Coordination Across Planning Processes

IRP Contemporary Issues Technical Conference

Grace Relf, Lawrence Berkeley National Laboratory
Contributions by Lisa Schwartz
September 18, 2025

Energy Technologies Area
BERKELEY LAB

This work was funded by the U.S. Department of Energy, Office of Electricity, under Contract No. DE-AC02-05CH11231.

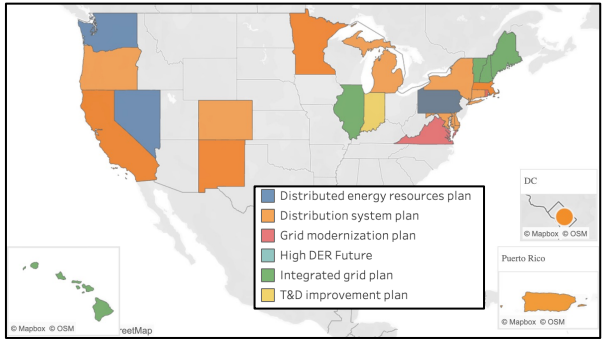
Agenda

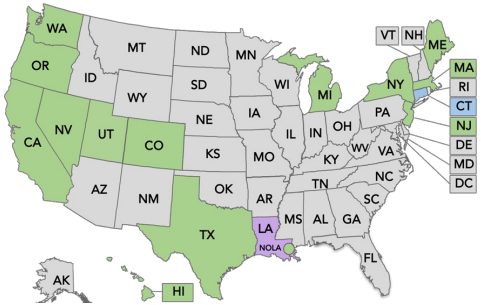
- Background and Context
- The “Why” and “How” of Coordinated Planning
  - Benefits of Coordination
  - Approaches to Coordinate Planning Processes
  - Responsibilities and Roles
- Types of Plans to Coordinate
  - Electric System Plans
  - Other State Plans
  - Rate Cases and Cost Recovery
- Deep Dive: Considering Distribution System Planning (DSP) Elements in Integrated Resource Planning (IRP)
  - Value of Integrating DSP Elements in IRP
  - Key Linkages Between DSP and IRP
  - Examples
- Conclusions

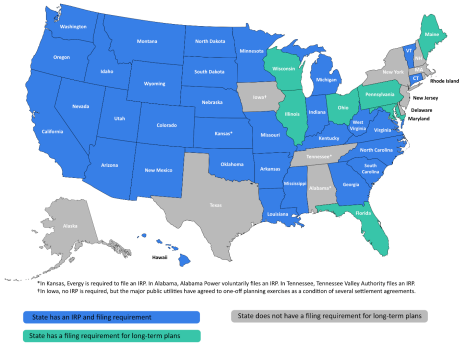
Background and Context

Electricity Planning

- 22 states, DC and PR require regulated electric utilities to file some type of distribution plan* — for example:
  - Expedited cost recovery for certain upgrades
  - Grid modernization strategy and investments
- Most states require integrated resource plans for bulk power system planning
- 15 states require grid resilience plans
- Planning in most states remains siloed
- Integrated system planning can optimize grid investment strategies and address growing complexity at the grid edge





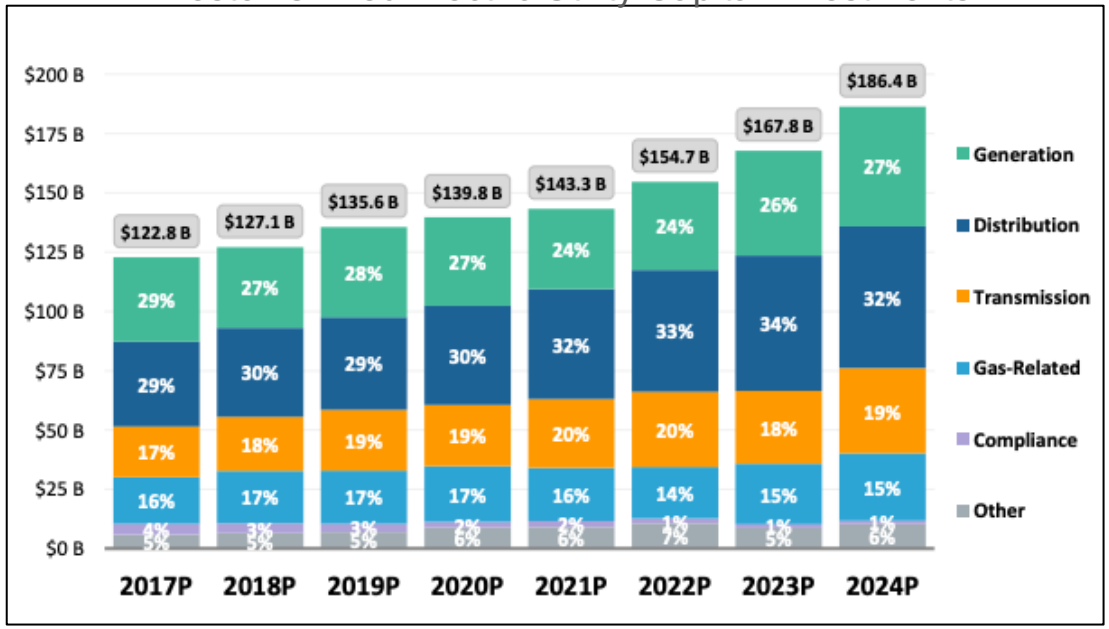


*Some states require multiple types of distribution-related plans

Sources (clockwise): LBNL 2025, LBNL 2024(a), LBNL 2024(b)

