February 2021

CORAL COHORT ROADMAP

NARUC-NASEO TASK FORCE ON COMPREHENSIVE ELECTRICITY PLANNING

NARUC
National Association of Regulatory Utility Commissioners

NASEO
National Association of State Energy Officials

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Introduction

This roadmap document describes a vision for an ideal comprehensive electricity planning process created by the members of the NARUC-NASEO Task Force on Comprehensive Electricity Planning – Coral cohort.[1] This idealized planning process is viewed from the state perspective, specifically a collaboration between the public utility commission and state energy office. For the purposes of this roadmap, a comprehensive electricity planning process refers to the alignment or integration of distinct planning processes that, historically, have not significantly informed one another (i.e., resource, distribution, and transmission planning processes). This roadmap includes:

- A flowchart of the entire integrated or aligned planning process.
- Brief descriptions and explanations of each section of the flowchart.
- Points of evidence for innovative planning steps that appear in the vision.

The roadmap explains the ideal, integrated planning process one section at a time, including both procedural and analytical steps in the planning processes. Each section identifies the specific innovations developed by the Coral cohort, accompanied by a brief discussion of the rationale for these changes in comparison to the status quo of electricity system planning.

About Coral: A Fictional, Representative State

Structure	
Regulatory	**Our state's investor-owned utilities** are vertically integrated and own generation assets
Market	**Our state is located** within an RTO/ISO market
Planning Processes	**Our state is seeking to align** distribution, resource, and transmission planning processes

Additional Characteristics		
A few other characteristics you should know	• We are pragmatic, but take calculated risks • We are collaborative across our region • We are in two RTOs with ability to benefit from their experts and resources	
We are doing this because we want to accomplish	• Affordability/cost effectiveness • Core regulatory requirements • Leadership guided by public interest • Visibility into system needs • Holistic view of alternatives	• Continuous improvements • Adaptive to technology change • Risk mitigation • Access to data
While keeping in mind	• Market dynamics • Limitations on regulatory authority	• Potential for a theoretical federal policy • Improvements of planning and modeling tools
And trying to be responsive to	• Market developments and technology change • Customer engagement/customer preferences	• Political realities • Concerns over cost shifting • Concerns over evolving utility role

1 Cohorts are groups of Task Force members from three states, organized by similar market and regulatory structures. Members of each cohort worked as a team to define and support their fictional, representative state. Each cohort was given a color name.

The roadmap is intended to support states considering taking actions to increase the alignment of their own electricity system planning processes by providing:

- A high-level understanding of the sequence of steps included in an electricity planning process.
- Descriptions of the innovations introduced by the cohort and represented in the vision.
- Starting points for all states, particularly those with similar characteristics to the Coral cohort.

How to Read the Roadmap

The roadmap describes the substantive activities, specific milestones, regulatory actions, and other deliberate aspects of this cohort's vision that comprise an ideal planning process. It describes the necessary sequences, dependencies, and relationships among steps, actions, and information flows (e.g., where the outputs from one step are leveraged as inputs to the next step), depicted by arrows.

- The roadmap contains **guidance, resources, and examples** of emerging and promising approaches currently being implemented, which offer points of evidence for innovations that states and utilities have already incorporated into their efforts, demonstrating the feasibility of these approaches. In places where no guidance, resources, or examples are included, new efforts might be needed to enable or demonstrate an innovation's viability.
- The roadmap uses a **color key**—outlining each box in the flowchart—to allow for comparison with other Task Force cohort roadmaps. The colors align with eight generalized procedural and analytical planning categories that typically characterize electricity system planning processes. For further descriptions of these general categories, see the Task Force discussion document *Aligning Integrated Resource Planning and Distribution Planning – Standard Building Blocks of Electricity System Planning Processes*.[2]

The roadmap does not place planning steps on a timeline or calendar and does not indicate a responsible entity or actor for various steps because such details will necessarily vary across states.[3]

Guidance, resources, and examples are accompanied by this symbol:

Color key used in flowchart and vision summary:

