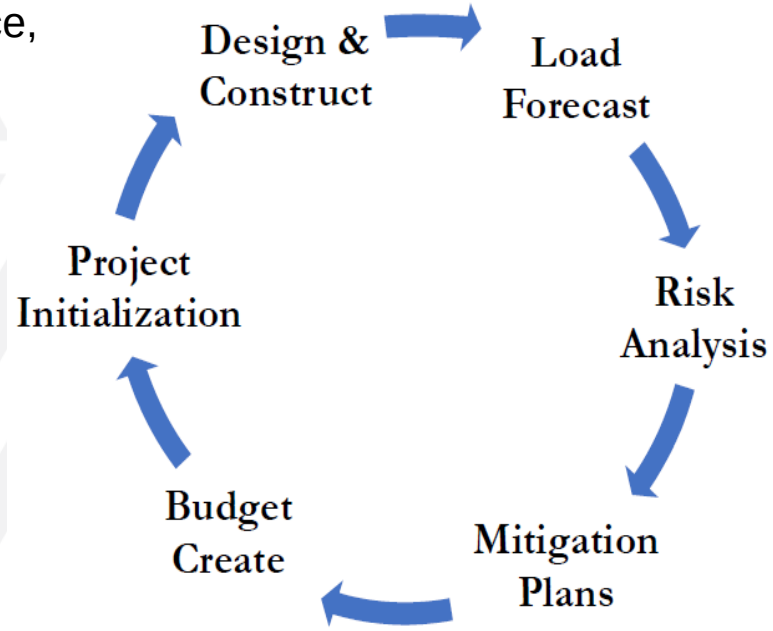
- Stakeholder engagement
  When well designed, the benefits are “better information, decreased risk, and smarter solutions” (De Martini et al. 2016).
- Requirements
  - *Before plan is filed:* Can include significant input through working groups (e.g., CA, DC, HI, MI, NH, NY) and ongoing engagement
  - *After plan is filed:* Stakeholders can file comments, utility provides periodic updates
- Examples
  - Hawaii - Stakeholder council, technical advisory panel, ad hoc working groups
  - New York - Surveys, newsletters, webinars, meetings, and designated website
  - Oregon - Utilities must file a community engagement plan, host ≥4 stakeholder workshops before filing the distribution plan.



Portland General Electric Community Meeting Participant Feedback

Substantive elements (1)

- 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 for overloads and mitigation plans
  - 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



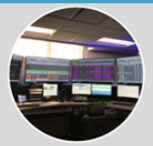
Source: Xcel Energy, 2021

Substantive elements (2)

- DER forecast
  - Types, amounts and locations
- Hosting capacity analysis
  - Including maps
- Grid needs assessment and NWA analysis to identify:
  - Existing and anticipated capacity deficiencies and constraints
  - Traditional utility mitigation projects
  - A subset of these projects that may be suitable for non-wires alternatives (NWA) to defer or avoid infrastructure upgrades for load relief, voltage, reducing interruptions, resilience

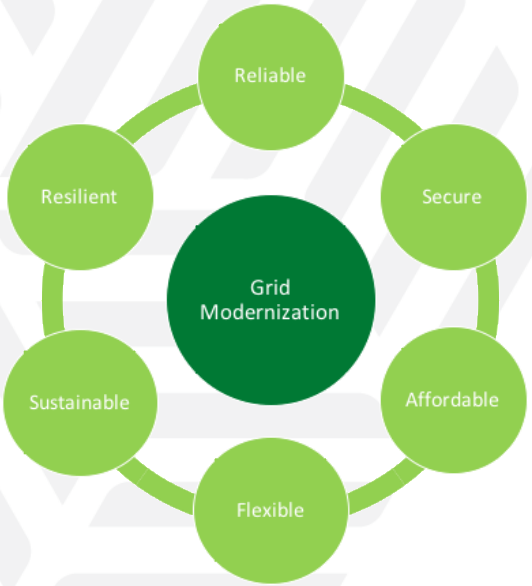
Substantive elements (3)

- Grid modernization strategy
  - Includes financial forecasts associated with grid modernization plans
  - May include request for certification for major investments
- Action plan
- Additional elements
  - 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

GRID VISIBILITY AND CONTROLS		Network	Meters
Advanced Distribution Management System (ADMS)	**Fault Location, Isolation and Service Restoration (FLISR)**	**Field Area Network (FAN) & Home Area Network (HAN)**	**Advanced Metering Infrastructure (AMI)**
			
• Advanced centralized software or the "brains," enhances the operation of the distribution grid • Enables improved reliability, management of DERs, and improved efficiency when operating the grid • Enables enhanced visibility and control of field devices (including customer meters via AMI)	• ADMS provides fault location prediction and the automatic operation of intelligent grid devices • Reduces outage durations and the number of customers impacted by an outage • Enabled by intelligent field devices, FAN, and ADMS	• Two-way communications network • Connects intelligent grid devices and smart meters with software • Enables enhanced remote monitoring and control of intelligent field devices and advanced meters	• Focused on the deployment of smart meters and software • Provides near real-time communication between software and meters • Data and AMI functionality enable new products and services and improves customer experience

