State and Local Climate and Energy Program

State Energy and Environment Guide to Action:

Electricity Resource Planning and Procurement

2022

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Preface and Acknowledgments

The U.S. Environmental Protection Agency (EPA) *State Energy and Environment Guide to Action* offers real-world best practices to help states design and implement policies that reduce emissions associated with electricity generation and energy consumption. First published in 2006 and then updated in 2015, the *Guide* is a longstanding EPA resource designed to help state officials draw insights from other states' policy innovations and implementation experiences to help meet their own state's climate, environment, energy, and equity goals.

As part of the 2022 update, each chapter reflects significant state regulatory and policy developments since the 2015 publication. *Guide* chapters provide descriptions and definitions of each featured policy; explain how the policy delivers energy, climate, health, and equity benefits; highlight how states have approached key design and implementation issues; and share best practices based on state experiences.

Unlike earlier *Guide* editions, which were released as a complete set of chapters comprising a single document, the 2022 update is being released in phases of collected chapters. This chapter is one of seven addressing state-level utility policies that support clean energy and energy efficiency:

- Overview of Electric Utility Polices
- Electricity Resource Planning and Procurement
- Electric Utility Regulatory Frameworks and Financial Incentives
- Interconnection and Net Metering
- Customer Rates and Data Access
- Maximizing Grid Investments
- Energy Efficiency Programs and Resource Standards

Guide chapters are available online on the *Guide to Action* webpage.

All *Guide* chapters were developed by the Climate Protection Partnership Division's State and Local Climate and Energy Program within EPA's Office of Atmospheric Programs. Phil Assmus managed the overall update of the *Guide* and provided content and editorial support for all chapters. David Tancabel served as the chapter lead for six utility policy chapters, and Cassandra Kubes led a crosscutting effort to address equity issues across all *Guide* chapters. Maggie Molina provided technical review and editorial support across all chapters and led the development of the energy efficiency chapter. We thank additional EPA staff, namely Erica Bollerud, Joe Bryson, Beth Conlin, James Critchfield, Risa Edelman, Maureen McNamara, and Neeharika Naik-Dhungel, who provided guidance for one or more chapter's initial development, early draft review, or final content.

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Policy Description and Benefits

Summary

Most states require utilities to engage in electricity resource planning to substantiate that the utility's plans for meeting demand for electricity services are in the public interest. Planning varies greatly by state but is typically accomplished through processes set by the state utility regulator, often called a public utility commission (PUC), through a docketed proceeding with public involvement. Plans consider future customer needs, available resources to meet those needs, costs, benefits, and risks over the long term. The planning processes provide stakeholders a forum to submit feedback on resource options and offer states an opportunity to accelerate progress towards environmental, social, and economic goals (LBNL and E3 2016).

> Electricity resource planning includes the review of current and future resource options for meeting customer demand for electricity services under a range of scenarios. In addition to supply-side, demand-side, and transmission and distribution system resources, states can require utilities to consider environmental and social factors, incorporate input from communities and stakeholders, and align planning and procurement processes with state policy priorities.

Many states are updating utility planning and procurement requirements to address broader state priorities, such as climate change mitigation, energy equity, and grid resilience and modernization, while ensuring electricity is universally supplied at a just and reasonable rate. As part of electricity resource planning, utilities consider supply- and demand-side resource options for meeting customer demand for electricity services under a range of scenarios. Resource planning is becoming increasingly complex, requiring analysis of state policies on electrification and clean energy as well as the interplay of variable generation and the time and location valuation of demand-side resources such as energy efficiency, demand response, and energy storage. Utility planning models include integrated resource planning or integrated resource plans (IRP), discrete resource approvals, default service, and other medium- to long-term procurement planning processes.

This chapter identifies electricity resource planning pathways that states are using to achieve environmental and equity goals, primarily through the incorporation of supply- and demand-side clean generation resources like renewables and energy efficiency. The chapter focuses on IRP but also discusses discrete resource approvals (such as through Certificate of Public Convenience and Necessity or CPCN), default service (also known as Standard Offer Service), and long-term procurement plans, which may be complementary policies and processes many states use in combination with IRP. The chapter describes state requirements to consider or procure certain types of resources, such as non-wire alternatives, all cost-effective energy efficiency, all-source request for proposal (RFP), and storage procurement requirements. In addition, the chapter discusses how resource planning and procurement are influenced by, and require analysis of, other clean energy policies such as a state energy efficiency resource standard (EERS) and renewable portfolio standard (RPS), which are covered elsewhere in this *Guide to Action*.[1]

[1] The Taskforce on Comprehensive Electricity Planning, facilitated by the National Association of Regulatory Utility Commissioners (NARUC) and the National Association of State Energy Officials (NASEO), has technical resources to support state decision makers in advancing electricity system planning processes.

The following are several examples of actions states use to realize the benefits of electricity resource planning:

- Conduct rigorous and meaningful engagement with diverse stakeholders including consumer advocates, environmental organizations, and groups representing communities with environmental justice concerns and communities that may be affected by utility resource decisions.
- Ensure equal consideration of supply and demand-side resources.
- Develop and vet key analysis factors and their underlying assumptions, such as demand forecasts, commodity price forecasts, benefits analysis, and cost and viability of commercially available resource options.
- Articulate short-term (two to five year) action plans based on longer-term plans that allow utilities to be agile in meeting resource needs.
- Evaluate, track, and transparently document plan impacts on customers, and incorporate lessons learned into future resource and procurement plans.

The State Examples section of this chapter provides detailed information about the policy approaches used in Colorado, Nevada, South Carolina, and Washington.

Benefits

Electricity resource planning and procurement policies that incorporate opportunities for clean generation and demand-side resources can provide substantial electricity system benefits, environmental and health benefits, and progress toward equity. For example, in 2019, a Kansas study of the value of state-regulated IRP processes identified several potential benefits, including capital investment deferment, distributed energy resource integration, energy efficiency integration, progress toward state level policy objectives, and added transparency (AECOM 2020). This section expands on many of these benefits of resource planning and identifies tools to quantify and communicate the benefits.

Electricity System Benefits

Inclusive and comprehensive resource planning and procurement policies can have a major effect on the electricity system. Electricity resource planning and procurement policies can lead to an increased share of clean energy supply in a utility's portfolio and greater investment in technologies and programs that reduce peak demand. Planning and procurement policies that accelerate adoption of distributed energy resources (DERs) and reduce peak demand can contribute to electricity system and customer benefits such as increased resilience and system-wide cost savings. DERs are electric generation, energy efficiency, demand response, or energy storage systems located on the distribution system, typically close to load, used individually or aggregated to provide more value. Policies can support greater investment in energy efficiency and other DER programs, which contribute to capital investment deferment by reducing demand for centralized fossil fuel power generation, new generation capacity, and upgrades to transmission and distribution infrastructure. In addition, resource planning that helps drive greater investment in flexible grid resources can result in grid management benefits. Capital investment deferment and improved grid management ultimately benefit utility customers.

In the short term, resource planning that results in increased DERs can help reduce wholesale electricity market prices and capacity market prices (NESP 2020). In the long term, resource planning that results in increased DERs can improve real-time grid management capabilities and reduce capital costs for grid infrastructure. Specifically, some DER technologies help grid operators balance supply and demand in real time (AEE 2018). In this way, to the extent DERs can meet capacity needs, DERs can reduce the need for large-scale investment in new fossil fuel power generation and therefore benefit customers through reduced costs (NARUC 2016). Additionally, plans with diverse portfolios of resources including utility-scale renewables and DERs can help utilities mitigate the risk of fuel price volatility. Approved IRPs that promote clean energy including DERs also convey that utility regulators may allow the recovery of costs from investing in these technologies.[2] Increasing the penetration of a diverse portfolio of low- or no-emission resources may reduce the cost and risks for the utility and its customers, as well as amplify the benefits of compliance with existing and future environmental regulations.

Environmental and Health Benefits

Electricity resource planning and procurement policies that lead to an increased share of clean energy supply, including utility-scale renewables and energy storage, combined heat and power projects, and clean DERs, result in environmental and health benefits. Planning policies that increase the share of clean generating resources or lead to energy and peak demand reduction can significantly and cost-effectively reduce the negative impacts of the electricity system like air and water pollution, land use, associated environmental compliance costs, wildlife impacts of utility scale renewables, and toxic materials generated from fossil fuel production and energy technology manufacturing. Many of the power system's environmental impacts are regulated by state, local and federal law and have significant legal and financial implications for generators.

Some of the environmental effects of fossil-fired power generation can harm human health, particularly if they result in people being exposed to pollutants in air, water, or soil. These environmental effects, which vary depending on how and where the electricity is generated and delivered, can include:

- Emissions of greenhouse gases and other air pollutants, especially from fuel combustion;
- Use of water resources to produce electricity or steam, provide cooling, and serve other functions;
- Discharges of pollution into water bodies, including thermal pollution;
- Generation of solid waste, which may include hazardous waste;
- Land use for fuel production, power generation, and transmission and distribution lines; and
- Effects on plants, animals, and ecosystems that result from the air, water, waste, and land impacts described in this chapter.

Electricity resource planning that increases energy efficiency and reduces fossil-fired power generation can enhance public health by reducing incidences of premature death, asthma attacks, and respiratory and heart disease; avoiding related health costs; and reducing the number of missed school and workdays due to illnesses (Abel et al. 2019).

Equity Benefits

Resource planning and procurement policies that promote clean and distributed resources have the potential to reduce pollution in communities with environmental justice concerns where traditional fossil fuel power plants tend to be located,[3] pollution rates can be higher, energy burdens can be greater, and where efficiency programs have had lower levels of implementation (NAACP 2017). State resource planning and procurement

[2] Cost recovery is determined in separate proceedings where the utility must demonstrate that its investment decisions are prudent and in the public interest.

[3] EPA's Power Plants and Neighboring Communities Mapping Tool uses power plant data and demographic information from EPA's EJScreen allowing users to review plant location, carbon dioxide, nitrogen oxides, sulfur dioxide, and particulate matter emissions with community indicators.

decisions can produce equity benefits in different ways, such as by reducing low-income energy burdens and accelerating closure of high-polluting plants near communities that experience disparate health impacts.

Resource planning policies can also help minimize the financial burden of electricity bills for lowest-income customers. This can be achieved when states direct utilities to integrate clean energy, such as cost-effective energy efficiency or community solar, into resource planning. When plans are executed, utilities can design and fund such programs to reach low-income households. Resource plans that prioritize load management strategies such as demand response and energy efficiency can help to reduce energy burdens and enhance household and community resilience. Energy efficiency is an important tool to support equity in electricity bill impacts (refer to the Energy Efficiency Programs and Resource Standards chapter in the *Guide*).

In another approach, resource planning and procurement policies can direct utilities to analyze the electricity system's immediate and cumulative impacts to communities with environmental justice concerns. Several states have passed laws and regulations (e.g., California's Community Air Protection Program) to address air pollution disparities among communities and the disparate health impacts on those communities (CPUC 2019).

In some states, legislation may be required to incorporate additional factors to electricity resource decision-making to go beyond least-cost decision-making to promote equity. For example, Oregon requires differential rates for low-income households to reduce energy burden (OR H.B. 2475 2021). In some states, utility regulators may have existing authority to promote equity through their rulemakings.

Quantifying and Communicating the Benefits

Environmental regulators, state energy office officials, and utility regulators can all participate in discussions about the needs of the electricity grid and how resource planning driven by public policy can reduce negative impacts of the grid. To support these discussions and help states and stakeholders analyze and quantify the environmental impacts and health benefits of energy efficiency, renewable energy, and other forms of clean and distributed energy, EPA has a range of tools highlighted in the text box. For example, using tools such as EPA's AVoided Emissions and geneRation Tool (AVERT), Co-Benefit Risk Assessment (COBRA), Health Benefits Per Kilowatt-Hour (BPK), and Energy Savings and Impacts Scenario Tool (ESIST), state air agency staff can share information with energy and utility regulator colleagues on how efficiency and demand response can lower costs and environmental impacts and assist in meeting each jurisdiction's air quality goals.

Other state agencies can also use EPA tools to evaluate aspects of electric resource procurements relative to each agency's purview. State air agencies can use these tools to highlight now procurement of clean energy or demand response during peak hours can assist in lowering pollutants such as ozone or particulate matter on days when these pollutant levels may be high and endangering public health. State energy offices can use ESIST to demonstrate how these processes can be used to meet state energy burden and equity goals. Likewise, environmental regulators can inform benefit-cost assessments for their programs to better ensure power generation can be leveraged to improve targeted DER programs to address community needs, environmental goals, and the costs of achieving environmental goals.

In addition to tools, EPA offers the detailed resource Quantifying the Multiple Benefits of Energy Efficiency and Renewable Energy: A Guide for State and Local Governments (EPA 2018). Also, EPA's ENERGY STAR program supports state and local governments in communicating the value streams of efficiency under three pillars: enabler of growth, mitigator of risk, and protector of the public good, and offers resources to harness the power of storytelling (EPA n.d.).

EPA Environmental Impacts and Health Benefits of Clean Energy Tools

EPA has a range of free tools available to support states and stakeholders with analyzing and quantifying the environmental impacts and health benefits of clean energy, including but not limited to the following:

- **AVoided Emissions and geneRation Tool (AVERT)** is a tool designed to meet the needs of state air quality planners and other interested stakeholders. Non-experts can use AVERT to evaluate county, state, and regional emissions displaced at fossil fuel power plants by policies and programs that support efficiency, clean DERs, and utility scale renewable energy.
- **Health Benefits Per Kilowatt-Hour (BPK)** is a set of values that help state and local government policymakers and other stakeholders develop screening-level estimates of the outdoor air quality-related public health benefits of investments in energy efficiency and other clean DERs.
- **CO–Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool** is a tool that helps state and local governments estimate and map the air quality, human health, and related economic benefits of clean energy policies and programs at the national, state, and county levels. Analysts assessing the impacts of changes in rate design can enter corresponding changes in emissions from the electric utility sector and use the results from COBRA to inform cost-benefit analyses and other decision-making processes.
- **Energy Savings and Impacts Scenario Tool (ESIST)** is a customizable and transparent Excel-based planning tool for analyzing the energy savings and costs from customer-funded energy efficiency programs and their impacts on emissions, public health, and equity. ESIST enables users to develop, explore, and share energy efficiency scenarios between 2010 and 2040.
- **Emissions & Generation Resource Integrated Database (eGRID)** is a comprehensive source of data on environmental characteristics of electric power plants in the United States. The interactive eGRID Explorer dashboard offers data, maps and graphs on electric power generated, emissions, emission rates, heat input, resource mix and more.
- **Environmental Justice Screening and Mapping Tool (EJScreen)** is a resource that allows users to access high-resolution demographic and environmental information on a specified location. A key feature of EJScreen is the environmental justice indices, which combine the environmental and demographic information in the tool. EJScreen includes 11 environmental indicators, 6 demographic indicators, and 11 corresponding environmental justice indexes at a detailed level of mapping.
- **Power Plants and Neighboring Communities** is a mapping and graphing resource used to highlight power plant locations in or near communities at or above the 80th percentile of one or more of six key demographics.
- **Quantifying the Multiple Benefits of Energy Efficiency and Renewable Energy** describes methods, tools, and steps analysts can use to quantify these benefits so that they can compare costs and benefits and comprehensively assess the value of energy policy and program choices.