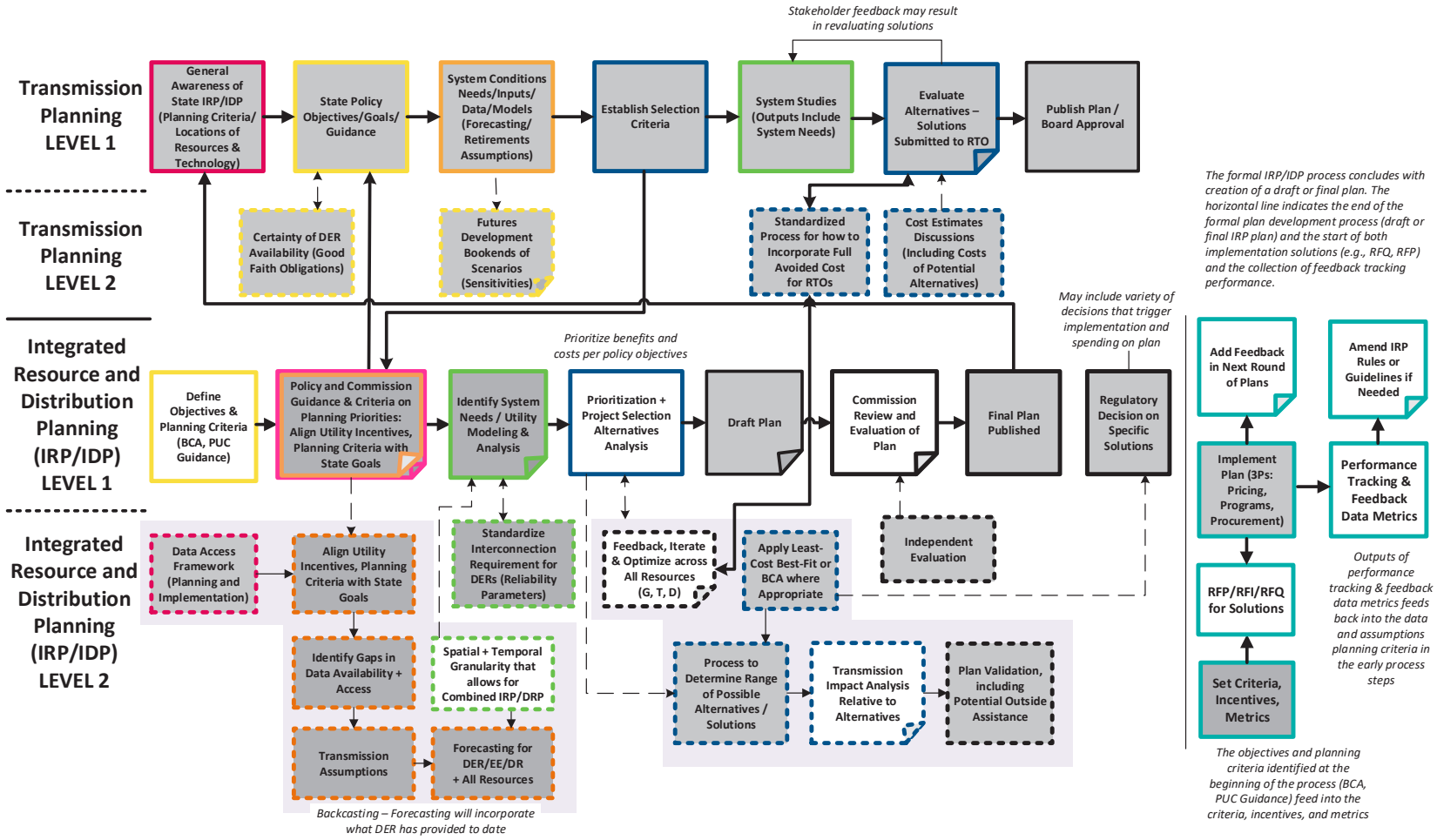
Planning Categories

- Establish Assumptions
- Develop Forecasts
- Objectives/Scenarios
- System Needs
- Identify Solutions
- Evaluate Solutions
- Finalize Plan
- Implement

2 Kristov, Lorenzo. "Aligning Integrated Resource Planning and Distribution Planning: Standard Building Blocks of Electricity System Planning Processes." Discussion Draft for NARUC-NASEO Task Force on Comprehensive Electricity Planning. July 2019.

3 While timing differences between processes are important, timelines were not broken out in order to reduce the number of complexities when mapping the relationships between the distribution, resources, and transmission processes.

Coral Cohort Flowchart of Idealized Comprehensive Electricity Planning Process



Key

Planning Categories

- Establish Assumptions
- Develop Forecasts
- Objectives/Scenarios
- System Needs
- Identify Solutions
- Evaluate Solutions
- Finalize Plan
- Implement

Process Steps

- Transmission Planning
- IRP/IDP Planning
- Touchpoints across planning processes
- Stakeholder Engagement
- Level 1 = Core transmission and IRP/IDP processes
- Level 2 = Additional detail for key steps in the core transmission and IRP/IDP processes
- IDP Level 2 Groupings
- Connections between Levels 1 and 2

Acronyms

BCA: Benefit-cost Analysis	G: Generation	RFQ: Request for Quote
D: Distrubted Energy Resources	IRP: Integrated Resource Planning	RTO: Regional Transmission Organization
DR: Demand Response	PUC: Public Utilities Commission	T: Transmission
EE: Energy Efficiency	RFI: Request for Information	
	RFP: Requst for Proposal	

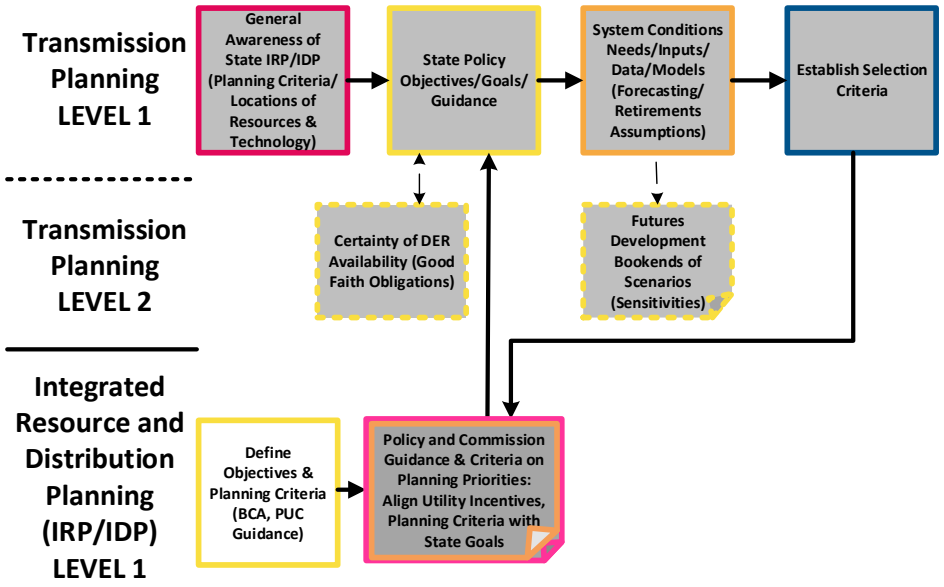
Coral Roadmap Features

The Coral cohort's vision seeks to align integrated resource and distribution planning (IRP/IDP), and transmission planning processes into a single process. The flowchart visually represents an aspirational and evolutionary approach to planning. Issues regarding how states choose to phase in the alignment of individual planning processes will be up to the individual jurisdictions. Put another way, comprehensive planning alignment may require a "crawl, walk, run" approach due to complexities and state-specific requirements intrinsic to each of the planning processes.

