A National Perspective on State Practices for Integrated Distribution System Planning

Maryland PSC Technical Conference on Best Practices in Distribution System Planning

Presented by Natalie Mims Frick
Contributions from Lisa Schwartz

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Agenda

- Distribution planning framework
- Plan requirements, including data transparency
- Distributed energy resources as non-wires solutions
- Stakeholder engagement, equity and justice
- Example state practices

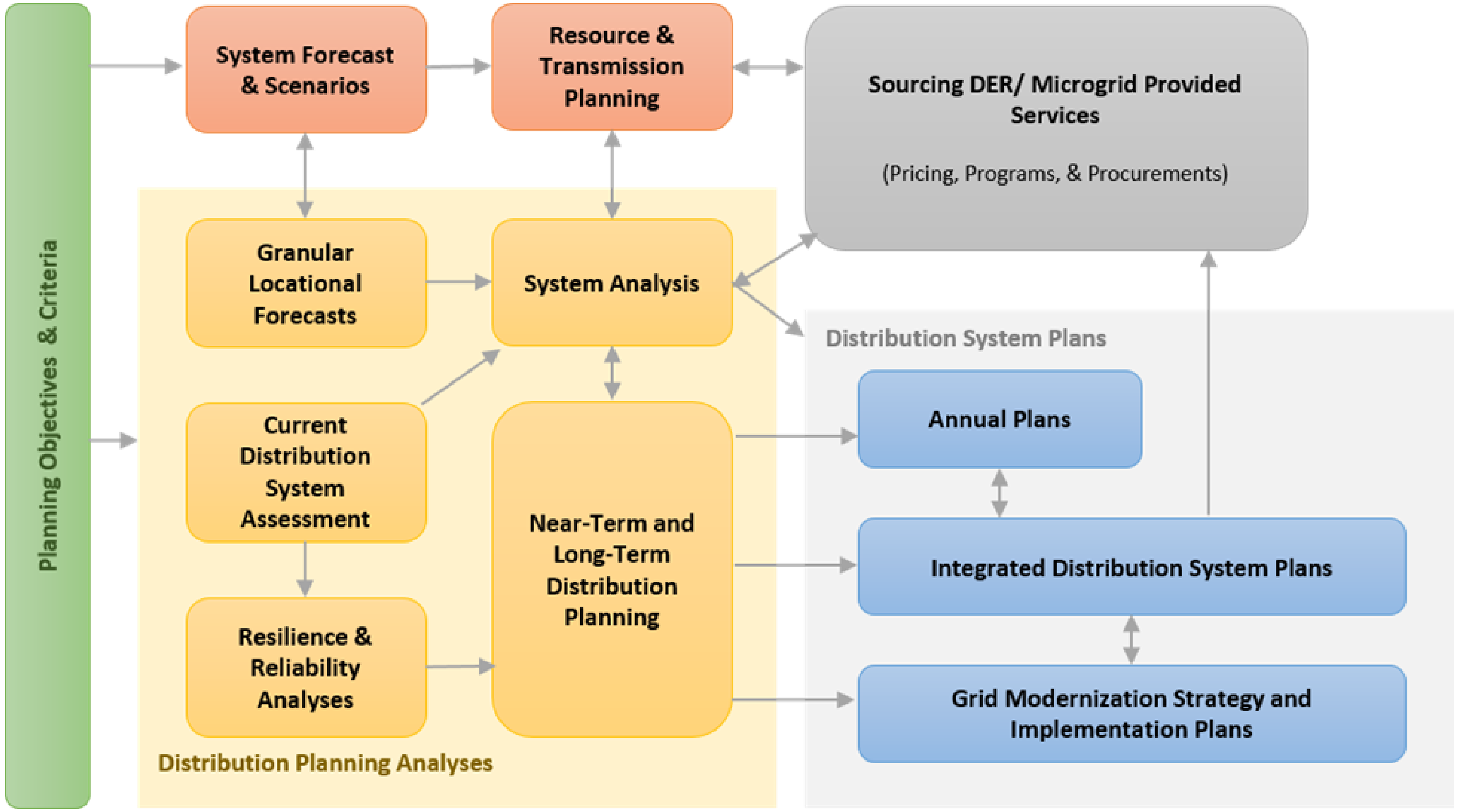
For more information, see Berkeley Lab's Integrated Distribution System Planning website.

Distribution Planning Framework

Objectives-based planning

Shared understanding among stakeholders of strategies for incorporating objectives and priorities in planning

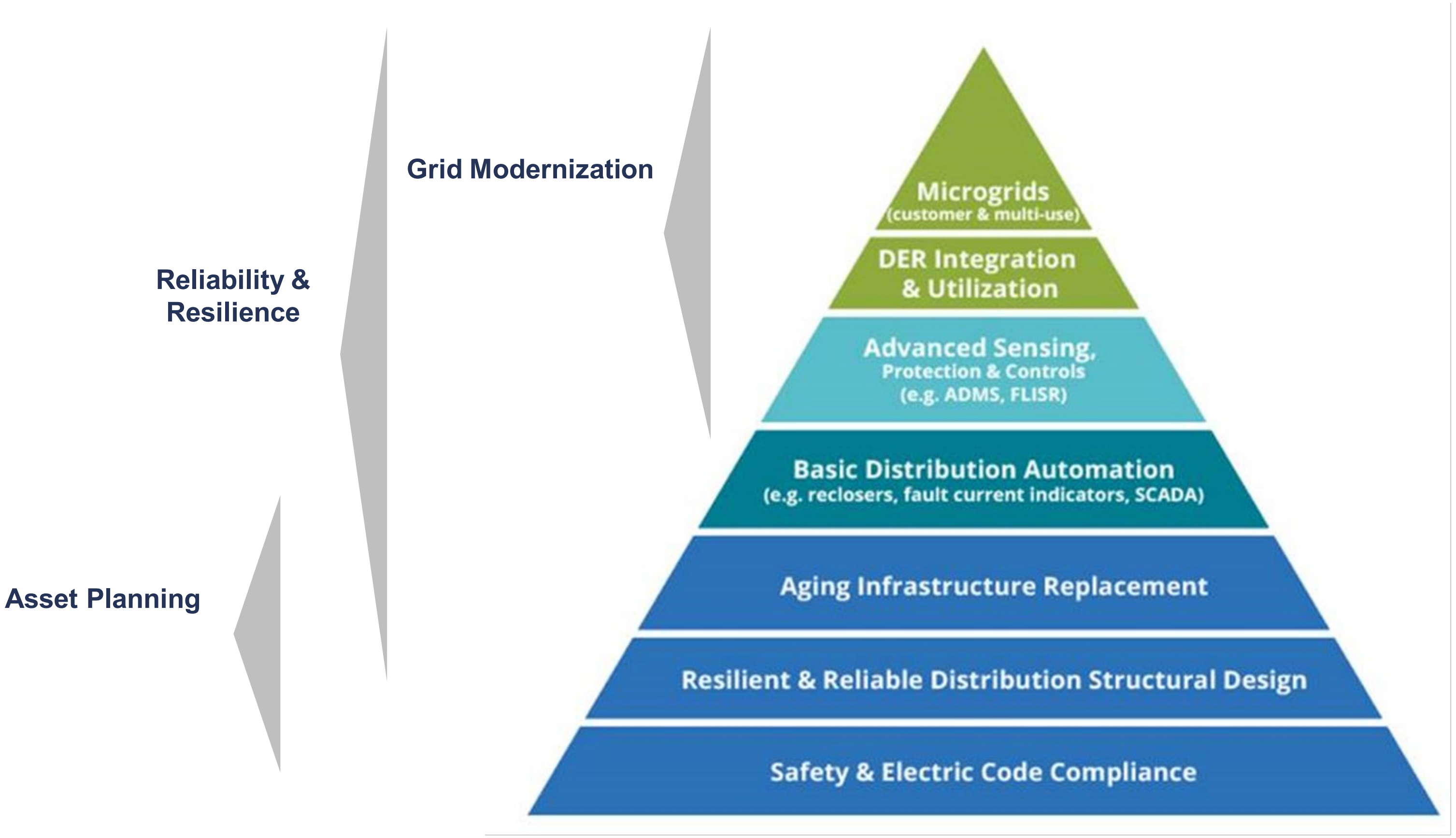
State policies and community and customer needs drive planning objectives and criteria.



Source: Modern Distribution Grid Guidebook, Volume 4, June 2020

Investment categories

Grid modernization layers on top of and integrates with foundational grid infrastructure.



Source: De Martini

Start with principles and objectives instead of picking technologies

- Planning starts with principles and objectives and the capabilities needed to achieve them. That determines functionality and system requirements.
- Holistic, long-term planning:
  - Supports state goals
  - Addresses interdependent and foundational technologies and systems
    - *Core components* — e.g., Advanced Distribution Management System, Geographic Information System, Outage Management System
    - *Applications* to support other grid modernization projects — e.g., smart meters, DER management
  - Considers proactive grid upgrades to facilitate customer choice

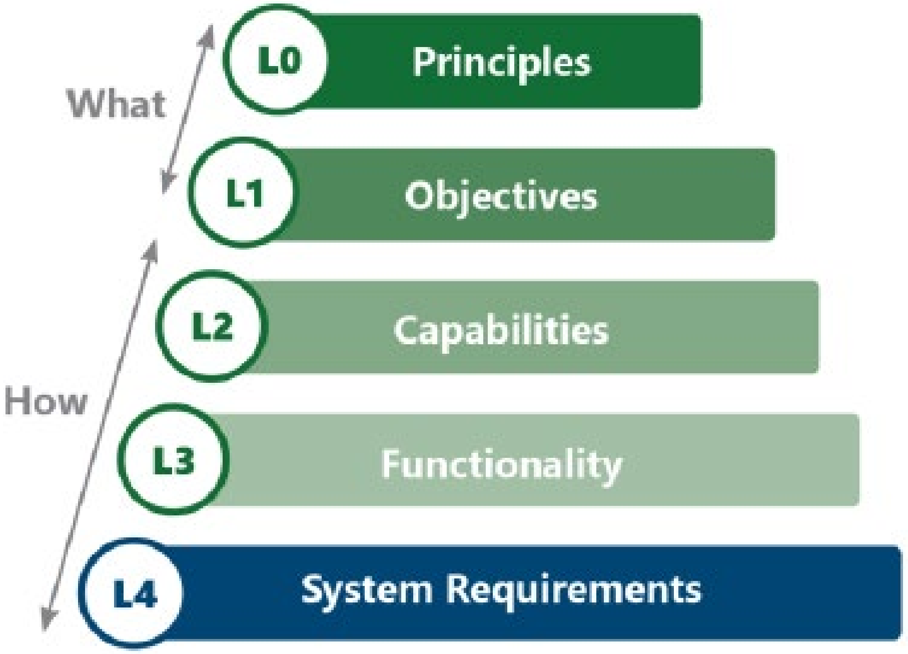
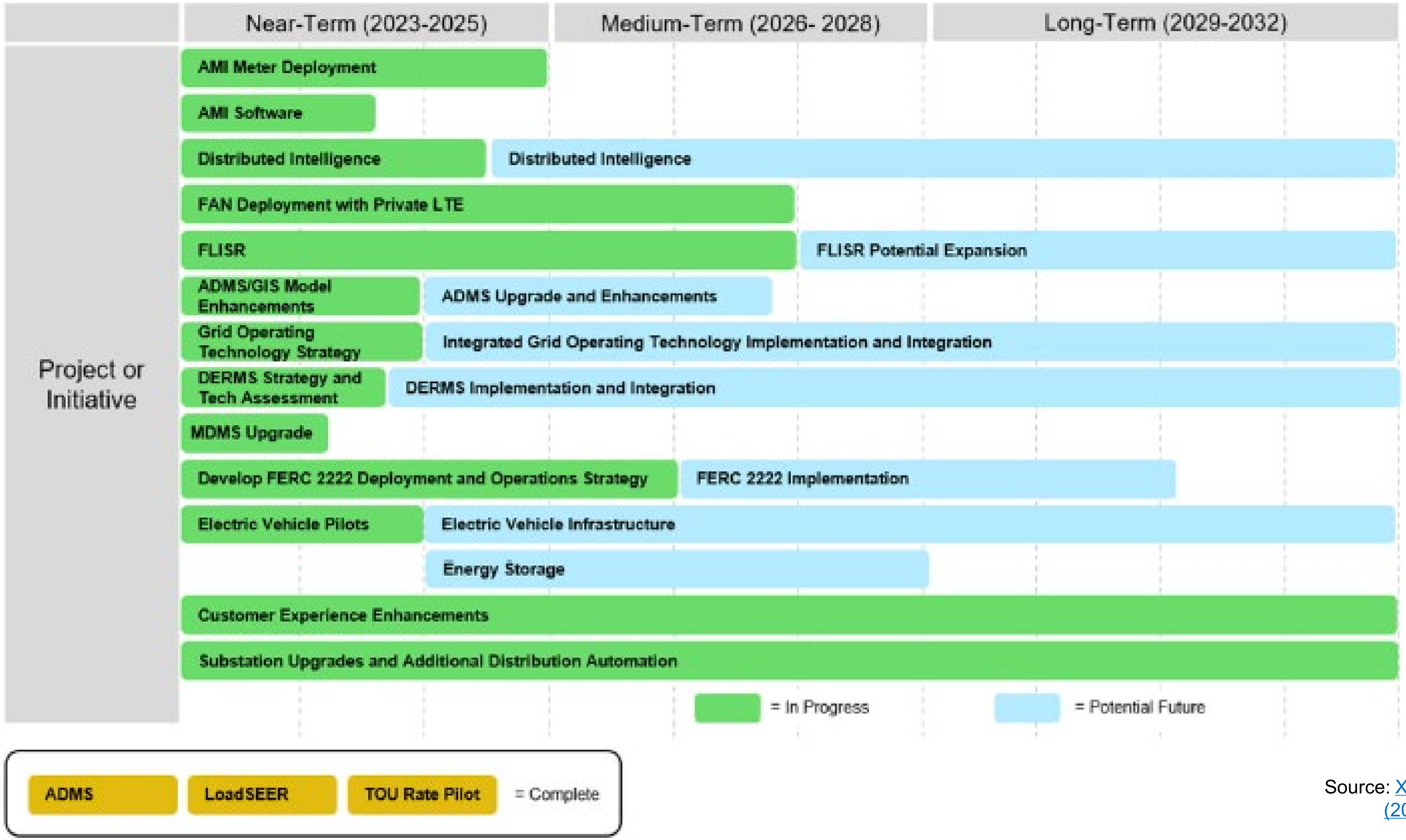


