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RURAL ELECTRIC COOPERATIVES AND THE TRANSITION TO A CLEAN ENERGY FUTURE

A Guide for Cooperative Leaders

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Executive Summary

Rural electric cooperatives are foundational institutions within their communities, serving not only as energy providers but also a cornerstone of economic development and community well-being. America's 832 distribution cooperatives and 63 generation and transmission cooperatives provide electricity to more than 20 million farms, schools, town halls, businesses and homes.[1] Their wires deliver power to more than 56% of the landmass of the United States, providing critical modern services for families in rural communities and growing suburbs alike. Cooperatives play a particularly crucial role in addressing energy burden and serving those with the fewest resources; 92% of persistent poverty counties get electricity from a cooperative.[2]

Cooperatives in the United States evolved out of the need to electrify rural America in the 1940s. These community-based and community-led institutions were founded to bring electricity to those left behind in the electrification revolution by investor-owned utilities. Their democratic governance structure, typically a board of directors directly elected by the member-owners of the cooperative, was instituted to ensure these utilities met local needs and served local people well. Rural electric cooperatives, to this day, ground their work in the seven cooperative principles:[3]

1. Open and voluntary membership.
2. Democratic member control.
3. Members' economic participation.
4. Autonomy and independence.
5. Education, training and information.
6. Cooperation among cooperatives.
7. Concern for community.

These values underpin cooperatives' service to their communities. The model has been so successful that today cooperatives provide power to more than 42 million people and have the highest customer satisfaction scores of any type of electric utility.[4]

The electric utility industry — including rural

1 National Rural Electric Cooperative Association. (2021, October). *America's electric cooperatives.* https://www.electric.coop/wp-content/uploads/2021/10/NCS-4745_Co-ops-Facts-and-Figures-Update_10-21-21_WEB.pdf

2 National Rural Electric Cooperative Association, 2021.

3 National Rural Electric Cooperative Association. (2016, December 1). *Understanding the seven cooperative principles.* https://www.electric.coop/seven-cooperative-principles%E2%80%8B

4 National Rural Electric Cooperative Association, 2021.

cooperatives — is undergoing a transformation today that is on par with some of the biggest industrial transformations in history. Just as computing and telecommunications rapidly evolved from capital-intensive industries with centralized operations to customer-driven, distributed business models, the energy sector is quickly transforming to be ever more consumer-centric, modular and distributed. These changes are catalyzed by advances in technology, shifting economics, changing policy and member-owner demands for cleaner energy and greater energy system security.

The clean energy transition provides a unique opportunity for cooperatives to utilize these resources to provide safer, cleaner, more reliable and more affordable service to their member-owners. By engaging in this transition proactively and through the lens of the seven cooperative principles, electric cooperatives can pursue synergistic benefits for their own operations, their member-owners and the communities they serve, while positioning themselves to reduce emissions and build systems resilient to climate change. Wind and solar are now the cheapest forms of new generation in most of the United States, and their market share is growing rapidly. Storage and other technologies are coming online to help balance electricity load, including to address the intermittency of renewable generation sources.

This paper is designed to provide a guide for rural electric cooperative board directors, managers and staff seeking to make responsible, forward-looking planning decisions and investments within a clean energy transition while meeting their bedrock obligations to balance load and ensure service reliability in an economical manner.

This Executive Summary provides an entry point for each of the main components of the clean energy transition. Each topic is explored in greater depth in the full report.

The Clean Energy Transformation

The clean energy transformation can be broken down into three trends that are accelerating in parallel, each of which has the power to drive immediate benefits for the cooperative, its member-owners and the broader community.

Essential components of the clean energy transition include:

1. Energy efficiency
2. 100% carbon-free electricity
3. Electrification

These changes are being set in motion and supported by advances in technology in electricity generation, management and storage. And they are driving costs down rapidly, with wind and solar now the least-expensive sources of new generation in most of the United States. In many locations, it is cheaper to build new solar or wind than it is to simply operate aging coal and gas generating facilities.[5] There are key technical constraints — balancing load, ensuring consistent voltage, interconnecting distributed resources — but there are proven methods today to address what once were barriers to wide-scale deployment. Use of these resources now allows a cooperative to better position itself for the years to come.

The clean energy transformation is also being catalyzed by policies at the local, state and federal levels that call for or require carbon emissions reductions or the speedy deployment of clean energy through clean energy standards or renewable portfolio standards, as have been adopted in 29 states. Although cooperatives generally experience less regulation and oversight by state utility commissions, they too are subject to some clean energy obligations. Beyond regulatory requirements, commitments to clean energy and local generation are gaining popularity and being demanded by member-owners. Member-owners are becoming increasingly engaged with their cooperative and calling for programs that deliver measurable economic, social and environmental benefits to them and their communities — the same benefits that the clean energy transition can deliver, as illustrated in Table 1.

This transformation is unfolding today and will continue to accelerate over the next decade. There are immediate, low-cost, proven actions to take now that will have immediate impact and will also facilitate future actions that can be adopted in subsequent phases of the transition.

Cooperatives and other public power entities have the opportunity to act nimbly in response to these changes. Due to their not-for-profit status and local governance structure, rural electric cooperative directors have a unique opportunity — and clear responsibility — to deliver value to their member-owners and communities. They can do so by actively pursuing a clean energy transition. The policies and programs that drive emissions reductions align synergistically with

5 Energy Innovation. (2021). *The coal cost crossover 2.0.* https://energyinnovation.org/publication/the-coal-cost-crossover-2021/

multiple community, member-owner and cooperative objectives and can reduce costs for the cooperative and its member-owners. Clean energy, electrification and efficiency enable a cooperative to serve its community more economically and equitably and with much lower environmental impact.