Level 1 in the flowchart (for both IRP/IDP and transmission) is the "big picture." The lines between process steps, and between IRP/IDP and transmission, represent contextual details designed to showcase depth within a single process. Level 2 provides more details for most key steps in Level 1 (both IRP/IDP and transmission).

The Coral cohort envisioned several innovative steps that represent a departure from traditional planning practices. These innovations include:

- **Stakeholder engagement.** Stakeholders are engaged at multiple points in the process, not merely at the end of the IRP/IDP and transmission processes when draft plans are filed by utility planners either at the Commission or the Regional Transmission Organization (RTO). Where stakeholder input is suggested, the corner of the box is flipped over.
- **Linkages between IRP/IDP and transmission plans.** Utility planners identify system needs for transmission based on pre-defined criteria (e.g., reliability, public policy, economics). By incorporating IRP/IDP planning priorities (e.g., investment needs, interconnection processes, resource value) into transmission system studies, utilities are better able to incorporate distributed energy resources (DERs) solutions.
- **Feedback loops.** Where possible, DER market data are used to inform future plans. Implementation of the IRP/IDP plan includes issuance of a request for proposal (RFP) (second to last box, IRP/IDP). RFP project data are received and, where possible, integrated back into Step 1 (Define Objectives and Planning Criteria, or Box 1 IRP/IDP) to inform future IRP/IDP plans.



Define Objectives and Planning Criteria

The IRP/IDP and transmission processes both begin with the establishment of objectives and planning criteria. Objectives are based on assumptions around state policy and Commission guidance, whereas criteria, goals, planning priorities, and state guidance describe the future trajectory.

IRP/IDP Planning Objectives (state policy) and Planning Criteria (standards to evaluate solutions) are aligned. A Benefits-Cost Analysis (BCA) Framework is developed, and Public Utilities Commission (PUC or Commission) guidance is issued, if needed.

The objectives and planning criteria in IRP/IDP Level 1 link to **policy and Commission guidance**, including **alignment of utility incentives and planning criteria with state goals**. This step also describes integration of policy goals or milestones that may or may not be achievable through existing plans, such as a state goal of 50% renewables by 2050. A planning assumption could be capacity needs at key points in the system or where retirements or new infrastructure deployments are identified.

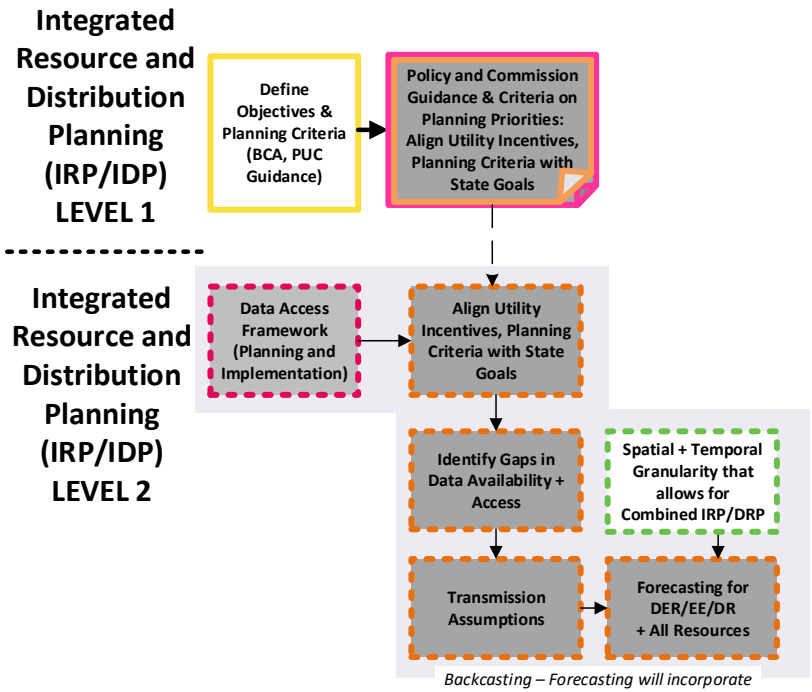
This initial set of steps is an example of several touchpoints between the IRP/IDP and transmission processes. The policy and Commission guidance and criteria for IRP/IDP are aligned with the state policy objectives, goals, and guidance at the transmission level. These IRP/IDP objectives also are informed by the **selection criteria** established for the transmission system (Transmission, Level 2, blue box).

To develop transmission selection criteria, planners start with a general awareness of system conditions, needs, and state policy goals to develop forecasts. Here, the IRP/IDP plan (which is, in turn, informed by state policy goals and criteria) can serve as an input. At this step, the **forecasting of load and retirements** is completed, which informs the development of sensitivities (bookend scenarios). Alternative forecasts also serve as useful inputs to help inform the selection of alternatives.

IRP/IDP Level 2 provides additional details about the **load and DER forecasts** that are informed by the outputs from use of the **data access framework**. It is important to define the **data access framework** upfront so that when modeling occurs, there are clear protocols in place for sharing information (e.g., assumptions, outputs) with stakeholders. A data access framework will ideally include data specification, scope, and access rules (including liability).