Current Regulatory Landscape

This section presents an overview of the history and recent developments in how states guide and regulate electric resource planning and procurement. Subsequent sections provide descriptions of IRP, discrete resource approvals, default service, and long-term procurement planning, and discussions and examples of the strategies states use within planning processes to require or facilitate utilities' integration of clean energy into their resource portfolios.

Overview

The majority of utilities conduct some form of electricity resource planning, but the processes, time horizon, and content of the resulting plans differ significantly across states (LBNL and E3 2016). States and utilities design resource planning and procurement processes to ensure adequate resources are procured at a reasonable cost to meet future customer needs. Planning processes can provide an opportunity for state agencies, community representatives, and other stakeholders to inform utility planning. In these processes, many utilities consider best practices, share information, and consider input from customers and other stakeholders. Utility regulators typically provide oversight and may approve or acknowledge plans. IRP processes are increasingly used as a tool for aligning utility plans with state clean energy, equity, and environmental objectives. This overview provides a brief history of planning practices, focusing on IRP.

The original purpose of IRP was to minimize total economic costs and environmental impacts of meeting society's energy needs. States established IRP and demand-side energy efficiency programs during the 1980s and early 1990s in response to rising and uncertain prices of certain fuel types, availability of new resource types, and changing demand growth rates (Weston 2009). With vertically integrated electric utilities responsible for generation, transmission, and distribution services for their customers, IRP was a useful tool for developing the most efficient resource portfolio.[4] As such, IRP included not only utility-scale power plants but also demand-side resources including energy efficiency programs, as data demonstrated that the latter was the most cost-effective resource available. In 1992, 36 states had IRP requirements in place.

After electricity market restructuring in some regions in the 1990s, some states rescinded their IRP regulations and others ceased requiring utilities to comply with them. At this time, the focus of resource planning in these regions shifted to short-term commitments. One consequence of this shift was the significant decline of ratepayer-funded energy efficiency programs during this decade. However, incidents such as the California energy crisis in the early 2000s, when utilities did not procure enough power to meet demand, helped shift perspectives back to the importance of resource planning.

Many states are returning to IRP processes to meet a variety of public goals. As of 2022, most states require one or more forms of electricity resource planning. For example, California required long-term procurement plans from the early 2000s until it reinstated IRP requirements in 2015 (CA A.B. 57 2002; CA S.B. 350 2015). Mississippi adopted an IRP requirement in 2019 (MS PSC 2021). Other states use alternative approaches to long-term planning. For example, Florida requires ten-year site plans, in which utilities report to the Florida Public Service Commission on existing and proposed resources including renewable energy (FL PSC n.d.).

Many states have provisions requiring vertically integrated[5] utilities that own and operate electricity generation, transmission, and distribution to conduct both IRP and planning for discrete resource approvals (such as through CPCN[6]). For load-serving entities (LSEs)[7] that are in a restructured electricity market, resource planning informs the procurement of electricity supply for default customers,[8] but LSEs do not develop their own IRPs. Some state utility regulators use a form of long-term procurement planning for utilities participating in restructured electricity markets to ensure safe, reliable, and cost-effective electricity supply.

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4 The U.S. Department of Energy's *Guide for Incorporating Energy Efficiency into State Energy Plans* provides a discussion and examples to inform other states' planning efforts.

5 Vertical integration refers to a situation where the same entity (a utility) owns and operates generating units (power plants), transmission lines, and distribution of electricity to customers. Some states and utilities still largely follow this model, while others have decoupled generation, transmission, and distribution through restructuring. The Electric Utility Policies Overview chapter in this *Guide* provides more discussion about various types of utilities and market structures.

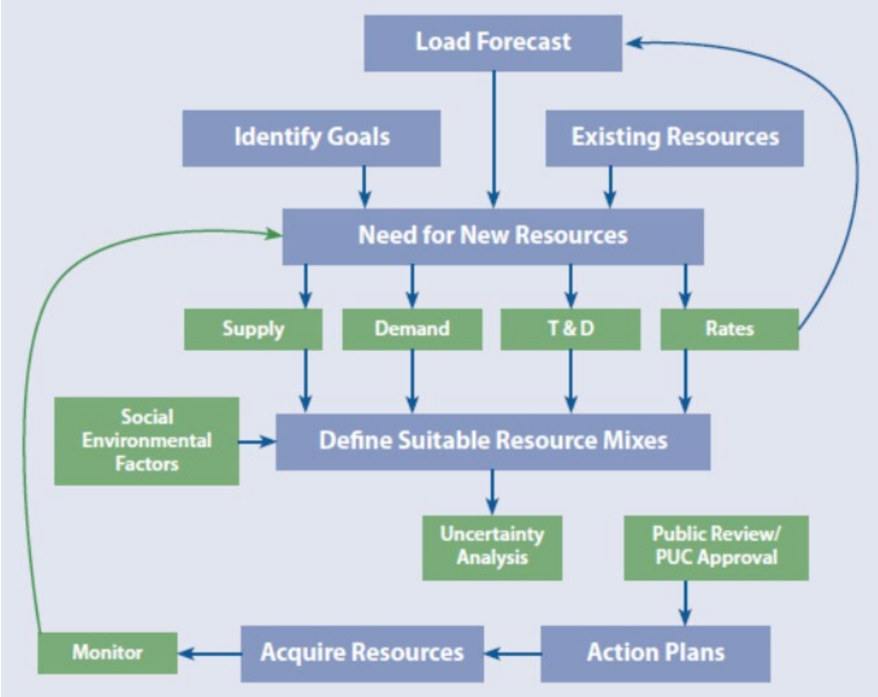
6 The CPCN is a formal utility regulatory approval or determination that a proposed resource is necessary to serve the public good (RAP 2016). While most states continue to call this legal process CPCN, some use the term Certificate of Convenience and Necessity (CCN) or different naming convention. In Minnesota, for example, the process is referred to as Advance Determination of Prudence and in Vermont it is referred to as Certificate of Public Good. This chapter uses the term CPCN when describing this state regulatory certificate process.

7 An LSE is a transmission or distribution utility that supplies an electric load.

8 Default service customers cannot or choose not to access competitive electricity suppliers. The Customer Rates and Data Access chapter in this *Guide* provides more information on default service.

Planning requirements differ significantly from state to state, and even within a state. Some regulations require that utilities use specific methods of analysis for resource planning or consider specific resources, such as energy efficiency and energy storage, in planning. Figure 1 illustrates one process flow of electricity resource planning. The following sections provide details and state examples of each of four categories of electricity resource planning and procurement strategies.

Figure 1: Process Flow of Electricity Resource Planning



Source: Synapse and RAP 2013.

Planning and Procurement Processes

Electricity resource planning processes generally fall into four categories: IRP, discrete resource approvals through CPCN, default service, and medium- to long-term procurement planning. Table 1 provides an overview of the four categories, their applicability, and legal status. Table 2 identifies a state example for each category of electricity resource planning and procurement processes.

Table 1: Electricity Resource Planning and Procurement Processes at a Glance

Process	Overview	Applicability	Legal Status
Integrated Resource Planning or Integrated Resource Plan (IRP)	IRP considers forecasted demand, supply- and demand-side resources, financial and environmental costs and risks, and stakeholder input in a plan to reliably meet customer load. IRP planning horizons are typically 10–30 years, and the frequency of IRP updates are commonly 2–3 years.	With some exceptions, IRP rules typically apply to vertically integrated utilities in regulated states.	IRPs are commonly required by state legislation or regulation and reviewed by utility regulators. Approved IRPs are generally not legally binding.
Discrete Resource Approvals Through a Certificate of Public Convenience and Necessity (CPCN)	A CPCN is considered through a docketed proceeding before a state utility commission in which a utility provides justification for a large capital investment in generation, transmission, and some distribution infrastructure.	A CPCN is required for owners of generation, transmission, and some distribution projects. It occurs in both regulated and restructured states, as required by state law.	A CPCN proceeding is a litigated process. An approval gives permission, but does not require, a utility to take the requested action.
Default Service—also known as Standard Offer Service (SOS)	Default service provisions ensure that load-serving utilities procure electricity for those customers who are ineligible (e.g., due to size) or have not elected to choose a competitive energy provider.	Default service applies to distribution-only utilities operating in restructured markets with retail competition. In some restructured states, retail choice is available only to large industrial consumers.	Procurement of electricity for default service customers is required by law in applicable states.

Process	Overview	Applicability	Legal Status
Long-Term Procurement Planning	Long-term procurement planning refers to utility plans that consider medium- to long-term (e.g., 3- to 10-year horizon) system and local resource needs and solicit market-based supply offers. The update cycle may occur over a shorter period (e.g., every year) than IRPs.	Long-term procurement planning generally applies to distribution-only utilities operating in restructured states.	In states where it occurs, long-term procurement planning is required by law.

Table 2: State Examples of Electricity Resource Planning and Procurement Processes

Process	State Example
Integrated Resource Planning	A 2016 Michigan energy law initiated a cycle of long-term energy planning for electric utilities providers through Integrated Resource Plan (IRP) submission requirements (every 5 years). These plans outline the role of utilities in the state's energy future and may be approved or denied by the Michigan Public Service Commission (MI SB 437 2016).
Discrete Resource Approvals Through a CPCN	In Maryland, a CPCN is generally required to construct or modify a generating station or high-voltage transmission lines, and a case can take between 4 and 12 months to complete. The CPCN is issued by Maryland's Public Service Commission under the authority of Public Utility Companies Article, §§2-121 and 7-205–7-208 of the Annotated Code of Maryland (MD PSC n.d.).
Default Service	In 2005, the Delaware Public Service Commission initiated its SOS procurement process that serves default service customers who do not choose a competitive energy supplier. The Commission order established the method for determining which entity would provide default service, and at what price (DE PSC n.d.).
Long-Term Procurement Planning	The Illinois Power Agency (IPA) oversees electric utility planning and procurement processes for residential and small commercial customers of IOUs and manages the implementation of the state RPS. Each year, utilities submit five-year load forecasts to the IPA. The IPA then creates the Electricity Procurement Plan for wholesale electricity and demand response products to supply default service customers. IPA submits the Plan to the Illinois Commerce Commission for approval (IPA 2021). As of 2018, to meet the state's RPS, renewables are procured through a separate planning process that results in a Long-Term Renewables Procurement Plan. This Plan for renewables is reviewed and revised by the IPA every two years (IPA 2022). The Illinois Power Agency Act (20 ILCS 3855), the Illinois Public Utilities Act (220 ILCS 5), and the Climate and Equitable Jobs Act in 2021 (IL S.B. 2408 2021) outline the planning and procurement requirements.

More detailed descriptions of each process follow. Some of these processes are specific to states with either vertically integrated utilities or restructured (sometimes called deregulated) electricity markets.[9]

In addition to the planning processes listed in Table 1 and this sections, states may also maintain a separate but complementary statewide energy planning process that is updated periodically (refer to State Energy Planning Processes text box). During this process, the state could review policies and practices targeted towards specific outcomes such as clean energy and environmental justice goals.

9 The Electricity Policies Overview chapter of the *Guide* provides greater detail on market structures and utility types.

State Energy Planning Processes

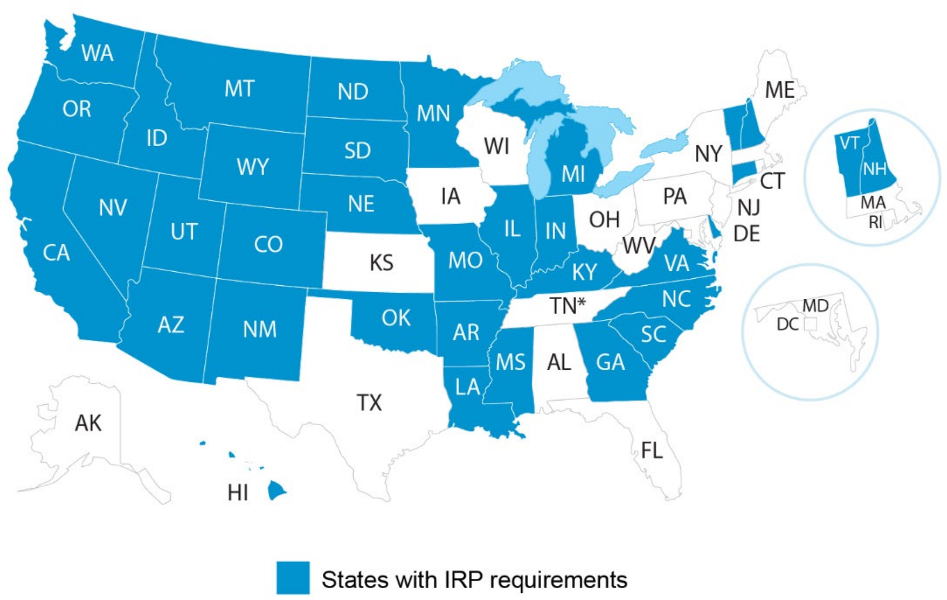
In addition to processes conducted by utility regulators, states also maintain a regular or occasional executive or legislative-driven statewide energy planning process, wherein the state reviews policies and practices targeted toward specific outcomes such as resource utilization, economic development, or climate or other environmental goals. These plans may be independent of utilities—examining long-term and general policy measures with a particular end-goal—or may explicitly engage utilities and require companies to meet specific performance requirements. Tracking and analysis by the National Association of State Energy Officials (NASEO) indicates that as of 2018, 30 states as well as the District of Columbia introduced plans that were initiated either through state legislation or executive order. In addition to this, 12 state energy plans have been initiated by a state governor without executive order or created by a state agency (such as state energy office, administrative services division, economic development agency, environmental office, or other energy-related entity). Many states may also conduct a form of planning to inform the development of specific state policies such of RPS and EERS. NASEO maintains a database of statewide comprehensive energy plans.