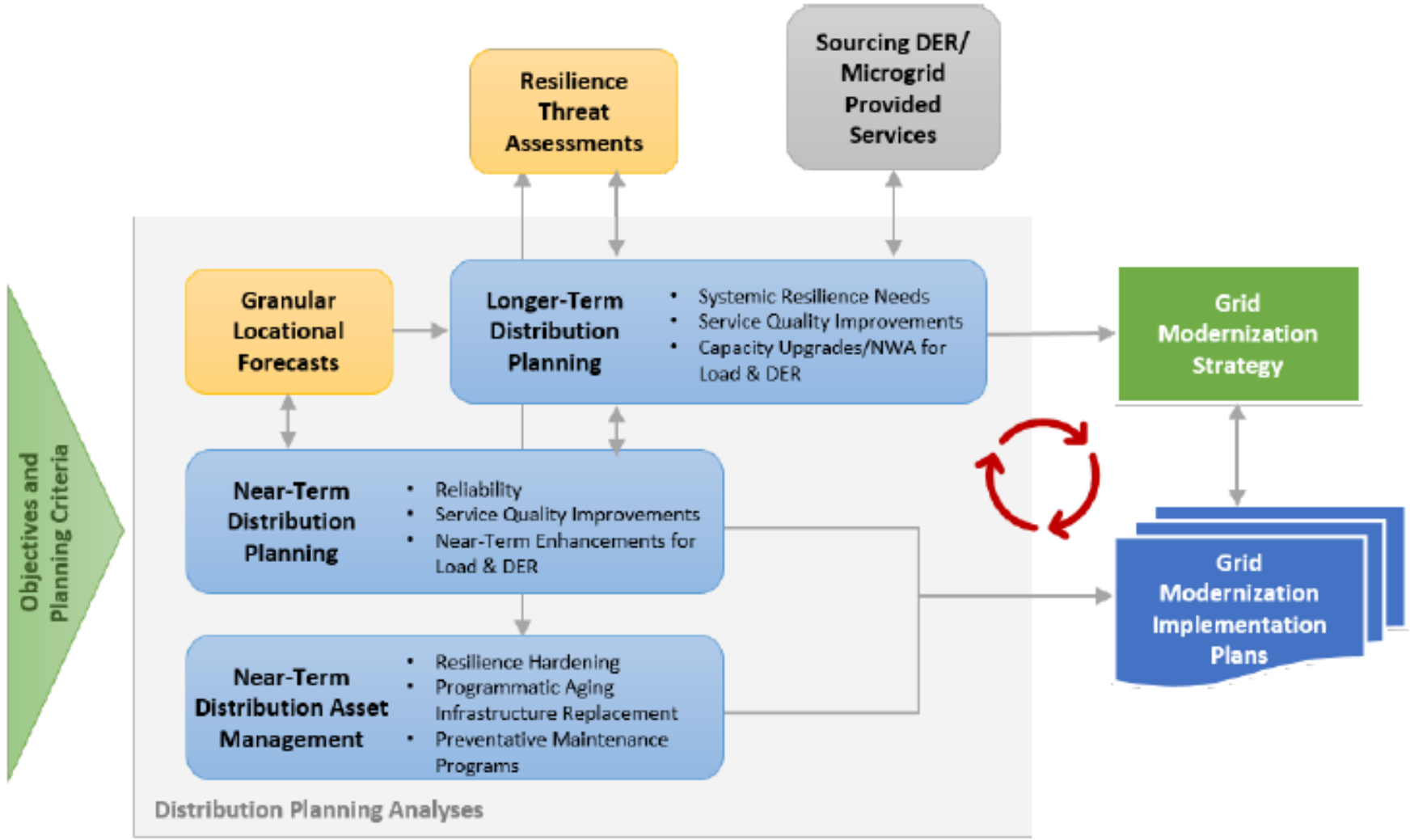
Source: Xcel Energy 2021

Grid Modernization and Distribution Planning



Source: U.S. Department of Energy's *Grid Modernization Multi-Year Program Plan*

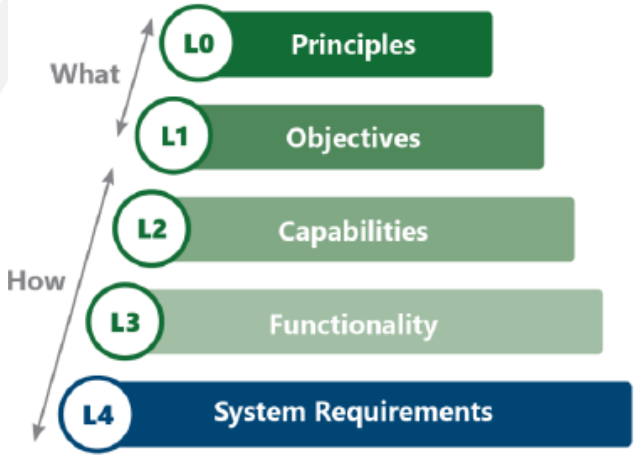
Relationship of grid modernization planning to integrated distribution planning



