Planning for Electrification: Guidance on Aligning Gas and Electric Distribution Planning

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ABSTRACT

State regulatory commissions will have a significant role in planning for the transformation of electric and gas distribution utilities as the energy sector decarbonizes. Technological change and growing demand for building and transportation electrification complicate the long-term planning for electric and gas distribution systems. At the same time, regulators must continue to deliver reliable and affordable gas and electric service. In this context, commissions confront complex tradeoffs, technical barriers and uncertainty about the impact of their decisions. Many regulators are struggling to develop a comprehensive approach to forward-looking planning for how both electric and gas distribution systems will transition in the face of electrification of a broad array of end uses across several different affected industries.

To help inform potential coordination approaches, this paper begins with a summary of research on current electric and gas distribution system planning practices. The research focused on the extent to which states had robust distribution system plans in place across both the electric and gas sectors. It then identifies practices used today and provides guidance on opportunities to align the treatment of electrification (e.g., assumptions and scenarios) across planning processes, including electric distribution system planning and gas distribution planning. In this paper, we focus on both electric and gas distribution planning processes that exhibit the characteristics of enhanced transparency, improved information sharing and meaningful stakeholder engagement to advance more informed decision-making.

Introduction

Historically, electricity planning at the distribution level has been conducted by utilities with very little public engagement. However, over the last decade, electric utilities have faced an expanded set of distribution system planning objectives and goals, including aspirations for increased transparency on the investments and solutions selected. Energy stakeholders have also become increasingly aware of the role that electric distribution plays in maintaining the traditional features of an affordable and reliable electric system in a way that also supports the evolution of energy resources and advances state policy priorities — a recognition that has led to calls for more robust stakeholder engagement processes.

Data from Edison Electric Institute (2023) shows that U.S. investor-owned electric utilities' expenditures on their distribution system are growing, from about 27% of total company spending in 2016 to 34% in 2023. Given these significant investments, it is increasingly important for utilities to identify distribution system needs and solutions through better, more robust planning processes, increased data collection, and enhanced transparency for energy stakeholders.

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Gas distribution planning, on the other hand, is a relatively nascent area of practice, especially when compared with other more mature planning processes, including integrated resource plans and electric distribution system planning (Prause 2022). Though states generally have some form of gas distribution planning in place to meet needs during peak times, there is no consensus across states on the elements that make up gas distribution plans in the same robust way as those found on the electric side (U.S. Department of Energy — Office of Electricity 2020). Most of the states that have demonstrated an interest in evolving gas distribution planning processes are at the investigation stage, with only a few notable state examples where plans have been developed and submitted to commissions (National Association of Regulatory Utility Commissioners 2024).

Traditionally, electric and gas distribution planning activities are performed in silos. Moving forward, however, these processes must aim to be more coordinated to address customer preferences — given their increased options for building electrification — as well as account for the impact of decarbonization policies. Without increased coordination, there is a risk of creating an energy system that is larger and more expensive than needed. These inefficiencies can also limit the willingness of customers to bear additional costs related to investments that advance desired priorities, such as decarbonization and electrification.

Additionally, failing to harmonize gas and electric supply and demand profiles and forecasts across these planning processes could result in underbuilding or overbuilding, depending on the specific region of electric and gas service territories. Similarly, opportunities to advance policy objectives and expand customer service offerings while managing costs and maintaining reliability may be missed if stakeholders and decision-makers have only a partial view of the areas of need and appropriateness of proposed investments. Expanded data, with the proper context, will be key to making strategic, informed decisions that will help states navigate the anticipated changes across the electric and gas distribution systems.

Analysis

To gain a better sense of the existing landscape of electric and gas distribution system planning, as well as explore the case for coordinating these planning processes, we reviewed the planning practices across 10 key states (California, New York, Oregon, Minnesota, Colorado, Massachusetts, Rhode Island, Nevada, Illinois and Washington). To identify the states for this review, we began with a selection of states with a robust electric distribution system planning process in place and then focused on a subset that have also demonstrated an interest in gas distribution planning or a “future of gas” process (i.e., a formal investigation under their respective public utility commission to develop a view on what the gas planning process might evolve into).

Among these 10 states there is a relatively broad spectrum of maturity in planning efforts. We organized the states into three tiers, primarily based on the maturity level of their standalone gas distribution planning, given that all had some form of electric distribution system planning (Table 1).

- Tier 1 states have gas planning processes in place and plans that have been filed (California, New York and Colorado).
- Tier 2 states have made decisions to activate one or more components of a gas planning process but have not had comprehensive gas distribution system plans submitted (Oregon, Minnesota, Massachusetts and Washington).