Integrated Resource Planning

IRPs are utility plans for meeting forecasted annual peak and energy demand, along with some established reserve margin, through a portfolio of supply-side and demand-side resources over a specified future period, usually 10 to 30 years. In addition to being a good practice measure, IRPs may also be a legal requirement in some states for certain entities. For example, California's Clean Energy and Pollution Reduction Act of 2015 (SB 350) requires that investor owned utilities, community choice aggregators, and almost all electric service providers develop an IRP every two years and submit those plans to the California Public Utilities Commission (CPUC) for approval (CPUC n.d.; CA S.B. 350 2015; CEC n.d.).

Figure 2 shows the 33 U.S. states with IRP requirements as of 2022. Most states with vertically integrated utilities require IRPs. In Mississippi, the Public Service Commission established an IRP requirement in 2019 (MS PSC 2021). Texas and most states in the Northeast, which have restructured electricity markets, do not require IRPs but may require other planning. For example, Massachusetts does not require an IRP but does have a filing requirement for long-term plans. Tennessee does not require resource planning but the Tennessee Valley Authority (TVA) conducts IRP (TVA 2019). Kansas does not have a requirement, but

Figure 2: States with IRP Requirements



* Although Tennessee does not require resource planning, the utility TVA, which serves all of Tennessee, conducts IRP as required by the 1992 Energy Policy Act (LBNL and E3 2016).

Note: Policy requirements as of March 2022.

Source: Research conducted for EPA's *Guide* by Abt Associates and Regulatory Assistance Project, updated from EPA's *Energy and Environment Guide to Action*, 2015.

the state studied the value of a utility IRP process that requires state regulatory approval and found that nearly all Kansas utilities already participate in some form of IRP (AECOM 2020).

IRP processes vary in their degree of rigor, stakeholder feedback process, and degree to which they are subject to regulatory scrutiny. In states that conduct integrated resource planning, the process should provide an opportunity to examine how energy efficiency and renewable energy affect utility operations, customer costs, system reliability, equitable distribution of burdens and benefits, and risk.

State utility regulators generally do not require or enforce specific findings or outcomes as part of the IRP development or vetting process. Thus, IRPs are generally not legally binding. Instead, regulatory commissions may have formal proceedings to approve the content of the IRP, acknowledge that IRP processes were followed, or both. These proceedings differ by state. State utility regulators may expect or require that significant deviations from IRPs be justified in rate cases or preapproval processes. IRPs do not negate the need for discrete resource approvals and should form the framework for other resource processes and decisions.

Discrete Resource Approvals

Discrete resource approval refers to a utility regulatory proceeding in which a utility provides justification for a large capital investment in generation or transmission infrastructure, even if the investments are outlined in an approved IRP. If the utility succeeds in justifying their investment, they are granted a CPCN by their regulators. Some regulatory commissions or state statutes require that significant power plant additions, new plants, or large capital investments above a certain capacity threshold go through this process. There may also be instances where long-term contracts are treated like other power resources.

These processes maintain many of the same analytical and planning elements of integrated resource planning, but they include regulatory review by intervenors[10] rather than an interactive and potentially contested stakeholder process. CPCNs are litigated processes argued before a state's public utility commissioner or hearing official. CPCNs are legally binding and enforceable. A utility that obtains a CPCN from a utility regulator has generally proven, to the satisfaction of that regulator, that a plan is prudent.

States differ on the threshold of when a CPCN is required and the rigor of the information gathering and analysis. States that require CPCN or a similar proceeding for the acquisition of large new capital investments include Georgia, Indiana, Kentucky, Minnesota, West Virginia, Wisconsin, and others. A CPCN may provide the opportunity for state entities and the public to ensure all resources including demand side management, energy efficiency, renewable energy, and CHP are considered on par with other capital investments. For example, the Vermont PUC requires this comparison as part of its discrete resource approval process, called a Certificate of Public Good (VT PUC n.d.).

A CPCN does not guarantee that a utility will recover the costs of a capital investment in rates; instead, it establishes that the choice to move forward with a capital investment is prudent at the cost, or cost range, established in the plan. To mitigate the risk of not recovering capital investments in rates after a project is in service, some states allow for preapproval or cost riders, through which utilities can begin recovering costs prior to the project being constructed.

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[10] Intervenors might include attorneys general, industrial groups, generation owners, transmission owners, landowners, consumer advocates, environmental groups, and other citizen action groups.

Default Service

In states with retail restructuring, customers have their electricity delivered by a regulated utility that operates the distribution network (i.e., a load-serving entity), but they may be able to choose the source of their electricity by comparing products and rates from a variety of companies. This process is known as retail choice, and the suppliers are typically called competitive retail suppliers. Default service provisions ensure that load-serving entities procure electricity for those customers who have not proactively elected to choose a competitive retail supplier. As of 2017, 13 states and Washington, D.C., have fully restructured retail electricity markets, and five states offered partial electricity retail choice (NREL 2017). Though retail choice has been an option for customers in these states for many years, default service has stayed the primary option. The majority of residential load in these jurisdictions is served through procurement by a regulated utility[11] (NREL 2017).

Default service requirements vary among jurisdictions. However, one common theme across requirements is the use of laddered contracts to minimize exposure of the default service load to price volatility. Under the ladder structure, only a fraction of the default service load is exposed to current market prices. Default service procurement typically reviews supply for periods as short as six months and up to five years and is a mechanism of portfolio management. A mechanism such as the default service plan requirements may be used as a shorter action plan to achieve an optimal portfolio of electric power system resources. Therefore, default service planning requirements typically do not require long-term assessments of supply options outside the procurement period.

Long-Term Procurement Planning

Long-term procurement planning is a general category of medium- to long-term procurement planning in which the state requires that utilities prepare plans soliciting market-based electricity supply offers over a period of 10 years or less. This offers planning over a longer time period than discrete resource approval but is a shorter planning horizon than typical IRPs. This planning process usually evaluates purchases for capacity and energy as well as energy efficiency and other demand-side management programs.

State policies that promoted renewable energy led to a return to these medium- to long-term resource planning practices, even in some restructured states with default service. When retail competition was introduced, utilities halted long-term planning efforts and relied on market competition to keep electricity prices low. However, when RPS policies were introduced, at the time renewable resources often had higher capital costs and costs of delivered energy than conventional generation, and investors were hesitant to support these projects without guaranteed cost recovery well beyond the default service procurement window. As a result, regulators in many states began to require that utilities engage in long-term procurement planning.

For example, in 2002 California passed legislation requiring each investor-owned utility (IOU) to develop a long-term procurement plan (LTPP) for CPUC approval. The bill also required that CPUC authorize resource procurements to meet demonstrated needs, which ensures the procurement expenses would be approved for recovery by ratepayers (CA A.B. 57 2002). The CPUC LTPP proceeding evaluated system needs over a future ten-year period. After California implemented the IRP requirements of the state's 2015 Clean Energy and Pollution Reduction Act, S.B. 350, the relevant LTPP processes were incorporated into the overarching IRP-LTPP proceeding (CPUC n.d.). Other states including Illinois require a form of long-term procurement planning.

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[11] Texas is one exception, as retail choice is required in this state. Eligible residential customers must choose a competitive supplier, or they will be assigned one; however, customers in utility service areas outside of the Electric Reliability Council of Texas are not eligible, and municipally and cooperatively owned utilities may opt out of the program.

Integration of Clean Energy in Electricity Resource Planning

States have many different approaches to require or encourage utilities to integrate clean energy in electricity resource planning and procure the best possible combination of supply- and demand-side resources. Strategies include requirements that all cost-effective demand management and energy efficiency measures be incorporated into planning and energy storage procurement requirements. Table 3 presents strategies and considerations states have incorporated into utility policy to encourage the integration of clean energy in planning and procurement practices.

Table 3: State Strategies to Support Clean Energy in Planning and Procurement Processes

Strategy	Description	State Example
Meaningful stakeholder involvement	Gather input through accessible, flexible, accommodating public meetings/workshops. Engage with inclusive group of participants including environmental advocates and representatives for low-income ratepayers, communities with environmental justice concerns, and other historically underserved customers. Consider using a facilitator, offering background information, and providing funding opportunities for public interest stakeholders and intervenors.	Maine statute allows an intervenor to be compensated if their interests were not sufficiently represented by the Utilities Commission or the public advocate, and they contributed substantially to the Commission proceeding.
Engagement with state utility and environmental regulators	Leverage existing knowledge from state utility and environmental regulators. Establish mechanisms for coordinating environmental permitting and utility electric planning.	The Kentucky Energy and Environment Cabinet works with the Public Service Commission on electric utility regulation.
Reasonably expected environmental regulations	Require utilities to estimate and consider costs and potential impacts on resource planning of current and reasonably foreseeable future energy and environmental regulations, including potential greenhouse gas rules or carbon pricing.	The Wyoming Public Service Commission IRP Guidelines require utilities to consider environmental impacts, which may include greenhouse gas emissions, environmental taxes and/or constraints associated with federal or state regulation.
Energy efficiency potential studies	Require utilities to develop energy efficiency potential studies as part of planning process or perform a statewide study for use in planning.	The Wisconsin Public Service Commission uses energy efficiency potential studies to inform state program planning.
All cost-effective energy efficiency in planning	Require utilities to plan for all achievable cost-effective energy efficiency or demonstrate that all supply-side and demand-side resources have been evaluated on a consistent and comparable basis.	Massachusetts Department of Public Utilities Energy Efficiency Guidelines require programs to pursue all available cost-effective energy efficiency and demand reduction resources.
Assumptions for Renewable Energy Capacity Value and Supply and Integration Costs	Require utilities to use most recent available cost data.	The South Carolina Public Service Commission ordered a utility to re-model the costs of all potential resources in its IRP, including for solar and battery storage power purchase agreements, using updated cost and capacity value assumptions.
Non-wires alternatives (NWA)/ alternatives to peaking resources	Consider non-wires alternatives, or alternative peaking resources, such as battery storage and EV storage, as an alternative to new peaking plant requirements to satisfy forecasted demand growth.	The New York Public Service Commission requires utilities to consider NWA in resource planning and procurement processes.

Strategy	Description	State Example
Storage procurement requirements	Adopt energy storage targets or procurement mandates to recognize energy storage as a key component in strategies to advance renewable energy generation, electrification and decarbonization and to enhance grid stability and resiliency	The Oregon legislature directed IOUs to analyze how energy storage would complement actions in its IRP and to propose storage system procurement(s). It also directed the Public Utility Commission to develop a valuation methodology for six areas in which storage provides value.
All-source Request for Proposal	Direct utilities to conduct competitive procurement through RFP to select adequate generation resources. In an RFP, the utility describes the resources it wishes to procure, and may also offer self-build options to compete against market offers.	Washington WAC §480-107 requires a utility to issue an all-source RFP if its IRP identifies a need within the four-year plan period. The RFP must allow bids for resource types including but not limited to energy storage, efficiency resources, demand response, and other resources recognized for "equitable distribution of energy and nonenergy benefits to vulnerable populations and highly impacted communities."
Integrated distribution planning	Incorporate distribution planning within the resource and transmission planning process. This policy could safely interconnect higher percentages of demand-side resources such as rooftop solar and energy storage systems.	The Hawaii Public Utilities Commission suspended utilities IRP requirements to allow them to execute a new integrated grid planning (IGP) process that seeks to accelerate clean energy adoption including DERs. IGP would merge the separate planning processes of generation, transmission and distribution and developing an integrated procurement plan.
Resilience planning	Establish mechanisms to improve the resilience of the existing grid and integrate resilience goals into planning procedures.	The Michigan Public Service Commission's statewide energy assessment recommended that utilities work with staff and stakeholders to quantify the value of resource diversity and resilience within future IRPs and improve demand response programs.
Execution / Implementation mechanisms	Tie investment decisions to planning process. Require that IRP results in an action plan with resource activities the utility intends to undertake over the next two to four years. Test investment decisions against IRP results.	Article 4 of Indiana's administrative code Title 170, which applies to the state's utility regulatory commission, requires utility IRPs to include a short-term action plan for implementing the resource portfolio.

Meaningful Stakeholder Involvement

Stakeholder processes are important to ensure that the concerns of ratepayers, environmental advocates, communities with environmental justice concerns, historically underserved customers, and other communities affected by the planning decisions are heard and incorporated into decisions. Some states have authorized intervenor compensation programs through legislation or rulemakings to help reimburse individuals or groups for their regulatory involvement in utility planning procedures (Low-Income Solar 2020). States have supported public interest and environmental interest intervenors with funds from regulated utilities who recoup the costs from ratepayers rather than funds from taxpayers (NARUC 2021b). Other examples of support to allow for more equitable inclusion of groups affected by utility resource decisions include targeted outreach and education, technical assistance, scheduling intervention opportunities outside of normal business hours in easily accessed locations, and providing materials or presentations in multiple languages. The impact of stakeholder engagement can also depend on its timing to ensure feedback can be substantially incorporated into decision-making.

The following are examples of state and local efforts to design meaningful stakeholder involvement:

- The Council of the City of New Orleans, which has full regulatory authority of its IOU, independent from the Louisiana Public Service Commission, requires at least four technical conferences with stakeholders/intervenors in each IRP cycle, including to receive feedback on the planning scenarios, planning strategies, input parameters, and assumptions (NOLA Council 2017).
- Oregon's 2021 H.B. 2475 established up to $500,000 annually from electricity or natural gas public utilities for intervenor financial assistance. Organizations eligible for funding include those that serve the broad interest of customers, the specific interests of low-income residential customers, or the interests of residential customers in environmental justice communities (OR H.B. 2475 2021).
- The Wisconsin legislature established the Intervenor Compensation program in 1983 to financially support individuals or organizations in need of funding to be able to participate in Public Service Commission cases, including a customer which is the subject of the proceeding or a customer that may be materially affected by its outcome (WI PSC n.d.).
- In Maryland, all ratepayers fund the Environmental Trust Fund that is used by the Power Plant Research Program (PPRP) to conduct a statutorily required independent environmental and socioeconomic assessment of proposed transmission and generation facilities. PPRP's independent assessment includes consultation with neighbors, community members, and other interested parties, separate from official hearings by the Maryland Public Service Commission (PSC). PPRP submits its assessment along with a recommendation to the Maryland PSC for their consideration (MD PPRP 2020).
- Illinois's 2021 Senate Bill 2408 directed the state to establish a Consumer Intervenor Compensation Fund in the State treasury, to provide financial assistance to consumer interest representatives that intervene in Illinois Commerce Commission proceedings in support of the community, economic, environmental, or social welfare of residential utility customers (IL S.B. 2408 2021).