Source: DOE 2021

Start with principles and objectives instead of picking technologies

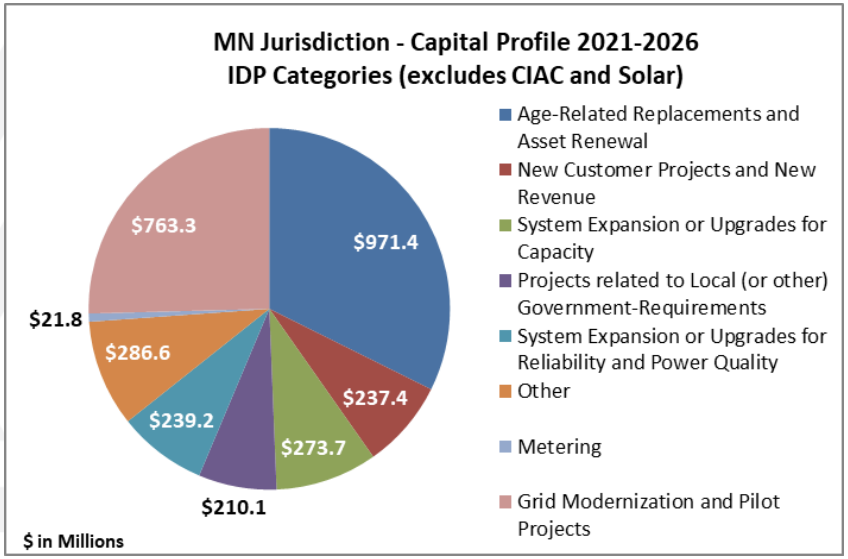
- Grid modernization planning starts with principles, objectives and capabilities needed. They determine functionality and system requirements.
- Holistic, long-term planning for grid modernization is needed to:
  - Support state goals, including reliability, resilience, affordability, clean energy resources, climate and electrification (e.g., AMI for time-varying rates that provide demand flexibility to integrate more wind and solar)
  - Address interdependent technologies and systems, including “platform” components (e.g., Advanced Distribution Management Systems, Geographic Information System, Outage Management System) needed to enable or support other grid modernization projects
  - Consider proactive grid upgrades to facilitate customer choice
- Other plans may feed into distribution plans:
  - Electrification plan informs grid needs for EV charging
  - Cybersecurity plan identifies resilience threats that distribution planning can consider
  - Demand-side management plan specifies capabilities that distribution technologies and systems should provide to achieve multi-year targets for demand response, energy efficiency and conservation



Source: DOE 2021

How one state put together the pieces: Minnesota (1)

- Minn. Stat. §216B.2425 (2015) requires the largest utility (Xcel Energy) to submit biennial transmission and distribution plans to the PUC
  - To *"identify … investments that it considers necessary to* ***modernize the transmission and distribution system by enhancing reliability, improving security against cyber and physical threats, and by increasing energy conservation opportunities*** *…."*
  - May ask Commission to **certify priority projects and approve costs through a rider** — a finding that the project is consistent with requirements of this statute, not a prudency determination
  - Analyze hosting capacity for *small-scale distributed generation resources* and *identify necessary distribution upgrades to support [their] continued development*
- Xcel Energy 1st grid modernization report (Docket 15-962)
- Xcel Energy 2nd grid modernization report (Docket 17-776)
- The Commission certified investments in:
  - Advanced Distribution Management System (ADMS)
  - Residential Time of Use Pilot using AMI
  - Field Area Network (FAN)

