# Practical steps for a flexible utility path to decarbonization

## Introduction

The imperative to decarbonize has risen to one of the top boardroom priorities for every utility.

The path to decarbonization, however, varies in pace and shape across different utilities and the areas each utility serves. In some cases, decarbonization plans are driven by new—and sometimes very aggressive—legislative mandates. In other instances, net zero or carbon neutrality is part of a broader corporate strategy and commitment. Regardless of the driving factors, one cannot discount the complexity of deeply reducing greenhouse gas (GHG) emissions in a way that successfully balances economics, reliability, and customer affordability, and builds consensus.

Each situation is shaped uniquely by a utility's operating reality, but any effective decarbonization process requires rigorous analysis, planning, implementation, tracking, and reporting.

Making key strategic decisions at any point on the path to decarbonization can feel overwhelming. Therefore, the goal of this paper is to provide guiding principles and practical tips for flexible utility decarbonization planning. The paper also examines examples of how large, integrated utilities are approaching decarbonization and demonstrating practical steps in action.

The practical tips and case study insights in this paper can be adopted and adapted for any utility decarbonization planning and implementation process.


**The ICF Climate Center** offers compelling research and unique insights to help organizations achieve climate goals. We draw practice-driven insights from our climate consultancy and our deep expertise as one of the world's leading science-based climate consultancies. Our insights are driven by science, technology, predictive analytics, 40+ years of experience, and—most importantly—a passion for making a positive impact on the world.

## Guiding principles for utility decarbonization

In our work with utilities on their decarbonization efforts, ICF has found several common guiding principles utilities use to achieve their goals:

- **There is no silver-bullet decarbonization solution, strategy, or technology.**
- **Comprehensive analysis is required to progress to practical solutions.**
- **Accelerated action is likely, so embrace it despite the difficulties of short-term prioritization.**
- **Existing solutions should be balanced with yet-to-be-proven solutions.**
- **Decarbonization cannot live in a vacuum inside the utility.**

While every utility's decarbonization strategy will be different, the right approaches have several themes in common. They will:

- **Be built on robust analysis and assessment of all options without presupposing the answers.**
- **Pursue no-regrets actions first, testing and reviewing different approaches to more complex solutions.**
- **Avoid committing to specific paths sooner than necessary to preserve flexibility.**
- **Consider the potential trade-offs between investing in low-carbon options and system reliability and resiliency.**
- **Take into account cost impacts on customers, ensuring that the most vulnerable customers are not overburdened and have a realistic path to participate in the benefits.**
- **Consider multiple scenarios, because every scenario forecast will be wrong in certain respects.**
- **Rely on collaboration, often with new and nontraditional stakeholders.**

## Practical steps for utility decarbonization

### Step 1: Understand what's driving the imperative to act

Utilities will be spurred to action for clean energy and decarbonization by new policies, executive mandates, regulations, emerging operational vulnerabilities, or investor pressure—or all of the above. These drivers often result in goals that will broadly define the shape and pace of a utility's decarbonization strategy. For example, there may be a focus on certain technologies, timelines, or thresholds that define how decarbonization should be achieved. Based on each utility's mix of policy, regulatory, operational, and investor-related drivers, leaders must decide how rigorous their analysis should be and who needs to be engaged in the process in order to properly shape the utility's approach to decarbonization planning.

## Step 2: Study technical, economic, timing factors

After developing a firm grasp of the guideposts created by a policy mandate, rule, or corporate directive, utilities must examine how to achieve the desired or required outcome from a technical standpoint. For example, what level of GHG reduction could the expanded use of renewable energy and energy storage deliver affordably and reliably? How could next-generation energy efficiency, distributed energy resources, and flexible load management complement traditional supply-side options? How optimistic should a utility be in new and emerging technologies?

After technical potential analysis, utilities should study the economic potential of the technical solutions they unearth. If a new decarbonization policy includes an aggressive 2030 intermediate goal on the way to a 2050 net zero goal, is a high-potential but less commercially developed solution a realistic pursuit for the 2030 goal? Perhaps efforts to accelerate EV adoption are better suited from a cost and timing perspective. Consider the costs and timelines associated with technical solutions, and study supply and demand solutions to recognize the preferred pathways to decarbonize.

## Step 3: Assess the reality on the ground

Moving from strategy to planning, the decarbonization planning process should begin by considering the utility's reality on the ground. What programs does the utility have in place that might need to evolve to meet the goals of the decarbonization strategy? What new programs should be created? What innovative technologies or energy resources may be used or developed? How will the strategies the utility is pursuing, given potential technology and program changes, impact reliability? How will energy equity and justice concerns be managed in the service territories?