Figure: DOE 2020

For example state principles, see Minnesota Public Utilities Commission Staff Report on Grid Modernization (2016)

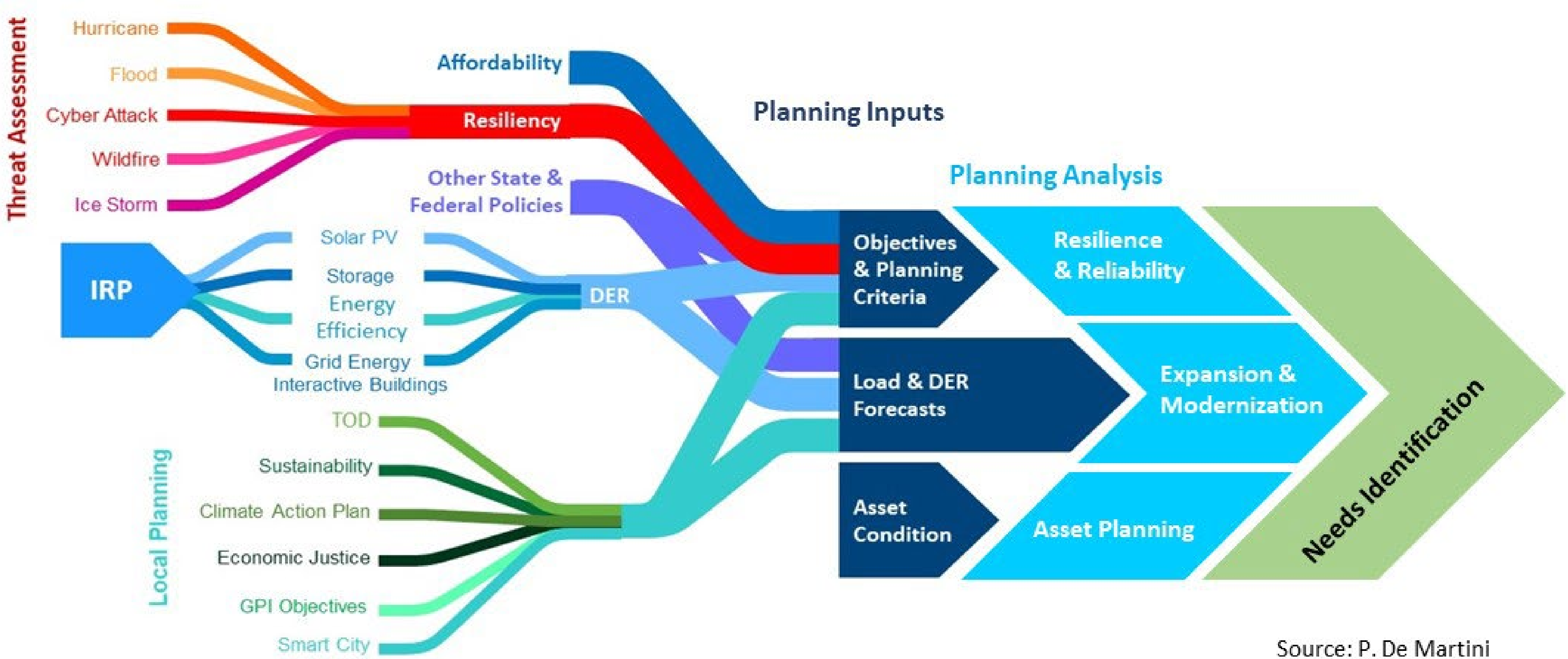
Example technology roadmap



Source: [Xcel Energy (2023)]

Emerging distribution system planning inputs

Distribution planning is increasingly dependent on resilience planning, bulk power system planning, local planning, and using DERs.



Source: P. De Martini

Integrating planning & other processes

- NY Distributed System Implementation Plans support 2019 Climate Act and 2022 Scoping Plan
- CA rulemaking on Distribution Resources Planning (DRP) in part required grid mod plans filed with GRCs (2018 decision). New rulemaking to support high levels of DERs (including managed EV charging):
  - Utility roles and responsibilities
  - Utility and aggregator business models
  - More holistic planning process
  - Grid mod investments, smart inverters to provide grid services, and aligning GRC filings with infrastructure needs in DRP
- MN requires grid modernization plan and transportation electrification plan filed with Integrated Distribution Plan
- HI requires planning across domains (G, T, D), aligned with sourcing — procurement, pricing and programs (HECO's 2023 Integrated Grid Plan)

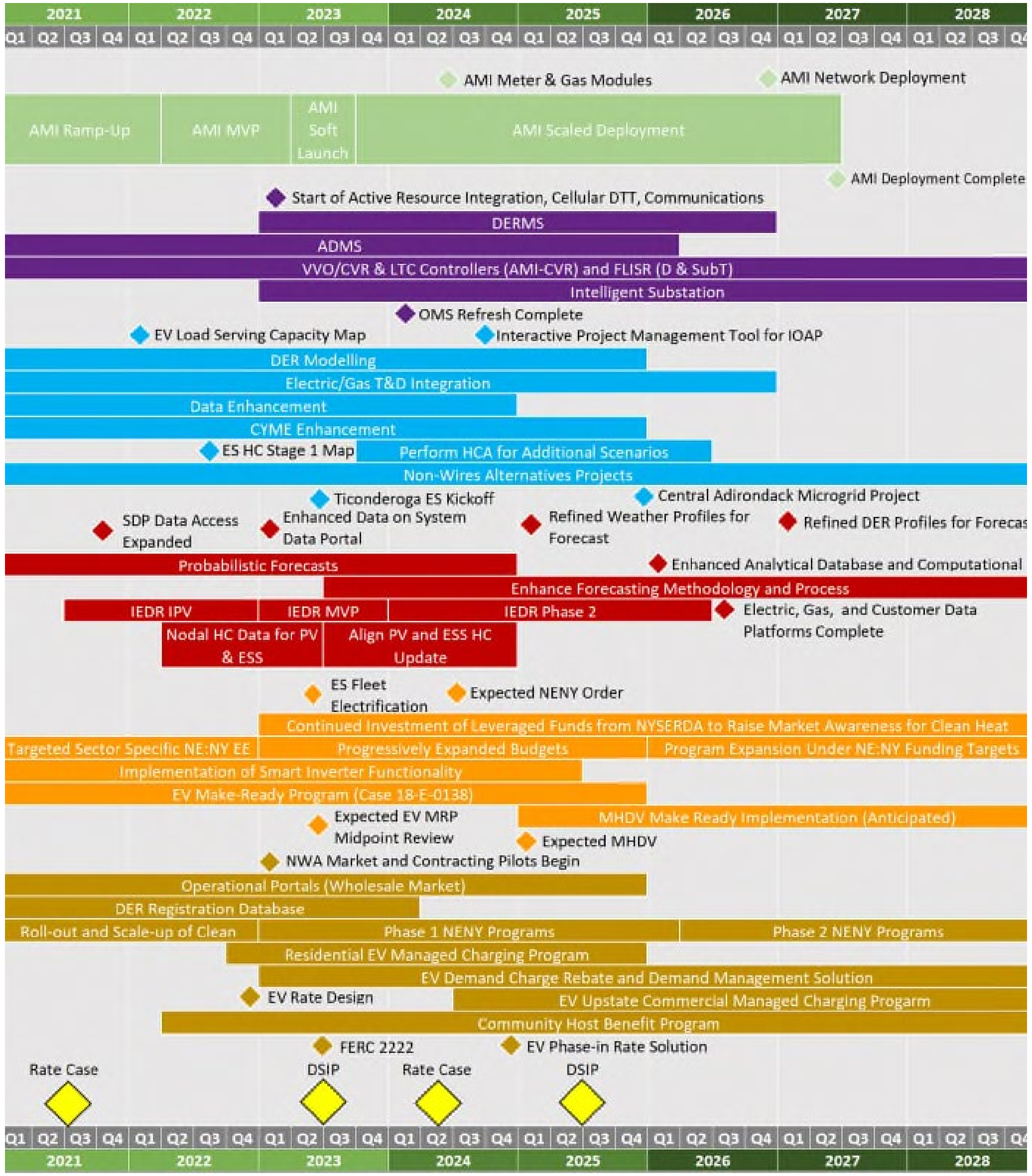


Figure source: National Grid Distributed System Implementation Plan (June 2023)

Planning Requirements

Procedural elements*

Frequency of filing

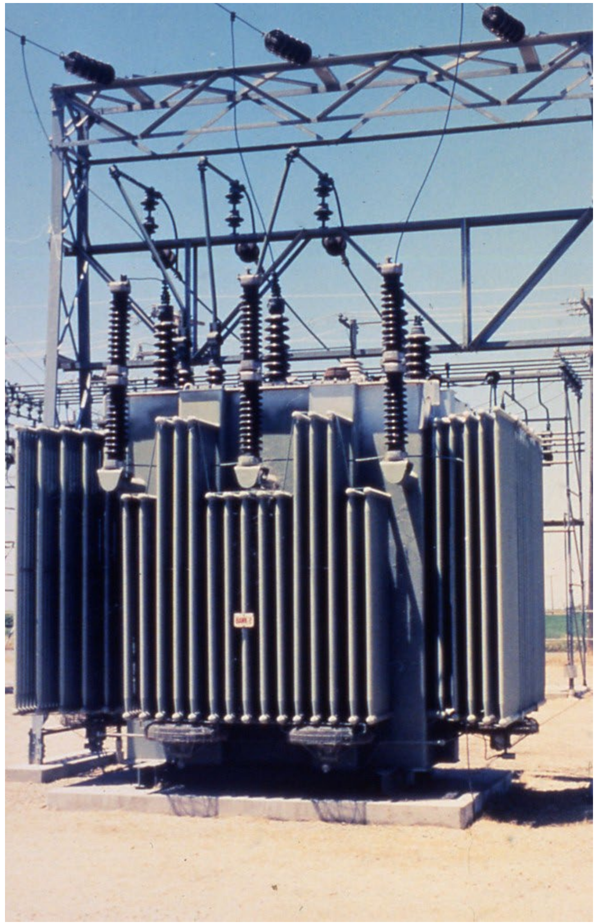
- Typically annual or biennial
- *Considerations:* alignment with utility capital planning, workload, tracking progress on goals and objectives, integrated resource plan filing cycle

Planning horizon

- Action plan: 2–4 years
- Long-term investment plan: 5–10 years

Confidentiality

- Level of specificity for hosting capacity
- Peak demand/capacity by feeder
- Contractual cost terms
- Bidder responses to non-wires alternatives solicitations
- Proprietary model information