As seen in the dotted orange boxes, once data access framework protocols are clear, utility planners can better ensure that **utility incentives and planning criteria are aligned with state goals and can identify gaps in data (availability and access)**. Ideally, transmission assumptions (reliability requirements, system needs) will be known and communicated between processes at this step. This means sorting out what information is needed as model inputs and how such information will feed into **forecasting for all resources**, including DER, energy efficiency, and demand response. Forecasting incorporates what DER has provided to date.

The results of the combined planning processes will feed back into these initial high-level key planning steps that guide the next planning cycle.



These initial steps for both IRP/IDP and transmission processes provide the high-level groundwork to define the future trajectory/state guidance upon which all decisions are based as the policies, cost frameworks, and forecasts feed into the rest of the planning cycle. Stakeholders are involved at this early stage to ensure that their input is incorporated and parties are all aligned on the plans for moving forward to ensure a successful planning process.

Existing Guidance, Resources, and Examples

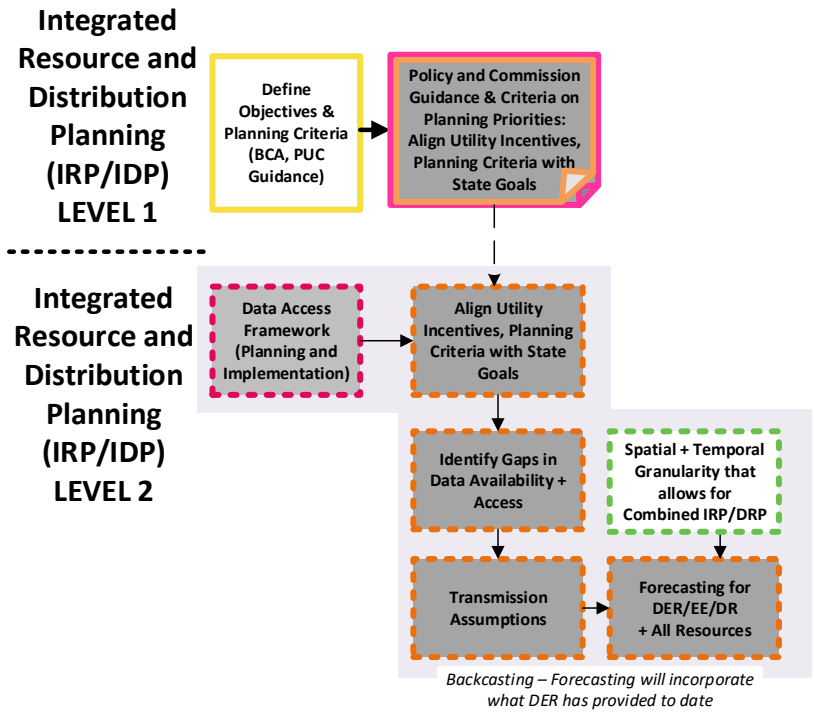
- **Streamlining planning objectives.** Hawaiian Electric Company's (HECO) Integrated Grid Planning Process. Planning Hawaii's Grid for Future Generations: Integrated Grid Planning Report. March 1, 2018.
- **Stakeholder involvement.** D.C. Public Service Commission. DC MEDSIS Stakeholder Working Group Report. Prepared by Smart Electric Power Alliance. May 31, 2019.
- **Stakeholder involvement and data access framework.** GridLab. Integrated Distribution Planning: A Path Forward. April 2019. pp. 17–18. (See the discussion regarding the data portal to securely share information and data.)
- **Key Commission decisions regarding an IRP/IDP proceeding; stakeholder involvement.** Mid-Atlantic Distributed Resources Initiative. Integrated Distribution Planning for Electric Utilities: Guidance for Public Utility Commissions. October 2019. pp. 6–9, 421.
- **Integrated planning coordination.** Electric Power Research Institute. Developing a Framework for Integrated Energy Network Planning (IEN-P). July 2018.
- **Planning objectives and criteria.** NARUC-NASEO Task Force on Comprehensive Electricity Planning. Planning Criteria Metrics for Distribution System Planning. September 25, 2019. Webinar slides and recording.

Spatial and Temporal Granularity in Planning Processes

The two distinct processes of resource planning and distribution planning are combined into one IRP/IDP process that covers both levels of the system. Because the IRP and distribution planning are combined in the IRP/IDP process, it is important to think about what information from the IRP needs to be part of the IRP/IDP, and vice versa.

Because there are typically different planning cycle time periods for IRP and IRP/IDP, **spatial and temporal granularity** needs to be considered from both planning perspectives, including:

- **Spatial.** At the resource level (IRP), planners may look at overall capacity needs, including locations where traditional investment is needed on the system, while IRP/IDP utility planners look at the distribution level and focus on work being done at the circuit level (e.g., load patterns, shaving peak load or consideration of non-wires alternatives to reduce usage). Depending on where the need is, solutions may be applicable to a specific geographic area.
- **Temporal.** The timing for investments or awareness of timing and locations for investments needs to be considered (e.g., new distribution investments or non-wires alternatives). It includes prioritizing when to make system upgrades through needs assessments that are spatially and temporally differentiated.



This spatial and temporal granularity feeds into the **load and DER forecasting**. System issues that need to be addressed are identified through forecasting or in-depth analysis, and then later, planners can explore solutions (e.g., resources) to address the gaps. For example, there may be a specific circuit on the distribution system that forecasting predicts will become overloaded in X number of years. It is important to note that this step is looking at inputs to address gaps resulting from forecasts.

