Advances, Challenges, and Opportunities with Comprehensive Electricity Planning

Session C3
Advances Challenges, and Opportunities with Comprehensive Electricity Planning

Chairman Jeffrey Ackermann, Colorado

November 20, 2019
NARUC Annual Meeting and Education Conference 2019
Planning and Investment Decisions Could Optimize Supply and Demand

Transmission needs might be reduced with less reliance on central station power and increased DER penetration.

With growth of DER, the amount and type of central station generation needed to balance supply and demand is evolving.

Distribution system investment decisions now need to account for the quantity, location, capabilities, and load shapes of resources added to the distribution system.

With greater alignment of resource and distribution planning, states & utilities could:

- Improve grid reliability and resilience
- Optimize use of distributed and existing energy resources
- Avoid unnecessary costs to ratepayers
- Support state policy priorities
- Increase the transparency of grid-related investments decisions
Key Trends Driving Need for Change

1. Resilience and reliability
2. Regulatory trends
3. Coordination needs and benefits
4. Policy/legislative interests
5. Fuel price and other cost uncertainties
6. Shifting consumer preferences / practices
7. Changes in electric industry
8. New technologies at lower costs
NARUC-NASEO Task Force on Comprehensive Electricity Planning

Purpose: Develop new pathways for aligned electricity planning

1. **Innovation**: Pioneer new tools and roadmaps for aligning planning to meet state needs
   - Participants are convening in multi-state cohorts with others operating in similar market, regulatory, and policy environments

2. **Action**: Apply insights to directly benefit state action
   - Each state will develop concrete steps / an action plan at the end of the initiative

3. **Replication**: NARUC and NASEO will publish templates and resources to support all members

Announced Nov. 2018
16 States represent NARUC & NASEO members

States are Diverse and Representative:
- Geography
- Market models (e.g., retail competition, wholesale market)
- Planning approaches (e.g., state energy office roles, distribution system planning)
- State goals (e.g., grid mod, resilience, climate, clean energy, economic development)
# Five State Teams (“Cohorts”)

<table>
<thead>
<tr>
<th>Vertically Integrated</th>
<th>Restructured</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coral</strong></td>
<td><strong>Jade</strong></td>
</tr>
<tr>
<td>• Within organized markets</td>
<td>• Within organized markets</td>
</tr>
<tr>
<td>Tackling alignment of distribution, resource, and transmission planning</td>
<td>Focused on integrated distribution planning (combined with other state / utility energy planning and programs)</td>
</tr>
<tr>
<td>• Pragmatic state; works collaboratively in region; operates in 2 RTOs</td>
<td>• Retail competition in state; dynamic policy environment; impacted by cold-weather events</td>
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<tr>
<td><strong>Turquoise</strong></td>
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<tr>
<td>• Outside organized markets</td>
<td></td>
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<tr>
<td>Tackling alignment of distribution and resource planning</td>
<td></td>
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<tr>
<td>• Anticipates range of energy policies; juggles urban vs. rural needs: long distances between load centers; transmission challenges</td>
<td></td>
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<tr>
<td><strong>Silver</strong></td>
<td></td>
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<tr>
<td>• Within organized markets</td>
<td></td>
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<tr>
<td>• Coastal state vulnerable to weather-related natural disasters; experiencing flat to declining load</td>
<td></td>
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<tr>
<td><strong>Amber</strong></td>
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<tr>
<td>• Outside organized markets</td>
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<tr>
<td>• State is facing increasing weather-related damages and costs; new transmission and generation siting requests coming in</td>
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</table>

16 states | 5 cohorts

NARUC-NASEO TASK FORCE ON COMPREHENSIVE ELECTRICITY PLANNING

NARUC
National Association of Regulatory Utility Commissioners

NASEO
National Association of State Energy Officials
Task Force Process

2 years | 4 workshops

Workshop 1
Identify key trends, articulate guiding principles, map status quo planning processes, begin identifying alignment needs