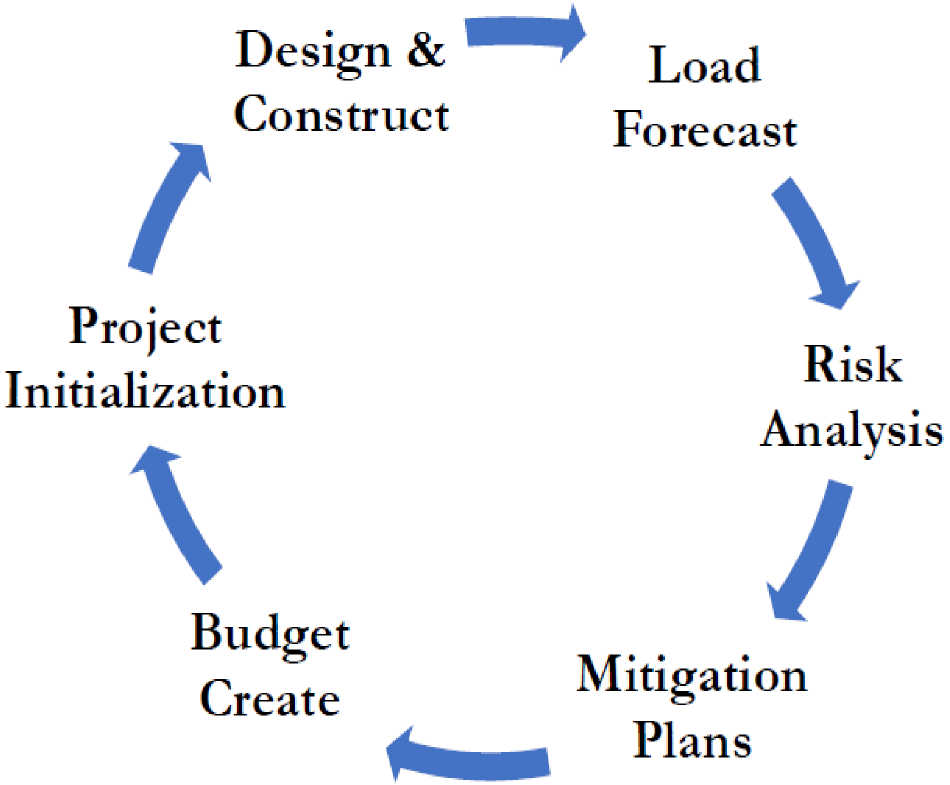


Source: EPRI

*Requirements for stakeholder engagement and equity covered in later slides

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 plans for mitigation
  - 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
  - Event management



Source: Xcel Energy

Substantive elements (2)

- **Data access**
  - **Customer usage data** - AMI interval data for 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** – To support customer and third-party solutions
    - NY, NH, MN, OH, CA and DC are examples of jurisdictions with detailed system data sharing requirements.
    - New NARUC resources on grid data sharing

Green Button

*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.

Substantive elements (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)

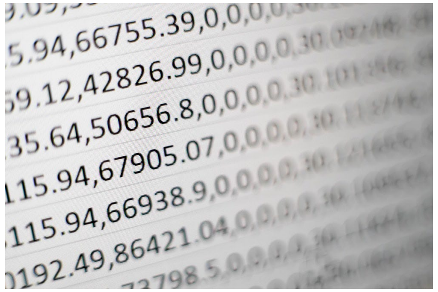
- To collect and share aggregated or anonymized, disaggregated customer energy use data for use by third parties
- Data provided at closest level of geographical specificity possible to maintain customer anonymity and at the finest practicable time interval

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.

Substantive elements (4)



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
  - ❑ Capital Investment Plans
  - ❑ Planned Resiliency / Reliability Projects
  - ❑ Reliability Statistics
  - ❑ Hosting Capacity
  - ❑ Beneficial Locations
  - ❑ Load Forecasts
  - ❑ Historical Load Data
  - ❑ NWA Opportunities
  - ❑ Queued DG
  - ❑ Installed DG
  - ❑ 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.

Substantive elements (5)

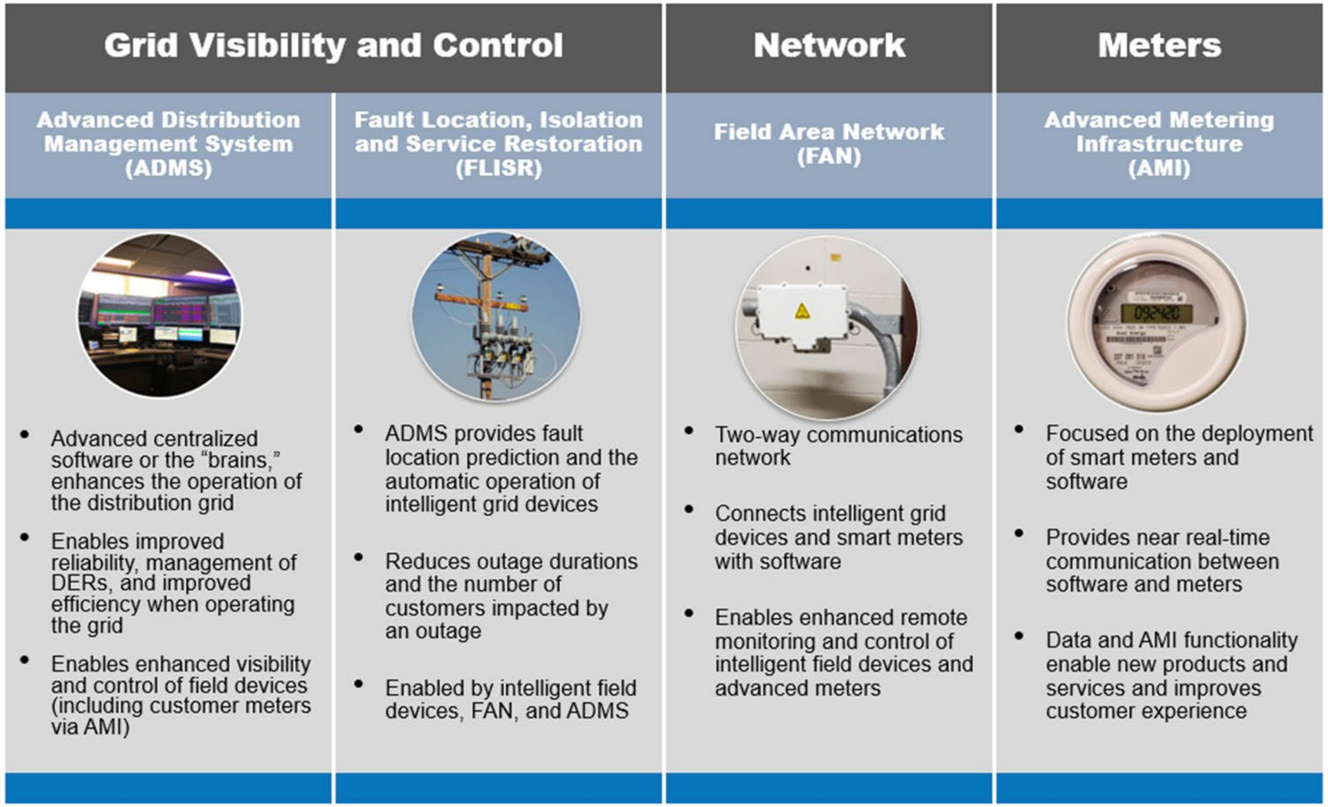
- **DER forecast**
  - Types, sizes, amounts and locations
- **Hosting capacity analysis***
  - Maps showing where interconnection costs will be low or high; supporting data provide details
  - Use cases: guidance for DER developers, interconnection screens, distribution planning
- **Geotargeting DER programs**
  - Efficiency, demand flexibility, distributed PV and storage, and managed EV charging to meet location- and time-dependent distribution needs
- **Grid needs assessment and analysis of non-wires alternatives****
  - Existing and anticipated capacity deficiencies and constraints
  - Traditional utility mitigation projects
  - A subset of these planned projects may be suitable for non-wires alternatives to defer or avoid infrastructure upgrades

**Amount of DERs that can be interconnected without adversely impacting power quality or reliability under existing control and protection systems and without infrastructure upgrades*

***DERs that provide specific grid services at specific locations to defer some traditional infrastructure investments*

Substantive elements (6)

- Grid modernization strategy and technology roadmap
- Near-term action plan
- Long-term utility vision and objectives
- Discussion of how distribution planning is coordinated with other types of planning
- Summary of stakeholder and community engagement
- Proposals for pilots
  - Resilience projects (e.g., solar+storage, community microgrids)
  - Time-varying pricing (e.g., for managed EV charging)

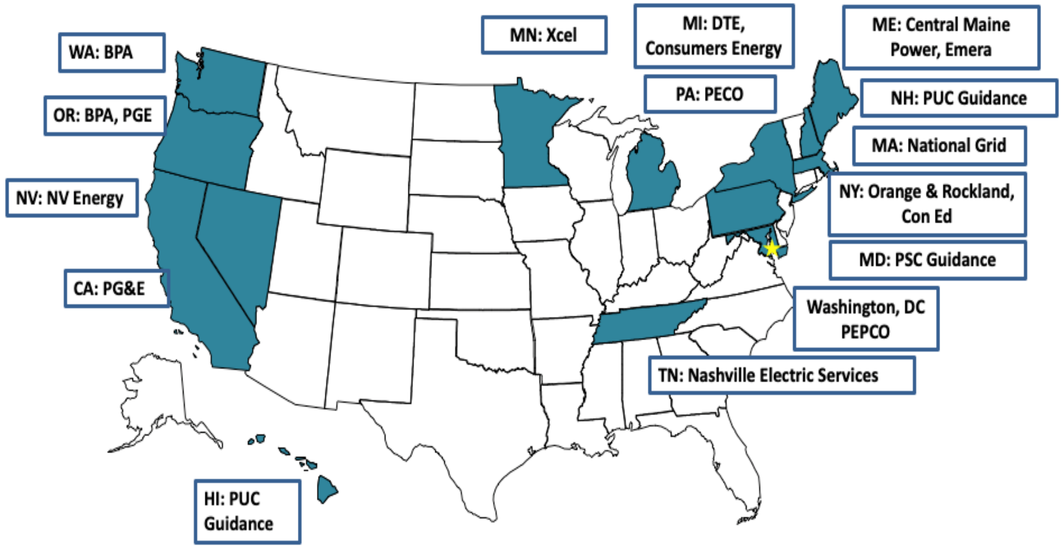


Source: [Xcel Energy (2023)]