Lastly, this stage of planning involves understanding how the utility's decarbonization efforts will be paid for. If federal and state programs are available to help fund the transition, taxpayers might be a significant part of the approach. Increased bills for customers might be another approach, but the utility will need to work with regulators on whether the increased costs should be paid in the form of a surcharge, base rate increases, performance-based mechanisms, or some other on-bill means.

## Step 4: Identify implementation challenges and opportunities

Utilities should study program designs to determine which might be the most cost-effective for decarbonization, factoring in both scale and timeline.

When a utility assesses the reality on the ground, it might discover several promising decarbonization solutions that have high potential for reducing GHGs and are cost-effective. Utilities must go deeper in this step, though, to study if the cost-effectiveness will hold up at scale. For example, replacing gas heaters with electrified heat pumps in 60,000 buildings might theoretically be a cost-effective means to drive significant decarbonization. However, if the service territory lacks contractors to complete that volume of installations by the requisite date, even with rebates and incentives to manage costs, then the projections shown by modeling or plans become moot.

Utilities must also align timelines because utility program planning tends to be shorter term while decarbonization planning involves longer time horizons. Programs will fall short of their potential to reduce GHGs and be cost effective if the planning cycles aren't lined up.

## Step 5: Cycle learnings back to the top

The previous steps follow a macro to micro path. What started beyond the utility at the policy level moved inward to a utility-wide strategy informed by technical, economic, and timing factors. Then, the process moved deeper into the organization to the program level. Finally, the process focuses on granular logistical details needed to accomplish individual milestones, such as identifying a shortfall of electricians to install heat pumps.

The steps don't end when this macro to micro path is completed, however. Learnings from the increasingly micro levels of the process should cycle back up to the macro level to ensure an ongoing strategy, planning, and implementation refinement.

For example, the team that uncovers the estimated shortfall of electricians for HVAC work should report the finding to appropriate utility leaders and stakeholders, who may need to advocate for a state workforce development policy or seek regulatory approval for a utility-driven workforce development initiative.

## Guiding principles and practical steps

Duke Energy, with utilities operating across multiple jurisdictions, and BG&E, an Exelon utility operating in Maryland, offer two unique case studies that demonstrate these guiding principles and practical steps in action.

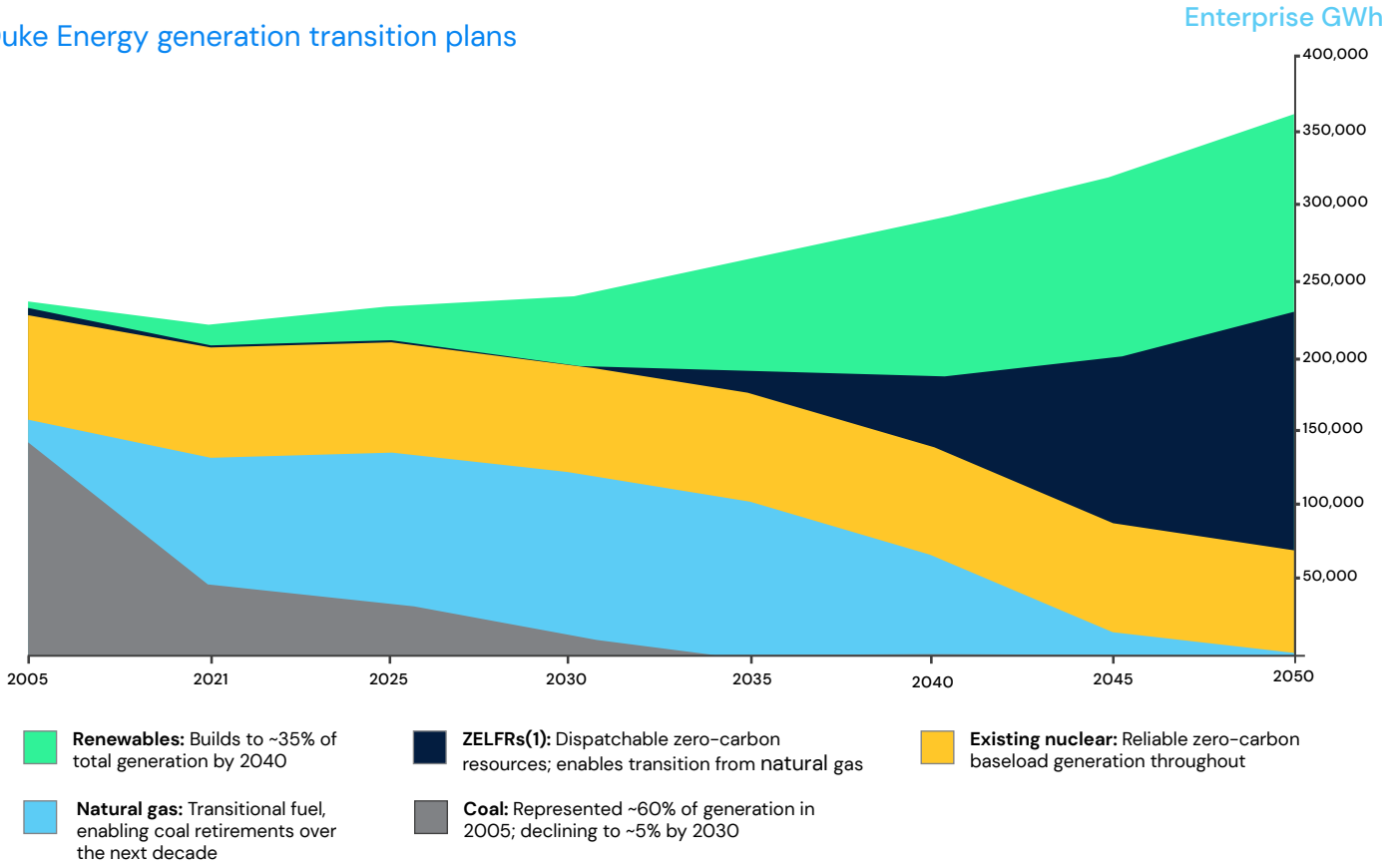
### Duke Energy's corporate decarbonization planning