Resources are available to help states promote meaningful stakeholder engagement. For example, the Clean Energy for Low-Income Communities Accelerator (CELICA) Toolkit provides lessons learned from a voluntary partnership to lower energy bills through stakeholder engagement and response to concerns (CELICA n.d.). NARUC offers several publications for states and stakeholders, including a decision-making framework for stakeholder engagement that provides a roadmap of considerations and best practices for engagement (NARUC 2021a). NARUC also has summarized state approaches to intervenor compensation (NARUC 2021b). In addition to community-based organizations and other stakeholders, local governments also bring value to regulatory proceedings on resource planning (NARUC 2019). Local governments are large energy users and policymakers with cross-cutting roles, and a liaison could represent diverse community interests.

Engagement between State Utility and Environmental Regulators

States can leverage expertise between utility regulators and environmental regulators to help inform utility plans. Environmental regulations and the associated permitting requirements may explicitly shape utility actions and planning outcomes. Therefore, states have found significant benefits from enhanced dialogue between utility and environmental regulators (RAP 2013). This communication can help inform coherent, multi-pollutant permitting processes, help utility regulators respond and prepare for existing and emerging environmental regulations, and ensure that decisions from different regulatory authorities do not work toward cross-purposes.

States use a variety of mechanisms to coordinate utility and environmental regulators. Here are some examples:

- The Colorado Clean Air Clean Jobs Act of 2010 requires utilities to prepare emission reduction plans for coal-fired generation units in the state and incentivizes coal plant replacement by natural gas-fired resources or DERS such as energy efficiency. Prior to filing an emission reduction plan with the Commission, the Act requires the utility to consult with the Department of Public Health and Environment to ensure the plan meets current and anticipated state and federal clean air laws. The Act also directs the Department to determine the emission rate (in pounds of carbon dioxide per megawatt-hour [MWh]) of the new or repowered units proposed in the plan. The Public Utilities Commission must allow the Department of Public Health and Environment to comment on utilities' emission reduction plans, and must not approve a plan unless the Department has determined that the plan is consistent with current and likely future requirements of the Clean Air Act (CO H.B. 1365 2010).
- Recognizing the value of collaboration, the Connecticut Department of Energy and Environmental Protection (CT DEEP) was created in 2011, merging the Department of Environmental Protection, the Department of Public Utility Control, and energy policy staff from other areas of state government. The DEEP oversees the roles of utility and environmental regulators. DEEP and the Connecticut Energy Advisory Board are required by state statute to prepare a statewide Comprehensive Energy Strategy (CES) for the state every three years. (CT DEEP 2013).
- Kentucky established an interagency Energy and Environment Cabinet (EEC) to provide regulatory guidance, environmental protection, coordinated energy strategy, and effective utility regulation. The Kentucky EEC includes its state Department of Environmental Protection, Department of Natural Resources, and Office of Energy Policy. The EEC works with the state Public Service Commission in various roles involving utility regulation (KY EEC 2021).
- In 2017, Oregon passed legislation that stated, "the PUC will collaborate with the Legislature and stakeholders to make progress on climate and equity—two issues that most SB 978 participants prioritized" (OR S.B. 978 2017).

Reasonably Expected Environmental Regulations

Environmental regulations that are already promulgated and implemented may impose known costs or operating restrictions. Predicting the impact of regulations that are not yet finalized can be more difficult, but is still a critical element of prudent planning.[12] Oregon rules require utilities to account for regulatory compliance costs for carbon dioxide and criteria pollutants (OPUC 2007). Arizona requires that utilities "address the costs for compliance with current and projected environmental regulations" in their plans, related to air emissions, solid waste, and water use (ACC 2010). Planning processes give utilities the opportunity to quantify the costs of complying with environmental regulations alongside the environmental, health, and equity benefits. This process can also be an opportunity for the utility to collaborate with the state and stakeholders around the utility's role in environmental protection.

[12] For example, PacifiCorp states that integrated resource planning, "in parallel to administration of the Regional Haze rules, state agencies and EPA must also ensure compliance with other environmental regulations including the recently enacted Mercury and Air Toxics Standards (MATS), and emerging regulations for coal combustion residuals (CCR) handling and storage, Clean Water Act §316(b) cooling water intake rules, and effluent limitation guidelines (ELG). The Company must therefore assess not only currently known obligations but must also assess reasonably foreseeable compliance obligations in its analyses" (PacifiCorp 2014)

Energy Efficiency Potential Studies

Energy efficiency potential studies are often used to inform long term planning. These studies explore energy savings opportunities for specific measures and end-uses, customer segments, building types, and costs. While these studies are often used to develop short-term savings targets and budgets, states also use energy efficiency potential studies to identify long-term energy savings opportunities, which may then be used in utility integrated resource plans or long-term resource plans at the state or regional level. For example, the Northwest Power and Conservation Council (NWPCC) conducts energy efficiency potential studies for the entire region as part of its regional power plans, which seek "an electrical resource strategy that minimizes the expected cost of, and risks to, the regional power system over a long period of time" (NWPCC 2016).

Comprehensive energy efficiency potential studies[13] provide a basis for near-term planning expectations and reasonable long-term trajectories in resource plans. For instance, Kansas City Power and Light Company conducted a study to quantify energy efficiency potential in its service area at four levels: technical, economic, maximum achievable, and realistic achievable potential (KCP&L 2017). The State of Rhode Island Energy Efficiency & Resource Management Council commissioned an energy efficiency market potential study to better understand opportunities and strategies for accessing energy savings and peak electricity demand savings in Rhode Island, and to quantify the costs and benefits across a range of achievable scenarios (EERMC 2020).

All Cost-Effective Energy Efficiency in Planning

Energy efficiency can provide a long-term, reliable, and low-risk electricity resource. Efficiency can avoid near-term energy and emissions, and potentially help defer long-term generation capacity and transmission expansion requirements. Some states require utilities to develop long-term electricity resource plans that rigorously review opportunities to acquire and pursue "all cost-effective energy efficiency."

Recognizing that a sole focus on cost-effectiveness without accounting for non-energy benefits may leave out opportunities for low-income households, many states are updating benefit-cost tests to account for non-energy benefits or make cost-effectiveness exemptions for low-income energy efficiency programs. States looking to update their electricity resource planning policies may wish to encourage utilities to include all equitable, cost-effective energy efficiency in their plans (refer to the Energy Efficiency Programs and Resource Standards chapter in the *Guide* for more information about the benefits of energy efficiency and equitable cost tests). The National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources is a comprehensive framework on the concepts and methodologies for cost-effectiveness assessment of energy efficiency and other DERs (NESP 2020).

In some states, a comprehensive estimate of avoided energy and capacity costs, emissions benefits, and other benefits is used to characterize the amount of energy efficiency that is cost-effective, but states vary in their approach to benefit-cost analysis.[14] Oregon utilities are required to include in their integrated resource plan the "least-cost, least-risk acquisition of resources" (OR S.B. 1547 2016). In California, a Joint Agency Report (2021) emphasized the continued importance of prioritizing cost-effective energy efficiency and load flexibility, before new generation is considered, to minimize total implementation costs in meeting the state 100 percent clean electricity (CARB, CEC, and CPUC 2021).

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[13] The U.S. Department of Energy maintains a catalog of Energy Efficiency Studies published by states, utilities, and NGOs going back to 2010. The studies identify potential energy savings and can be used for energy efficiency program planning, goal setting, and utility resource planning (DOE n.d.).

[14] For this reason, avoided costs are extremely important to an IRP, as they help determine the amount of customer demand that can be cost-effectively met by energy efficiency and the amount that must be met by supply-side resources.

Assumptions for Renewable Energy Capacity Value and Supply and Integration Costs

Accurate cost information regarding renewable energy infrastructure and system integration is key to effective resource planning and procurement. States can use updated cost and performance projections for renewable energy and flexible grid resource options, including solar photovoltaic (PV) systems and energy storage, to analyze the likely contribution and benefit of these resources over the period of the electricity resource plan. As the market for renewable energy technologies expands, manufacturing and installation costs have declined (NREL 2021). For example, since 2010, NREL reported a 64, 69, and 82 percent reduction in the cost of residential, commercial-rooftop, and utility-scale PV systems, respectively. Additionally, LBNL recently studied the locational value–the value at a specific point in the system–of DERs in distribution or transmission planning processes as NWA (LBNL 2021a). The study identified high-value opportunities for DERs to provide peak load relief and potential deferment of large capital investment. Research showed that early evaluation of DER alternatives led to more successful projects (LBNL 2021a).

Non-Wires Alternatives and Alternatives to Peaking Resources

NWA[15] allow utilities to avoid or delay new centralized generation or transmission infrastructure investments by procuring lower-cost and lower-emission DERs such as energy storage. Aging infrastructure and challenges of connecting remotely located renewable energy sources are some reasons why utilities may need to address unexpected equipment failure and access more economic sources of energy and peak capacity. It is more common for utilities to respond with investment in the transmission and distribution system, rather than exploring NWA, but several states including New York now require utilities to consider NWA in resource planning and procurement processes (NY PSC 2015). Assessing NWA involves strategically evaluating and planning for options other than traditional capital investments. Some utilities are studying the physical and operational needs of a project and determining whether DERs with different attributes can be bundled to avoid or defer the infrastructure investment at a cost savings. Cost-effective NWA have demonstrated the ability to accelerate grid decarbonization while providing cost savings to ratepayers if implemented (E4TheFuture, PLMA, and SEPA 2018). Recent research suggests that most proposed NWA projects have not been pursued, but among those that are implemented, battery storage is a preferred technology (GTM 2020). As more states and utilities consider NWA in planning processes, they can look to utility case studies for lessons learned about methods for assessing the impacts and locational value of the DER in the distribution system (LBNL 2021a).

Minnesota and Arizona offer two more examples of state utility regulators requiring utilities to assess NWA within utility planning practices, including electric distribution system planning and IRP. The Minnesota PUC requires rate regulated utilities to file Integrated Distribution System plans with details regarding the utility's planned non-wires alternatives and smart grid advancements (MN PUC n.d.). In 2018, the Arizona Corporation Commission directed Arizona utilities to include a storage resource as an alternative in future IRPs and analyze storage alternatives when considering transmission or distribution infrastructure upgrades or investments to upgrade or build new generation capacity (ACC 2018). Additional NWA discussion and examples are presented in the Maximizing Grid Investments chapter in the *Guide* and *Non-Wires Alternatives Case Studies from Leading U.S. Projects* (E4TheFuture, PLMA, and SEPA 2018).

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[15] Non-Wires Alternatives are combinations of DERs that utilities consider for adoption in their distribution systems.

Storage Procurement Requirements

States are establishing storage procurement requirements, recognizing the importance of energy storage to advance renewable energy generation, electrification and decarbonization, and enhance grid stability and resiliency. As of 2021, over a dozen states had adopted energy storage mandates, goals, targets, or planning and procurement requirements (PNNL 2021). Some states including Minnesota and New Mexico required utilities to consider storage within IRPs (PNNL 2021). Other states have introduced policies supporting the growth of energy storage technology markets. Recent improvements in advanced metering technologies could advance utilities' ability to capture resource benefits at a sub-hourly scale within the distribution network (i.e., this enables the IRP process to capture many of the flexibility and locational benefits of energy storage).

States with storage procurement requirements set targets for energy storage and include meaningful follow-through by state regulators to ensure accountability and progress toward storage goals and mandates. Utilities in the state solicit bids through official requests for proposals (RFPs) for firms to support resource needs. Reporting and accountability approaches vary by state. In 2018, Massachusetts established a 1,000 MWh energy storage deployment target to be met by 2026 and incorporated storage into the state's Solar Massachusetts Renewable Target (SMART) incentive program. To ensure follow-through, the Massachusetts bill requires that utilities make public their plans for attaining energy storage (MA H. 4857 2018).

All-Source Request for Proposal

Many vertically integrated utilities either voluntarily or by regulatory requirements conduct competitive procurement through RFPs to select adequate generation resources. An all-source RFP is a procurement process where a utility and its regulators conduct a unified resource acquisition process. In an all-source RFP, the requirements for capacity or generation resources include all potential resources or combinations of resources available within the system. The utility may also offer self-build options to compete against market offers. All-source RFPs help determine competitive prices for relevant technologies. In addition, all-source RFPs help utilities optimize their resource portfolios based on the current market conditions, which change over time (LBNL 2021b). For example, in Colorado, Xcel Energy released an all-source solicitation in 2013 and only received one energy storage bid that was not competitive. In 2017, Xcel all-source solicitations received over 100 bids that included either stand-alone battery storage or battery storage paired with other resources (LBNL 2021b). In South Carolina, PSC directed Dominion Power to include an All Source Procurement Plan in IRPs (SC PSC 2020). Such a directive is expected to enable independent power producers and developers to compete with Dominion Power proposals.

Increasing State Agency Coordination in Electricity Resource Planning

Energy planning can affect the work of a variety of state government agencies, and many of these agencies can provide valuable input to the planning process. Thus, many states have found benefits in fostering more interagency communication and collaboration.

A useful first step is to determine who plays a role and what mechanisms currently exist for interagency collaboration. As the Participants section explains, state agencies may already participate in planning as regulators (e.g., utility regulators in rate-based cases such as IRP, CPCN, and default service cases; air regulators in permitting) or as intervenors or stakeholders (e.g., a consumer advocate or attorney general's office representing ratepayers, or an energy department representing state policy).

In one example of fostering coordination, the Commonwealth of Massachusetts Energy Efficiency Advisory Council (EEAC), chaired by the Massachusetts Department of Energy Resources (DOER) Commissioner, coordinates and brings stakeholders into resource planning for energy efficiency.

Even without combining agencies, utility and environmental regulators can find many opportunities to coordinate. For example, utility regulator staff can alert environmental managers about ongoing planning processes and engage them to vet long-term environmental outcomes; environmental regulators can similarly alert utility regulator staff and ratepayer advocates about air and water permit applications. Such coordination can be mutually beneficial to both agencies as decisions made by one state entity can have significant implications on other regulatory bodies. In some cases, utilities pursue air or construction permits prior to pursuing a CPCN or preapproval, thus creating a situation in which long-term planning is necessarily compressed by permit deadlines or constraining potential outcomes for utility regulators. In the inverse situation, utility regulators may not be aware of impending, or even ongoing, environmental regulatory requirements that pose financial risks or costs. Utility regulatory decisions may have substantial effects on a state's ability to pursue energy efficiency, renewable energy, and CHP alternatives.