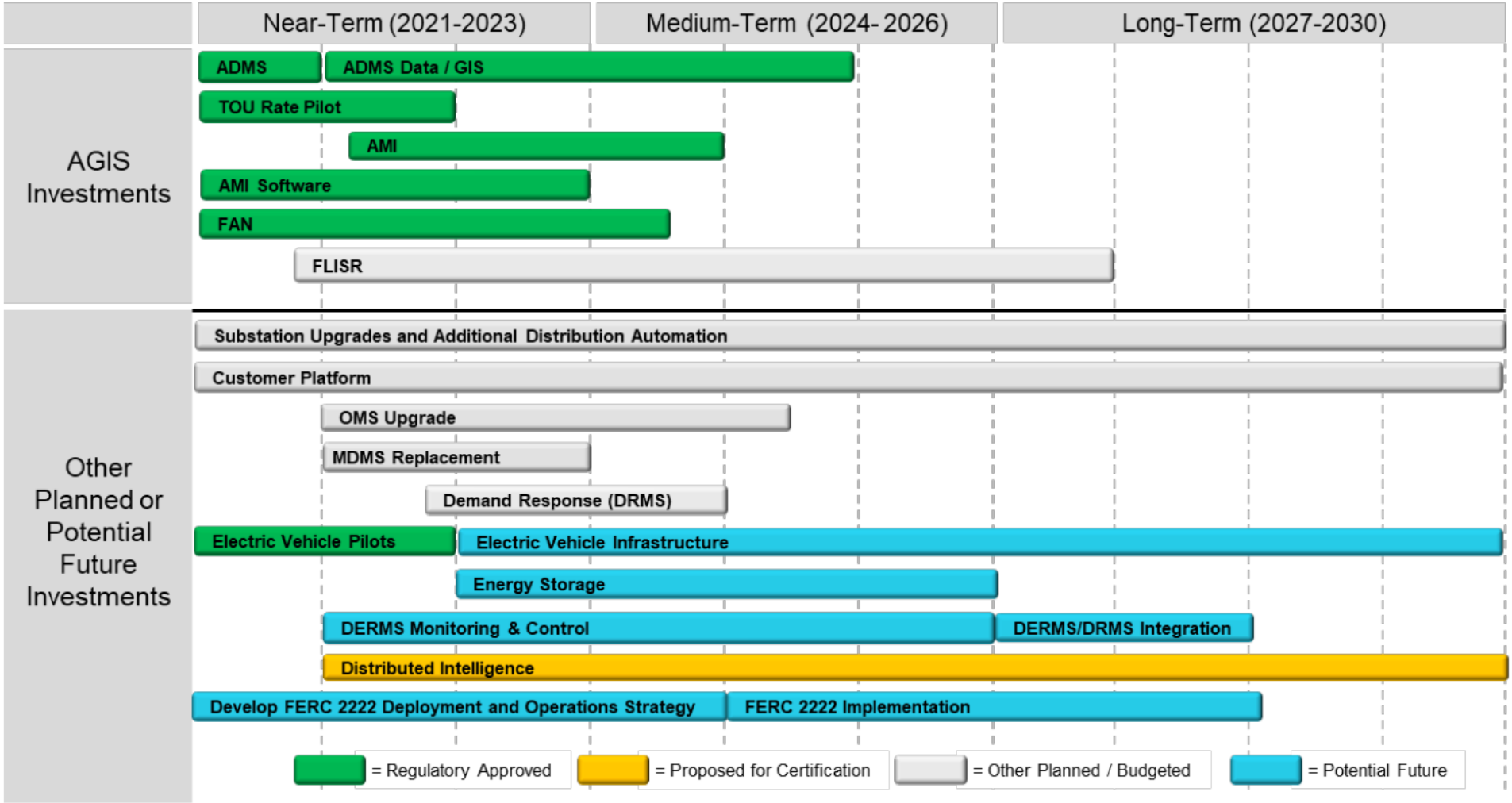


Xcel Energy 2021

How one state put together the pieces: Minnesota (2)

- The PUC initiated an inquiry on Electric Utility Grid Modernization with a focus on distribution planning (Docket CI-15-556)
  - Series of stakeholder meetings
  - Questionnaire to utilities on utility planning practices plus stakeholder comments
    - How do Minnesota utilities currently plan their distribution systems?
    - What is the status of each utility's current plan?
    - How could the utility's planning processes be improved or augmented?
  - Staff Report on Grid Modernization defined grid modernization for Minnesota, proposed a phased approach, and identified principles to guide it.
- The Commission set Integrated Distribution Planning requirements for Xcel Energy (Docket 18-251) and smaller regulated utilities (Dockets 18-253, 18-254 and 18-252).
- Xcel Energy filed the 1st DSP in 2018 (Docket 18-251), a 2nd IDP in 2019 (Docket 19-666), and a 3rd IDP in 2021 (Docket 21-694).
  - **Grid modernization plan now filed *with* IDP filing**

Illustrative Long-Term Grid Modernization Plan



Source: Xcel Energy 2021

DERs and Distribution Planning

Proactive planning is more effective.

Tell customers where the grid needs help and what services the grid needs. Provide appropriate incentives.

- *Load and DER forecasting* helps resource planners avoid overbuilding and feeds into analysis of which feeders may be stressed by DER in the near-term.
- *Hosting capacity analysis* shows how much more DER can be managed on a given feeder easily and where interconnection costs will be low/high.
- Together, these processes identify feeders that are likely to see DER growth and can be considered for proactive upgrades.
- *Locational net benefits analysis* helps determine the benefits of specific services at a specific location to guide developers.
- Cost-effective *non-wires alternatives* can provide specific services at specific locations to defer some traditional infrastructure investments.
- These analyses also can inform rates and tariffs.

Source: Adapted from Debbie Lew, Emerging distribution planning analyses, prepared for Berkeley Lab, 2020

What is hosting capacity?

- Amount of DERs that can be interconnected without adversely impacting power quality or reliability under existing control and protection systems and without infrastructure upgrades
- Analysis shared by utility typically in maps with supporting data
- Three main constraints: thermal, voltage/power quality, protection limits

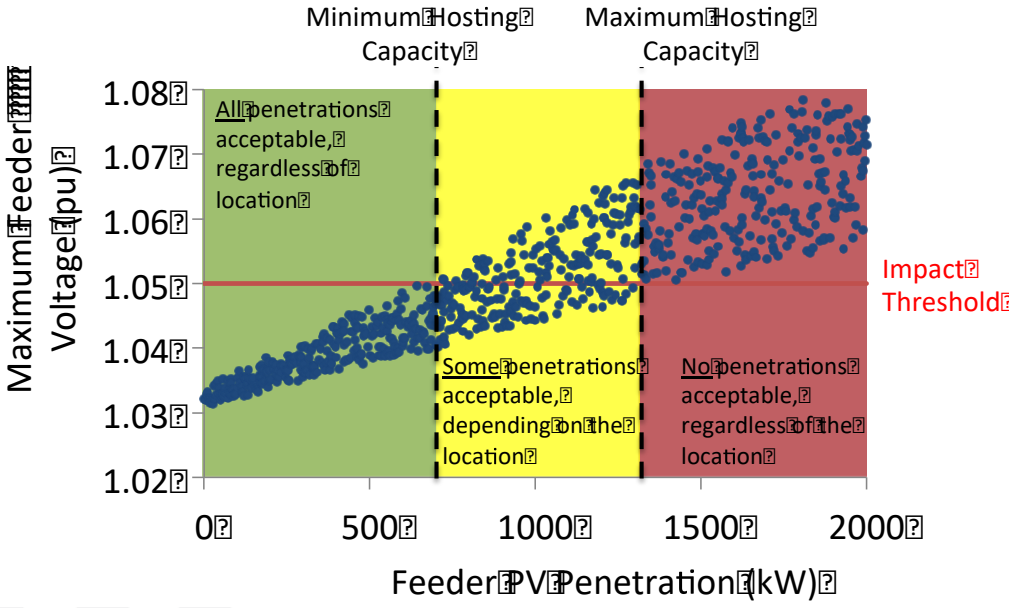


Figure adapted by Berkeley Lab from EPRI (2015), *Distribution Feeder Hosting Capacity: What Matters When Planning for DER?*