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- Tier 3 states have indicated an intent to investigate gas distribution planning reforms but are still at the early stages of this process (Rhode Island, Nevada and Illinois).

Table 1. State overview of gas distribution system planning

	State	Key references	Description	Why it's notable
Tier 1: Taking the lead	CA	CPUC R.20-01-007 CEC 23-IEPR-01	Integrated gas/electric planning and modeling is accomplished through the Integrated Energy Policy Report and accounts for decarbonization and electrification impacts	CPUC removed incentives and financing subsidies for gas line extensions; BUILD and TECH programs fund all-electric housing and clean heat technology pilots
	NY	NY PSC 20-G-0131	NY PSC ordered each gas utility to file separate long-term plans accompanied by a meaningful stakeholder process	Includes assessment of non-pipeline alternatives and alternatives to replacing leak-prone pipe
	CO	COPUC 21R-0449G; 20R-0516E	Utilities are required to submit gas infrastructure plans every two years and clean heat plans every four years	Utilities must report and demonstrate how they would meet state greenhouse gas reduction targets in local distribution company operations
Tier 2: Making progress	OR	EO 20-04 UM 2178	OR PUC launched a fact-finding proceeding recommending that integrated resource planning and distribution system planning consider non-pipeline alternatives and electrification impacts	OR PUC requires assessment of alternatives considered when utilities file for approval of growth-driven gas projects
	MN	MN PUC CI-21-565; CI-21-566	PUC has opened docket on possible changes to natural gas regulation and frameworks to assess greenhouse gas emissions intensity	Dockets include stakeholder engagement processes on changes to existing utility planning practices
	MA	MA DPU 20-80	Utilities are required to file climate compliance plans starting in 2025 and to explore joint electric and gas planning and non-pipeline alternatives	Networked geothermal pilots, targeted electrification and climate metrics are also being explored
	WA	WA UTC U-210553; ESHB 1589	WA UTC has investigated energy decarbonization impacts and pathways for utilities to meet state emissions targets.	ESHB 1589 establishes integrated planning, including the full phaseout of natural gas end uses, consideration of non-pipeline alternatives and analysis of transportation electrification impacts.
Tier 3: Next movers	RI	Docket No. 22-01-NG	RI PUC launched the "Investigation into the Future of the Regulated Gas Distribution Business in Rhode Island in Light of the Act on Climate" in 2022	Non-pipeline alternatives policies have been established through energy efficiency and least-cost procurement statutory requirements
	NV	SB 146 (2017); SB 281 (2023)	NV PUC opened an investigation on long-term gas planning to include assessment of energy efficiency, electrification, and decarbonization on operations	SB 281 reformed gas planning from annual repointing to a more robust three-year planning cycle
	IL	ICC 23-0067; 24-0081 HB 3445	ICC staff required to prepare an initiating order on the future of gas within 90 days from the final 2023 utility rate case orders	A recent law requires ICC to launch thermal energy network workshops and develop a regulatory structure

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As indicated in Table 1, very few states have had utilities develop and file both electric and gas distribution system plans demonstrating a sufficient level of transparency and stakeholder engagement for informed decision-making on policy priorities and changes to customer preferences for energy services. Even for the few states that have robust plans submitted for both electric and gas distribution planning, none has gone through multiple cycles of the gas distribution plan development process, indicating further refinement of these approaches may be expected. Even at this early stage, however, it is possible to draw insights on these state experiences with evolved distribution planning.

Summary of Electric and Gas Distribution Planning Processes Findings

Electric Distribution Planning

About 20 states, including Oregon, Minnesota and New York, have established a more transparent distribution system planning process that assesses grid needs and required investments in the near term (~2-3 years) and long term (~10 years) (National Association of State Energy Officials and Lawrence Berkeley National Laboratory 2024). Though the exact nature of each planning process varies based on the jurisdiction, the components listed in Table 2 are generally present in a distribution system planning process.

Forecasts and energy profiles associated with emerging customer uses and supply resources can vary from those of legacy generation and demand. Advanced forecasting methods and system modeling may be used to better account for changes in customer consumption, as well as the impact of alternative and emerging resources for meeting customer demand for energy, including due to rooftop solar, energy storage and electric vehicles. Hosting capacity analyses allow utilities to get a better sense of the level of distributed energy resources (DERs) that may be integrated at the local circuit level, with current system assets and without impacting power quality or reliability. As grid needs are identified and disclosed to third-party solution providers, nonwires alternatives such as aggregated DERs may be deployed to defer or avoid traditional utility investments. A robust stakeholder engagement process is also a foundational element of this evolution in distribution system planning, as it allows for greater alignment between planned investments and local objectives, as well as facilitates the identification of new solutions and customer offerings.