Distribution System Planning Is Increasingly Important

Investor-Owned Electric Utility Capital Investments



Source: EEI 2024

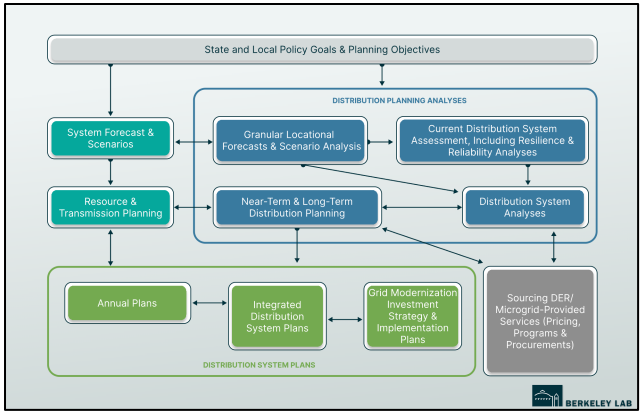
Distribution system investments account for the largest portion of capex for U.S. investor-owned utilities — 32% in 2024 (estimated $59.7B)

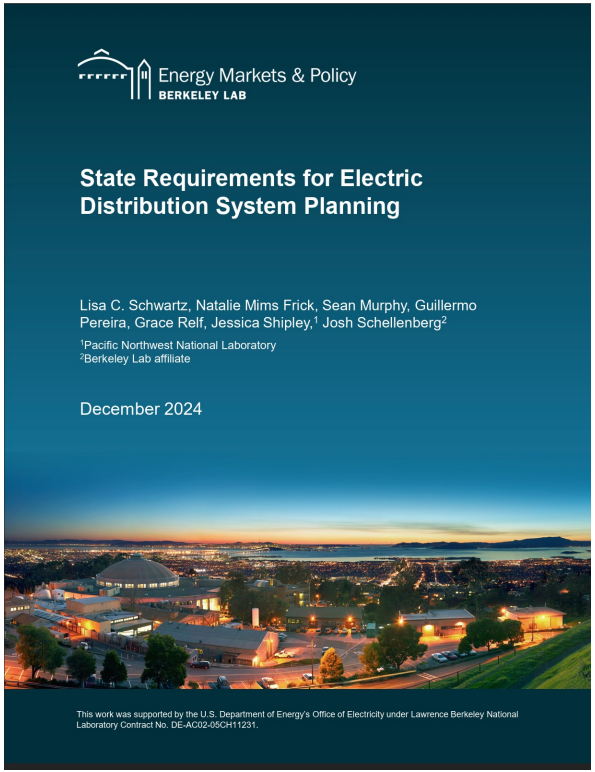
Berkeley Lab Resources

This presentation draws on prior and ongoing Berkeley Lab research.

- *State Requirements for Electric Distribution System Planning* includes best practices for coordinating DSP with various other types of utility and state plans, with supporting online tools.
- Initial findings from interviews and literature review for new research provide insights into specific actions to better consider DSP in IRP.

See interactive DSP decision framework





The “Why” and “How” of Coordinated Planning

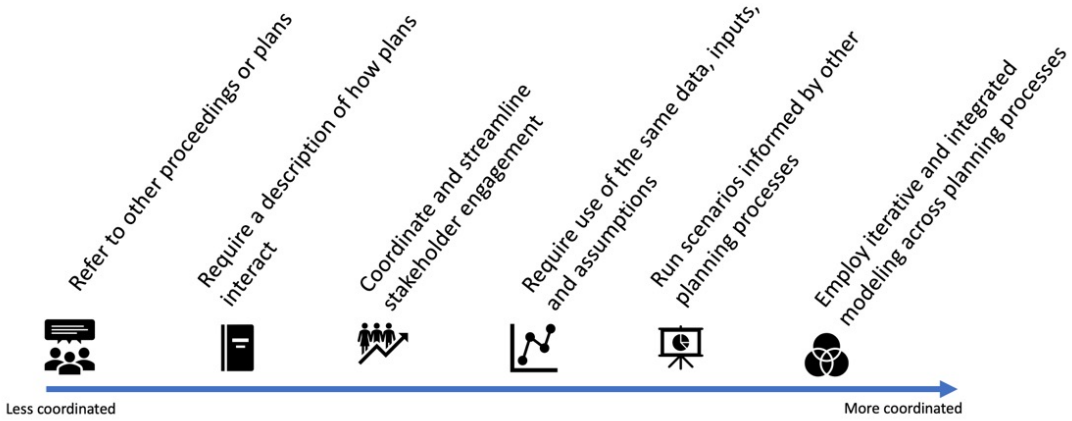
Why Coordinate? The Benefits of Coordination

Coordinating various plans improves electricity system planning outcomes by:

- Aligning inputs, methods, and information flows across plans for improved consistency
- Ensuring that all factors that influence system needs are captured
- Creating a holistic picture of investment alternatives that can result in cost savings
- Increasing understanding, transparency, and credibility of plan results
- Improving stakeholder ability to participate, resulting in higher quality information available to planners and decision-makers
- Applying knowledge from multiple planning processes to realize efficiencies

How to Coordinate? Approaches to Coordination (1)

- Actions to coordinate plans range in complexity and impact, depending on resource availability (e.g., staff time and modeling tool capabilities), plan maturity, and planning objectives.
  - Utilities and regulators can move along a spectrum to achieve more benefits as they gain experience with coordinated planning.



Source: Berkeley Lab

How to Coordinate? Approaches to Coordination (2)

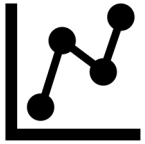
- Refer to other proceedings or plans
  - Without any explicit direction in rules, stakeholders may proactively refer to data, processes and findings in related proceedings.
  - Drawing on information from other proceedings and other types of plans is a simple initial coordination element that can improve the quality of planning.