Hosting capacity use cases

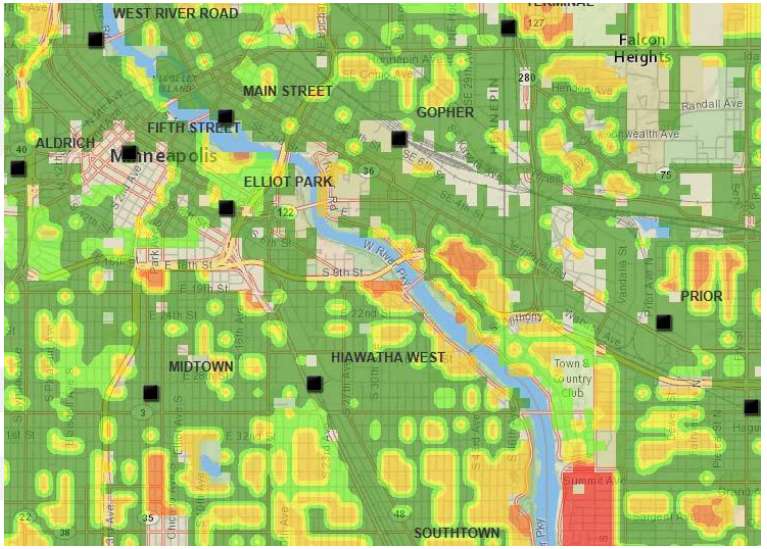
	Use Case	Objective	Capability	Challenges
Hosting Capacity Analysis Use Cases	**Development Guide**	Support market-driven DER deployment	Identify areas with potentially lower interconnection costs	Security concerns; analysis/model refresh; data accuracy and availability
	Technical Screens	Improve the interconnection screening process	Augment or replace rules of thumb; determine need for detailed study	Data granularity; benchmarking and validation to detailed studies
	Distribution Planning Tool	Enable greater DER integration	Identify potential future constraints and proactive upgrades	Higher input data requirements; granular load and DER forecasts

Source: ICF International for DOE

Useful reference: IREC, *Key Decisions for Hosting Capacity Analysis*, 2021

Example hosting capacity analysis requirements: Minnesota (1)

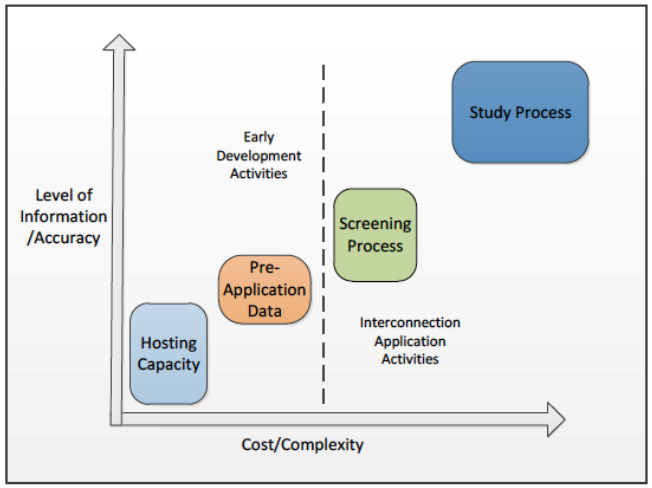
- State law (§216B.2425, 2015) requires Xcel Energy to conduct a distribution study to identify interconnection points for small-scale distributed generation and system upgrades to support its development
- PUC requires analysis of each feeder for solar ≤1 MW and potential distribution upgrades necessary to support expected distributed generation levels, based on utility's IRP filings and Community Solar Gardens program
- Utility filed 1st hosting capacity analysis on 12/1/16 (Docket 15-962)
  - Commission's Aug. 1, 2017 decision requires filing Nov. 1 each year
  - Provided guidance for future analysis, including reliable estimates and maps of available hosting capacity at feeder level
    - Details to inform distribution planning and upgrades for efficient integration of distributed generation
    - Detailed information on data, modeling assumptions and methodologies



Source: Xcel Energy

Example hosting capacity analysis requirements: Minnesota (2)