Taken together, electric distribution planning across key states has evolved over the last decade and has resulted in relatively consistent frameworks of what the capabilities of these planning processes should entail (Lawrence Berkeley National Laboratory 2024a). In this time, several iterations of utility distribution plans have been filed across commissions, with refinements made in part through robust stakeholder processes along the way. Today, electric distribution planning processes are in place in about half the states in the U.S. and in more advanced states are being integrated with other planning processes to ensure consistency of assumptions and outcomes and clarity of vision (Lawrence Berkeley National Laboratory 2024b).

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Table 2. Electric distribution system planning components

Component	Description
Meaningful stakeholder engagement	Establishing processes for open dialogue, transparent information sharing, collaboration and consensus building among stakeholders
Advanced forecasting and system modeling	Enhanced forecasting to reflect the uncertainty of DER growth, more detailed system modeling of loads and DER impacts on the distribution system
Hosting capacity analysis	Determining the level of additional DERs each distribution circuit can accommodate without requiring upgrades
Disclosure of grid needs and locational value	Identification and publication of opportunities for DERs to provide grid services as nonwires alternatives; identification and publication of locations on each circuit where DER deployment can provide grid benefits
New solution acquisition	Acquiring or sourcing DERs from utilities, customers and third parties to provide grid services using pricing, programs or procurement — for example, using the peak demand reduction capability of smart thermostats in a targeted way to reduce circuit peak loads and avoid the need for circuit or substation upgrades

Source: Adapted from GridLab 2019 and U.S. Department of Energy 2020.

Gas Distribution Planning

Interest from states in establishing more transparent gas planning processes has predominantly been driven by policies that aim to decarbonize the economy, as well as the desire to better understand and manage the level of electrification of end uses that could be anticipated in the coming years (Strategen 2023). Though there is not a consistent gas distribution system planning framework in place, some examples from states at the forefront of this effort provide a view of how such a framework could develop soon, as demonstrated in Table 3.

There are several parallels between the sample gas planning capabilities in Table 3 and those established on the electric side (Table 2). Given the uncertainty of the pace and scale of electrification of end uses traditionally met by gas system service, there is a need to develop more advanced forecasts accompanied by the development of a range of scenarios that account for the potential deployment levels of gas system alternatives in the future. As certain customers electrify their end uses across geographies and alternatives such as thermal energy networks are deployed, the value of building and maintaining certain gas system assets may vary temporally and by geography. Disclosure of gas system needs over time and by location can inform when nonpipeline alternatives to traditional gas system investments may be prudent. And as is the case with electric distribution planning, a stakeholder engagement process can help illuminate areas of need and facilitate a dialogue regarding the role of new planning approaches and solutions.

On the whole, current gas distribution planning does not have a consistent framework across states and is less mature than its counterpart on the electric side. Though there are about 10 or so states that are exploring the potential for more advanced gas system planning, only a few have developed gas plans across their utility service territories (New York, California and

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Colorado). The misalignment in maturity across electric and gas planning processes makes it a challenge to coordinate them. Frameworks, planning processes and information may be limited or absent from existing gas planning processes, making it difficult to unify assumptions and approaches.

Table 3. Sample gas distribution system planning components

Component	Description
Meaningful stakeholder engagement	Establishing processes for open dialogue, transparent information sharing, collaboration and consensus building among stakeholders
Advanced forecasting and system modeling	Enhanced forecasting to reflect the uncertainty of the pace of electrification, more detailed system modeling of demand and scenarios
Disclosure of gas system needs and locational value	Identification and publication of opportunities for alternatives to traditional gas system investments to provide value, including thermal energy networks, strategic asset decommissioning and beneficial electrification
Gas innovation portfolio	Innovative resources acquired to satisfy state policy objectives and allow customers to meet a portion of or all their energy needs through innovative resources
Nonpipeline alternatives	Third-party solutions that may be used to defer or avoid traditional utility investments in gas system capital projects, resulting in lower costs while maintaining reliability

Source: Adapted from New York State Electric & Gas and Rochester Gas and Electric 2024.