- Require a description of how plans interact
  - Rules may require an overview of how related plans interact.
  - This is a low level of coordination because it does not require any specific analysis, explicitly define areas for coordination, or require any particular outcomes from coordination.

- Coordinate and streamline stakeholder engagement
  - Utilities can explicitly coordinate stakeholder engagement activities such as workshops, technical conferences, and working groups to more efficiently draw on stakeholder expertise across proceedings.
  - This achieves a mid-level of coordination because stakeholders will contribute to a robust and coordinated record for decision-making using their knowledge of other proceedings.

Source: Berkeley Lab

How to Coordinate? Approaches to Coordination (3)



- Require the use of the same data
  - Regulators specify that utilities use the same underlying information across plans such as load forecasts, economic indicators, and cost assumptions for grid-edge resources.
  - Such mid-level coordination may increase efficiency across planning activities and help ensure outcomes of different types of plans are comparable.
- Run scenarios informed by other planning process
  - Guidelines explicitly direct utilities to run scenarios aligned with other planning processes or goals, such as increased deployment of local resources.
  - Clear direction on how utilities consider the results of such scenarios and incorporate findings in their final plans and identified actions supports robust planning outcomes.
- Employ iterative and integrated modeling across planning processes
  - This highest level of coordination explicitly requires that inputs and outputs of different planning processes inform one another.
  - This action creates assurances that the resulting plans are consistent with one another.

Source: Berkeley Lab

How to Coordinate? Challenges to Effective Coordination

- Effective coordination can be challenging
  - There may be tradeoffs between depth of analysis and breadth of topic coverage
  - If not thoughtfully administered, stakeholders may not have the bandwidth to effectively participate in large-scale proceedings
  - Best practice is consistent and sustained coordination throughout proceedings, requiring dedication and time by the utility, regulator and stakeholders
- Utility planners and regulators can manage and reduce challenges
  - Carefully articulate planning objectives upfront
  - Sequence workstreams
  - Thoughtfully schedule milestones and meetings
  - Communicate frequently with participants and demonstrate the value of their inputs

How to Coordinate? Roles and Responsibilities (1)

Utilities	• Conduct coordinated analyses • File plans that demonstrate how plans are coordinated
Public utility commissions	• Establish planning requirements • Conduct technical conferences • Review, provide input to, and take action on plans
Other state agencies	• Departments such as energy, emergency management, health, and transportation can facilitate coordination for plans they develop or oversee ○ For example, Utility Consumer offices review and provide input on various utility plans
Participants in planning processes	• Other participants may include 3rd party service providers, industry, and community groups • Provide market and technical insights and specialized expertise • Review plans and suggest improvements • Participate in proceedings or working groups

How to Coordinate? Roles and Responsibilities (2)

Planning Responsibilities by Organization

Organization type	C/DER	D	T	G
Vertically-integrated utility	●	●	●	●
Transmission & distribution utility	●	●	●	
Generation & transmission co-op			●	●
Federal power marketing administration (PMA)			●	●
Regional transmission organization (RTO)			●	
Non-RTO transmission planning regions			●	
Competitive supplier	●			●
Community choice aggregator	●			●
Distribution co-op / municipal utility	●	●		

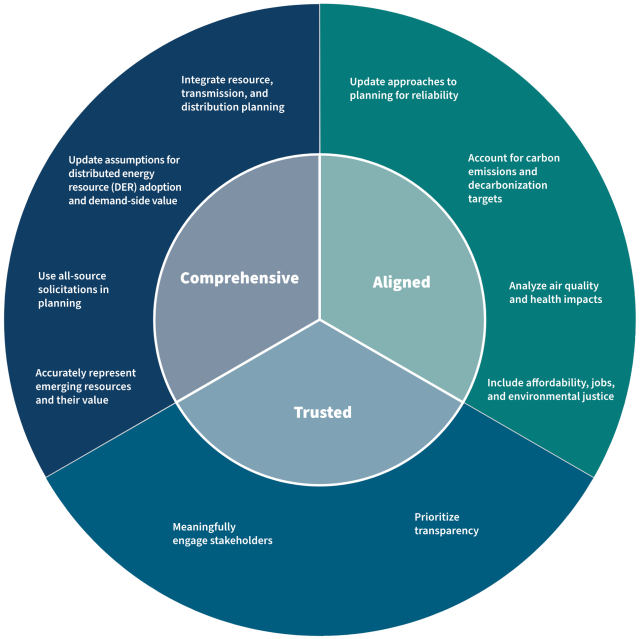
Planned by organization

Need to consider in planning

Source: Energy and Environmental Economics, Inc.

Beyond Coordination: Integrated System Planning

- Some states and utilities are moving toward planning processes that consider all levels of the grid in conjunction with one another.
- Fully Integrated System Planning considers generation, transmission, distribution, and grid-edge resources together.
  - Truly integrated system planning is still a nascent effort, and the depth of integration varies.
  - Best practice is to develop iterative feedback loops between process steps.
- Integrated System Planning may look at gas and electric systems together.