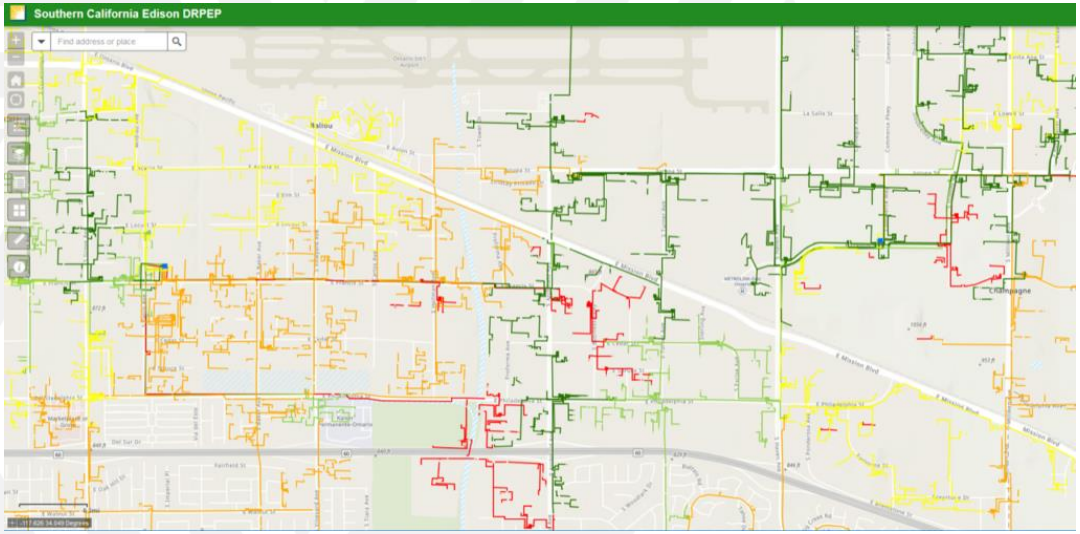
- Aug. 15, 2019, order (Docket 18-684) required further improvements
  - Work with stakeholders to improve value of analysis, with more detailed data in maps
  - Provide spreadsheet with hosting capacity data by substation and feeder, with peak load, daytime min. load, installed generation capacity, and queued generation capacity
  - For feeders with no hosting capacity, identify "The full range of mitigation options … including a range of potential costs … and financial benefits…."
  - Identify cost and benefits of replacing or augmenting initial interconnection review screens and supplemental review and automating interconnection studies
- July 23, 2020, order (Docket 19-666)
  - Adopts long-term goal for using hosting capacity analysis in interconnection fast-track screens
  - Requires estimating costs for more frequent updates and other use cases (e.g., initial interconnection review screens and supplemental review), considering *load* hosting analysis
- June 1, 2022, order (Docket M-21-694)
  - Requires proactive investments in hosting capacity and other necessary system capacity to allow distributed generation and electric vehicle additions consistent with the forecast for DERs — in coordination with IRP



Source: Xcel Energy 2021

California Integration Capacity Analysis

- Models how much new generation — as well as **load** – can be accommodated on the distribution system at specific locations, using actual grid conditions
  - Understanding capacity for new load is especially important in the context of state electrification initiatives, as well as energy storage projects (load+generation).
- PUC's ruling on Jan. 27, 2021, directed utilities to refine their Integration Capacity Analysis maps and include them in data portals: PG&E, SCE (see user guide), SDG&E*

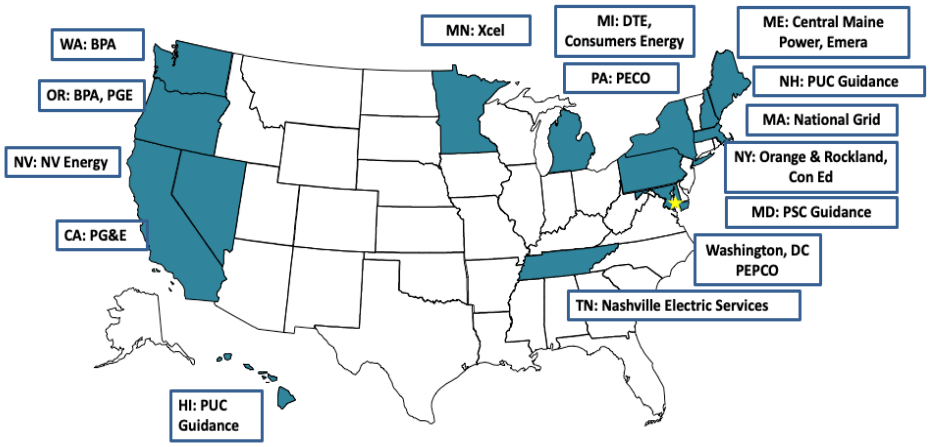


Source: SCE

*In addition to the ICA map, the portals include the utility's Distribution Investment Deferral Framework map (Grid Needs Assessment + Distribution Deferral Opportunity Report) and Solar Photovoltaic and Renewable Auction Mechanism map.

What are non-wires alternatives?

- Options for meeting distribution system needs related to load growth, reliability and resilience.
  - Single large DER (e.g., battery) or portfolio of DERs that can meet the specified need
- Provide load relief, address voltage issues, reduce interruptions, enhance resilience, or meet local 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.



Case studies featured in Berkeley Lab report, *Locational Value of Distributed Energy Resources*

- Typically, the utility issues a competitive solicitation for NWA for specific distribution system needs and compares bids to planned traditional grid investments to determine the lowest reasonable cost solution.
- Jurisdictions that require NWA consideration include CA, CO, DE, DC, HI, ME, MI, MN, NV, NH, NY and RI. Other states have related proceedings, pilots or studies underway.