Integrated Distribution Planning

Integrated distribution planning (IDP) promotes a holistic analysis of distribution requirements and the capabilities of the current generation mix. Comprehensive distribution system planning supports DERs by helping to enable grid operators to better analyze DER solutions to meet grid needs. Widespread DER deployment in strategic locations will increasingly help reduce demand for fossil-fired power generation and the construction of new power lines and centralized power stations.

The IDP process considers the future growth of a distribution grid by consulting with the electric utility, the commission, and stakeholders. It is important that both demand side and supply side resources are considered during the planning process to have a truly integrated distribution plan. The long-term objectives of the IDP process includes cost reductions, efficiency improvements and a pathway for a safe, secure, reliable, and resilient power grid. The NARUC and NASEO Task Force on Comprehensive Electricity Planning develops and curates resource lists for members to learn more about the evolving planning process. Resources are available across 15 topic areas, including Distribution System Planning (DSP), Emerging Practices in DSP, and Utility Best Practices for Integrated Planning (NARUC n.d.).

Research finds that distribution planning is prevalent among utilities but is not always reported publicly, nor has it consistently included demand reductions or energy efficiency (ACEEE 2018). Among 31 electric utilities surveyed nationwide in 2018, all reported conducting some form distribution system planning—with 18 considering demand reductions and 7 specifically considering energy efficiency as a resource—although only 15 of the utilities reported filing the plans publicly with a regulatory agency (ACEEE 2018). Among states surveyed, those that required utilities to file distribution plans include California, New York, and Washington (ACEEE 2018).

A new evolution of IDP is hosting capacity analysis (HCA), a modern grid planning activity. HCA is an analytical "pre-screening" process used to determine the distribution system's ability to accommodate new DERs at specific locations without significant control changes or system upgrades. HCA increases transparency into the distribution grid's current operational conditions and limits through maps and supporting datasets. The information can help commissions and utilities identify where in the distribution system new DERs could provide beneficial services and support longer-term strategic DER investment decisions. In some states, including California, Hawaii, Minnesota, Nevada, New York, and Rhode Island, regulators require utilities to produce HCAs to support distribution system planning and grid modernization. For further information on HCA, refer to the *Guide* chapters Interconnection and Net Metering, and Maximizing Grid Investments.

States have taken a variety of approaches to IDP. For example, California and Hawaii have processes that integrate state transmission and distribution planning into their broader distribution system planning processes. California incorporates IDP into a multi-agency integrated planning processes mandated by SB 100 and led by the Joint Agency of California, comprised of the California Energy Commission (CEC), CPUC, and California Air Resources Board (CARB). The Joint Agencies lead processes that establish least-cost paths with integrated environmental goals of the future grid (CEC 2021).[16] In collaboration CARB, the Joint Agency has analyzed various pathways to achieve the state's decarbonization target (CARB, CEC, and CPUC 2021, 100). In addition, the Joint Agency is exploring opportunities to analyze the performance of DERs under various scenarios of operating and climatic conditions.

The Hawaii Public Utilities Commission approved the 2018 Integrated Grid Planning (IGP) process that utilities would use to develop an Integrated System Plan (HI PUC 2018). The IGP process aims to support clean energy adoption including DERs by looking at system needs and opportunities more broadly by combining historically separate planning activities in generation, transmission, and distribution. The Hawaii PUC suspended utilities IRP requirements to allow them to execute a new integrated grid planning (IGP) process (HI PUC 2018). The Hawaiian Electric company formed working groups in the following areas: forecasting and assumptions, resilience, distribution planning, solution evaluation and optimization, and competitive procurement. Hawaii PUC staff participated in these working groups as an advisory role.

Resilience Planning

Electric utility resiliency planning involves assessing natural, human, and technological threats to safe, reliable power delivery to customers and proactively safeguarding systems against those threats (NREL 2019). Resiliency planning includes a review of both supply-side, such as CHP, and demand-side, such as energy efficiency, infrastructure, and operations. For the grid, three key components of resiliency are: prevention, recovery, and survivability (EPRI 2013). The DOE-coordinated Grid Modernization Laboratory Consortium has published guidance on resilience metrics, suggesting that measurements of resilience can include both examinations of properties of an electricity system that make it more or less resilient and examinations of system performance through historical events or modeling (DOE 2020).

Utilities are experienced in developing and prioritizing resiliency solutions based on risks and costs, but the threats, costs and potential solutions change over time. Climate change, for example, introduces physical risks to a utility's infrastructure, such as wildfire risk to transmission lines, and more extreme summertime high temperatures. Extreme heat can affect generation (e.g., thermal generator efficiency, water availability for hydroelectric, fossil, and nuclear generators), transmission and distribution system operation (e.g., line losses and sag), and the magnitude and duration of peak demand, which can push generation and transmission to

[16] These processes include the CEC Integrated Energy Policy Report (IEPR); the CPUC IRP Proceeding and Distribution Resource Planning (DRP) process; and the California ISO Transmission Planning Process (TPP).

peak capacity. Utilities experience different risks and vulnerabilities based on their circumstances, including legacy infrastructure and fuel type, geographic region, and adaptation and resiliency planning to date (DOE 2016). Cybersecurity is another significant and growing threat. Clean DERs, while having cybersecurity vulnerabilities, may contribute to a range of potential resiliency strategies, for example providing redundancy in decentralized microgrids.

States and utilities are taking different approaches to resiliency planning within the context of electricity resource planning and procurement. For example, Michigan increased its prioritization of resiliency planning in the IRP process after electric and natural gas emergencies stemming from the 2019 polar vortex. Governor Whitmer requested a statewide energy assessment (SEA), which the Michigan Public Service Commission (PSC) implemented, issuing the SEA final report in 2019 and a two-year Progress Report in 2021 (MI PSC n.d.). The SEA discussed diversifying resources to reduce reliance on any single type of fuel or technology. In the SEA, the PSC recommended that utilities and transmission owners better integrate the electricity system planning processes; utilities work with staff and stakeholders to quantify the value of resource diversity and resilience within future IRPs; and utilities improve demand response programs (MI PSC n.d.). PSC reported that the Michigan Power Grid Initiative is helping to address many of the recommendations, including the work to quantify the value of resilience for DERs (MI PSC 2021). In addition, the PSC and the Michigan Department of Environment, Great Lakes and Energy recently participated in the nationwide Task Force on Comprehensive Electricity Planning.[17]

Execution and Implementation Mechanisms

Plans need to be executed, and many IRPs lead to near-term action plans or explicit lists of proposed activities and procurements that the utility intends on completing in response to the IRP. In some states, the approval of an IRP implies approval of near-term utility actions; in other states, approval of an IRP signals that the IRP's intent is reasonable but the actual decisions may be contested later, such as through a CPCN process. Regardless of the approach, states have found that utilities file action plans to make explicit their intent following planning proceedings, and states follow up on action plans to assess if the planning process has resulted in expected outcomes. State requirements for action plans vary. For example, Georgia requires that utilities provide "a description of the major research projects and programs the utility will continue or commence during the ensuing three-year period, and the reasons for their selection" (GA 515-3-4 1997). At a more detailed level, Arizona requires that "with its resource plan, a load-serving entity shall include an action plan, based on the results of the resource planning process, that: (1) includes a summary of actions to be taken on future resource acquisitions, (2) includes details on resource types, resource capacity, and resource timing, and (3) covers the three-year period following the Commission's acknowledgement of the resource plan" (ACC 2010).

Designing Electricity Resource Planning and Procurement Policies

In many states, planning and procurement processes help to level the playing field for energy efficiency and clean energy supply such as DERs. This section describes key components of an effective planning and procurement process, including participants, timing and duration, and consideration of factors that can affect the results of utility planning analyses.

[17] This is a joint effort by NARUC and NASEO, and one of the key goals of this joint effort is to improve grid resilience and reliability.

Both IRP and portfolio management for default service occur on a regular planning and/or solicitation cycle, which can range from about 1 to 5 years depending on the state. CPCN and preapproval dockets are triggered by specific utility actions, changes in commodity or market prices, or regulatory compliance obligations, and do not necessarily adhere to a regular or predictable schedule. IRPs typically take anywhere from a half year to a full year to complete, depending on the stakeholder engagement processes, and in certain instances can extend into the next IRP cycle. In contrast, CPCN, preapprovals, and default service proceedings are faster and may pass through a regulatory proceeding, which can be a quasi-judicial proceeding, with live testimony from witnesses and take as few as three months to six months or more.

Planning and portfolio management typically require reviewing decisions and investments with long lives or extended spending; portfolio costs and risks are thus reviewed over a longer term, from 10 to 30 years, which is the time horizon of most IRPs. In IRPs, short-term action plans usually include specific near-term actions or investments that are likely to result from the IRP. These action plans range from one to five years forward from the IRP. Some states provide or require intracycle IRP updates or reviews, in which prices, regulatory conditions, and model results are updated and checked.[18]

Participants

Effective planning requires engagement with stakeholders, intervenors, regulators, and the public through either collaborative or litigated processes. Various electric system planning and procurement processes engage a range of participants, including those who conduct, review, and ultimately approve the process. The state utility regulators, legislature, and utilities interact in different ways depending on state law and historical practice. Effective resource planning includes meaningful engagement with the following key stakeholders:

- *Utilities.* Utilities can either be IOUs, municipal government entities, cooperatively owned utilities, or even federal entities (as in the case of TVA and Bonneville Power Association). Generally, rates and costs at IOUs are regulated by state PUCs, while a municipal government operates and oversees municipally owned utilities and member-owners oversee cooperatives. Under most circumstances, IOUs have the greatest degree of state oversight through integrated resource planning, CPCNs and preapproval dockets, and ultimately rate cases. In some states, municipally and cooperatively owned utilities may not be required to submit plans for state review (except environmental permitting).
- *Regional transmission organizations (RTOs)*. RTOs are responsible for the reliability and adequacy of the transmission system, which directly affects the planning process.[19] Adequacy needs focus on load forecasting and studies to address retirements and new resources. Reliability needs focus on regional and specific planning studies commissioned by the RTO. State agencies often engage and participate at the committee and sub-committee levels within the RTO.
- *State PUCs*. State PUCs and their technical staff oversee, engage in, and/or monitor most state planning processes, including integrated resource planning, CPCN, and—in retail-choice states—default service or similar procurement proceedings. In some cases, utility regulators are limited by their statutory authority on their ability to weigh factors such as social or environmental impacts while in other regulators are required by statute to consider such factors. Utility regulators consider costs, risks, rate impacts, reliability, and continuity of service. Some utility regulators do not have direct knowledge of environmental regulatory matters or permitting processes and may rely on utilities and other regulated entities to present

[18] For example, utilities in South Carolina must submit IRPs to the PSC every three years and update them annually (SC Code 58-37-40 2019, 58).

[19] Independent System Operators (ISOs) are entities similar to RTOs which also may be engaged in power planning. ISOs operate within a single state, managing the transmission system and fostering market competition for wholesale electricity generation.

that information. Utility regulators' primary enforcement mechanism is the regulation of rates and financial incentives or penalties to utilities. They generally have a wide range of latitude in these matters.

- *Environmental regulators.* Electric generators have significant air, water and land use impacts that are subject to regulation and present important considerations for electricity resource planning and procurement. For example, state and local air agencies exercise both independent regulatory authority and delegated federal Clean Air Act authority to limit air pollution from electricity generators. Their responsibilities can include siting, permitting, and setting emissions standards for electricity generators. Environmental regulators may also be able to provide information about proposed or pending environmental regulations. Thus, some states have found benefits in strengthening relationships and communication between environmental regulators and utility regulators.
- *State legislatures, governors, and energy offices.* Elected state representatives may create state policies that either incentivize or require actions from LDCs (such as an EERS or RPS) or generators (such as carbon regulation in the Regional Greenhouse Gas Initiative and California) or provide guidance or requirements to PUCs (such as the guaranteed recovery of rates for environmental expenditures). State representatives and governors may not directly engage in specific utility plans. In some states, the governor is indirectly represented through the Attorney General's office or a state ratepayer advocate, and/or through the participation of state energy offices, which are charged with implementation of state policies and aligning those policies with those enacted at PUCs.
- *Community advocates and representatives from communities with environmental justice concerns.* Where planning and procurement processes occur, they are reviewed, commented upon, and/or audited by a variety of stakeholders and intervenors. Soliciting feedback from the public at the outset is beneficial for comprehensive decision making and identification of suitable goals for the IRP process. Environmental advocacy groups and community advocacy groups are increasingly engaged in both statewide planning processes and specific utility planning proceedings, including integrated resource planning, CPCN, preapproval, and default service dockets. Examples of stakeholder participation processes for electricity resource planning include the development of Washington's Clean Energy Transformation Act and Colorado Energy Office's GHG Pollution Reduction Roadmap, both discussed in State Examples section of this chapter. Advocates for communities with environmental justice concerns may need to be actively recruited for their input given that such organizations may face barriers to tracking utility regulatory proceedings.
- *Customer representatives*. In most states, a consumer advocate office represents the interests of residential (and sometimes commercial) ratepayers; these advocates may or may not have an interest or opinion regarding the procurement of clean energy resources. Industrial consumers or their representatives are often actively engaged in state planning processes, usually to minimize industrial rate impacts.
- *Clean energy developers and independent power producers.* Incorporation of clean energy developers or independent power producers could provide useful insights from the stakeholder perspective. These stakeholders could share their experiences on how state policy can facilitate or inhibit higher penetration of renewables, which can affect the growth of that state's industry and resulting economic development, as well as affect the long-term stability of costs to customers.

Interaction with State and Federal Programs

Utility and electricity generator operations, planning, and financial decisions are governed by state and federal rules and regulations. In addition, RTOs and independent system operators (ISOs) engage in regional transmission planning that may affect utility decisions. States have found it useful to consider these state, regional, and federal policies in electricity resource planning. In turn, findings from electricity resource planning are also considered in the design and implementation of related policies. Standard planning practice requires that utilities and generators follow legal requirements for emissions, system reliability, renewable procurement, and efficiency investments, among other considerations.

Energy Efficiency Resource Standards and Renewable Portfolio Standards

Many states maintain EERS and/or RPS or clean energy standard[20] policies, or minimum requirements for utilities (refer to other *Guide* chapters including Energy Efficiency Programs and Resource Standards). Because these standards generally create legal obligations for utility operators or other program administrators, states require their inclusion in electricity resource planning. Some states require that EERSs and/or RPSs be treated as a floor, rather than as a default procurement level that utilities should meet but not exceed. Many states also consider and model pending portfolio or efficiency standards or goals, although pending or voluntary measures may be modeled as a sensitivity or uncertainty instead of the reference case. Sample questions to answer when evaluating assumptions on future efficiency include how the scope of energy efficiency or the range of resource supply would change with greater funding for programs designed to reach low-income households or with increased participation of community-based organizations in power planning and permitting.