For transmission, the **Establish Selection Criteria and System Studies** steps (blue and green boxes, respectively) represent a linkage: Utility planners identify system needs for transmission based on defined criteria (e.g., reliability, public policy, economics). The outputs from System Studies, which are typically defined as reliability and economic studies, inform planning on the needs of the systems. By using IRP/IDP planning priorities (e.g., investment needs, interconnection processes, resource value) as inputs to transmission system studies, utilities may be better able to incorporate DER solutions. Stakeholder feedback is an important part of this process linkage as it can help inform the utility's preferred solutions, which are added to systems studies for submission to the RTO.

Existing Guidance, Resources, and Examples

- **Spatial granularity for DERs.** Modern Distribution Grid. U.S. Department of Energy. Modern Distribution Grid, Volume III: Decision Guide. Updated 2019. pp. 47–49.
- **Locational net benefits analysis.** Integrated Distribution Planning. ICF. Integrated Distribution Planning. U.S. Department of Energy, Office of Electricity Delivery and Energy Reliability, prepared for the Minnesota Public Utilities Commission. August 2016. pp. 16–18.

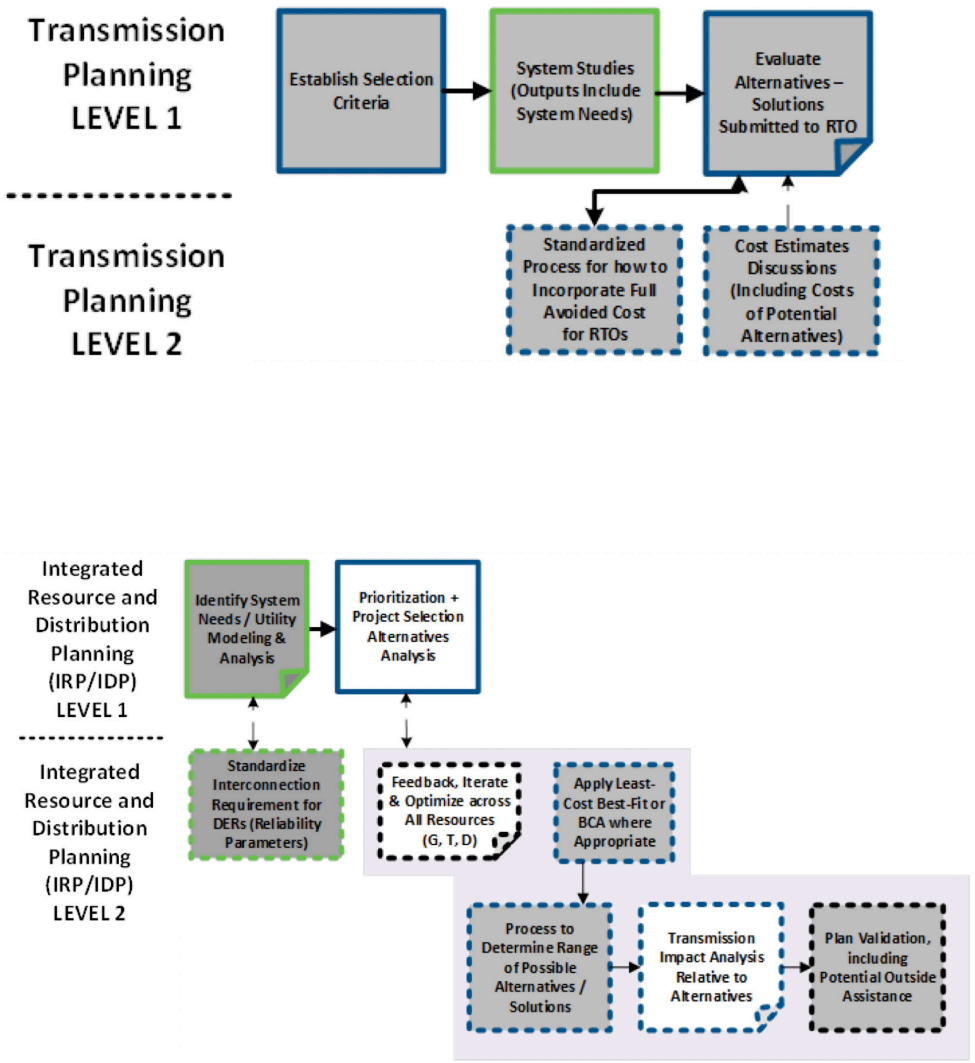
System Needs, Selection Criteria, and Solutions

Taking into consideration state policies, objectives, and forecasting outputs, system studies conducted by an RTO are used to define system needs as part of both the transmission and IRP/IDP planning processes. Once the system needs have been identified and selection criteria have been established, it is time to evaluate the alternatives and select the preferred solutions.

On the transmission system, alternatives are evaluated based on system studies, which, as noted earlier, help planners understand the needs of the system. Discussions on cost estimates impact which solutions are preferred. Based on stakeholder feedback, system studies may need to be revised, resulting in the evaluation of alternatives. On the distribution system, system needs are identified through modeling, which leads to Prioritization, Alternatives Analysis, and Project Selection. This step involves looking at potential non-wires solutions and the potential for DER aggregations to meet thermal voltage needs. A Least-Cost Best-Fit or BCA is applied to the process to determine the range of possible solutions. Both may be necessary.