Distributed Energy Resources as Non-Wires Alternatives

Targeted adoption of resources to meet distribution system needs

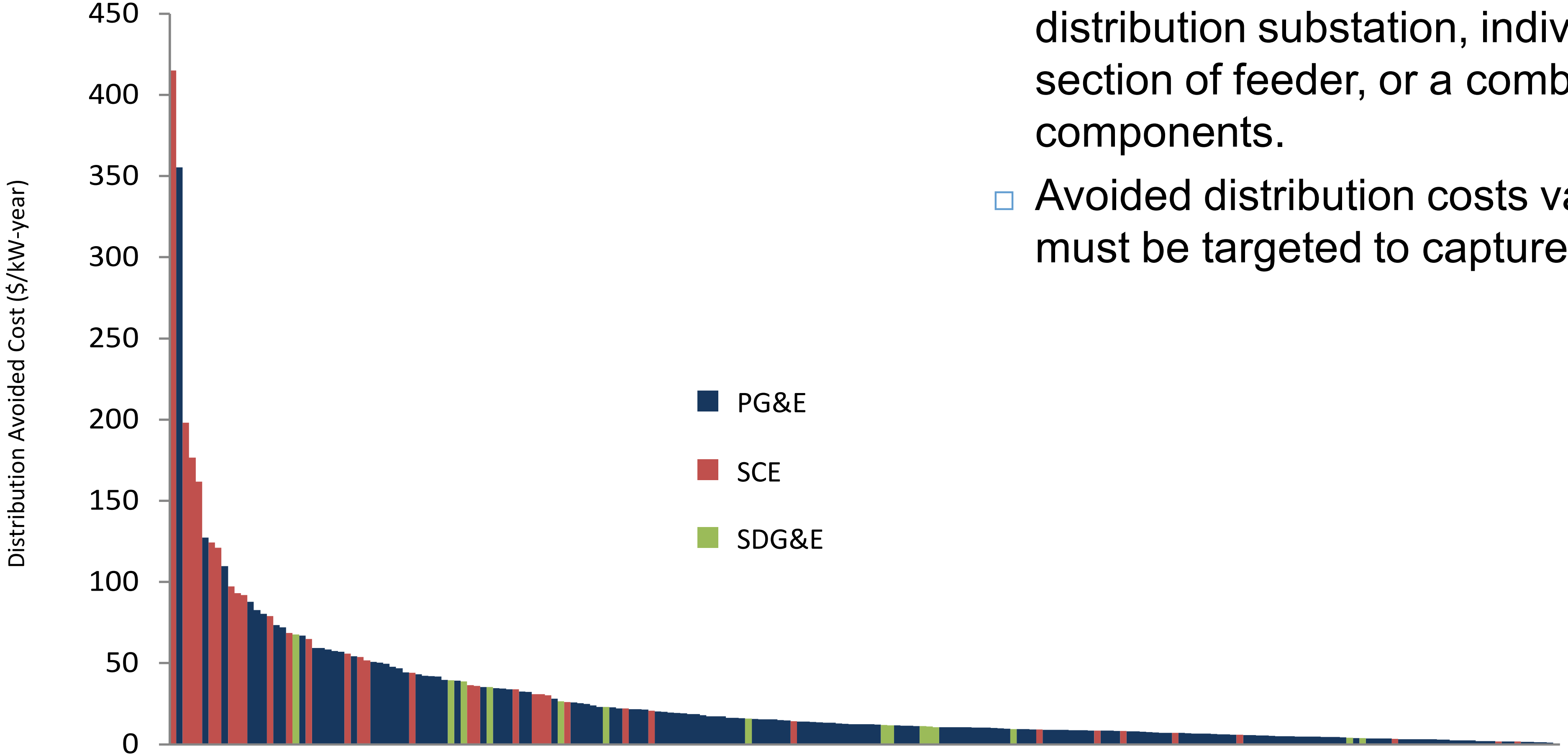
- Non wires solutions (or non-wires alternatives) are options for meeting specific distribution system needs at specific locations, related to load growth, reliability and resilience.
  - Single large DER (e.g., battery) or portfolio of DERs that can meet the specified need
- Objectives: Provide load 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 these bids to planned traditional grid investments to determine the lowest reasonable cost solution.
- Jurisdictions that require NWA consideration include CA, CO, CT, DE, DC, HI, IL, ME, MI, MN, NY, OR, RI and VT. Other states have related proceedings, pilots or studies underway (MD, VA, NM).

Right place

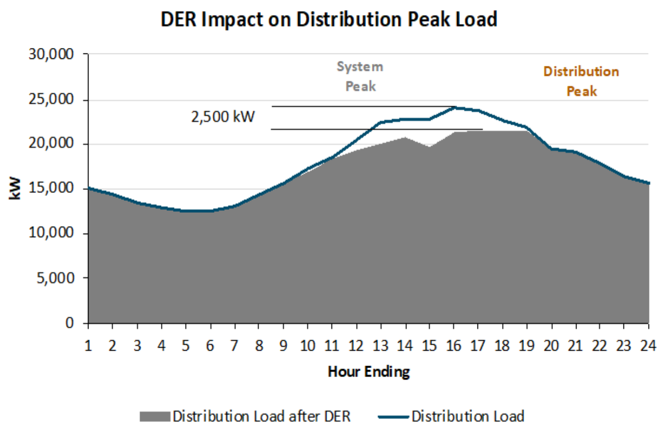


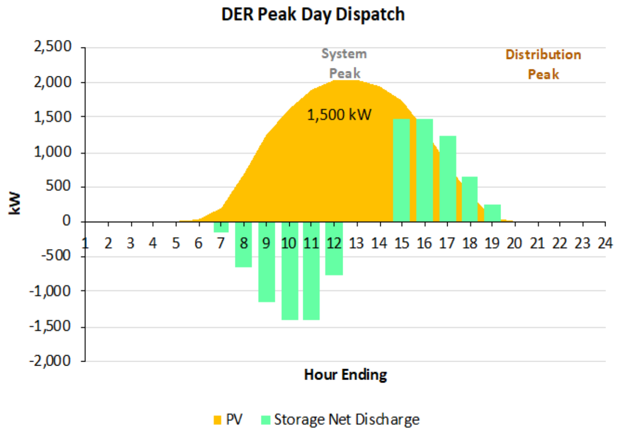
E3 study for California using utility distribution planning information

- DER value may be associated with a distribution substation, individual feeder, section of feeder, or a combination of these components.
- Avoided distribution costs vary by area. DERs must be targeted to capture the highest value.

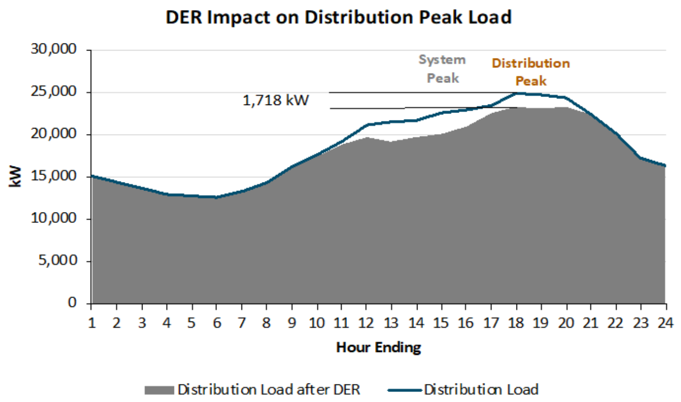
Right time

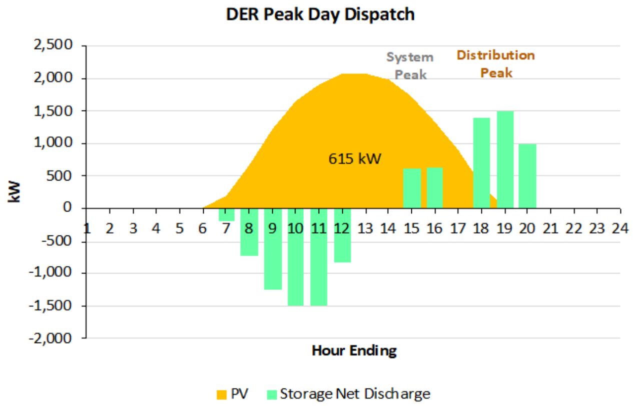
Peak load reductions from PV + storage when distribution and bulk power system peaks are **coincident**





Peak load reductions from PV + storage when bulk power system and distribution systems peaks are **not coincident**

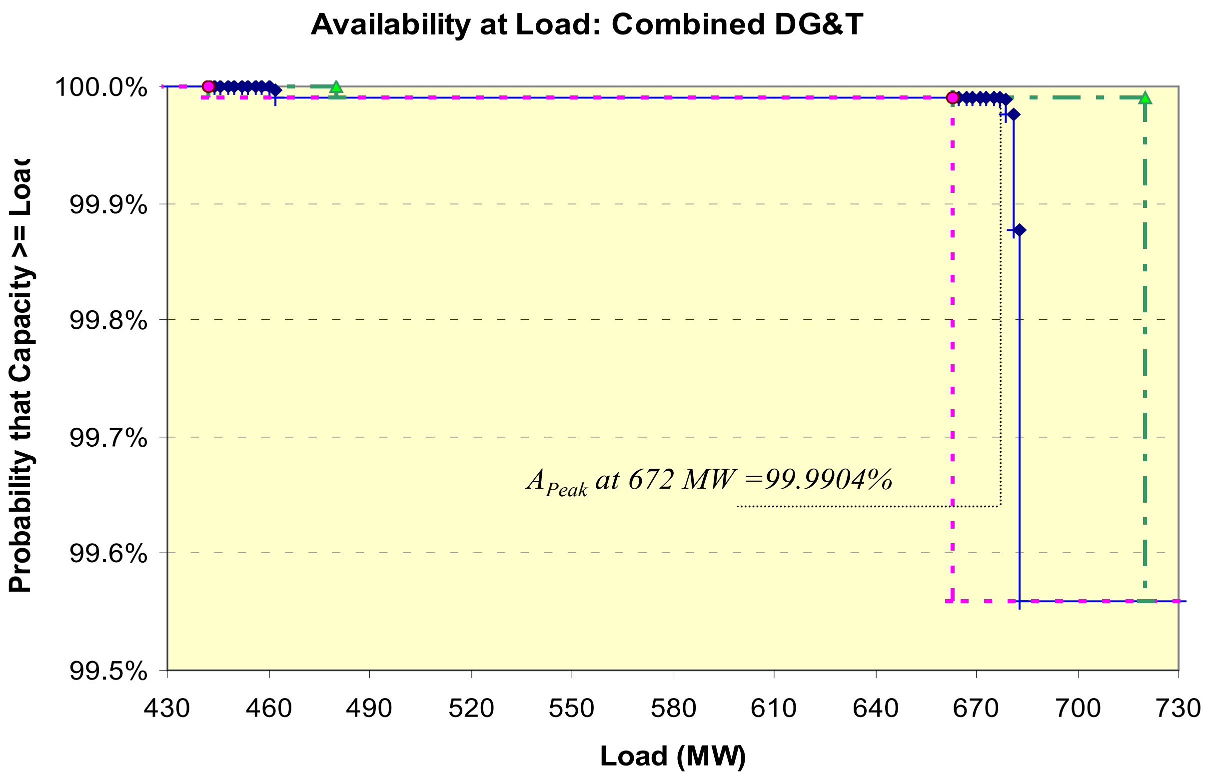




Source: *Locational Value of Distributed Energy Resources*

Right certainty

Finally, DERs must provide sufficiently reliable load reduction in order to provide sufficient certainty to defer the investment.



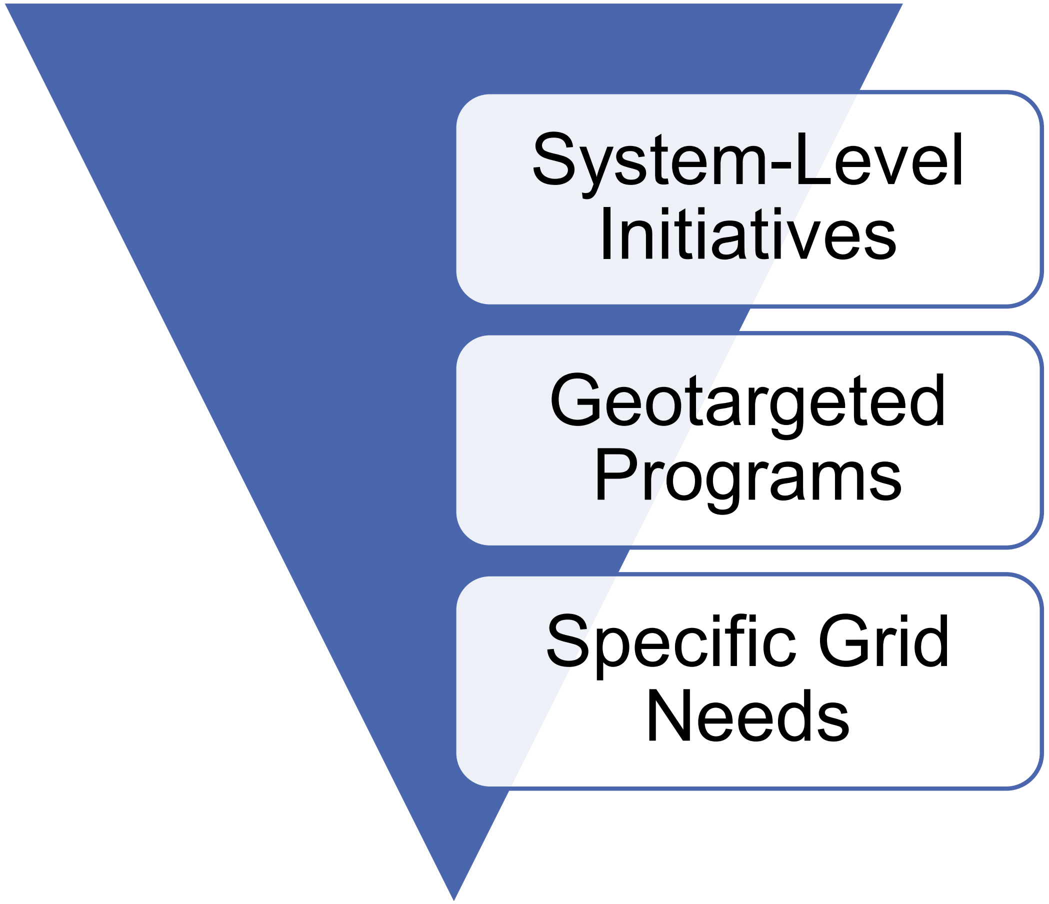
Source: Locational Value of Distributed Energy Resources

Example non-wires alternative solutions

NWA Grid Service	Traditional Solutions	NWA Solution	DER Types Considered
Capacity – Reduce thermal loading on utility equipment during peak load hours to defer upgrades	Upgrade overloaded equipment, construct new circuit or substation for segmentation	Inject power locally to reduce thermal load on equipment	Grid-following DER — e.g., PV, battery energy storage system (BESS), combined heat and power
Reliability – Provide an alternate source during loss of utility supply	Build circuit ties, construct redundant substation or circuit	Intentional island to restore service to unfaulted area	Grid-forming DER (grid-forming inverter or synchronous generator)
Voltage Support – Mitigate voltage violations	Install capacitor bank or voltage regulator, reconductor	Real and reactive power injection and absorption	Inverters with Volt/Var curves, BESS, etc.