Standards are often measured by the percentage of retail electric sales. However, some states such as Iowa and Texas require specific quantities of renewable energy capacity, and the state of Kansas requires a percentage of peak demand. As of August 2021, 14 U.S. states have statutory goals to reach 50 percent or more of retail electric sales from qualified clean or renewable energy sources (NCSL 2021). Among these 14 states, several have set goals of 100 percent clean or renewable electricity, with target dates between 2032 and 2050. For example, Colorado has established 30 percent renewable integration goals by 2020 for IOUs, 10 or 20 percent renewable integration requirement for municipalities and electric cooperatives (determined by size), and 100 percent clean energy by 2050 for utilities that serve 500,000 or more customers (NCSL 2021). New York state’s 2019 Climate Leadership and Community Protection Act (CLCPA) requires electricity sales to be 70 percent renewables by 2030 and 100 percent zero-emissions electricity by 2040. Utility planning processes can also consider other state policies that may be in place, such as interconnection and net metering standards that govern the integration of onsite generation resources (refer to the *Guide* chapter Interconnection and Net Metering for more information).

Environmental Regulations

States typically require that utility resource planning address the state and federal environmental regulations that affect utility or generator operations. States could also consider the impacts on specific communities adjacent to generation resources, substations, or pipelines. Including proposed, pending, and emerging regulations in utility planning ensures that social and environmental costs are reasonably anticipated, and their effects quantified. In return, electricity resource planning can help to inform environmental planning, as some environmental compliance plans leverage electricity resource planning to find a reasonable least-cost

[20] A state clean energy standard (CES) policy is a type of electricity portfolio standard that sets overall targets for clean energy from sources that emit little or no air emissions in the generation process. In general, CES policies differ from RPS policies in the types of resources that qualify as “clean” or “renewable.” A CES may define clean energy more broadly than just renewables (NCSL 2021).

mechanism for meeting environmental requirements. Several federal Clean Air Act programs influence utilities' plans for types of electric generating units and pollution controls including Ambient Air Quality Standards, New Source Performance Standards for GHG Emissions, and more (RAP 2022).

Regional Transmission Planning

RTOs and ISOs engage in long-term transmission planning. Decisions regarding the maintenance or enhancement of transmission facilities have important consequences for the development of generation and energy efficiency resources. Electricity resource planning may consider not only the generation resources that are available with the existing transmission system, but also those that could be accessible via new or upgraded transmission lines. Planning processes can also consider whether costly transmission upgrades and enhancements can be deferred or avoided due to increased utility-scale renewable energy or distributed energy resources such as energy efficiency. The transmission planning process requires that the RTOs/ISOs understand which resources are likely to be available in future years, including clean energy. In some regions, such as ISO New England (ISO-NE), energy efficiency programs are explicitly considered in transmission planning. States engage in RTO/ISO planning via representatives on market rules committees and by providing feedback in regional transmission plans.

Key Considerations for Electric Utility Planning

States have found that the most effective planning processes require appropriate treatment and documentation of key assumptions used in utility analyses. Key assumption categories that may significantly alter planning analysis results are discussed in this section. In some states, many assumptions used in planning are considered proprietary by utilities, potentially including load forecasts, fuel price forecasts, costs of demand- or supply-side resource options, transmission costs, emissions costs, models, and more. States differ as to what information they require to be made public. In the case of proprietary data, only those intervenors signing protective agreements are granted access to these data.

This section presents key topics (not exhaustive) that some states address in their planning processes. For further insight into these and other important elements of electric utility planning, the Task Force on Comprehensive Electricity Planning, facilitated by NARUC and NASEO, has a library of technical resources (NARUC n.d.).

Load Forecast

Load forecasts of energy and peak demand play a key role in determining the need for new and existing resources, as well as the type of those resources; they provide the fundamental basis for any energy planning process. For example, a utility that expects to retire a power plant can forecast customer demand and then assess electricity supply and demand-side options to determine whether the retirement must be replaced with new, similarly-sized resources to meet demand.

In vertically integrated states, the utility often develops its own demand projection. States may require utilities to base forecasts of future load on realistic assumptions about local demographic changes and local economic factors (i.e., the movement of industry and housing), and to fully document these assumptions. Forward-looking resource requirements can change quickly, based on changing economic realities, energy prices, and projection methods. Frequent updates to load forecasts allow for reasonable planning.[21]

[21] In 2009, the Michigan Planning Consortium conducted a load forecasting survey for the Michigan Public Service Commission designed to help improve the planning process for electricity infrastructure projects. Most utility respondents said that load forecasts are updated at least annually and some more frequently (MPC 2009).

Load forecasting requires assumptions about future energy efficiency and demand response. Load forecasts that treat energy efficiency as a resource and model economic scenarios with specific end-use technologies "allow a direct comparison between the level of efficiency assumed in a load forecast and the level of efficiency that could cost-effectively be substituted for generation to meet future demand" (LBNL 2021). Utilities use other approaches, but this is an effective option to incorporate energy efficiency into system planning (LBNL 2021). There is variation among the utilities when accounting for demand response measures in load forecasts. Some utilities subtract projected savings from these resources into their load forecasts while others report them separately (LBNL 2016). The use of net forecasts could provide a more accurate reflection of the effects of demand-side programs and other acquired energy efficiency over the periods considered in the load forecast analysis.

In states with restructured electricity markets, demand projections are developed jointly between utilities and RTOs. This regional long-term load forecast is one foundation to help ISOs/RTOs determine the need for future transmission projects. Some regions, like New England, develop load forecasts of peak demand and energy requirements based upon econometric models. ISO-NE's forecasts of annual energy for New England as a whole and for each individual state and load zone is based on previous usage along with real electricity price, real personal income, gross state product, and heating and cooling degree days. ISO-NE adjusts its forecast based on its expectations of energy efficiency program effects (ISO-NE n.d.).

Existing Regulations and Incorporation of Environmental Goals and Targets

Numerous policies and regulations that affect electric utilities have been promulgated at the federal, regional, and state levels, with several others either proposed or under consideration. As discussed in the Interaction with State and Federal Programs section of this chapter, key policies related to electricity resource planning include EERS, RPS/CES, environmental regulations, and regional transmission planning. For example, siting considerations for new generation resources can go beyond meeting utility and landowner preferences to securing local zoning approvals and demonstrating that any emissions impacts will not violate local, state, or federal clean air requirements.

Many states have climate policies that influence utility resource plans—24 U.S. states and the District of Columbia have adopted greenhouse gas emission reduction targets to mitigate climate change (C2ES n.d.). Target and baseline years vary based on individual states and their circumstances, but the prevalence of these targets demonstrate increasing support for climate action integration within state legislative planning and directives to energy utility providers. For example, in 2021 North Carolina legislature directed the Utilities Commission to take actions to achieve a 70 percent reduction in carbon dioxide from public utilities in the state from 2005 levels by 2030, and establishes the goal of carbon neutrality by 2050 (NC H.B. 951 2021). The legislation supported the state's 2019 Clean Energy Plan that aimed to reduce overall GHG emissions 40 percent below 2005 levels by 2025 (NC DEQ 2019). The state of Louisiana has targets to reduce net GHG emissions 26 to 28 percent by 2025 and 40 to 50 percent by 2030, compared to 2005 levels, which were set through executive order from the Governor in 2020 (LA EO No. 2020-18 2020). Joining the U.S. Climate Alliance in 2019, Michigan committed to reducing emissions by about a third below 2005 levels by 2025. Executive Directive 2020-10 required the Michigan Department of the Environment to include an evaluation of Integrated Resource Plans for consistency with the state's emission goals in an advisory opinion filed with the Michigan Public Service Commission (MI ED 2020-10 2020).

Supply Options

Supply resource types vary by capabilities, capital costs, operation and maintenance expenses, and variable fuel costs. Supply options are also affected by capacity factors, i.e., how often the resource generates electricity, and how new or modified generation assets are financed. Utilities and regulators may receive information from RTOs regarding system reliability. RTOs typically review supply, demand, and transmission infrastructure to estimate a "planning reserve margin," a measure of how much the system must be overbuilt to maintain reliability under adverse conditions. States have found that electricity resource planning provides an opportunity to include energy efficiency, storage, and other DERs with other utility-scale clean energy options.

Many states require that utilities: 1) not place limits on renewable energy options without rigorous justification, and 2) examine DERs with the same rigor as traditional resources (refer to the Demand-Side Resources section below). For example, Oregon requires that utility IRPs consider a full range of resource options through an all-source RFP.[22] As of 2021, Colorado and Washington also require all-source procurement in state code or statute. A fair comparison among available resources includes the ability to characterize each resource's dispatch capabilities in addition to its cost and size (RMI 2021).

The availability and costs of raw materials, skilled labor, construction schedules, and future regulations can all present uncertainties. States have found it useful to require utilities to model a range of possible costs and construction lead times for supply alternatives. In addition, some states require utilities to evaluate supply technologies that are not currently feasible from a cost perspective but may become so later during planning periods. Connecticut's regulator recommends monitoring various technology incentive changes and cost changes, including cross-state comparisons, to plan for timing future procurements so they are likely to be cost-effective (CT DEEP 2020).

With larger proportions of electricity generation coming from variable renewable resources, states have found that requiring planning ahead for this integration can be critical to substantial renewable power integration. Renewable energy integration studies help specify what types of other system resources are required for energy delivery and transmission. These studies along with information about DERs can guide utility supply choices. Some states are requiring distribution system planning as part of IRP processes to account for the implications of DERs. In 2018, the Hawaii Public Utilities Commission ordered the state's utilities to develop detailed Integrated Grid Planning processes to include distribution system planning, stakeholder and customer input, and use of market values through mid-planning process requests for information (HI PUC 2018; Hawaiian Electric 2018). In 2022, the docket was ongoing, and the Commission finalized Hawaiian Electric's comprehensive inputs and assumptions for modeling future energy use and resource costs to use in its Integrated Grid Planning process (HI PUC 2022).

Finally, economic retirements of existing resources are part of electricity system planning. Some states have found it useful to require utilities to consider retiring and replacing existing resources with a single resource or a portfolio of resources. In 2019, North Carolina's Utilities Commission began requiring Duke Energy to add to its IRPs an analysis of potential economic retirements for all coal-fired units (NCUC 2019). Since 2011, the utility PacifiCorp, which serves customers in six western states, has evaluated the economics of select coal units in its IRPs.[23] As alternative supply resources became more cost-effective and U.S. electricity demand

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[22] Oregon PUC Order 07-002 on IRP Guidelines requires "identification and estimated costs of all supply-side and demand-side resource options, taking into account anticipated advances in technology" (OPUC 2007).

[23] For example, refer to PacifiCorp's 2021 IRP in which cost pressures are cited for planned retirement of most of its 22 coal-fired units: 14 by 2030 and 5 more by 2040 (PacifiCorp 2021).

remained relatively flat, most coal-fired units that retired after 2015 had not reached their planned retirement age (EIA 2019).

Demand-Side Resources

Some states require electricity resource planning to evaluate of demand-side resources including energy efficiency and demand response. However, the extent of its inclusion and categories of resources that are considered varies by state. Several utilities consider energy efficiency as a resource relative to supply-side options in their long-term planning, but others assume either a regulatory minimum or a series of modest efficiency goals. States with rigorous energy efficiency planning require utilities to submit efficiency potential studies, budgets, savings targets, and evaluations for approval by regulatory commissions.

States have found that energy efficiency potential studies done by organizations independent of utility companies, and overseen by an independent party, can be critical to developing state energy plans and utility resource plans (DOE 2018). These studies identify energy efficiency that is technically possible, cost-effective, and achievable. They produce data about technologies, products, costs, and savings that can be incorporated directly into planning processes and documents. States can choose to pursue energy efficiency beyond that which is cost effective to meet other policy goals – the Energy Efficiency Programs and Resource Standards chapter of the *Guide* provides additional information.

Transmission and Distribution

Utilities rely on an extensive network of transmission and distribution lines to deliver electricity to customers. As electricity providers move towards more renewable energy and DERs, transmission needs are likely to increase (EPRI 2022). States generally require utility electricity resource planning to reflect constraints in existing transmission (and sometimes distribution) systems. These constraints may limit the location or types of supply resources that can be added to (or removed from) the system. Vermont's statutes require VELCO (the in-state transmission company) to plan for the state's 20-year transmission reliability needs and update this plan every three years (VT 30 V.S.A § 218c 2005).

In highly constrained systems (i.e., where transmission is binding through multiple hours of the year), resource planning can focus on overcoming such constraints through transmission improvements and strategically placed DERs. Models vary in the extent to which they represent specific localized transmission constraints. Modeling typically assumes additional cost and construction timing if new interconnection infrastructure is required, such as transmission lines to reach wind farms.

Transmission constraints may play a role in procuring renewable energy, particularly when utilities consider how to integrate more significant blocks of variable renewable energy. Such questions are generally addressed through technical integration studies. Because energy efficiency and demand-response programs generally do not require transmission (as they are implemented at load, rather than across wires), states have found that these programs can pose a significant quantifiable benefit for transmission constraints—a benefit that can be considered in resource procurement and planning. Planning can also account for, and accommodate, inevitable generator outages and transmission failures.

Commodity Prices

The expected future prices of fuel, electricity purchased from regional markets, and emissions allowances can influence the economic consideration of existing and new generation resources, and thus the relative economics of avoiding costs of those resources by using DERs or utility-scale renewables. In some regions, renewables and DERs including energy efficiency must compete in an open market; the degree to which these resources are considered competitive depends on commodity price assumptions.

- *Fuel prices*. The economic viability and hourly dispatch of power plants is highly sensitive to fuel price forecasts. Fuel prices represent an important, if not primary, component of the overall cost of generation for facilities using gas, coal, or biomass, as well as the relative competitive value of alternatives that do not consume fuel such as DERs or utility-scale renewables. Because prices change over time, sometimes dramatically, an up-to-date fuel price forecast is critical. In some states, utilities review multiple third-party fuel price projections and present a range of potential outcomes.
- *Electricity and capacity market prices.* Electricity market prices refer to the wholesale cost of energy (in dollars per MWh) available to resources that either sell on an open spot market or sell to other utilities. In organized markets (PJM, Midcontinent ISO [MISO], ISO-NE, Electric Reliability Council of Texas, California ISO, and Southwest Power Pool), past market prices are published (PJM 2020). In other regions, market prices are implied, but represent the price that a utility could command by selling its excess energy to a neighboring utility. Capacity prices refer to the wholesale cost of maintaining capacity (in dollars per megawatt [MW]) for the purposes of meeting peak load. In PJM, ISO-NE, and, to a lesser extent, MISO, capacity is sold on a wholesale market. Energy prices are directly related to fuel prices, but an electricity system model is required to derive market prices. States have found value in updating energy price forecasts with fuel prices.