Duke Energy—with utility service territories in North Carolina, South Carolina, Florida, Indiana, Ohio, and Kentucky—first committed to a corporate decarbonization goal more than 10 years ago.

In 2019, the company adopted its first net-zero goal for carbon emissions from electricity generation by 2050, and it increased its 2030 goal from 40% to 50%. The following year, the company committed to achieve net-zero methane emissions from its natural gas local distribution companies by 2030. In 2022, the company's leaders decided that Duke Energy needed to go further with a deeper commitment across the entire organization.

For the 2022 update, Duke Energy's interdisciplinary team oversaw an extensive process involving internal and external stakeholders. This led to the company committing to a new interim goal to reduce its Scope 1 carbon emissions from electricity generation 80% by 2040, reduce Scope 2 and certain Scope 3 emissions 50% by 2035, eliminate the use of coal across its fleet by 2035 (pending regulatory approval and replacement generation), and achieve net-zero emissions for Scopes 1, 2, and certain Scope 3 by 2050. In total, the emissions addressed by Duke Energy's goals comprise over 95% of the company's Scope 1, 2, and 3 emissions.

Duke Energy generation transition plans




*Source: Duke Energy*

After the goals were established, Duke Energy's enterprise strategy team worked with its own internal cross functional team as well as with ICF to help the natural gas business create specific decarbonization plans, identify barriers, evaluate new technologies, and revise assumptions—integrating both potential changes for energy demand and supply. Once the company's gas and electric businesses put their individual decarbonization plans in place, they were evaluated together in aggregate to ensure they would enable Duke Energy to meet its companywide goals. Using learning from the business lines' planning process, the enterprise strategy team also worked with the company's state policy teams to plan how to best leverage policies in different jurisdictions.

A broad coalition of stakeholders worked on a corporate decarbonization strategy that led to business-specific plans, which cycled back up to the top to guide strategic refinement.

## BGE's programmatic decarbonization planning

BGE faced a new imperative to start decarbonization planning with haste when Maryland passed the Climate Solutions Now Act of 2022 (CSNA). The law calls for a 60% GHG reduction by 2031, net-zero emissions by 2045, and includes several other specific provisions such as building electrification goals.

BGE's first response to the new law was to evaluate and understand its requirements. The utility gained insight into how it might need to approach distribution system planning for increased distributed energy resources (DERs) and electric vehicles (EVs), building electrification, and school bus electrification. In addition, it examined how the existing Empower Maryland state energy efficiency program might change to become more decarbonization focused.