Source: Cody Davis, Electric Power Engineers, Distributed Energy Resources Planning, Berkeley Lab training, Nov. 29, 2023

Identifying NWA opportunities – levels of targeting



- No specific locational drivers; impact to specific grid needs is coincidental
- Examples: Lighting LED Conversions, Net Metering

- Tailor programs and incentives to target areas of expected future distribution needs
- Ex: Targeted energy efficiency programs

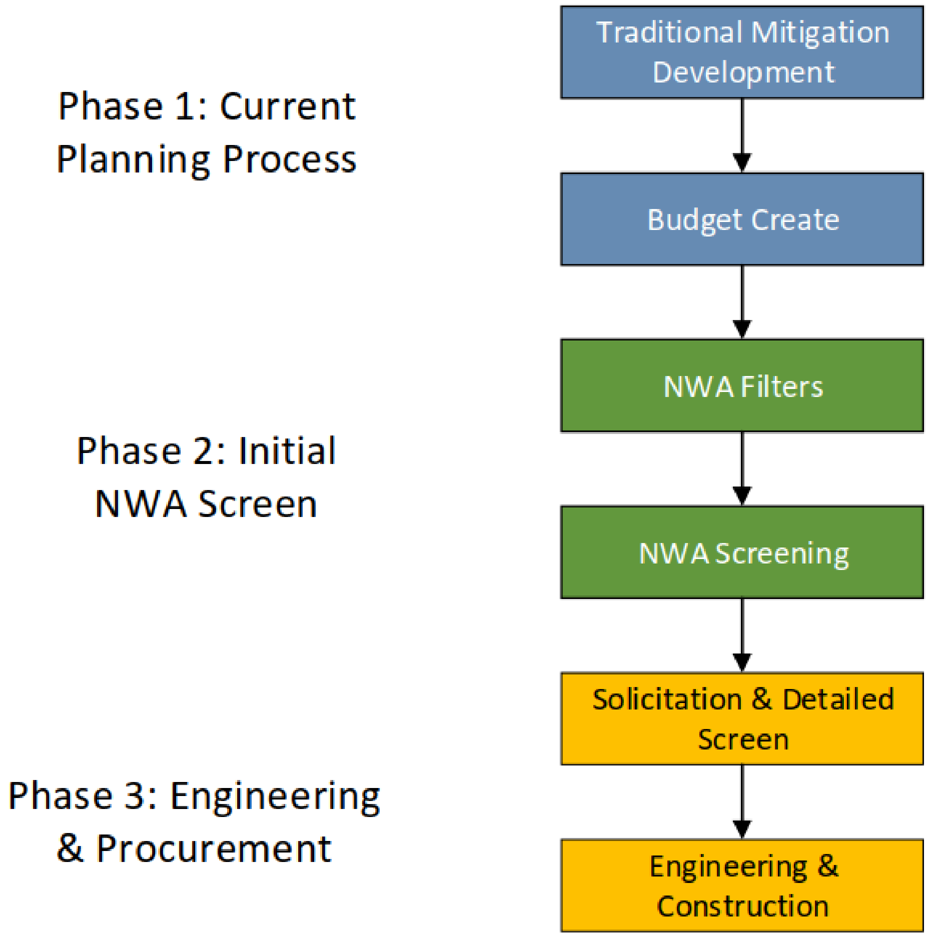
- Dedicated procurement of specific size/type of resource to meet known constraint
- Ex: Microgrid for reliability

Source: Cody Davis, Electric Power Engineers, Distributed Energy Resources Planning, Berkeley Lab training, Nov. 29, 2023

NWA evaluation framework – comparison with alternatives

Evaluating NWAs requires comparing them to traditional infrastructure solutions to understand benefits and limitations of NWAs in addressing specific grid needs. This comparison is a multi-faceted comparison including, but limited to, the following factors:

- Capital and operational costs
- Time to implement
- Scalability and flexibility
- Environmental impacts
- Reliability and resiliency measures
- Regulatory and policy compliance
- Public/community impact
- Maintenance and long-term use
- Finance and business models
- Risks



Source: Cody Davis, Electric Power Engineers, Distributed Energy Resources Planning, Berkeley Lab training, Nov. 29, 2023

Figure source: Xcel Minnesota 2023 Integrated Distribution Plan

NWA evaluation framework – benefit cost analysis

Cost-benefit analysis for NWAs scrutinizes a variety of factors to ascertain NWA economic viability compared to traditional grid upgrades, such as:

- Initial capital expenditure
- Operational expenditures
- Economic lifespan and depreciation
- Benefits and savings
- Scalability costs
- Avoided energy benefits
- Avoided capacity benefits
- Avoided non-energy benefits
- Benefit to cost ratio

Source: Cody Davis, Electric Power Engineers, Distributed Energy Resources Planning, Berkeley Lab training, Nov. 29, 2023

Individual Cost and Benefit Calculations for an Example Project, Used to Calculate the Net Impact

Cost and Benefits Summary	
Energy Generation	$1,544,526
Generation Capacity + MISO Reserves	$473,600
Transmission Capacity	$20,332
Deferral Benefit	$800,717
GHG Emissions + Other Environmental	$2,112,750
Solar Cost	$(2,177,637)
Battery Cost	$(438,363)
Interconnection Fees	$(204,000)
Total Benefit	**$4,951,924**
Total Cost	**$(2,819,999)**
Net Impact	**$2,131,925**

Source: Xcel Minnesota 2023 Integrated Distribution Plan – NWA Appendix F, Pg 24

NWA procurement mechanisms

Geotargeting or System Lavel
Programmatic Approach

- Employ systematic studies to discern the locational value of DERs, aiming to direct them to where they're most beneficial on the grid.
- Adjust incentive levels to promote DERs in locations which can offer the greatest value/relief to the system.
- The goal is to prevent as many specific grid needs as possible by managing load growth in targeted areas, thereby reducing reliance on traditional infrastructure upgrades.

Specific Grid Need
Direct Procurement

- Utility-initiated acquisition of resources to meet identified grid needs.
- Utility-owned/leased and directly controlled, offering a streamlined approach.
- The approach simplifies access to the value stack, mitigating contractual or control complexities associated with third-party operations.
- Suitable for vertically integrated utilities. More challenging for deregulated distribution utilities (ownership, market revenue, and dispatch coordination challenges).

Specific Grid Need
Distribution Services Approach

- Utility issues a call for proposals from third parties or customers for NWAs to address specific grid needs.
- Such solicitations enable the integration of customer or third-party-owned resources, which are then compensated for their services to the grid.
- These resources can be directed by the utility for distribution system needs as necessary, while otherwise participating freely in other market opportunities.

Source: Cody Davis, Electric Power Engineers, Distributed Energy Resources Planning, Berkeley Lab training, Nov. 29, 2023

NWA and DER aggregation

DER aggregation can facilitate NWA and help meet distribution system needs. Among the issues states will need to consider:

- Dual participation of DERs in retail and wholesale markets — e.g., impact of dual participation on NWA value proposition
- How distribution-level dispatch should be integrated with wholesale markets
- Appropriate utility roles — e.g., DER ownership, competing with third parties as DER aggregators
- Data needs and data access
  - Information-sharing provisions between participating customers, DER aggregators, utilities and regional grid operators
  - Enabling third-party DER aggregators to leverage the utility's customer interval data while protecting customer privacy
  - Utilities and regional grid operators relying on data from aggregators' proprietary meters
- Cost allocation for utility system upgrades to enable DER visibility, communications, control, coordination and compensation

NWA value proposition is likely to increase with growth in distribution system demands from building and transportation electrification.

Mitigating NWA risk

To mitigate contracting and performance risk, utilities in California are required to develop contingency plans after a DER solution or portfolio of DERs are selected.

Contingency plans are required for both competitive solicitations and utility-owned NWA solutions.

Scenario	Contingency Plan
DER provider is unable to install DERs according to contract SCE is unable to install DERs to meet the grid need	• Develop short lead time mitigation alternatives that supplement the DER portfolio for total solution, where feasible • If cost-effective solution does not exist, pursue construction of traditional project intended for deferral or short lead time mitigation until ultimate solution can be implemented
DER fails during commissioning, or underperforms during operations and doesn't meet real-time needs of the electric system (based on commissioning and performance verification protocols agreed to in the contract for 3rd party owned DERs)	• Determine emergency limitations if applicable, work with system operations on potential temporary grid reconfiguration, or in worst cases potentially drop load and de-energize customers • Determine reason for DER underperformance • Assess any equipment damage or outage impact • Assess if additional mitigation is required and develop expedited solution options

Source: SCE

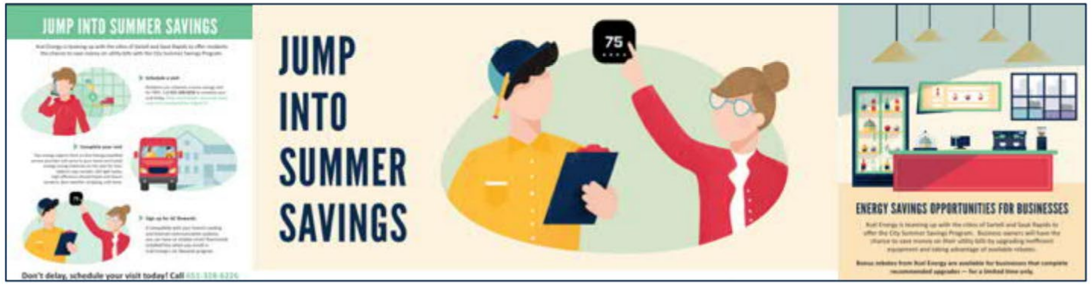
Geotargeting – programmatic approach – Minnesota

Grid need: New transformer, feeder, and feeder configuration, needed in 5 years

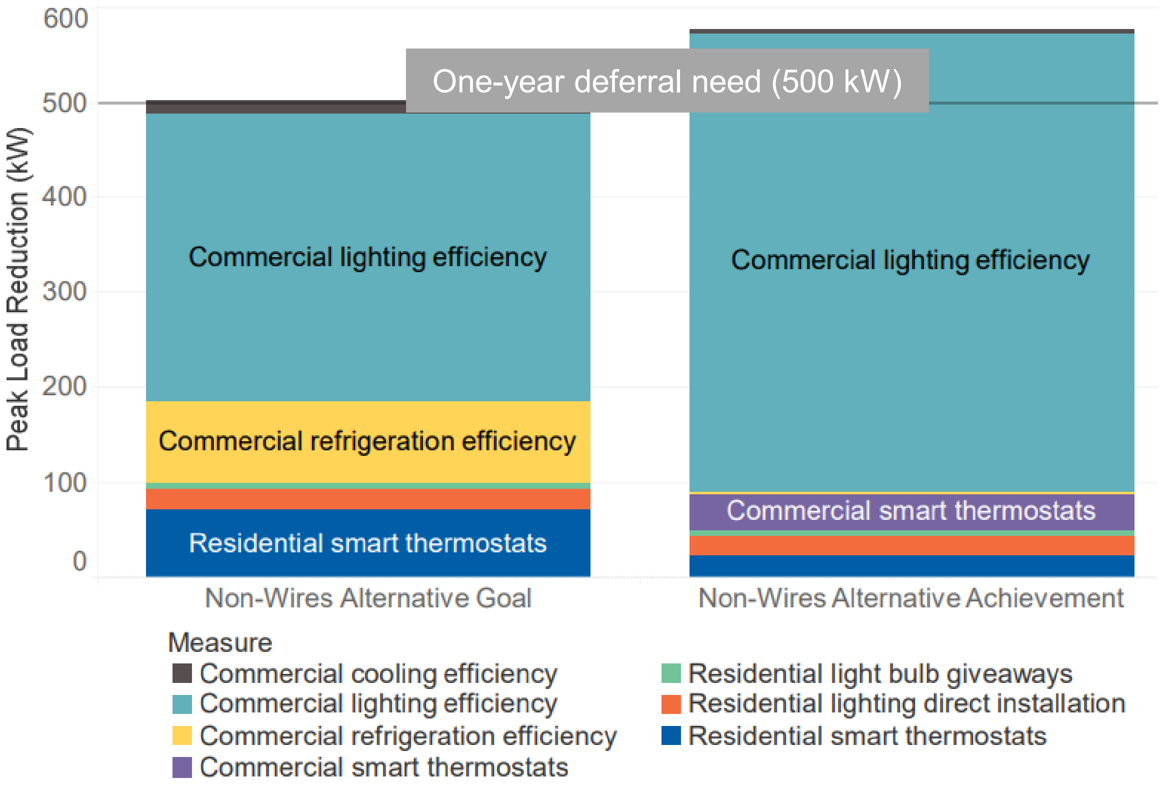
Solution: Targeted energy efficiency and load management to reduce peak demand by 500 kW