Workshop 2
Refine opportunities for planning process alignment with support from stakeholders and subject matter experts “Process Maps”

Workshop 3
Consider what it takes to operationalize idealized aligned planning processes “Roadmaps”

Workshop 4
Develop State Action Plans to build on the work of the Task Force

We are here
Examples of Guiding Principles: What the Cohorts Want to Accomplish

Guiding Principles for Planning Processes

- Let Public Interest Guide Approaches
- Facilitate Meaningful Stakeholder Engagement
- Use Consistent Assumptions Across Analytical Activities to Promote Data-Driven Results
- Holistically Identify & Consider Investment Options

Guiding Principles for Outcomes

- Preserve Safety, Reliability, & Affordability Foundation
- Promote Utility Financial Health
- Maximize Customer Value and Opportunity
- Increase System Efficiency
- Balance System Needs with Other Objectives
- Be Responsive to Changing Generation Mix
- Meet Evolving Public Policy Goals
- Ensure Resilient Critical Energy Infrastructure

NARUC-NASEO TASK FORCE ON COMPREHENSIVE ELECTRICITY PLANNING
Standard Building Blocks of Electricity System Planning

- Represent fundamental steps in system planning
- Use common language across cohorts while preserving diversity in approach
- Focus on analytic/technical steps: results (“what”) not methods/tools (“how”)
- See discussion draft and description of the building blocks in the online resource library at: www.naruc.org/taskforce/resources/
Illustrative Example of a Cohort Process Map

Building Blocks of Planning

- Establish Planning Assumptions
- Develop Load Forecasts
- Describe the Future Trajectory
- Identify System Needs
- Explore Solutions to Address Gaps
- Evaluate and Apply Criteria to Determine Preferred Solutions
- Finalize Solutions and Publish Plan
- Implement Solutions
Key Issues Being Addressed by Cohorts in Process Mapping Exercises

- Desire to clearly set expectations at outset for utilities, PUCs, SEOs, stakeholders about the process and what it is trying to accomplish.

- Identification of improved approaches for stakeholder engagement at critical steps in the planning process.

- Expanding on the fundamentals of distribution system planning to incorporate emerging methods (e.g., multi-scenario forecasting, hosting capacity analysis, non-wires alternatives, locational value).

- Encouraging cost-effective integration of DER by evaluating a range of solutions and procurement strategies to optimize grid investments and maximize value for customers.

- Coordination and syncing of data, assumptions and modeling scenarios to holistically consider grid needs and solutions across the entire system (generation, transmission, distribution).

- Acknowledging the contributions of energy efficiency as a resource, including impact of EE in forecast assumptions and solution identification.
Additional Issues Identified by Cohorts (not visible in process maps)

- How does rate design fit into aligned planning?
  - To what extent can innovations in rate design offer solutions for meeting grid needs, and how can that be reflected in aligned planning processes?

- What metrics should be used to factor resilience into aligned planning?
  - How is resilience best defined within the context of planning and what technical criteria or metrics should be applied to measure potential resilience benefits of investment options in an aligned planning process?

- How do we ensure equity and affordability in the transition being envisioned and articulated by new planning approaches?

- When will tools and models exist that can enable the types of holistic analysis that would allow for optimization of possible solutions across G, T, and D?

- Where should a state/utility draw the line between transparency and security when considering data access / data sharing?

- What kind of utility business models will support optimized investments in distribution, generation, and transmission assets?
Next Steps and New Resources

February 2021

• Release system planning process maps, roadmaps, and state action plans

www.naruc.org/taskforce/

New Resources

Online Resource Library

Task Force webinar slides and recordings

Profiles of Task Force participating states

Task Force press releases & articles
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November 20, 2019

NARUC Annual Meeting, San Antonio, Texas

From Energy Optimization to Aligned Outcomes

Carl Linvill, PhD, Principal
The Regulatory Assistance Project (RAP)®
Advanced Technologies Enable Decentralized Energy Optimization
From Grid-Integrated Buildings ...
... To Distribution and Bulk System Operations

Source: National Renewable Energy Laboratory
The Energy Optimization Problem is Framed in the Eye of the Beholder
From Optimizing Solar Plus Storage …

The figure shows the distribution of average monthly billing demand reductions across all building types, locations, solar sizes, and storage sizes. Each data point is the average percentage reduction, for a single load/solar/storage combination, across all months of the 17-year historical weather period.