Modeling Approach

All electricity system plans require some level of electricity system modeling. Electric system models are designed to answer questions about possible scenarios and can range from high-level regional or national models to detailed generator-specific dispatch simulation models. In general, larger scale, long-term models are designed to evaluate federal or regional policies and forecast how these policies will affect multiple electricity generators. Simulation dispatch models (also commonly referred to as production cost models) are designed to determine how one or more individual generators will dispatch into the electricity grid on an hourly (or even 15-minute) basis over a period of months, and how specific generators compete against each other. Policy-scale models simplify dispatch and individual unit operations, whereas detailed models generally examine shorter, well-defined timeframes and conditions. Between these two extremes are models designed to determine what types of generators a utility may want to invest in, called capacity expansion models, and models designed to review how uncertainty in forecast prices or conditions affects individual generators.

IRP, CPCN, default service, and other medium- to long-term procurement planning processes are not restricted to the use of one of these models, although capacity expansion models are commonly used to evaluate which resource choices best meet customer requirements for a utility. In some states, models are used in sequence to define regional outcomes, then electricity market prices, and then individual electric generating unit behaviors. Each model has strengths and weaknesses when it comes to reflecting behaviors of the power system. Almost all models used for these purposes are licensed by model vendors and require significant expertise to operate and vet. Input assumptions about individual generating units (such as ramping ability or maintenance outages) can be proprietary information. Thus, while models are the framework in which assumptions are used, they are often also the most complex and opaque components of utility planning.

Implementation and Evaluation

Much of electricity planning consists of ensuring that a framework and assumptions are in place to develop a reliable, sustainable, and cost-effective plan. Development of these assumptions and the vetting of the framework is effective when utilities, regulators, and other stakeholders are all involved from the onset. Evaluating plan implementation is imperative to ensure price stability, cost-effectiveness, maintain risk-awareness, as well as equitable electricity distribution. Utilities are also often required to publish progress reports, which inform program updates and future improvements. This section discusses state approaches to implementation and evaluation of IRP, discrete resource approvals, default service, and other medium- to long-term procurement planning processes.

Implementation

In most states, utilities are generally responsible for implementing the planning or procurement policy. State commissions oversee the utility planning processes in their states. Typically, commissions solicit comments and input as they develop planning and procurement practices from a wide variety of stakeholders, including generation owners, default service providers, competitive suppliers, consumer advocates, renewable developers, environmental advocates, low-income and environmental justice community advocates, and energy efficiency advocates. The commission may also play a role in reviewing and approving utilities' planning procedures, selection criteria, and competition solicitation processes. In some states, such as Oregon, California, Indiana, and Georgia, the review and evaluation of IRPs are conducted in a docketed forum, in which commission staff and stakeholders can both issue formal or informal discovery and comment on the IRP's assumptions and construction. Electricity procurement for default service customers and larger scale CPCN processes are almost always docketed, litigated proceedings, with supporting testimony and a multiple-month schedule of discovery and fact-finding, pre-filed testimony, and often oral argument. Commissions make the final determination of whether default service and/or CPCN are acceptable.

Cooperatively owned utilities and municipal electric boards may not be subject to formal state utility regulatory oversight. In the case of cooperatively owned utilities, boards appointed by member-customers are charged with supervision; municipal governments that supply electric services regulate their own utilities. In rare cases, such as in Kentucky, the PUC reviews and regulates cooperatively owned utilities (KY PSC n.d.). The TVA has little or no state administration, although the utility delivers to 153 local distribution companies that are subject to state requirements (TVA n.d.).

Evaluation

State regulators can review a variety of metrics when evaluating a utility plan, including "least cost", reliability, rate impacts, price stability, and equity. Least cost generally refers to the lowest long-term system cost discounted to present day dollars, determined through forecasts for commodity prices and expected future regulations. Some states require that utility plans go beyond least cost in their resource choices to account for equity and environmental priorities such as targeting emissions reductions in communities that are disproportionately affected by air pollution associated with utilities. Examples of state policies with equity requirements for IRPs include California's SB 350 and Michigan's Executive Directive No. 2020 (LBNL 2021c; CA S.B. 350 2015; MI ED 2020-10 2020). Utilities seek to generally prepare plans that are consistent with regulators' requirements so the plans will be approved.

Risk is also an important component of evaluation analysis, and comprehensive risk assessments could identify scenarios where least-cost outcomes of a utility plan could depend upon factors other than reliability implications, short term rate implications, and price stability. A report on practicing risk-aware electric regulations indicates the growing relevance of risk awareness given current utility challenges such as aging power plant fleets, evolving energy technologies and environmental regulatory proposals (Ceres 2014). There are situations where investments in energy efficiency, distributed energy and renewable energy are more attractive for both risk mitigation and cost reduction relative to long-term investments in fossil-fuels and nuclear plants. Reduced capital and operational costs of renewable energy is a major driver for this. To reduce the risk of inequitable outcomes in terms of the distribution of financial or health burdens, states could consider an equity review of resource plans prior to approval. An equity review could, for example, look for patterns in the location of polluting infrastructure relative to demographics of nearby residents. The reviewers could then make recommendations to modify the resource plan to avoid racial disparities in pollution exposure, which has been documented as a pattern across all areas of the United States and across all emission sectors (Tessum et al. 2021).

States vary in the extent to which they review elements of the utility planning process. In some states, such as Oregon and Nevada, utility regulators conduct a rigorous review of IRP assumptions and processes (the State Examples section provides more on Nevada's oversight of IRPs). IRPs may be approved, approved with conditions, or sent back to utilities to revise their assumptions or processes. Some states do not require formal review of IRP processes or results.

Updates and Progress Reports

Regulators sometimes require utilities to submit electricity resource plans and progress reports at regular intervals. These plans and reports describe in detail the assumptions used, the opportunities assessed, and the decisions made when developing resource portfolios. Regulators carefully review these plans and either approve them or recommend changes needed for approval.

Oregon requires utilities to submit biennial IRPs and annual IRP updates (OPUC 2007). Similarly, the Iowa Utilities Board requires companies to submit annual reports on their energy efficiency and load management programs (Iowa 2014).

Action Steps for States

Most states already have some form of electricity resource planning process. These states may be able to take action to ensure that equal considerations are given to both supply and demand side resources during the planning consideration. States that already have resource planning processes can consider the following actions:

- Remove barriers to fair consideration of available demand-side resources by requiring utilities to use third-party energy efficiency potential studies and pursue all cost-effective energy efficiency.
- Update key assumptions for renewable energy so that values for current and future capacity availability and costs reflect current market conditions.
- Critically assess equity implications of the historic and future distribution of social and environmental impacts of resource procurement. Example considerations include whether least-cost resources are the most equitable choice in all cases, and whether projections of energy efficiency include underserved households and communities.
- Require utilities to incorporate existing state climate and emission goals, efficiency programs and resource standards, RPS, DER plans, and environmental regulations into their electricity resource modeling. Scenario assessments on expected future goals and regulations could provide additional perspectives on plans for future electricity resource acquisitions and operations.

- Ensure that a mechanism exists to connect the resource planning process to investment decisions. This can be facilitated by having a more actionable plan on a shorter timeframe based on approved long-term plans.
- Develop comprehensive risk assessment frameworks. While direct cost calculations play a key role in determining least cost pathways, risk assessment can hedge against future uncertainty and result in the development of a robust and resilient electricity sector.
- Leverage existing knowledge from state utility, energy, and environmental regulators.
- Increase transparency in planning processes—for example, by presuming that all information should be public unless demonstrated to be proprietary or protected business information.
- Promote meaningful stakeholder input, including feedback from consumer advocates and non-governmental organizations that promote clean energy including DERs. Renewable energy developers can provide insights into the benefits and challenges of renewable integration in the grid.
- Engage with community-based organizations to seek policy input through targeted outreach and opportunities for communication that are tailored to the needs the participating groups. Use strategies to make engagement more accessible such as materials translation, financial compensation for time spent at hearings, and convenient meeting times and locations.
- Incorporation of demand-side resources within the load forecast process and capacity expansion modeling could provide a more accurate reflection of the effects of demand-side programs and other acquired energy efficiency over the periods considered in the load forecast analysis.

States that do not yet have long-term electricity resource planning processes or have gaps in their current practices can also consider the following state actions:

- Define planning objectives based on state and stakeholder priorities. Consider the substantial potential benefits including capital investment deferment, DER integration, emissions reduction, and progress toward equity. Adopt state legislation that requires utility resource planning through the state utility regulator.
- Work through their state legislatures and/or utility regulators to establish new electricity resource planning processes or make statutory changes that remove barriers to fair consideration of all resource options.
- Establish community and stakeholder engagement processes for robust participation in resource planning. Collaborate and communicate with state agencies and local governments, environmental organizations, and communities with environmental justice concerns.
- Consider available technical support and funding sources. National labs and federal agencies offer grant funding and technical assistance to state governments, including energy offices and utility regulators, to facilitate the sharing of state best practices and to conduct stakeholder processes that help establish electricity resource planning.[24]

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[24] For example, see funding opportunities available to assist states in electricity resource planning may be made available through DOE's State Energy Program through the Office of Energy Efficiency & Renewable Energy.

State Examples

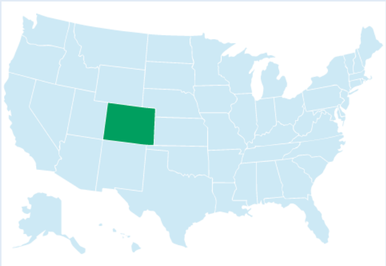
Colorado

The Colorado Energy Office helped direct the state's most recent Electric Resource Plan (ERP), which is the product of the state's IRP process, with its 2021 GHG Pollution Reduction Roadmap (CO Energy Office 2021). The Roadmap includes economy-wide actions to reduce GHG pollution and make progress toward the state's Climate Action Plan goals. Near-term electricity sector actions include the adoption of Clean Energy Plans and ERPs and use of the social cost of carbon when evaluating those plans (CO Energy Office 2021). The state requires Resource Plan filings every 4 years for all utilities (CO 4 CCR 723-3 2022). In 2019, the state passed legislation that requires Xcel Energy, the state's largest IOU, to file a Clean Energy Plan with the Colorado Public Utilities Commission (PUC) and allows other utilities to file Clean Energy Plans. A utility's Clean Energy Plan (CEP) must demonstrate an 80 percent reduction in carbon dioxide emissions by 2030 from a 2005 baseline. The CEP is part of the utility's resource planning (CO Energy Office 2021).

Colorado committed to climate equity and environmental justice in its development of the Roadmap and subsequent state action across sectors. To develop the roadmap, the state conducted a year-long process to gather input from communities with environmental justice concerns as well as communities that are economically dependent on high-GHG emission industries (CO Energy Office n.d.).

Consistent with the Roadmap, Xcel's 2021 ERP and Clean Energy Plan proposed to deliver an estimated 85 percent reduction in carbon dioxide emissions from 2005 levels by 2030. The proposed plan reflects the accelerated closure of three coal generation facilities and the conversion of another to natural gas as well as additions of nearly 4,000 MW of utility-scale renewables, 400 MW of battery storage, and just under 1,300 MW of DERs coming online by 2030 (Xcel 2021). Colorado Springs Utilities' resource plan include the accelerated closures of two coal generation facilities and no new fossil fuel generation investment after 2023 to comply with the Roadmap (Springs Utilities 2020).

The Colorado GHG Pollution Reduction Roadmap, State Legislation, and Regulations Guide Utilities' Electricity Resource Planning with Inclusive Community Engagement to Advance Equity and Achieve Emission Reductions



Colorado released its Greenhouse Gas Pollution Reduction Roadmap in 2021. During the Roadmap's development, electric utilities including Xcel Energy and Colorado Springs Utilities committed to a clean energy target of an 80 percent reduction in GHG pollution by 2030.

The utility targets are part of broader state goals for GHG emission reductions, as adopted in 2019 legislation: 26 percent by 2025, 50 percent by 2030 and 90 percent by 2050 from 2005 levels.

Xcel Energy's Colorado 2030 Clean Energy Plan aims to deliver an estimated 85 percent reduction in carbon dioxide emissions from 2005 levels by 2030.

For more information, refer to the following:

- Colorado Energy Office 2019 and 2021 Legislative Session Snapshots
- Colorado Energy Office GHG Pollution Reduction Roadmap
- Xcel Energy's 2021 Clean Energy Plan Filing Materials at PUC, docket number 21A-0141E

Many Colorado state laws and programs interact with utility resource planning and procurement policy. For example, state legislative action in 2019 established the State Climate Action Plan, certain electric utility resource plan requirements, and other complementary policies and programs that relate to utility resource planning (CO Energy Office 2019). The statewide Climate Action Plan outlined the following GHG emission reduction goals relative to a 2005 baseline: 26 percent by 2025, 50 percent by 2030, and 90 percent by 2050. In addition, the bill establishing the Climate Action Plan requires the state to identify communities disproportionally affected by climate change and to ensure that state climate action strategies benefit those communities through local air pollution reduction (CO Energy Office 2021). Two other bills adopted in 2019 include provisions that support the just transition to a clean energy economy for Colorado's coal workers and communities (CO Energy Office 2021). Legislation from 2007 launched the state EERS with goals for 2018 and required the Colorado PUC to set energy as well as demand savings goals for IOUs (CO H.B. 07-1037 2007). A 2017 bill extended the state's EERS for electric utilities to 2028 and set targets to reduce peak demand by 5 percent and achieve energy savings of 5 percent compared to a 2018 baseline. Utilities and the Colorado PUC make their IRP decisions taking into consideration these and other relevant state and federal policies and environmental issues that affect short- and long-term utility investments.