Goal: Defer $4.1M estimated distribution system capacity upgrades

Results: 576 kW of peak demand savings, exceeding the goal



Source: Guillermo Pereira, Berkeley Lab, "Using Energy Efficiency to Help Meet Distribution System Capacity Needs," 2023 ACEEE Energy Efficiency as a Resource conference, Oct. 18, 2023



Source:
CEE 2021, Non-wires Alternatives as a Path to Local Clean Energy: Results of a Minnesota Pilot
Geotargeted Distributed Clean Energy Initiative Update Report

Geotargeting – programmatic approach – Michigan

Grid need: Capacity upgrade needed in the medium term (2-3 years)

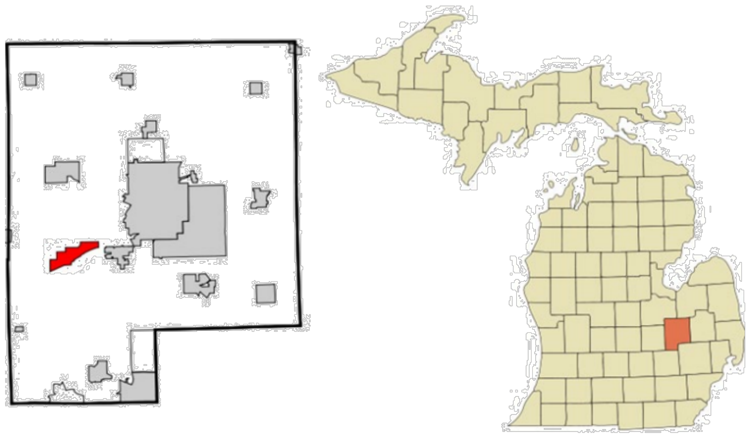
Solution: Use targeted energy efficiency and demand response programs as potential lower-cost solutions

Goal: Reduce peak load by 1.4 MW by 2018 and defer $1.1M infrastructure investment

Results: 694 residents reduced demand by 795 kW at the zip code level and 363 kW at the substation level

Zip Code	kW Savings
Residential Energy Efficiency	152.84
AC Peak Cycling Savings	455.3
TOU Savings	73.71
C&I Energy Efficiency	113.31
Total Savings	**795.16 kW**

Substation	kW Savings
Residential Energy Efficiency	70.04
AC Peak Cycling Savings	205.90
TOU Savings	28.35
C&I Energy Efficiency	58.96
Total Savings	**363.25 kW**



Sources: Guillermo Pereira, Berkeley Lab, "Using Energy Efficiency to Help Meet Distribution System Capacity Needs," 2023 ACEEE Energy Efficiency as a Resource conference, Oct. 18, 2023; Consumer Energy MESC Presentation, Consumers Energy Presentation MPSC Meeting 2019

Specific grid need – direct procurement – North Carolina

Grid need: Improved reliability (frequency, voltage regulation, ramping support)

Solution: 2 MW solar facility and 4.4 MW lithium battery (Docket E-2 1185)

Goal: Pilot microgrid, improve reliability (reduce frequency and duration of outages)

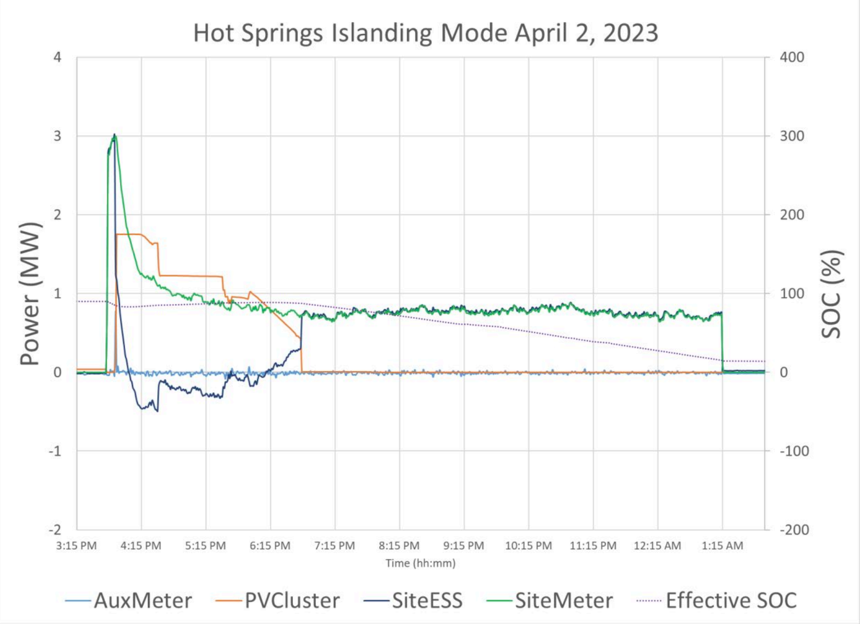
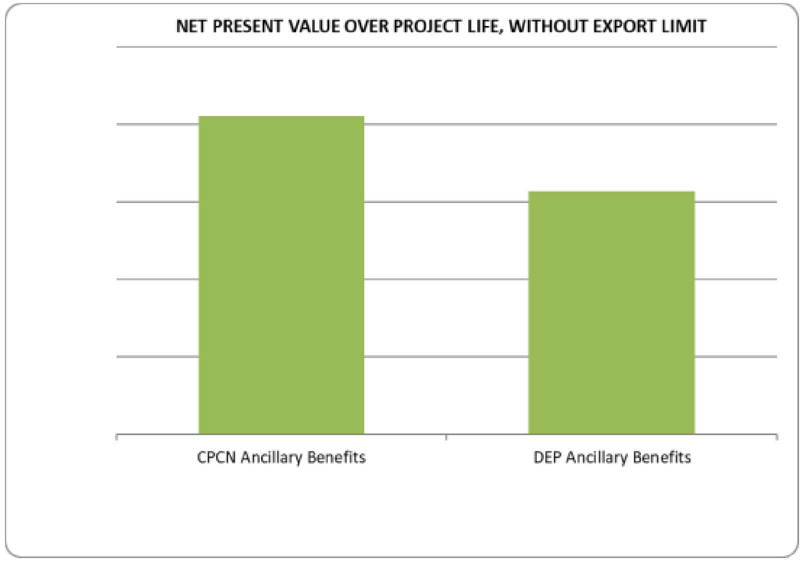


Figure 2: Islanding operation



Source: Duke Energy

Specific grid needs – distribution services approach – California

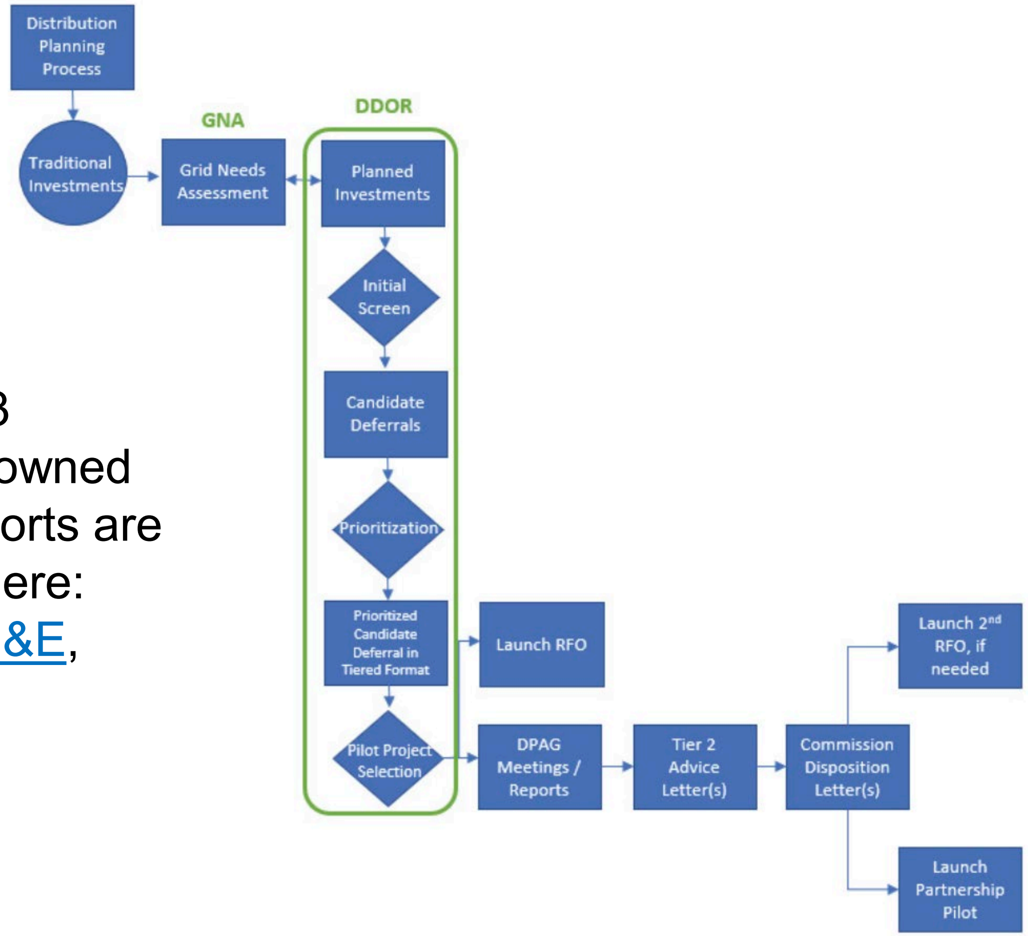
Partnership Pilot – Utilities prescreen aggregators to procure customer-owned, behind-the-meter DER aggregation.

2023 SCE Partnership Pilot Projects are shown in table below. All projects are seeking to reduce substation load to avoid a new subtransmission line or circuits.

Project	MW	MWh	Traditional mitigation cost
Mira-Loma Corona	10	33.1	$15.3M
Santiago-Irvine	2.3	2.3	$20.7M
Francis	5.6	19.3	$7.8M

Distribution Investment Deferral Framework - Annual Grid Needs Assessments and Distribution Deferral Opportunity Reports.

FIGURE 1: OVERALL DIDF PROCESS



The 2023 investor-owned utility reports are located here: SCE, PG&E, SDG&E

Source: SCE

Specific grid needs – distribution services approach – Colorado

- In Colorado, utilities are required to "conduct a technology-neutral competitive solicitation for NWAs to defer, reduce, or avoid the costs of the major distribution grid projects."
- In May 2023, Xcel Energy (PSCo) issued an RFP to solicit NWA solutions for two capacity-driven projects to defer $4.1M for new feeder from 2025 to 2031 for each project location.
- No bids were submitted for the projects. The independent evaluator provided Xcel with an assessment of the NWA process and improvements for consideration.

Suggested Improvements to NWA Process

- Review NWA suitability criteria
- Include approved DERs in needs assessment.
- Conduct an internal NWA assessment to identify customer program NWA opportunities.
- Understand potential resources through a request for information process.