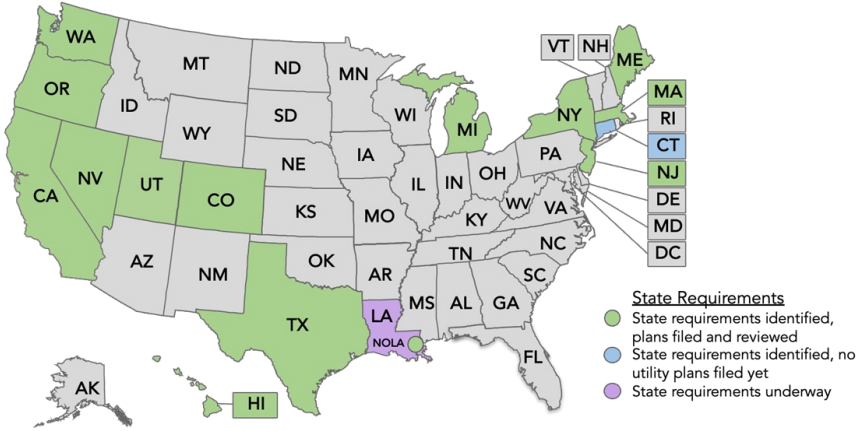
Source: RMI

Types of Plans to Coordinate

Types of Plans to Coordinate: Electric System Plans

- Plans that impact the timing, amount, location, and type of bulk power system resources needed
  - Distribution system plans
  - Transmission plans
  - Plans to facilitate local resources
  - Resilience plans
  - Grid modernization plans

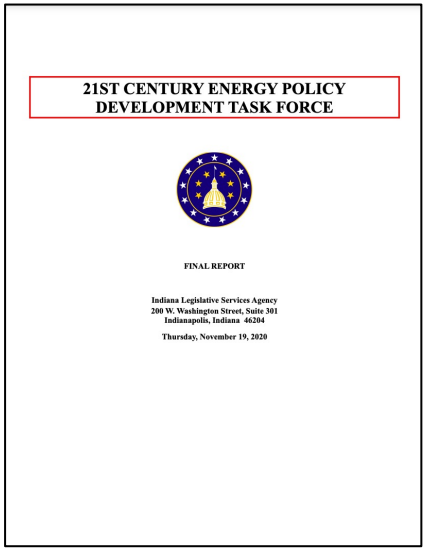
Resilience Planning Requirements for Regulated Electric Utilities

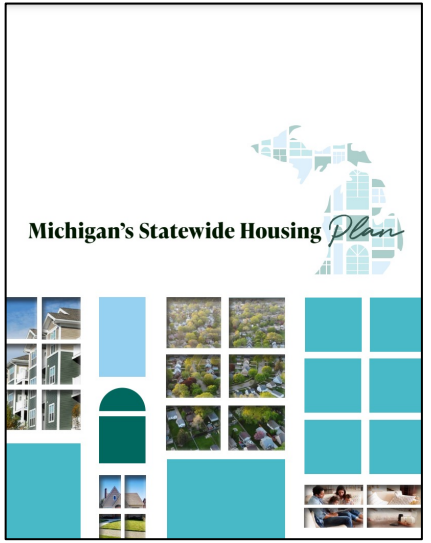


Source: Berkeley Lab

Types of Plans to Coordinate: Other Plans

Planning for other state objectives can impact electric system needs.





Sources: Indiana Legislative Services Agency, Wisconsin Department of Transportation, MI State Housing Development Authority

Rate Cases and Cost Recovery

- Importance of Coordination
  - Utilities use plans to demonstrate how planning objectives translate into expenditure decisions.
    - That supports regulatory and stakeholder review of expenditures for cost recovery in the short term, such as in a rate case, and their relation to future expenditure needs.
  - IRPs inform, and can be informed by, revenue requirements, resource procurements, certificate of public convenience and necessity proceedings, and other proceedings.
  - DSPs, and their action plans in particular, provide context and support for proposed distribution system expenditures in rate cases, or through riders between rate cases.
- Key Coordination Activities
  - Identify IRP and DSP linkages with rate cases in rules/guidelines, including timing of filings.
  - Discuss how IRPs and DSPs can support cost recovery requests.
- Challenges
  - Plans need to be flexible to adjust to changing conditions.
  - Regulators typically do not approve IRPs/DSPs. Utilities still need to meet cost recovery criteria and provide robust justifications in rate cases.
  - It can be challenging to assess the value of expensive operational/software investments.

See "Regulatory Challenges With Utility Investment Planning and Cost Recovery for Grid Modernization" (2025)

Rate Case and Cost Recovery: State Example

The California PUC has refined over time its guidance for how distribution system planning interacts with general rate cases.

Elements of CPUC's Guidance

- Common vocabulary and terminology
- Timelines and content requirements for grid modernization filings, including as part of rate cases
- How the Commission evaluates cost-effectiveness of grid modernization investments in rate cases
- Expectations for consistency in information between rate cases and distribution planning reports and data
- Decisions on ratemaking treatment for certain expenses for distributed resources
- Reporting on metrics that track distribution capital per customer

Sources: CPUC D18-02-004, D18-03-023, and D24-10-030

Deep Dive: Considering DSP Elements in IRP

Comparing the DSP and IRP Processes

Element	DSP	IRP
Question answered	How do we design, maintain, and manage the low-voltage network to maintain deliverability and reliability?	What is the least-cost, least-risk mix of supply- and demand-side resources needed to meet long-term electricity demand?
Planning horizon	5–10 years	15–30 years
Load forecast granularity	Localized, disaggregated loads; up to 8,760 hour forecast	System-level peak demand by customer segment
Common modeling tools	• Power flow simulations • Short-circuit / fault modeling	• Capacity expansion models • Resource adequacy models • Production cost models
Other key differences	• Scenario analysis is an emerging practice • Increasingly more dynamic analyses • Locational analysis is important for determining system needs • Utility requirements are less common	• More commonly use scenario analysis • Traditionally assess static snapshot of needs • More options for resource siting/locations • Utility requirements are more common

Sources: ESIG 2025, LBNL 2024

Expert Perspectives: Value of Incorporating DSP Elements in IRP (1)

A commitment to least-cost planning requires integration across planning processes.

There is significant value in getting DSP and IRP teams to talk to one another.

Integrated planning creates a paradigm shift in how utilities treat distribution-level assets and operations.

A holistic, long-term view helps to avoid “fire fighting” in addressing system needs.