To Optimizing Community Choices …

The Oakland Clean Energy Project

Source: East Bay Community Energy
... To Optimizing for Resilience

- Developer would construct, own, operate and maintain 16 MWs of solar power, energy storage, and microgrid components
- During normal ops, the developer sells power to the grid
- During contingency ops, the developer would provide islandable power for critical loads for min 7 – max 30 days
... To Optimizing Across Domains

Bulk System Guidelines
NERC, FERC
IEEE, ANSI, IEC
NESC

Technical and jurisdictional overlap

Distribution System Guidelines
IEEE 1547, PUC/PRC
IEEE, ANSI, IEC
NEC

Source: National Renewable Energy Laboratory
Effective Planning Establishes the Context for Aligning Decentralized Optimization
Effective planning creates a context where decentralized energy optimization choices can be consistent with grid-optimized outcomes.
About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org
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Session C3
PLANNING TOOLS

2019 NARUC Annual Meeting and Education Conference
Advances, Challenges, and Opportunities with Comprehensive Electricity Planning

Samir Succar

20 November 2019
What’s the value of transparency in distribution planning?
In the Context of Planning Analysis, We’re Talking About Three Things

**Inputs**
- Establish Planning Assumptions
- Develop Load Forecasts
- Describe the Future Trajectory

**Needs**
- Identify System Needs
- Explore Solutions to Address Gaps
- Evaluate and Apply Criteria to Determine Preferred Solutions

**Solutions**
- Finalize Solutions and Publish Plan
- Implement Solutions
Each addresses a different set of questions

- What is the current state?
- How will load and resources evolve?
Each addresses a different set of questions

- What is the current state?
- How will load and resources evolve?
- Where do we have gaps?
Each addresses a different set of questions

- What is the current state?
- How will load and resources evolve?
- Where do we have gaps?
- What solutions can meet these needs?
- Which solutions deliver the most value at the least cost?
Today’s Focus

<table>
<thead>
<tr>
<th>We are talking about…</th>
<th>We’re not focusing on…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software tools</td>
<td>Data availability, etc.</td>
</tr>
<tr>
<td>Utility tools</td>
<td>Other use cases</td>
</tr>
<tr>
<td>Distribution system analysis</td>
<td>Transmission, resource</td>
</tr>
<tr>
<td>Planning</td>
<td>Interconnection, protection, etc.</td>
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</table>
What tools exist to answer these questions?

Distribution / DER Analysis

EPRI StorageVET, NREL SAM, HOMER, NREL ReOPT, LBNL DER-CAM E3 DERAC, NREL PVWatts, PVSyst, NREL BLAST, IA LoadSEER, CPR WattPlan, NREL dGen, ICF Sightline, ESRI Network Analyst, Prosumer Grid, Kevala Network Assessor / Grid Assessor, Nexant Grid 360, CYME, Synergi, Milsoft Windmil, EDD DEW, GridLabD, EPRI OpenDSS, PowerFactory, EPRI DRIVE, Siemens PSS SINCAL, OpusOne GridOS
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Forecasting / Propensity
IA LoadSEER, CPR WattPlan, NREL dGen, ICF Sightline
How do these map to the building blocks?

- Establish Planning Assumption
- Develop Forecasts
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How is the picture evolving?

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A Few Observations Thus Far

- Transparency promotes better dialog
- Tools can support planners, developers, state energy offices and regulators
- Complexity does not always produce value
- Criteria should reflect objectives
- Evolving objectives require new approaches
  - Planning alignment
  - DER integration/utilization
  - Resilience
  - Capital efficiency
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