NWA procurement strategies in New York (1)

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

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

NWA procurement strategies in New York (2)

GRID MODERNIZATION LABORATORY CONSORTIUM
U.S. Department of Energy

Projects, Needs and Default Solutions: Orange & Rockland NWA projects

Project	Need	Default Solution	Status
West Warwick **RFP**	Amount: 12MW Location: Wisner Substation #80 When: 2022	Construction of new transmission/distribution substation	Executed contract
Sparkill **RFP**	Amount: 2 MW Location: Circuit 50-3-13 When: 2023	New distribution circuit tie	Procurement process to begin in 2022; in service 2023
Monsey **RFP**	Amount: 15 MW Location: Bank #244 When:2021	Upgrade of Monsey substation	Going through siting and permitting process
Pomona DER project	Amount: 2 MW Location: 4 circuits in Pomona load area Overload period: 1-7 pm When: 2020 (spring/summer)	Construct Pomona substation	Completed; 4.1 MW peak reduction from EE, DR and battery

See Joint Utilities NWA Opportunities and REV CONNECT

Data-Related Requirements

Data-related requirements (1)

- Several Commissions are addressing data access in distribution planning and other proceedings.
- **Customer usage data** - Making AMI interval data available to customers and third parties
  - Some states are requiring utilities to use or evaluate feasibility of the Green Button framework* (e.g., CA, CO, CT, DC, HI, IL, MI, NH, NY and TX).
    - Download My Data – standard enables customer to download their data
    - Connect My Data – data exchange protocol allows automatic transfer of data from utility to third party on customer authorization
    - Some states require specific aggregation levels for data sharing to protect privacy.
- **System level data** – Making system level data available to support customer and third-party solutions
    - NY, NH, MN, OH, CA and DC are examples of jurisdictions with detailed system data sharing requirements. (See *Extra Slides* for more information.)

*The Green Button initiative is an industry-led effort to provide utility customers with easy and secure access to their energy usage information in a consumer-friendly and computer-friendly format.

Data-related requirements (2)

Data platforms are centralized online resources where energy data are aggregated, stored in a common format, and accessible to customers and third parties.

New York

- Joint Utilities data sharing portal provides the following information by utility:

❑ Distributed System Implementation Plans	❑ Load Forecasts
❑ Capital Investment Plans	❑ Historical Load Data
❑ Planned Resiliency / Reliability Projects	❑ NWA Opportunities
❑ Reliability Statistics	❑ Queued DG
❑ Hosting Capacity	❑ Installed DG
❑ Beneficial Locations	❑ SIR Pre-Application Information

- NYSERDA established the Utility Energy Registry to develop an Integrated Energy Data Resource platform to streamline community access to aggregated data. New York adopted a 15/15 aggregation screen for residential customers and a 4/60 screen for all other customers.
  - 15/15 rule - An aggregation sample must have more than 15 customers and no single customer's data may comprise more than 15% of the total aggregated data.

New Hampshire

- A settlement agreement in April 2021 outlined data platform requirements for utilities. The portal for customers and third parties will follow Green Button Connect protocols.

Data-related requirements (3)

Minnesota* - In November 2020, the Commission approved open access data standards proposed by Citizens Utility Board to release customer energy use data to third parties. The standards apply to utilities with >50,000 customers for a specific set of applications. (Docket M-19-505)

- To collect and share aggregated or anonymized, disaggregated customer energy use data for use by third parties
- Data provided at closest level of geographical specificity possible to maintain customer anonymity and at the finest practicable time interval

Ohio – An order on a multi-utility settlement (October 2021) requires utilities to provide access to customer data including:

- ≥24 months of energy usage data in 15, 30, or 60 minute intervals made available on a best-efforts basis within 24 hours of performing industry-standard validation, estimation and editing processes
- ≥24 months of summary billing history data, including date of bill, usage, bill amount and due date

*Report requested by Commission Staff, *Access to Aggregated or Anonymized Customer Energy Use Data* (October 2021): (1) discusses key aspects of data access and privacy policies and issues raised in the proceeding and (2) highlights the importance of access to aggregated customer energy use data for meeting climate targets, building benchmarking, and DER participation in wholesale markets, retail choice, and community choice aggregation

Resources for more information

U.S. Department of Energy's (DOE) *Modern Distribution Grid*, Vol. IV, 2021

P. De Martini et al., *Integrated Resilience Distribution Planning*, PNNL, 2022

Berkeley Lab's integrated distribution system planning website: https://emp.lbl.gov/projects/integrated-distribution-system-planning

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

C. Farley et al., *Advancing Equity in Utility Regulation*, Berkeley Lab, 2021

Xcel Energy, *2022-2031 Integrated Distribution Plan*, 2021

N. Frick, S. Price, L. Schwartz, N. Hanus and B. Shapiro, *Locational Value of Distributed Energy Resources*, Berkeley Lab, 2021

T. Woolf, B. Havumaki, D. Bhandari, M. Whited and L. Schwartz, *Benefit-Cost Analysis for Utility-Facing Grid Modernization Investments: Trends, Challenges and Considerations*, Berkeley Lab, 2021

T. Eckman, L. Schwartz and G. Leventis, *Determining Utility System Value of Demand Flexibility From Grid-interactive Efficient Buildings*, Berkeley Lab, 2020

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*, Pacific Northwest National Laboratory and National Renewable Energy Laboratory, 2020