Integrating DSP elements in IRP can add complexity and time to the process without commensurate value.

Example responses in Berkeley Lab interviews with utilities, PUCs, and other experts

Expert Perspectives: Value of Incorporating DSP Elements in IRP (2)

Interviewees strongly favored integrated planning and identified multiple value propositions.

- Optimize electricity system infrastructure
  - Avoid the need to touch infrastructure more than once which raises costs
  - Avoid line losses by building resources closer to load and site distribution assets to reduce needs and constraints
  - Build and operate the system for a universal optimum (all levels of the system) rather than to optimize one level of the system only
  - Avoid some infrastructure investments by optimizing use of existing distribution system assets

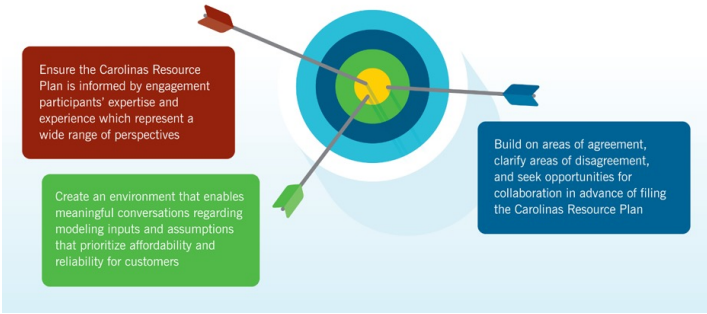
- Reduce costs
  - Reduce overly conservative assumptions that increase plan costs
  - Address upward rate pressure by assessing all possible solutions

- Improve stakeholder credibility, overall transparency, and communication
  - Provide greater insight into distribution system expenditures that may drive rate increases
  - Better justify distribution-level projects that tie back to a plan
  - Reduce internal utility functional silos
  - Build good will with regulators and communicate the utility's overall direction to stakeholders

Expert Perspectives: Process Considerations

- There are tradeoffs between large-scale, holistic planning proceedings and narrower proceedings.
  - Conduct planning in bite-sized pieces no matter the scope of the proceeding.
  - Make forward progress while making good use of additional data.
  - Calibrate the necessary level of detail for analyses to the level of uncertainty of the plan.
  - Communicate clearly using consistent naming conventions, updated calendars, and accessible webpages.
- Advisory groups help to vet elements of plans.
  - Solicit candid feedback regularly throughout the process.
  - Use stakeholders to identify new issues and improve analyses, even if good stakeholder engagement is challenging.
- **Good planning depends more on the people than the tools**.
  - Data marshalling is hard, but good planners will fix bad data.
  - Expertise at the nexus of DSP and IRP is nascent.
  - Use change management practices to support planners using new techniques.

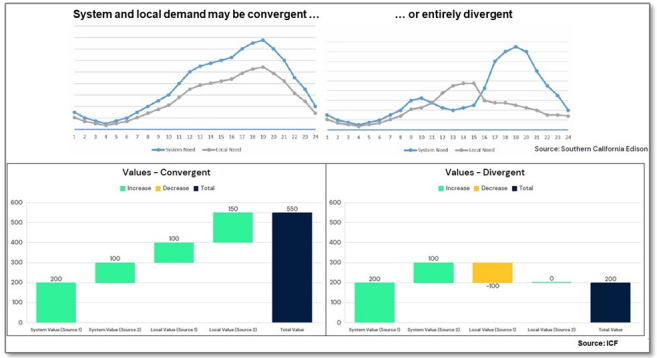
Duke Energy's IRP Stakeholder Engagement Objectives



Source: Duke Energy 2023

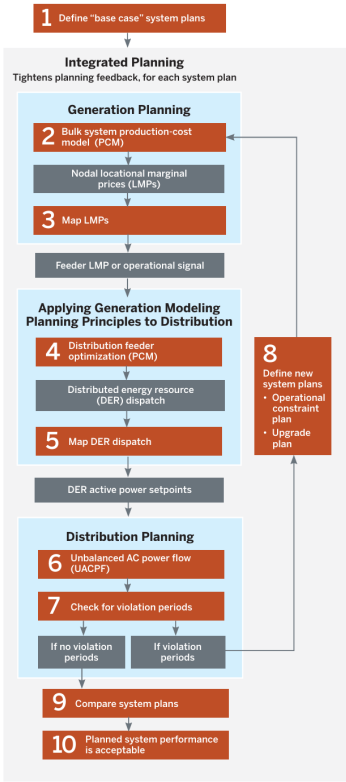
Key Linkages Between DSP and IRP

- DSP develops granular forecasts for loads and distributed energy resources (DERs), identifies distribution system needs, and estimates costs.
  - This process impacts IRP analyses and decisions, such as resource adequacy analysis, by assessing the capabilities of the distribution system to accommodate DERs to meet resource needs.
- IRP identifies an optimal (least-cost, least-risk) mix of future resources that meets state requirements.
  - This process can inform DSP by identifying the future quantity and role of DERs to help identify necessary distribution system investments for physically and operationally accommodating DERs.
- Key linkages
  - Load and DER forecasting
  - Analyzing coincidence and divergence of local and bulk system peak demand
  - Improving confidence in DER services
  - Co-optimizing bulk power and distribution resources and understanding resource interactivity
  - Assessing DER deliverability in the context of wholesale markets and distribution flexibility services



Actions to Incorporate DSP Elements in IRP

- Reconcile load forecasts.
  - More granular load forecasting in IRP improves understanding of load variability and coincidence or divergence of peak demand between the bulk power system and distribution system. The convergence or divergence of these peaks can impact DER value.
  - Discussion among different forecasting teams in the utility is key to reconciling information.
  - The timing of DSP and IRP processes can be modified to better enable iterative use of inputs and outputs.
- Use granular DER data to inform modeling assumptions.
  - Incorporate DER forecasts, behavior, energy and capacity impacts, and management limitations into IRP analyses.
  - Use DSP outputs to optimally site and discharge distribution-sited batteries to provide benefits for both the bulk power and distribution system.
- Iterate between production cost models and power flow models to determine DER energy impacts on the bulk power system and distribution loading impacts.