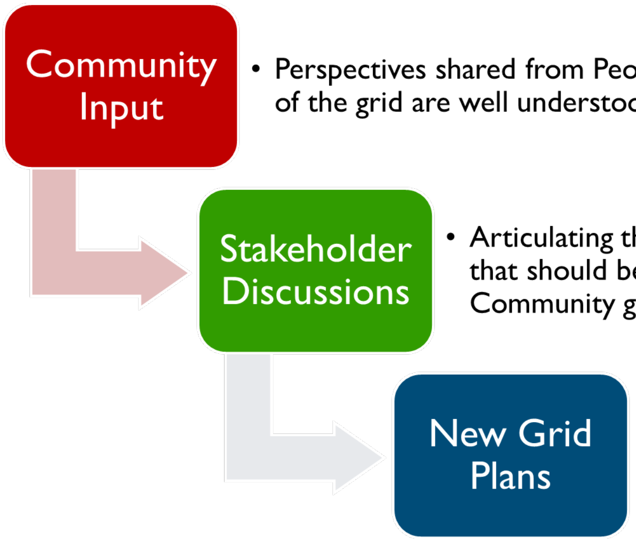
Community Feedback on NWA RFP Process

- Xcel was required to hold one engagement session with disproportionately impacted community leaders and community based organizations prior to issue NWA RFP
- Supportive of NWA concept, but did not have a specific project to respond to
- Interested in how project challenges would be messaged to community

Stakeholder Engagement and Equity and Justice

Stakeholder engagement in distribution planning

- **Benefits**
  - Improve quality of proceedings and outcomes
  - Develop solutions with broad support
  - Build trust among parties
- **Requirements**
  - *Before plan is filed:* Can include significant input through working groups (e.g., CA, DC, HI, MI, NH, NY) and stakeholder meetings
  - *After plan is filed:* Stakeholders file comments, utility provides periodic updates



- Perspectives shared from People and Communities to ensure goals of the grid are well understood
- Articulating the set of solutions and optionality that should be considered in meeting these Community goals
- AIC and ComEd will file multi-year grid plans in early 2023

Source: Multi-Year Integrated Grid Plan Workshop Facilitator's Report: *Synthesizing the Input Collected through 15 Workshops*

Examples of stakeholder engagement in distribution system planning

- New York - Surveys, newsletters, webinars, meetings, and designated website
- Oregon - Utilities must host ≥4 stakeholder workshops before filing a distribution system plan and file a community engagement plan. A technical working group holds regular meetings for stakeholders before and after plan filings.
- Illinois - Utilities must hold ≥6 workshops run by an independent facilitator. At the conclusion of workshops, the facilitator prepares a draft and final report describing the process and areas of consensus and disagreement, with recommendations to the Commission. Stakeholders can comment on the report.
- Hawaii - Stakeholder council, technical advisory panel, working groups

Example process improvements for stakeholder engagement (1)

Based on feedback from stakeholder engagement in the distribution planning process, DTE created reliability improvement maps (figures on the right). Source: DTE Electric

The Massachusetts Grid Modernization Advisory Council (GMAC) suggested improvements to stakeholder engagement in its November 2023 recommendations to the electric utilities.

- Develop goals and clear reporting metrics of success to measure the efficacy of proposed stakeholder engagement
- Include the Clean Energy Stakeholder Advisory Group (CESAG) within GMAC to avoid duplication across utilities
- Develop specific and consistent definitions of equity in CESAG (among other definitions) and adopt quantifiable reporting metrics

Exhibit 17.1.1 Electric Reliability Improvement Map (DTE Service Territory)

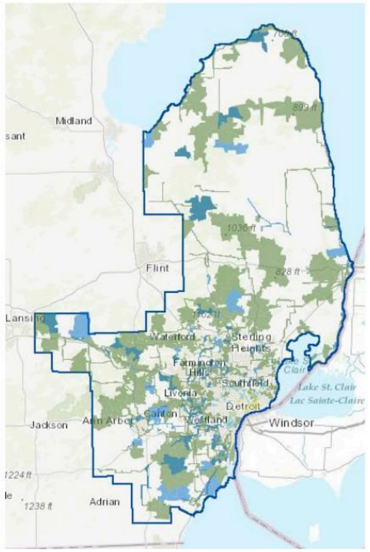
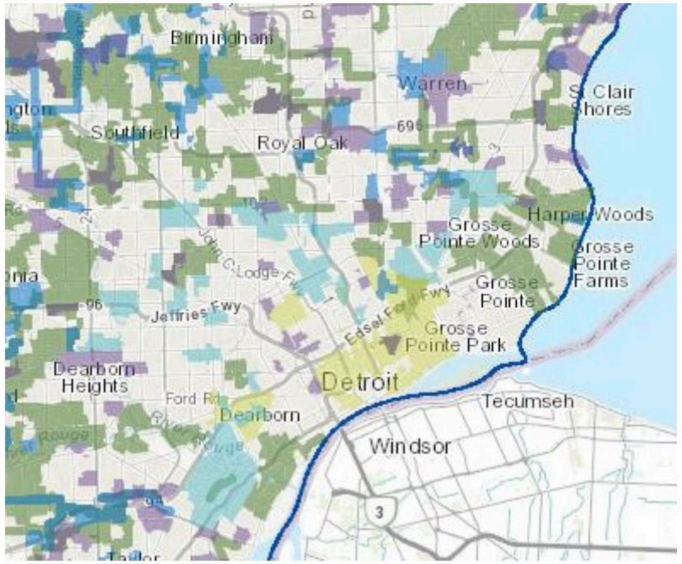


Exhibit 17.1.2 Electric Reliability Improvement Map (Metro Detroit)



	Tree Trimming	Tree limbs and branches are responsible for nearly 70% of the time our customers spend without power. That's why we're surging our efforts to trim overgrown trees in your neighborhood to keep you safe and the energy grid reliable.
	Strengthen Power Lines	We're upgrading and strengthening power lines to ensure the electric system in your neighborhood is more resilient and reliable.
	Utility Poles Maintenance	We're inspecting and repairing utility poles and replacing cross arms and other pole top equipment to ensure our system delivers the power you need when you need it.
	Rapid Response	Tree trimming and pole top equipment repairs/replacements to quickly improve reliability in communities experiencing emergent issues in between planned maintenance schedules.
	Modernizing & Rebuilding the Grid	Modernizing electrical substation equipment, as well as the underground and overhead infrastructure that delivers power to you, including replacing poles and wiring. Tree trimming will be completed, as necessary, in advance of pole replacements.

Example process improvements for stakeholder engagement (2)

- The Minnesota PUC ordered Xcel Energy to file a summary of the stakeholder process for its next integrated distribution plan and list next steps by August 2023.
  - The PUC required at least four stakeholder meetings. The utility held six meetings to cover all of the content in the plan.
  - The utility observed that fewer participants attended workshops when the content was more detailed and technical.
  - To encourage participation, Xcel asked stakeholders about preferred meeting format.
  - Participants could submit questions during the registration process or during workshops.
  - Xcel concluded that it may not be possible to develop “a shared vision for the distribution grid of the future.”

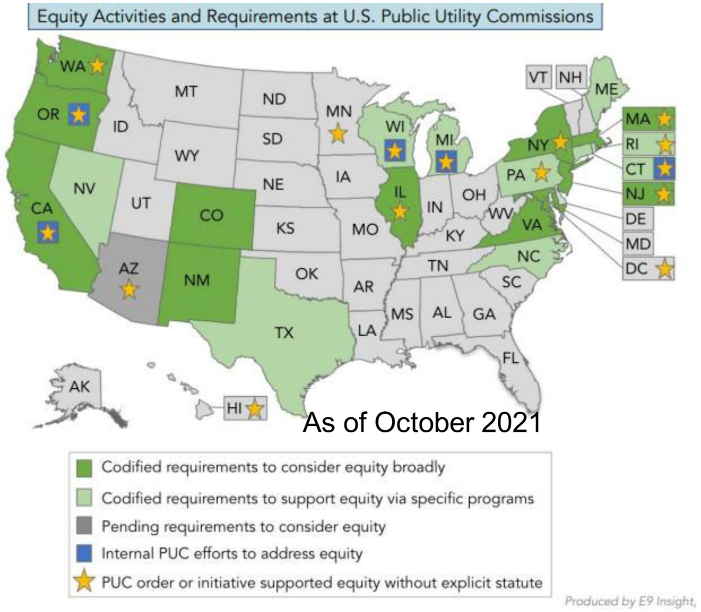
Stakeholder workshop series generated new ideas for Xcel on:

- How to prioritize projects
- Reflecting distribution system constraints in forecasting
- Reflecting benefits of distributed PV for reducing system peak
- Considering multi-value projects

Stakeholder information available in Docket 21-M-694 (eDockets)

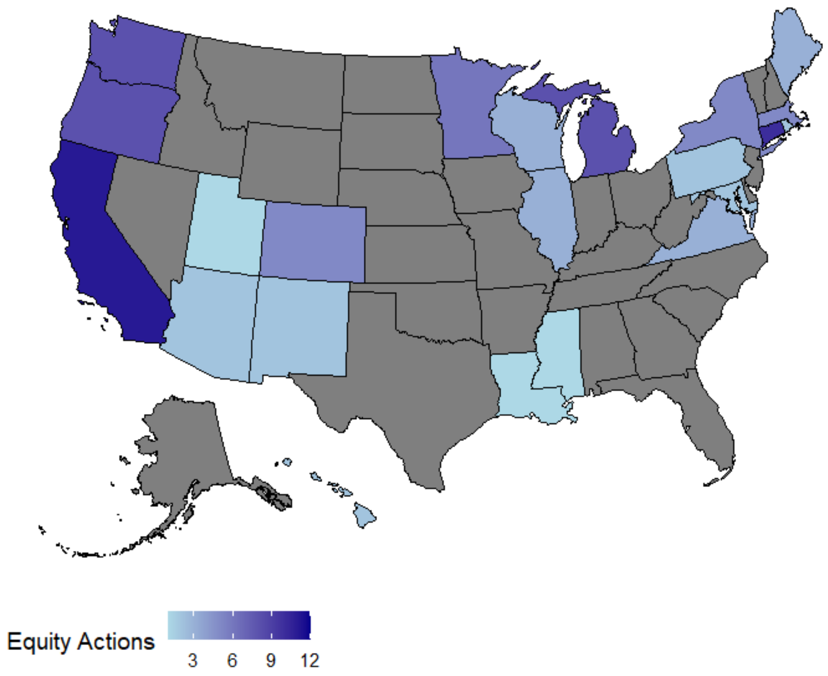
Energy equity and justice

- Many states are adopting equity and justice provisions that apply to regulated utilities, including for planning.
  - To address social, economic and health disparities
  - Through legislation, governor's executive orders, PUC orders, or actions by other agencies*



As of October 2021

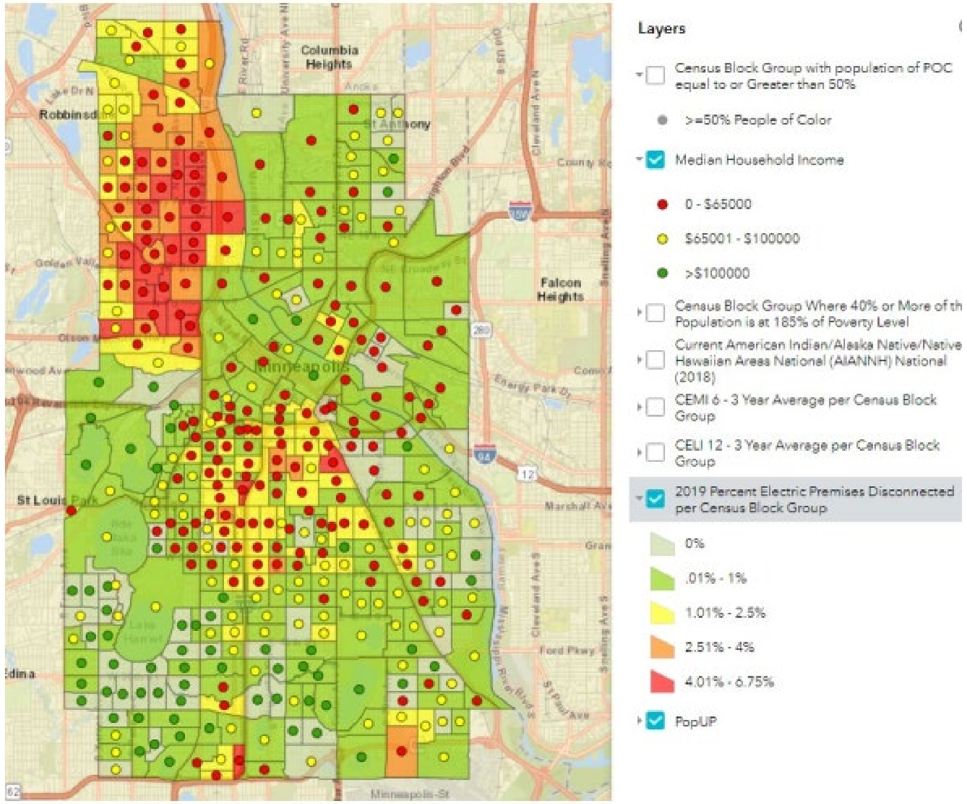
Almost half of U.S. states took action on energy equity between January 2020 and July 2022.