Benefits and Challenges to a Coordinated Electric and Gas Distribution Planning Process

The interactions among assumptions, forecasts and solutions clearly show the need to ensure that planning and investment strategies across electric and gas planning processes are complementary and coordinated. Potential benefits of more integrated planning processes include:

- Providing better outcomes for utility customers and the public by improving process and administrative efficiency.
- Enhancing the opportunity for knowledge sharing among internal utility teams.
- Strengthening the commission's ability to issue guidance across related processes.
- Providing greater confidence in the validity of resulting plans.
- Reducing barriers to participation, improving understanding and providing greater transparency for interested stakeholders.
- Allowing for streamlined discussion and discovery and improved strategic outcomes.

However, there are challenges to realizing these benefits. Before attempting to align gas and electric distribution system planning processes in a comprehensive way, gas planning

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capabilities need to be developed further and mature. Again, few states today have gas system planning processes that exhibit the kind of reforms and capabilities, such as in new solution acquisition, that we have seen on the electric side. To develop the required gas planning processes, states may need to experiment (through some necessary siloing) with gas planning capabilities to arrive at the desired outcomes. Gas system planning is at the early stages of its journey in delivering a process that allows for stakeholders and decision-makers to understand and engage on how gas system offerings to customers can and should evolve. It is important, however, to not only understand the impacts this evolution may have on the electric system, but also understand the scope and pace of these changes in a coordinated process.

Insights and Recommendations

Strategies to improve coordination between electric and gas distribution planning can draw on an emerging trend to combine traditionally siloed electric system planning processes. For example, in December 2022, the Minnesota Public Utilities Commission issued an order unifying the planning practices for electric transportation and local distribution systems for regulated electric utilities (MPUC 2022). The anticipated benefits of combining these processes included improving process and administrative efficiency and more effectively using stakeholder time and resources. The first plans incorporating these transportation and distribution planning processes into one strategy, providing greater transparency on how these processes interact and consistency of assumptions, were filed with the commission at the end of 2023 (MPUC 2023a).

Similarly, the Hawaii Public Utilities Commission directed the Hawaiian Electric companies to develop an integrated grid planning process that brings together traditionally disparate planning and procurement activities into a unified process, including grid modernization plans, electrification of transportation plans, demand management portfolios, integrated distribution plans and integrated resource plans (Hawaiian Electric 2023). Through the integration of these processes, the commission sought to better appraise total system needs and consider all alternative solutions available from customers, independent providers and the utility. Additional anticipated benefits of increased coordination and integration across these traditionally siloed processes included strengthening the commission's ability to issue guidance across related processes; improving stakeholder understanding of and confidence in utility strategies; and enhancing the opportunity for knowledge sharing among utility teams. The commission subsequently accepted Hawaiian Electric's 2023 integrated grid planning final report. It also provided guidance to the companies on the strengths and opportunities of the plan, as well as set expectations for future iterations of the filing to further evolve (Hawaii Public Utilities Commission 2024).

Another strategy that could be leveraged to coordinate planning is the use of a statewide forecast. For instance, the California Energy Commission develops consistent forecasts that investor-owned utility companies use in their electric system capital investment plans. The process for the energy commission to generate statewide gas system forecasts is still being refined, so investor-owned utilities are still responsible for generating their respective gas system forecasts to better manage reliability needs until the impacts of factors such as electrification of end uses on the gas system are better understood.

Similarly, states can anticipate the kind of information sharing that could be important for a coordinated gas planning process, including alignment on assumptions behind forecasts, the portfolio of solutions for addressing areas of system need, and actionable information to inform decision-making.

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As discussed earlier in this paper, a coordinated electric and gas planning process can lead to better outcomes, including maximization of the most effective resources to meet system needs, increased cost-effectiveness and greater stakeholder confidence in capital investment decisions. A coordinated electric and gas planning process can result in better plan outcomes including the maximization of the most effective resources to meet system needs, cost effectiveness of solutions ultimately selected, and greater surety across stakeholders that plans developed, and capital deployments made are optimized and allow the opportunity for course-correction when necessary. Not having a coordinated process in place could lead to missed opportunities for timely action on desired priorities, including with respect to affordability and electrification.

Yet the benefits of coordinated and robust distribution planning processes for electric and gas do not accrue only to states with ambitious decarbonization and policy objectives. A case can be made that these advanced planning processes are even more important for states where changes in customer consumption are driven mostly by organic customer electrification preferences, since the scale of the investments and strategies needed to meet this growth, as well as the customer cost and affordability implications, is more difficult to anticipate.

In any case, all states can benefit from having a clearer view of how increased coordination and integration between planning siloes can enable better-informed decisions.

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