Smart Electric Power Alliance, *Integrated Distribution Planning: A Framework for the Future*, 2020

ICF (prepared for DOE), *Integrated Distribution Planning: Utility Practices in Hosting Capacity Analysis and Locational Value Assessment*, 2018

A. Cooke, J. Homer, L. Schwartz, *Distribution System Planning – State Examples by Topic*, Pacific Northwest National Laboratory and Berkeley Lab, 2018

J. Homer, A. Cooke, L. Schwartz, G. Leventis, F. Flores-Espino and M. Coddington, *State Engagement in Electric Distribution Planning*, Pacific Northwest National Laboratory, Berkeley Lab and National Renewable Energy Laboratory, 2017

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

J. McAdams, *Public Utility Commission Stakeholder Engagement: A Decision making Framework*, NARUC, 2021

P. De Martini et al., *The Rising Value of Stakeholder Engagement in Today's High-Stakes Power Landscape*, ICF, 2016

N.L. Seidman, J. Shenot, J. Lazar, *Health Benefits by the Kilowatt-Hour: Using EPA Data to Analyze the Cost-Effectiveness of Efficiency and Renewables*, Regulatory Assistance Project, 2021

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Extra Slides

Procedural elements - Confidentiality

- 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 NWA RFPs
  - Proprietary model information

Data-related requirements

California - By order, utilities must make datasets available as part of Grid Needs Assessments & Distribution Deferral Opportunities filings.

- Grid needs
  - By circuit, substation, and sub-transmission capacity service
    - Peak load (five years)
    - DER growth (EE, DR, PV, EV, storage)
    - Facility loading %
    - Current year demand
    - Five-year forecasted demand
    - Forecasted percentage deficiency above the existing rating over five years
    - Forecasted MW deficiency over five years
    - Anticipated season or date by which distribution upgrade must be installed
- Distribution deferral opportunities
  - Planned investments
    - Project description
    - Distribution service required
    - Type of traditional capital investment equipment to be installed
    - In-service date
    - Deferrable by DERs? (Y/N)
    - Number and composition of customers
  - Candidate deferrals
    - Expected performance and operational requirements
    - Specific locational values
    - Distribution service required
    - Expected magnitude of DER service provision (MW/kWA)
    - Duration and timing of the deficiency and associated DER service requirements
    - Unit cost of traditional mitigation
    - Contingency plans

Data-related requirements

- **California** - Privacy screens vary by purpose and level.
  - Some data are aggregated across time (e.g., monthly data) or across the utility's service territory (e.g., consumption data by city or zip code).
  - Residential customer usage data - Summarized monthly and aggregated by zip code using a 100/* screen (aggregated data must contain 100 customers, with no limit on the percentage of load that one customer can represent)
  - Commercial, agricultural and industrial data - 15/15 screen
  - Industrial customers - 5/25 screen
  - Local, state, and federal government agencies or academic researchers - 15/20 screen for residential, commercial, and agricultural customer monthly data, anonymized by census block
  - Zip code-level data is posted on utility websites (no data requests required).
  - Standard nondisclosure agreements and consent forms are used for other data requests.

Source: Littell, D., Regulatory Assistance Project. "Aggregate and Anonymized Data: Similarities & Differences, Regulatory Opportunities & Barriers." MI Power Grid Customer Education and Participation Workgroup. June 22, 2021

Data-related requirements

District of Columbia PSC required a dedicated data sharing website following working group recommendations. Some data sets require secure access.

Data Type	Frequency	Granularity	Availability
Capital Investment Plan – General Overview	Annual, 10 year forecast period	System	Current; Public (Pepco's Annual Consolidated Report)
Load forecast	Annual, 10 year forecast period	Substation	Current; Public (Pepco's Annual Consolidated Report)
Reliability statistics (SAIFI, CAIDI)	Annual (ACR)	Feeder level	Current; Public (Pepco's Annual Consolidated Report)
Planned resiliency/ reliability projects	Annual	Varies by project	Current; Public (Pepco's ACR and Rate Case Construction Report)
Load data	Annual (ACR)	Feeder (Historic)	NDA
Hosting Capacity	Quarterly	Feeder level	Hosting Capacity Map; Website
Beneficial Location	N/A	N/A	Not Available
Existing DER Capacity	Monthly	Feeder level	Heat Map; Website

The PSC reviewed the Customer Impact Working Group's Green Button Connect My Data Report in an order (Sept. 2021) and made decisions on issues such as data fields, authorization form contents, revocation process, process for customers without Internet access, development of a Connect My Data tariff, and platform certification by the Green Button Alliance.

Data Type	Frequency	Granularity	Availability
Circuit Capacity/ Design Criteria	Static (updated as projects are implemented)	Feeder level	Critical Energy Infrastructure Information (CEII); Secure access required.
Physical Attributes	Static (updated as projects are implemented)	Node level	Critical Energy Infrastructure Information (CEII); Secure access required.
Protective devices	Static (updated as projects are implemented)	Feeder level	Critical Energy Infrastructure Information (CEII); Secure access required.
Voltage profile	Static (updated as projects are implemented and with changes in load information)	Feeder level	Critical Energy Infrastructure Information (CEII); Secure access required.
Circuit impedance models	Static (updated as projects are implemented)	Feeder level	Critical Energy Infrastructure Information (CEII); Secure access required.