*See Farley et al. 2021, McAdams 2023, Hanus et al. 2023

Energy equity and justice examples

- OR – Compensating intervenors and engaging communities
  - OPUC has the authority to provide financial assistance to organizations that represent broad customer interests, including environmental justice (EJ) organizations, in regulatory proceedings.
  - OPUC requires active collaboration with community based organizations and EJ communities so community needs (energy burden, customer choice, resilience) inform distribution projects.*
- MN – Mapping metrics and demographic data
  - Xcel Energy is required to map reliability and service quality metrics and demographic data to reveal any equity issues (Dec. 18, 2020, order in Docket 20-406).
- ME – Assessing equity impacts
  - The Integrated Grid Planning law requires “An assessment of the environmental, equity and environmental justice impacts of grid plans.”



Source: Xcel Energy, Oct. 1, 2021, filing, Docket 20-406

*For example, see section 3.4 in PGE’s 2021 Distribution System Plan.

Example improvements for energy equity and justice

In Masschussetts, the GMAC charged the Equity Working Group (EWG) with providing input and feedback on how to consider equity in its review of the utility electric sector modernization plans. The EWG's observations and recommendations include:

- Include collaborative stakeholder development of the ESMP
- Incorporate early stakehodler engagement to shape engagement plans and modeling assumptions
- Standardize definitions of equity acros the ESMP
- Metrics should reflect the impact of work, not just effort
- The ESMPs should include the benefits for customers *after* considering cost of grid updates

The EWG made twelve procedural, recognition and distributive recommendations to improve the ESMP and process.

Appendices to the GMAC recommendations report include proposed metrics for equity assessments and stakeholder engagement.

- The equity assessment metrics are grouped into five categories- accessibility and community engagement, workforce and economic benefits, health benefits, financial benefits and incentives, and affordability.

Example State Practices

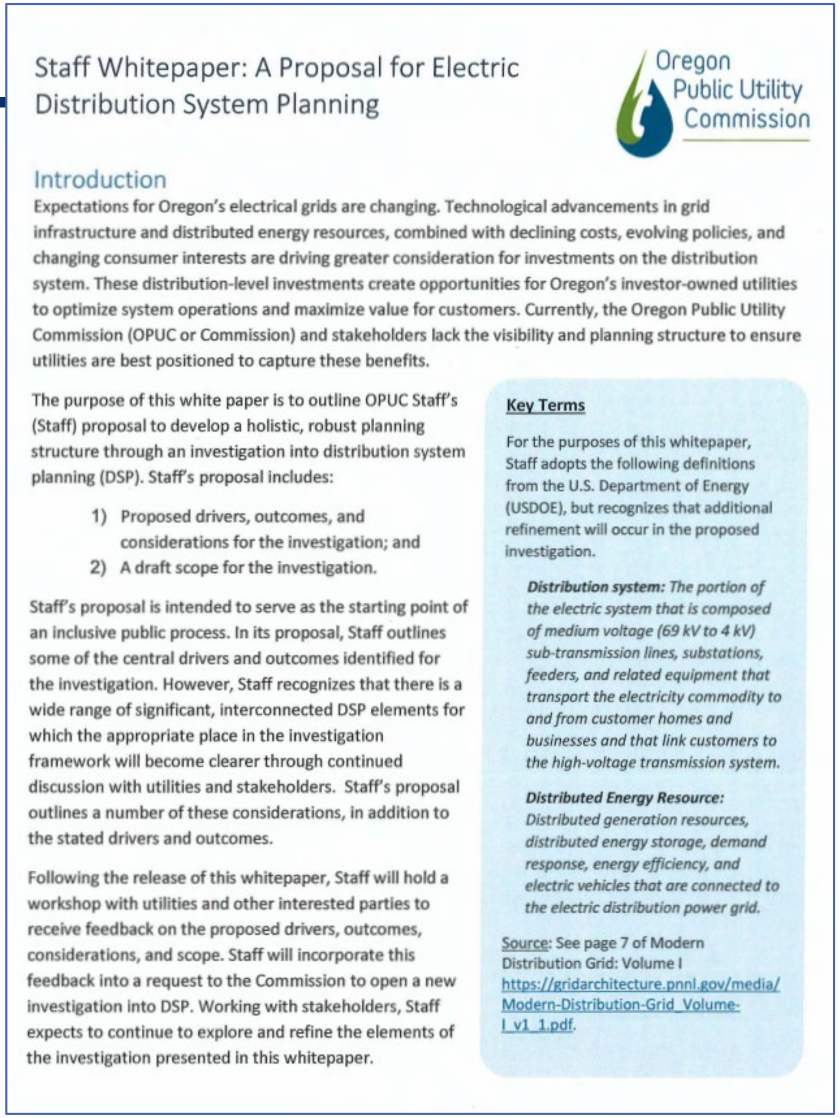
Example state practices (1)

Source: Portland General Electric

- Establish planning goals, objectives, and priorities with stakeholder engagement
- Build on work by other states, tailored to your state's interests
  - Forthcoming Berkeley Lab/PNNL report and catalog of state distribution planning requirements
- Host presentations to increase stakeholders' understanding
  - Colorado, Illinois, Maine, Massachusetts, Michigan, New Mexico, Oregon
- Engage stakeholders and communities in the planning process
  - Joint Utilities of NY stakeholder plan and timeline
  - Oregon's community engagement plans – see Portland General Electric distribution plan
- Ask utilities to respond to a questionnaire to gather baseline information on their distribution system and planning practices
  - Minnesota utilities; Oregon utilities and third-party energy efficiency administrator and stakeholders; New Jersey

Example state practices (2)

- Determine whether any current filings can be integrated/consolidated in DSP filings
  - Oregon PUC suspended smart grid filings (e.g., order on PGE's DSP)
  - Minnesota PUC integrated grid modernization plans and transportation electrification plans into DSP
- Prepare a white paper to lay out a vision for DSP processes and provide guidance for utility filings
  - Minnesota – Defined grid modernization for Minnesota, proposed a phased approach, and identified principles to guide it
  - New York – Proposed changes in filing requirements for effective interaction with the PSC's Coordinated Grid Planning proceeding to achieve the state's climate goals
  - Oregon – Outlined rationale and key drivers for opening a DSP investigation, desired outcomes and future planning process, near-term scope and schedule for investigation, and planning considerations



Staff Whitepaper: A Proposal for Electric Distribution System Planning

Oregon Public Utility Commission

Introduction

Expectations for Oregon's electrical grids are changing. Technological advancements in grid infrastructure and distributed energy resources, combined with declining costs, evolving policies, and changing consumer interests are driving greater consideration for investments on the distribution system. These distribution-level investments create opportunities for Oregon's investor-owned utilities to optimize system operations and maximize value for customers. Currently, the Oregon Public Utility Commission (OPUC or Commission) and stakeholders lack the visibility and planning structure to ensure utilities are best positioned to capture these benefits.

The purpose of this white paper is to outline OPUC Staff's (Staff) proposal to develop a holistic, robust planning structure through an investigation into distribution system planning (DSP). Staff's proposal includes:

1) Proposed drivers, outcomes, and considerations for the investigation; and
2) A draft scope for the investigation.

Staff's proposal is intended to serve as the starting point of an inclusive public process. In its proposal, Staff outlines some of the central drivers and outcomes identified for the investigation. However, Staff recognizes that there is a wide range of significant, interconnected DSP elements for which the appropriate place in the investigation framework will become clearer through continued discussion with utilities and stakeholders. Staff's proposal outlines a number of these considerations, in addition to the stated drivers and outcomes.

Following the release of this whitepaper, Staff will hold a workshop with utilities and other interested parties to receive feedback on the proposed drivers, outcomes, considerations, and scope. Staff will incorporate this feedback into a request to the Commission to open a new investigation into DSP. Working with stakeholders, Staff expects to continue to explore and refine the elements of the investigation presented in this whitepaper.

Key Terms

For the purposes of this whitepaper, Staff adopts the following definitions from the U.S. Department of Energy (USDOE), but recognizes that additional refinement will occur in the proposed investigation.

Distribution system: *The portion of the electric system that is composed of medium voltage (69 kV to 4 kV) sub-transmission lines, substations, feeders, and related equipment that transport the electricity commodity to and from customer homes and businesses and that link customers to the high-voltage transmission system.*

Distributed Energy Resource: *Distributed generation resources, distributed energy storage, demand response, energy efficiency, and electric vehicles that are connected to the electric distribution power grid.*

Source: See page 7 of Modern Distribution Grid: Volume I https://gridarchitecture.pnnl.gov/media/Modern-Distribution-Grid_Volume-I_v1_1.pdf.

Example state practices (3)

- Host work groups to help develop and refine requirements — and address emerging planning issues
  - Hawaii – Stakeholder council, technical advisory panel, and working groups
  - Maine – Working groups on forecasting, solutions evaluation criteria, and data availability/collection
  - Oregon – DSP Work Group serves as a forum to identify, articulate, discuss and, when possible, resolve technical and other questions that arise. The primary objective is finding solutions to barriers that would otherwise inhibit completion of the utilities' plans.
  - New Jersey – Third-party facilitated working groups with electric distribution companies and stakeholders will make recommendations for integrated DER planning — *forthcoming*
- Consider pilots for new processes and technologies
  - Non-wires alternatives (Oregon)
  - Resilience — Resilient Minneapolis project (Minnesota)
  - Hosting capacity analysis — start with solar PV, expand to other DERs, and specify use cases*
  - Time-based rates — for general service rates and managed electric vehicle charging (e.g., Oregon, Minnesota, Hawaii, New York)

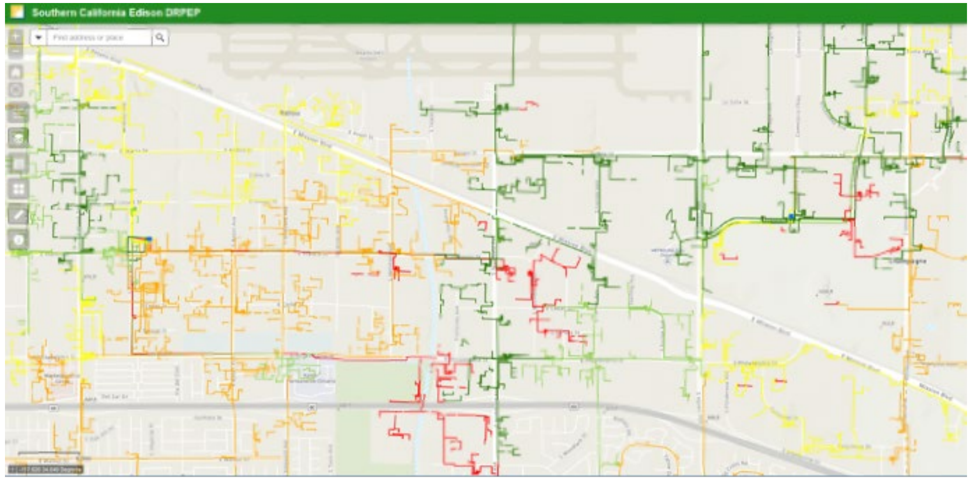


Figure source: Southern California Edison

*See Minnesota PUC orders in Docket Nos. 15-962, 18-684, 19-666, and 21-694

Resources for more information

Berkeley Lab's Integrated Distribution System Planning website

U.S. Department of Energy, *Modern Distribution Grid* guidebooks

S. Murphy, L. Schwartz, C. Reed, M. Gold, and K. Verclas, *State Energy Offices' Engagement in Electric Distribution Planning to Meet State Policy Goals*, National Association of State Energy Officials, 2023

J. Carvallo and L. Schwartz, *The use of price-based demand response as a resource in electricity system planning*, Berkeley Lab, 2023

J. Keen, E. Pohl, N. Mims Frick, J.P. Carvallo and L. Schwartz, *Duke Energy's Integrated System and Operations Planning: A comparative analysis of integrated planning practices*, Grid Modernization Laboratory Consortium, 2023

Berkeley Lab, Pacific Northwest National Lab and NARUC, Peer-Sharing Webinars for Public Utility Commissions on Integrated Distribution System Planning, 2023

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

NARUC resources on energy equity and justice

Contact

Lisa Schwartz
Senior Energy Policy Researcher/
Strategic Advisor
lcschwartz@lbl.gov

Natalie Mims Frick
Energy Policy Researcher/
Deputy Department Leader
nfrick@lbl.gov

For more information

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