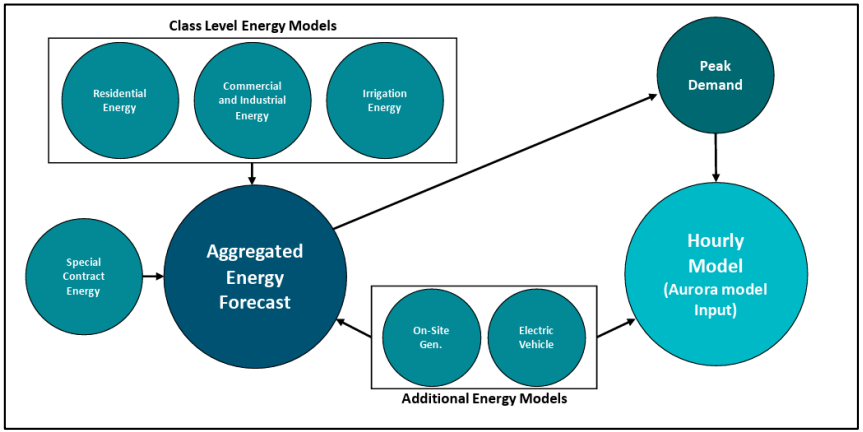


Source: ESIG 2025

Forecasting Data Translation: Utility Example

- In Oregon, Idaho Power files IRPs and DSPs, connecting its load and DER forecasts across both plans.
  - The IRP forecast for DERs uses historical adoption trends and customer billing data. The DSP then geolocates DER installations and uses IRP level and growth rate assumptions to develop feeder-level forecasts.
  - The IRP forecast for EVs uses historical adoption trends and county-level EV registration data. The DSP then proportionally disaggregates the data to feeders in conjunction with additional locational forecasts for charging loads.
  - DERs identified in the IRP action plan feed back into local load forecasts for the DSP.

Idaho Power IRP Load Forecasting Process

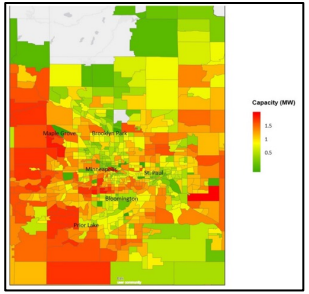


Sources: Idaho Power 2025, Idaho Power 2022

Coordination with Local Resource and Load Growth Planning: State Example

- The Minnesota PUC required utilities to combine Transportation Electrification Plans and Integrated Distribution Plans and provide a description of how the plan is coordinated with IRP.
  - Xcel Energy conducts locational analysis of electric vehicle charging needs.
  - The utility also forecasts electrification impacts for water and space heating.
  - Utilities aim for consistent forecasts across DSP and IRP.

Heat Map of 2030 Charging Needs in the Twin Cities



Alignment of Local Resource Forecasts Across Modeling Tools

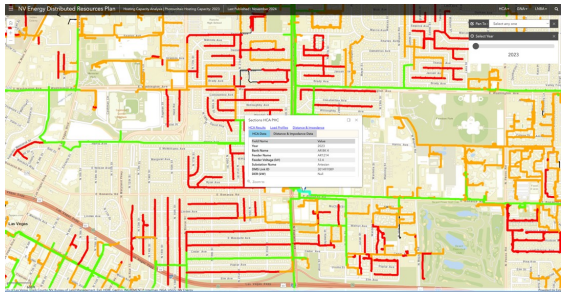
Forecast	Vintage Reflected in Corporate-Level DER Scenario Modeling	Vintage Used in LoadSEER DER Scenario Modeling
Distributed Solar PV	June 2023	June 2023
Community Solar Gardens	August 2023	August 2023[7]
Distributed Energy Storage	September 2023	2021 IDP
Energy Efficiency	September 2023	Embedded in 2022 Energy Sales & Demand forecast
Demand Response	2022	Embedded in 2022 Energy Sales & Demand forecast
Electric Vehicles	July 2023	2022

Sources: Minnesota PUC, Xcel Minnesota

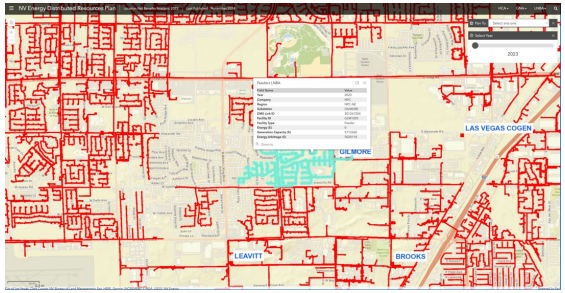
Coordination with Local Resource Planning: State Example

- Nevada requires utilities to include DER plans in IRPs.
- NV Energy's 2024 IRP includes:
  - Discussion of how the DER plan is coordinated with other components of the IRP
  - Transportation Electrification Plan
  - Discussion of continued refinement of DER analysis going forward
  - Publicly available DER portal with:
    - Locational net benefits analysis
    - Hosting capacity analysis for three scenarios
    - Load profile and data downloads
    - Grid needs assessment data