Stakeholder feedback on system needs is encouraged in both IRP/IDP and the transmission processes:

- For IRP/IDP, **feedback** ensures that planners can **iterate and optimize across the generation,** transmission, and distribution processes (G, T, and D). The gray box in IRP/IDP Level 2 (no color) includes a flipped corner to indicate the need for stakeholder engagement. It is important to ensure consistency of stakeholder participation; having the same parties involved in both efforts will allow for needed cross-walks between processes. This box is an input to the box Prioritization and Project Selection.
- For transmission processes, future scenarios serve as the alternatives analysis (dotted boxes, IRP/IDP Level 2 in the flowchart just above).
- This is the final stage of planning and analysis before the plans are drafted and developed



Existing Guidance, Resources, and Examples

- **Benefit-cost analysis.** BCA for Utility-Facing Grid Modernization Investments. Woolf, Tim. Benefit-Cost Analysis for Utility-Facing Grid Modernization Investments. Synapse Energy Economics. March 7–8, 2019. Presentation.
- **Identifying system needs and sourcing solutions.** Non-Wires Alternatives Identification and Sourcing Process and Notification Practices. Joint Utilities of New York. Supplemental Information on the Non-Wires Alternatives Identification and Sourcing Process and Notification Practices. Filed with the New York Public Service Commission on May 8, 2017.
- **Cost-effectiveness.** Modern Distribution Grid. U.S. Department of Energy. Modern Distribution Grid, Volume III: Decision Guide. Updated 2019. pp. 38–44.
- **Needs assessment and evaluation; stakeholder involvement.** California Public Utilities Commission. Decision on Track 3 Policy Issues, Sub-Track 1 (Growth Scenarios) and Sub-Track 3 (Distribution Investment and Deferral Process). Decision 18-02-004, February 8, 2018.
- **Integration of DERs.** Dyson, Mark, et al. The Non-Wires Solutions Implementation Playbook: A Practical Guide for Regulators, Utilities, and Developers. Rocky Mountain Institute. December 2018.
- **System needs assessment.** National Efficiency Screening Project (NESP). The National Standard Practice Manual for Distributed Energy Resources (NSPM for DERs). NESP, August 2020.

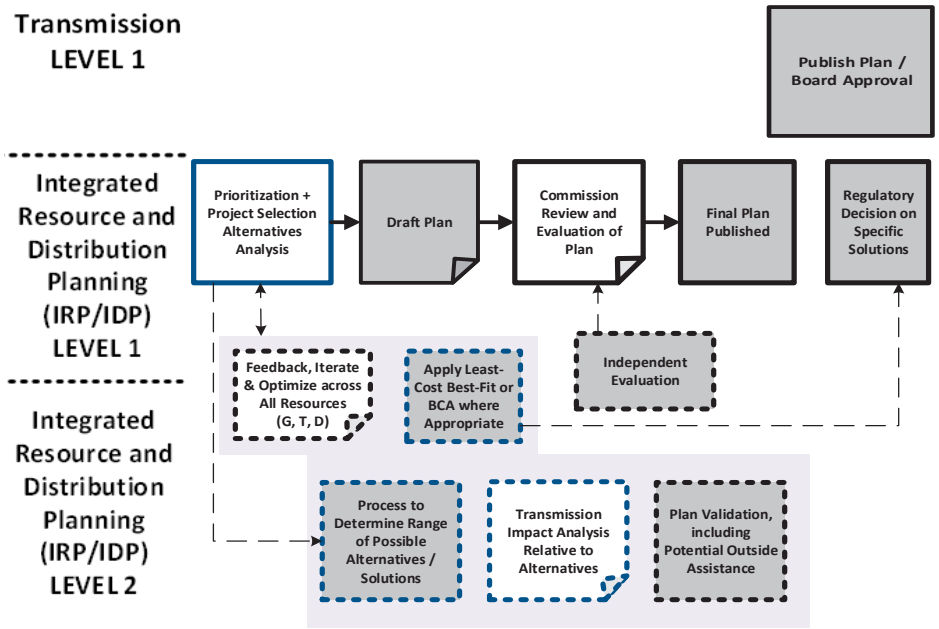
Plan Development

Once the solutions have been evaluated and selected, **plans are drafted**. Stakeholder input is important at this point as the Commission reviews and evaluates the plans.

An **independent, third-party evaluation** may be requested to help inform the Commission's evaluation of the IRP/IDP Plan before it is ultimately finalized and published.

The results of the **Least-Cost Best-Fit or BCA** impact the **Regulatory Decision on Specific Solutions**, which may include a variety of decisions that trigger implementation and spending on the **Final Plan** that is published.

In the flowchart, feedback loops illustrate how the results of the filed plans feed into the next cycles of the planning processes. As noted, the **Final Plan** itself serves as an input to system studies, which are used to develop the transmission plan (set of approved projects).



Existing Guidance, Resources, and Examples

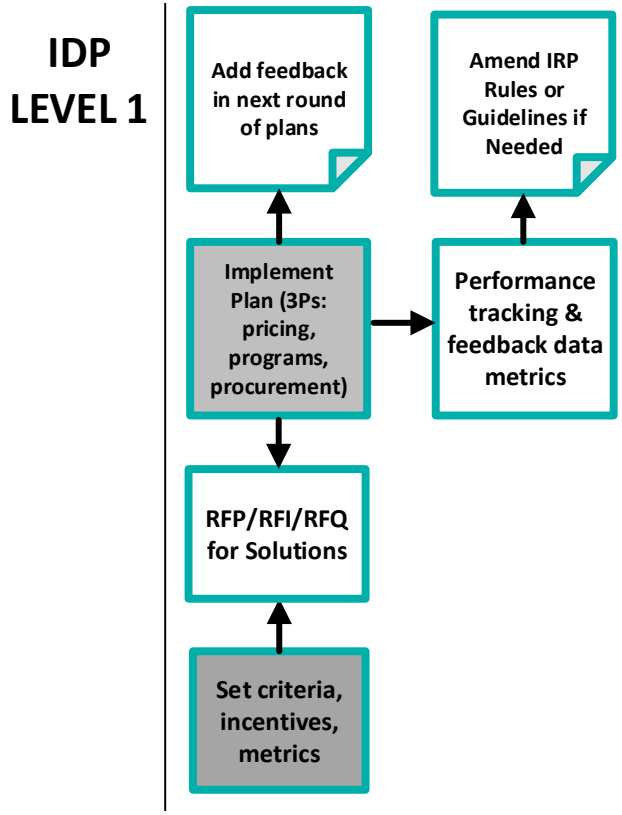
- **Action plans.** Mid-Atlantic Distributed Resources Initiative. Integrated Distribution Planning for Electric Utilities: Guidance for Public Utility Commissions. October 2019. p. 42.
- **Stakeholder engagement.** GridLab. Integrated Distribution Planning: A Path Forward. April 2019.
- **Stakeholder engagement.** HECO's Integrated Grid Planning. Stakeholder Engagement.
- **Stakeholder engagement.** D.C. Public Service Commission Stakeholder Process. DC MEDSIS Stakeholder Working Group Report. Prepared by Smart Electric Power Alliance. May 31, 2019.