BGE conducted a model analysis, using key provisions in the CSNA as parameters, to examine available pathways it could pursue to achieve deep decarbonization, including a high electrification pathway and integrated energy systems with low-carbon fuels pathways. The analysis helped BGE gain a perspective in favor of an electric and gas integrated decarbonization strategy, due to the lower cost and lower risk the models predicted that approach could deliver. It also empowered the utility to identify essential building blocks for its decarbonization strategy, including:

- **Transition to a lower-carbon generation stack.**
- **Launch a building electrification program.**
- **Accelerate its transportation electrification program.**
- **Develop strategies for energy efficiency, demand response, and managed EV charging.**
- **Expand electric grid capacity.**
- **Convert to decarbonized fuels in the natural gas distribution system gradually.**
- **Evaluate emerging technologies.**
- **Pursue policy and regulatory actions that will enable the clean energy transition.**

## Conclusion

Decarbonization strategy, planning, and implementation are complex endeavors, requiring action and commitment at every level of a utility organization and from external stakeholders. Knowing where and how to start the process is difficult. Starting on the wrong foot or failing to integrate decarbonization with other planning efforts properly can hamper efforts for years, even decades.

Consider utility integrated resource plans (IRPs). Every utility engages with a broad range of internal and external stakeholders on a complex IRP process. Given that IRPs frame a utility's strategic path for years at a time, failing to integrate and align the decarbonization process with the IRP process could be a multiyear setback. Following the guiding principle that decarbonization doesn't live in a vacuum and implementing the practical step of cycling learnings back to the top could help avoid such a costly missed opportunity.

Every utility needs to rely on tested guiding principles and practical steps to avoid regrets later when it comes to their respective decarbonization journeys.

ICF provides utilities with the analysis, modeling, and planning tools needed to confidently make no-regrets decisions on the decarbonization journey. ICF's program implementation support ensures each step on the journey executes the strategy and achieves goals.

## About the authors

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Deb works with local, state, and federal governments and utilities across the United States to plan for and implement decarbonization strategies. Examples include New York City, Philadelphia, multiple Northern Virginia counties, Los Angeles, Pennsylvania, Oregon, Delaware, Con Edison, National Grid, and Duke Energy. She has worked with the U.S. Environmental Protection Agency, the U.S. Department of Homeland Security, the U.S. Agency for International Development, the UK Department of Energy and Climate Change, the Global Carbon Capture and Storage Institute, the Western Climate Initiative, and the World Bank Partnership for Market Readiness, among others.

Deb is also a senior fellow with the ICF Climate Center. In this role, she provides compelling research and objective perspectives on a wide range of climate-related topics to help advance climate conversations and accelerate climate action.

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Justin is an expert in project and program management, including strategic planning, customer acquisition, finance, quality assurance, and technical training. Using his background in residential construction, building science, and energy management, Justin has worked with numerous private sector clients on several award-winning projects.

Justin leads all ICF's energy-efficiency, decarbonization, and electrification projects for utility clients in the Mid-Atlantic region.

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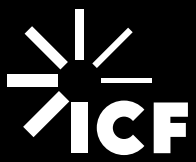
Michael serves as the founding Executive Director of the ICF Climate Center, a resource hub for knowledge and insights on climate mitigation, resilience, and adaptation, drawn from ICF's 2000+ climate, energy, and environment professionals.
Michael's career in energy has reached across both investor-owned and consumer-owned utilities. He has served as a policy advisor to governors and has been an early team member at several successful clean technology startups, including Utilidata, Varentec, and Silver Spring Networks.

Michael most recently served as Vice President for Government Affairs at the Pacific Northwest Generating Cooperative. He chaired an energy task force for Oregon Governor John Kitzhaber and crafted landmark electricity legislation as a policy advisor to the campaign and administration of Ohio Governor Ted Strickland. Michael began his career managing environmental and climate change policy at American Electric Power.



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## About the ICF Climate Center

The ICF Climate Center offers compelling research and unique insights that help organizations establish clear, practical pathways forward through the combination of climate science and predictive analytics. The Center builds upon the work of 2,000+ climate, energy, and environment experts worldwide—making us one of the world's largest science-based climate consultancies. ICF works with business, government, and nonprofit organizations to design and implement programs and policies that drive low-carbon transitions and build resilience against the effects of climate change.

## About ICF

ICF is a global consulting services company, but we are not your typical consultants. We help clients navigate change and better prepare for the future. Our experts have been embedded in every corner of the energy industry for over 40 years, working at the intersection of policy and practice. We work with the top global utilities, plus all major federal agencies and relevant energy NGOs, to devise effective strategies, implement efficient programs, and build strong relationships with their customers. From creating roadmaps to meet net zero carbon goals to advising on regulatory compliance, we provide deep industry expertise, advanced data modeling, and innovative technology solutions, so the right decisions can be made when the stakes are high.