Hosting Capacity Analysis



Locational Net Benefits Analysis

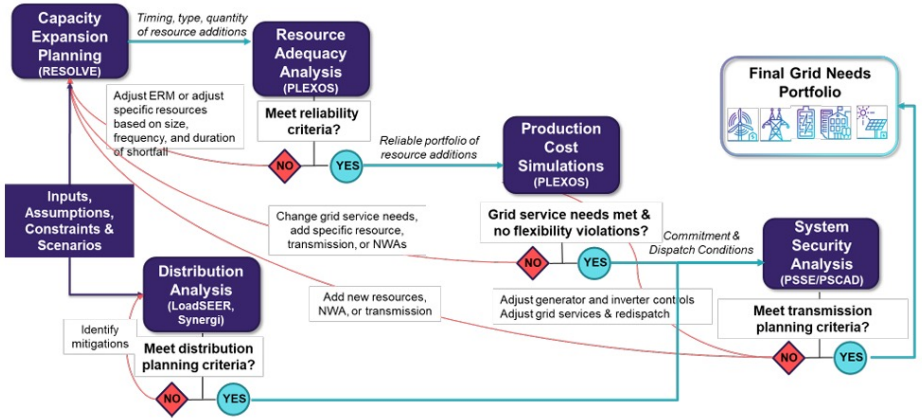


Sources: NV Energy 2024, NV Energy

Integrated System Planning: Utility Example

Hawaiian Electric deploys iterative modeling across generation, transmission, and distribution systems.

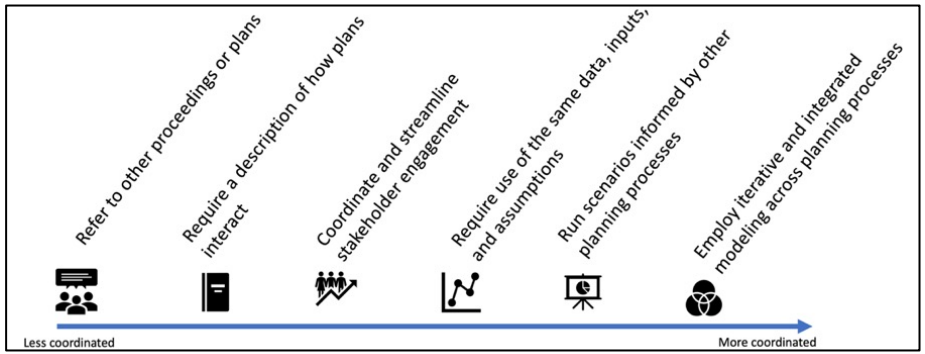
- The system security analysis account for distribution-level resources and, if violations occur, the utility iterates to identify what would be needed to accommodate DERs.
- The production cost model then helps to identify if solutions are cost-prohibitive.



Source: Hawaiian Electric

Conclusions

Coordination of DSP With Other IRP and Other Types of Plans: By State



State	Bulk Power (IRP and Transmission)	DERs (including efficiency)	Electrification	Other Related Plans	Highest Level of Coordination
CA	●	●	●	●	
CO	●	●	●	●	
DC				●	
HI	●	●	●	●	
IL	●	●	●	●	
ME	●	●	●	●	
MA	●	●	●	●	
MI	●	●			
MN	●		●	●	
NV	●	●			
NM	●			●	
NH		●		●	
NY	●	●	●	●	
OR	●	●	●	●	
RI		●		●	
VT	●	●	●	●	
VA	●			●	
WA	●	●	●	●	

Source: Berkeley Lab

Best Practices

- Ensure use of consistent datasets, inputs, outputs, and scenarios across planning processes.
- Establish consistent, meaningful, and streamlined opportunities for input from stakeholders and demonstrate how that input impacted plans and decision-making.
- Consider timing requirements across planning processes and sequence planning processes appropriately. That includes limiting or coordinating working group processes to ensure participants have adequate bandwidth to effectively engage with the material and maintain the ability and desire to participate.
- Prioritize integration of plans that are most closely aligned and mature over more nascent plans to maximize the benefits of coordination and ensure adequate depth of analysis for newer types of plans.
- When establishing new reporting requirements, assess whether there is opportunity to eliminate, modify or consolidate existing reporting requirements.
- Develop metrics at the outset to determine whether integration across planning processes has delivered the intended benefits and met the desired outcomes.

Actions States and Stakeholders Can Take

State agencies can begin coordinating planning processes and improve the depth of coordination.

- State regulators can:
  - Provide guidance to utilities on types of plans to coordinate and methods for doing so
  - Conduct technical conferences to explore existing and possible coordination efforts
  - Request input from stakeholders on plans and datasets that may be coordinated
  - Ensure stakeholder engagement is effectively streamlined and accessible
- State utility consumer advocates can:
  - Participate in utility planning proceedings and working groups
  - Identify existing data sets, information, and plans that utilities can use, particularly from other proceedings
  - Validate plan assumptions and outputs
  - Help ensure coordination between utility planning and state planning processes
- Other stakeholders can:
  - Participate in utility planning proceedings and working groups
  - Use specialized expertise to raise new issues and validate plan assumptions and outputs

Questions States and Stakeholders Can Ask: Pre-Filing

- What plans, either internal or external to the utility, has the utility identified that may impact the IRP?
  - Who leads execution of each plan?
  - What are the key data inputs, outputs, and procedural dates for each plan?
- How does each identified plan impact the IRP?
- What approaches will be used to coordinate each plan with the IRP?
  - Will the utility employ data from other plans in its IRP?
  - Will the utility use data from the IRP in other plans?
  - Will the utility run any scenarios that are based on findings from other plans?
- How will the utility coordinate and streamline stakeholder and community engagement for IRP and other planning processes?