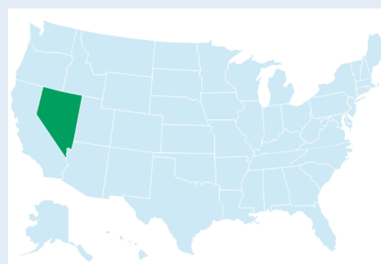
Nevada

The Nevada legislature updated its state IRP processes in 2017, requiring the Public Utilities Commission of Nevada (PUCN) to give preference to measures and sources that provide the greatest economic and environmental benefits to the state. In addition, the legislation expanded utility requirements for stakeholder engagement to allow for greater community participation by interested parties. Subsequently, 2019 state legislation strengthened the state RPS, which affects the amount of clean energy that utilities are required to include in their resource plans (NV S.B. 358 2019; NV S.B. 65 2017).

Nevada's IRP process was established in 2004. All IOU electric utilities must submit a resource plan to the PUCN every three years that demonstrates how the utility will meet demand for electric service in an efficient, reliable, and sustainable manner over a 20-year planning period. The utility's IRP must include a distributed resource plan and a three-year action plan(NV S.B. 146 2017).

The PUCN has the authority to approve, deny, or modify the plan's content. After a utility has submitted its plan, PUCN holds a hearing to determine whether the plan adequately forecasts its loads and resources, its energy efficiency savings, and whether it considers the benefits of improvements in efficiency, power pooling, power purchases, renewable generation including cogeneration, other types of generation facilities, and other transmission facilities. The PUCN gives preference to measures and sources that provide the greatest economic and environmental benefits to the state and provide the greatest opportunity for creating new jobs.

Nevada Prioritizes Clean Energy Resources that Provide Environmental and Economic Benefits in adopting State Policy on IRP and RPS Regulations



In 2017, the legislature updated its IRP requirements to prioritize resources that offer the greatest environmental and economic benefits for Nevada and expand opportunities for community engagement.

The IRP legislation granted authority to the PUCN to approve, deny, or modify the contents of the IRP. This includes determination of "the best combination of sources of supply to meet the demands or the best method to reduce them." The PUCN is required to give preference to measures and sources of supply that provide the greatest economic and environmental benefits to the state.

In 2019 the legislature established goals for IOU utilities to develop a net-zero carbon emission resource portfolio by 2050.

For more information, refer to the following:

- 2019 Nevada State Bill 358
- 2017 Nevada State Bill 65
- Nevada's Climate Strategy

The 2017 IRP legislation maintained the utility requirement to meet with PUCN staff and the Bureau of Consumer Protection prior to anticipated resource plan filing. To facilitate a more transparent planning process and gather more input from interested parties during the IRP process, the legislation added a requirement for the utility to engage with any other interested persons by providing a public-facing, easy-to-understand summary of the anticipated IRP filing and receiving their input (NV S.B. 65 2017).

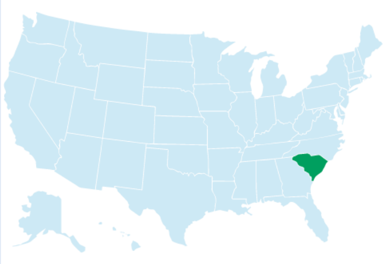
Complementary state policy that interacts with the state's IRP requirements includes Nevada's RPS. In 2019, legislation overhauled the state RPS, which directly affects utilities IRP processes, giving greater preference to clean energy resources. The state RPS requires 50 percent renewable energy by 2030 and net-zero carbon emissions by 2050 (NV S.B. 358 2019).

South Carolina

South Carolina expanded its IRP process in 2019 when the legislature unanimously passed the South Carolina Energy Freedom Act (SC H. 3659 2019). The new law changed the resource planning process by increasing transparency and requiring utilities to consider higher levels of clean energy resources in IRPs. The bill updated the procurement process by subjecting a proposed new generation facility to additional steps of comparative analysis and evaluation prior to construction approval. The Energy Freedom Act directs the South Carolina Public Service Commission (PSC) to consider seven factors before approving an IRP, including consumer affordability, compliance with state and federal environmental regulations, commodity price risks, and generation portfolio diversity. The PSC is to weigh these factors to decide whether the IRP is the "most reasonable and prudent means of meeting energy and capacity needs" (SC H. 3659 2019). The IRP requirements of the Energy Freedom Act apply to investor-owned utilities, electric cooperatives, municipally owned electric utilities, and state-owned Santee Cooper utility. In addition to IRP and procurement provisions, the Energy Freedom Act directs utilities to establish a voluntary renewable energy program for commercial and industrial customers, encourages utilities to offer a Neighborhood Community Solar program, and directs the PSC to support access to solar energy for low-income customers (SC H. 3659 2019).

South Carolina requires utilities to evaluate a range of supply-side, demand-side, storage and other available technologies and measures to include in the portfolio, including renewable energy, energy efficiency, demand response measures, and cogeneration each at various levels of adoption (SC Code 58-37-40 2019). In addition, utilities must update and include in the IRP their assumptions about facility retirements. The law requires Santee Cooper, the state's largest power provider, to include in its IRP a retirement analysis that quantifies any potential customer cost savings that could result from coal plant retirements. Utilities are to submit IRPs at least every three years and updates annually. The annual updates must include changes to the projected retirement dates of existing facilities as well as the renewable energy, energy efficiency and demand-side management forecasts (SC Code 58-37-40 2019).

South Carolina's Updated IRP Requirements Direct Utilties to Incorporate Retirement Analysis into Resource Planning



South Carolina passed the South Carolina Energy Freedom Act in 2019 that expanded the existing IRP process by requiring greater consideration of clean energy resources.

Since adopting the requirement, the South Carolina PSC has ordered that at least two major utilities resubmit IRPs that failed to include a comprehensive coal retirement analysis. The PSC ordered those utilities to make the IRPs and all coal retirement analysis data and models available for interested parties, increasing transparency in the resource planning process.

For more information, refer to the following:

- South Carolina's Code of Laws Title 58 –, Chapter 37 – Energy Supply and Efficiency
- South Carolina Energy Office 2019 Summary of the South Carolina Energy Freedom Act

In December 2020, in response to the proposed 2020 IRP from Dominion Energy South Carolina, PSC ordered the utility to submit a Modified 2020 IRP, based in part on the lack of consideration for near-term coal retirement and clean energy deployment in the initial draft (SC PSC 2020). The PSC ruled that Dominion Energy's IRPs must include a comprehensive retirement analysis of the company's coal plants. The PSC directed the utility to remodel resource costs using new cost assumptions for solar and storage, present an adjusted demand-side management (DSM[25]) portfolio that reflects higher levels of energy savings, and include a three-year action plan for near-term IRP implementation. In addition, PSC ordered that beginning in 2022, Dominion Energy was to update its methodologies for future IRPs. For example, to comply with the Energy Freedom Act transparency requirements, the utility must allow third parties to duplicate the IRP analyses by making the modeling software, inputs, assumptions, outputs, and spreadsheets available. Also, the 2022 IRP must examine the potential for four higher levels of capacity and energy savings from DSM, and future IRPs must incorporate U.S. Energy Information Administration carbon dioxide cost projections (SC PSC 2020). In 2021, the PSC similarly ordered Duke Energy to comprehensively analyze coal resource retirements for subsequent IRP updates (SC PSC 2021). In addition, PSC ordered Duke to include in its Modified 2020 IRPs and future IRPs an expanded evaluation of potential energy efficiency and DSM savings, including examinations of scenarios reflecting a future with higher fuel costs or a carbon pricing scheme. In the next IRP cycle, PSC directed Duke to consider natural gas transportation and delivery risks, such as high gas price or lack of availability that could result from pipeline project cancelations or rejections (SC PSC 2021).

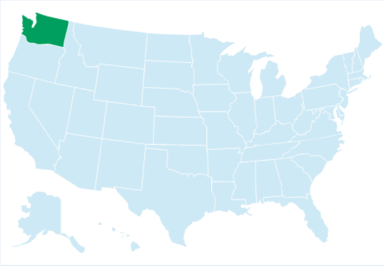
Washington

In 2019, Washington enacted the Clean Energy Transformation Act (CETA) that requires all IOUs and community-owned utilities to plan for and procure a carbon-free electricity supply by 2045. CETA also requires utilities to ensure that all customers are benefitting from the clean energy transition through the equitable distribution of energy and nonenergy benefits and reduction of burdens to vulnerable populations and highly impacted communities

CETA requires utilities to pursue all cost-effective efficiency and demand response, and plan for renewable resources and energy storage to meet projected demand. The law requires utilities to develop a clean energy implementation plan (CEIP) to ensure that their planning and procurement processes including IRP are in alignment with CETA's clean electricity standards (WA SB 5116 2019).

Washington requires a robust public participation process in the development of a utility IRP. Specifically, each utility must: account for barriers to participation specific to subgroups; provide for public participation during the planning process rather than after decisions have already been made; include public input into performance metrics or indicators; target highly affected communities or those

Washington State's Clean Energy Transformation Act Requires Utilities to Align their Planning and Procurement Processes toward a Carbon-free Grid and Establishes a Robust Public Engagement Process to Ensure Equitable Distribution of Benefits and Reduction of Burdens



The state of Washington passed the Clean Energy Transformation Act (CETA) in 2019, requiring all electricity to be renewable or non-carbon-emitting by 2045 and to consider equity issues across planning, procurement, and operations as part of the IRP process.

For more information, refer to the following:

- Washington Senate Bill 5116
- Washington State's Clean Energy Transformation Act

[25] DSM is a term for a utility energy efficiency program that supports customer adoption of efficient technologies and energy-saving measures (refer to the Energy Efficiency Programs and Resource Standards chapter in this *Guide*).

experiencing disproportionate risk from environmental burdens; and include public input into identifying vulnerable populations (WA WAC §194-40 2020). CETA directed the Washington Department of Health (DOH) to develop a Cumulative Impact Analysis to designate those communities that are highly affected by pollution and climate change. In the development of the Cumulative Impacts Analysis and accompanying environmental health disparities map, the DOH collaborated with an equity and environmental justice coalition,[26] University of Washington's Department of Environmental and Occupational Health Sciences, University of Washington's Climate Impacts Group, University of Washington's Center for Health and the Global Environment, the Washington State Department of Commerce, and the UTC (WA DOH n.d.).

The UTC issued implementation rules for CETA, including CEIP requirements, in 2020. In 2021 and 2022, UTC began evaluating the first utility IRPs and CEIPs submitted under the new CETA requirements. UTC maintains separate dockets for each IOU's CEIP and public participation plan (WA UTC n.d.).

Information Resources

Title/Description
American Council for an Energy-Efficient Economy. Energy Efficiency as a Utility Resource. (2017). This state policy database provides information on how certain states treat energy efficiency as a utility resource in their planning processes.
Ceres. Practicing Risk-Aware Electricity Regulation: What Every State Regulator Needs to Know. (2012). This report discusses risks associated with electric utility resource investment and suggests a risk-aware regulation approach that would allow regulators to reduce these risks.
Grid Modernization Laboratory Consortium, U.S. Department of Energy. Advancing Equity in Utility Regulation. (2021). This report is a compilation of essays, each covering how to incorporate equity into utility regulation.
Lawrence Berkeley National Laboratory, Electricity Markets & Policy Group. All-Source Competitive Solicitations: State and Electric Utility Practices. (2021). The report provides an overview of all-source competitive solicitations to help public utility commissions decide whether to allow, encourage, or require utilities to use them for the purpose of gaining new bulk power system resources.
Lawrence Berkeley National Laboratory. Exploring the Relationship Between Planning and Procurement in Western U.S. Utilities. (2017). This study reviewed the planning and procurement processes for 12 load serving entities in the Western United States between 2003 and 2014. Results showed that information from SIPs and other long-term planning are not used very often during the procurement process, implying that long-term planning documents don't provide helpful information for procurement.
Lawrence Berkeley National Laboratory, Electricity Markets & Policy Group. The Financial Impacts of Declining Investment Opportunities on Electric Utility Shareholders. (2016). This report examines the declining growth in electric utility investment and what policy responses could be used to restore lost value.
Lawrence Berkeley National Laboratory, Electricity Markets & Policy Group. The Future of Electricity Resource Planning. (2016). This report examines electricity resource planning and emerging issues in five areas: central scape generation, distributed generation, demand-side resources, transmission, and uncertainty and risk management.
Lawrence Berkeley National Laboratory, Electricity Markets & Policy Group. Regulatory Incentives and Disincentives for Utility Investments in Grid Modernization. (2017). This webinar discusses whether current regulatory approaches offer sufficient incentive for utilities to invest in grid modernization.
National Association of Regulatory Utility Commissioners. State Approaches to Intervenor Compensation. (2021). This paper identifies describes features of state intervenor compensation programs and provides case studies.
Compiled by the National Association of Regulatory Utility Commissioners. Topic 4 – Emerging Distribution System Planning (DSP) Practices. (2013-2021). A collection of resources on distribution system planning, energy efficiency, and IRPs.

[26] Front and Centered is a coalition of communities of color-led groups across Washington State that focuses on equity, environmental, and climate justice.

Title/Description
National Energy Screening Project. National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (NSPM for DERs) (2020). This manual provides instructions for how to screen cost-effectiveness of energy efficiency and other distributed energy resources.
Pacific Northwest National Laboratory. Energy Storage in Integrated Resource Plans. (2019). This report reviews 21 IRPs for utilities' treatment of battery energy storage and pumped storage hydro and whether they are taking advantage of the unique benefits of energy storage.
Regulatory Assistance Project. Energy Infrastructure: Sources of Inequities and Policy Solutions for Improving Community Health and Wellbeing. (2020). This report looks at how the impacts that electric and natural gas infrastructure have on economic, social, and health outcomes, especially regarding low-income communities. It explores ways policymakers can help create more affordable energy to ensure a more equitable future for clean energy.
Regulatory Assistance Project. Retooling Regulation: A Closer Look at Integrating Energy and Environmental Policy. (2016). This resource explains the E-Merge approach to integrating energy and environmental planning. This approach seeks to combine both integrated resource plans (IRPs) and state implementation plans (SIPs) and address any issues in the plans.
Regulatory Assistance Project. Why Integrated Resource Planning Matters for Air Quality. (2019). This presentation from a National Association of Clean Air Agencies (NACAA)-hosted webinar explains what IRP is, how it compares to a SIP, and why it matters for air quality.
Rocky Mountain Institute. How to Build Clean Energy Portfolios. (2020). This study shares recommendations for updated electricity resource procurement processes and explores three principles–all-source, objective-aligned, and least-regrets–that define the leading edge of resource procurement.
Rocky Mountain Institute. The Economics of Clean Energy Portfolios. (2018). This resource describes clean energy portfolios and technology costs. It also analyzes four new natural gas facilities compared to clean portfolios that provide the same services.

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