Implementation and Performance Tracking

The formal IRP/IDP process concludes with creation of a draft or final plan. The vertical line in the flowchart indicates the publication of the plan, the end of the formal plan development process, and the start of implementation and performance tracking.

After the plan is published, it is time to **implement the plan** and assess the costs through the "three Ps": pricing, programs, and procurement. The **RFP/request for information/ request for quotations** ideally provide insight on market alternatives that can inform the cost of implementation. As such, they may reflect some or all of the objectives and planning criteria, including utility incentives and policy goals, identified at the beginning of the process (see **PUC Guidance and BCA**).

Once implementation is underway, **performance tracking and feedback data metrics** are collected and used to inform both the **modeling and the assumptions planning criteria** in the early process steps of the next planning cycles.



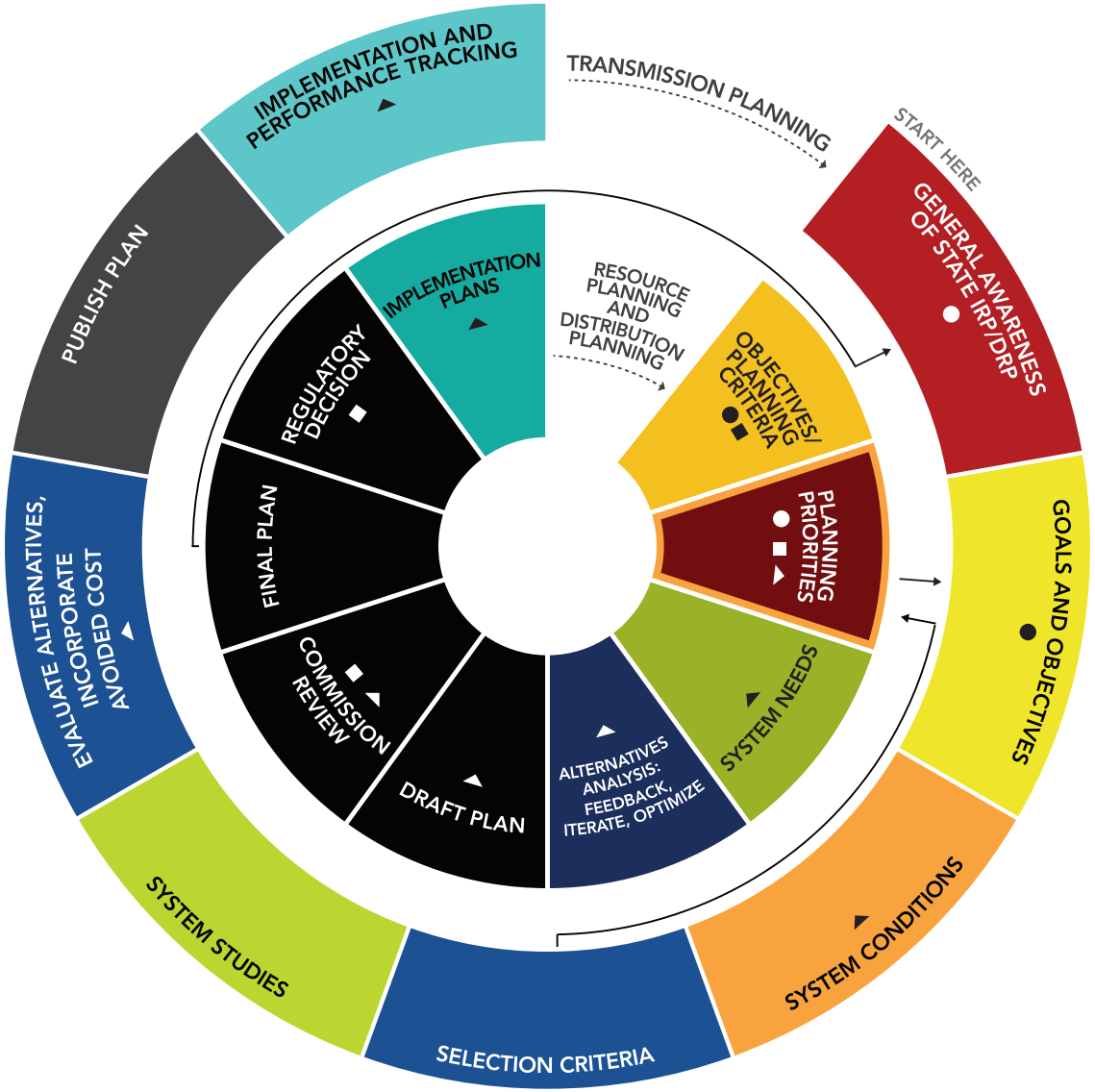
Existing Guidance, Resources, and Examples