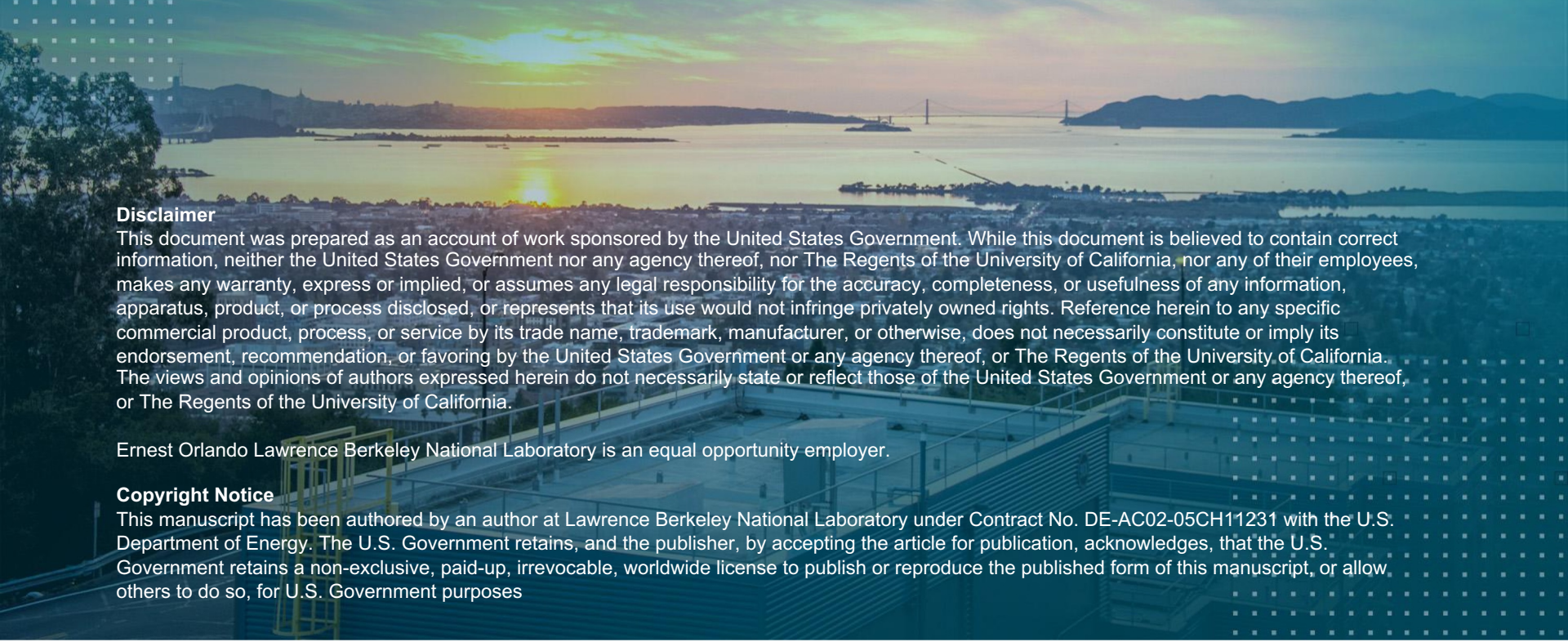
Questions States and Stakeholders Can Ask: Post-Filing

- What tangible outcomes or improvements occurred from coordinating multiple plans?
  - What specific elements of coordination led to those outcomes or improvements?
  - Can those elements be applied to other areas of the IRP?
- Which processes related to coordination were most and least fruitful?
- Which processes related to coordination were resource-intensive or lighter lifts and which were relatively most valuable?
- In the next IRP planning cycle, what other types of plans will become increasingly important?
  - Can those plans be better integrated with IRP in some way in the next cycle?

Thank you!

Resources for More Information

- Lawrence Berkeley National Laboratory (Berkeley Lab) Integrated Distribution System Planning website
- Schwartz, L., N. Mims Frick, S. Murphy, G. Pereira, G. Relf, J. Shipley, J. Schellenberg, and A. Fernandez. 2024. *State Requirements for Electric Distribution System Planning*. Berkeley Lab. Complementary online catalog
- Murphy, S., L. Schwartz, G. Pereira, and C. Davis. 2025. *Bridging the Gap on Data and Analysis for Distribution System Planning: Information That Utilities Can Provide Regulators, State Energy Offices and Other Stakeholders*. Berkeley Lab
- Energy Systems Integration Group. 2025. Integrated Planning Guidebook: A Practical Coordination Framework for Electricity Planners. A report by the Integrated Planning Task Force. https://www.esig.energy/integrated-planning/
- Collins, Myles T, Matia Whiting, Josh A Schellenberg, and Lisa C Schwartz. 2025. *Bridging the Gap on Data, Metrics, and Analyses for Grid Resilience to Weather Events: Information that utilities can provide regulators, state energy offices, and other stakeholders*. Berkeley Lab
- Schellenberg, J., and L. Schwartz. 2024. *Grid Resilience Plans: State Requirements, Utility Practices, and Utility Plan Template*. Berkeley Lab
- Burdick, A., J. Hooker, L. Alagappan, M. Levine, and A. Olsen. 2024. "Integrated System Planning: Holistic Planning for the Energy Transition," Energy and Environmental Economics, Inc.
- LeBel, M., R. Sandoval, N. Mims Frick, and J. Deason. 2025. *Opportunities for Integrating Electric and Gas Planning*. Regulatory Assistance Project and Berkeley Lab
- Shipley, J., J. Barlow, and G. Relf. 2024. *Review of Literature and Utility Commission Proceedings Relevant to Integrated System Planning: Annotated Bibliography Prepared to Support the Washington Utilities and Transportation Commission*. Pacific Northwest National Lab and Berkeley Lab
- Dyson, M., L. Swishberg, and K. Stephan. 2023. *Reimagining Resource Planning*. Rocky Mountain Institute



Energy Technologies Area
BERKELEY LAB