- **Sourcing solutions; input into future planning cycles.** Schwartz, Lisa. Overview of Integrated Distribution Planning Concepts and State Activity. Mid-Atlantic Distributed Resources Initiative. March 13, 2018. pp. 11, 23–31. Presentation.
- **Performance tracking to evaluate plan implementation.** HECO's Integrated Grid Planning Process. Planning Hawaii's Grid for Future Generations: Integrated Grid Planning Report. March 1, 2018. p. 15.
- **Screening, solicitation, evaluation, and contracting considerations.** Non-Wires Solutions Implementation. Dyson, Mark, et al. The Non-Wires Solutions Implementation Playbook: A Practical Guide for Regulators, Utilities, and Developers. Rocky Mountain Institute. December 2018. pp. 52–70.
- **Sourcing non-utility and utility alternatives.** Integrated Distribution Planning. ICF. Integrated Distribution Planning. U.S. Department of Energy, Office of Electricity Delivery and Energy Reliability. Prepared for the Minnesota Public Utilities Commission. August 2016. pp. 18–19.
- **Sourcing mechanisms.** ICF. Procuring Distribution Non-Wires Alternatives: Practical Lessons from the Bleeding Edge. July 2017.

Vision Summary

This circular diagram is a representation of the Coral cohort's vision for aligned electricity planning, highlighting the vision and emphasizing the touchpoints and opportunities for greater alignment of electricity planning processes. The diagram serves two purposes: it is the executive summary of the cohort's roadmap and is designed in a way to facilitate comparison with other cohorts' visions.

To structure their roadmap, the cohort relied on eight foundational categories of planning, indicated by the color of each step. The sequence of the categories in this diagram is specific to the Coral cohort vision for aligned planning.



- Describe the Future Trajectory
- Develop Forecasts
- Establish Planning Assumptions
- Evaluate and Apply Criteria to Determine Preferred Solutions
- Finalize Solutions, Approve and Publish Plan
- Identify System Needs
- Implement
- Integrated Process Steps

- State Policy Inputs to Planning
- State Regulatory Role in Planning
- Stakeholder Engagement

The Coral diagram shows two concentric rings that represent three planning processes: distribution, resource, and transmission planning. The Coral diagram envisions all nine planning steps represented in the inner circle as integrating both distribution and resource planning.

Where the black arrows connect one step to another between the concentric circles, the Coral cohort envisions information flowing between the combined distribution and resource planning step and the transmission planning step for:

- Allowing goals and objectives to inform planning priorities
- Having the final plan of the distribution planning and resource planning process provide input into the start of the transmission planning cycle

This roadmap document explains the Coral cohort vision in greater detail, expanding upon the visual summary diagram to include a flowchart of the entire integrated or aligned planning process, brief descriptions and explanations of each section of the flowchart, and points of evidence for innovative planning steps that appear in the vision.

NARUC-NASEO Task Force on Comprehensive Electricity Planning Resources Available

Through the Task Force on Comprehensive Electricity Planning, Task Force members, NARUC and NASEO staff, technical and subject matter experts, and others have developed a robust set of resources to support state decision makers in advancing aligned electricity system planning processes. Task Force materials are now available on the Task Force website: www.naruc.org/taskforce.

Task Force Resources

- Factsheet provides a synopsis of the Task Force goals, members, and resources.
- Blueprint for State Action supports states seeking to further align electricity system planning processes in ways that meet their own goals and objectives. The Blueprint provides a step-by-step approach for states to develop and implement a plan or series of actions to better align planning processes, based on the experience of Task Force member states.
- Task Force Cohort Roadmaps describe five distinct visions for an ideal comprehensive electricity planning process created by Task Force members. The process is viewed from the state perspective on how to align or integrate distinct planning processes that, historically, have not significantly informed one another. Each roadmap explains one vision for aligned planning, including both procedural and analytical steps, alongside points of evidence for innovative approaches that appear in the vision.
- Opportunities to Improve Analytical Capabilities towards Comprehensive Electricity System Planning outlines potential data, tools, and methods for conducting integrated analyses across key points in electricity planning processes that could help achieve the visions of the Task Force. This scoping study will be used to conduct a gap analysis and develop a research agenda for approaches and capabilities in areas such as load forecasting, solution evaluation, and system optimization within planning.
- Standard Building Blocks of Electricity System Planning Processes shares information about the color-coded framework cohorts used to describe their vision for aligned planning processes in consistent terms.
- Comprehensive Electricity Planning Library enables further learning about important issues related to comprehensive electricity planning by linking to existing publications and webinars. The library is organized across 15 key topical areas.
- Member State Summary Information includes a 2018 snapshot of each of the 15 member state's electricity system profile, organizational responsibilities, policy goals, and existing planning processes.

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About NARUC

NARUC is a non-profit organization founded in 1889 whose members include the governmental agencies that are engaged in the regulation of utilities and carriers in the fifty states, the District of Columbia, Puerto Rico and the Virgin Islands. NARUC's member agencies regulate telecommunications, energy, and water utilities. NARUC represents the interests of state public utility commissions before the three branches of the federal government. www.naruc.org.

About NASEO

NASEO is the only national non-profit association for the governor-designated State Energy Directors and the over 3,000 staff of their offices from each of the 56 states and territories. Formed by the states in 1986, NASEO facilitates peer learning among state energy officials, serves as a resource for and about state energy policy, and advocates the interests of the state energy offices to Congress and federal agencies. www.naseo.org.

NARUC-NASEO Task Force on Comprehensive Electricity Planning