The Importance of the Electric Cooperative Director

In periods of rapid change, the job of an electric cooperative director is all the more important. Directors are elected to exercise judgment on behalf of member-owners and the broader community. Taking steps to begin a clean energy transition today will enable the cooperative to capitalize on the opportunity to create an energy system for its community that will realize the multiple benefits of the transition. Waiting to act, by contrast, may leave cooperatives stuck in an outdated model that subjects them to higher costs, less flexibility and greater dependence on outside influences.

In helping to spur and navigate these changes, directors can meaningfully improve the lives of their neighbors. They can advocate for lower bills for all member-owners and for programs that bring local jobs to their community. They can clean up the air and water by reducing or eliminating pollution from fossil-fueled generating facilities and energy end uses. Directors can help low-income families by reducing the significant energy burden they face while making their homes safer and healthier to live in.

This guide outlines the actions that a rural electric cooperative board director can take to engage in the clean energy transition. It provides examples from other cooperatives that have charted a similar path. This Executive Summary offers an overview of a utility planning process in which the board and staff work together with members to set goals, understand the options available to them, articulate a path forward and begin to implement a plan. It then outlines a menu of clean energy policies and programs, including energy efficiency programs, beneficial electrification, demand management, clean energy generation and policies to reduce energy burden.

The guide concludes with an examination of good governance practices that can help cooperatives engage their member-owners and community stakeholders along the way. Following this Executive Summary, the guide addresses each of these topics in depth with a rich set of examples, recommendations, proven financing mechanisms and implementation insights. In short, this guide is a comprehensive toolkit for directors ready to bring transformational best practices to their own cooperative.

The Benefits of the Clean Energy Transition

By transitioning to clean energy, cooperatives have the opportunity to create a more flexible and resilient electric system that realizes many more benefits than the traditional model where power was simply produced in a centralized location and transmitted to serve demand. The benefits that accrue from more distributed and sustainable energy systems have often been underrecognized, but their value is significant and can be compounded through intentional planning. These benefits can include those shown in Table 1.

Table 1. **Benefits of the clean energy transition**

Benefits to Member-Owners	
Lower Utility Bills	Directors can lower bills for families and businesses through energy efficiency programs and renewable energy procurement. Energy efficiency is consistently the lowest-cost, highest-value action a cooperative can undertake to generate value for all member-owners. Wind and solar are the cheapest new generation sources in most of the United States today. Moreover, new wind and solar now cost less to build and operate than operating an existing coal or gas plant.
Healthier Homes	Member-owners who benefit from home weatherization programs are less susceptible to extreme heat and cold, as well as mold and moisture hazards. When homes are electrified, indoor air quality directly benefits from the removal of combustion by-products within the home.[6]
Reduced Energy Burden	Prioritizing energy efficiency, and especially putting programs in place for low-income families in combination with other policies, can reduce costs specifically for those member-owners through lower bills and improved, more efficient and more comfortable living environments.

6 Seal, B., & Krasner, A. (2020). *Gas stoves: Health and air quality impacts and solutions.* Rocky Mountain Institute. https://rmi.org/insight/gas-stoves-pollution-health/

Benefits to Communities	
Local Jobs	Cooperatives create more local jobs and keep money within the local economy when they invest in energy efficiency, weatherization, beneficial electrification and transitioning their energy system to locally sourced clean power. By investing within the community, cooperatives create further opportunities for local companies and can often lower electricity costs, benefiting all businesses in a community. This investment increases local job opportunities and keeps money local.[7]
Cleaner Air and Water	Traditional fossil-fueled energy sources affect public health as a result of the air and water pollution that comes with the transportation, storage and combustion of fossil fuels and disposal of its waste products. Transitioning to clean energy significantly reduces local air, water and waste pollution.
Healthier Communities	Cooperatives can improve public health by investing in energy efficiency, beneficial electrification and renewable energy. These changes can help residents avoid illnesses and deaths from heart, respiratory and other ailments caused or exacerbated by pollution.[8]
Climate Change Mitigation and Resilience	Communities are feeling the impacts of the changing climate in their own backyards as they grapple with the social and economic ramifications of higher-intensity storms, more widespread and prolonged droughts or floods, and more frequent and severe wildfires.[9] By implementing energy efficiency programs and deploying renewables, cooperatives cannot only dramatically reduce total carbon emissions to mitigate worsening climate change but can also ensure a more resilient, reliable energy system in the face of more extreme weather events.

7 Energy efficiency and renewable energy benefit the local economy in a number of tangible ways. For example, a study conducted for Efficiency Vermont concluded that for every $1 million spent on energy efficiency, there was a net gain of 43 job-years. Every $1 of program spending results in a net increase of nearly $5 in cumulative gross state product, an additional $2 in Vermonters' incomes over 20 years and more than $6 in gross energy savings. Optimal Energy & Synapse Energy Economics. (2011). *Economic impacts of energy efficiency investments in Vermont — Final report.* https://publicservice.vermont.gov/sites/dps/files/documents/Energy_Efficiency/EVT_Performance_Eval/Economic%20Impacts%20of%20EE%20Investments_2011.pdf

8 U.S. Environmental Protection Agency. (2021). *Estimating the health benefits per kilowatt-hour of energy efficiency and renewable energy.* https://www.epa.gov/statelocalenergy/estimating-health-benefits-kilowatt-hour-energy-efficiency-and-renewable-energy; Seidman, N., Shenot, J., & Lazar, J. (2021, September 28). Health benefits by the kilowatt-hour: Using EPA data to analyze the cost-effectiveness of efficiency and renewables. Regulatory Assistance Project. https://www.raponline.org/knowledge-center/health-benefits-kilowatt-hour-epa-data-cost-effectiveness-efficiency-renewables/; Lazar, J., & Colburn, K. (2013). *Recognizing the full value of energy efficiency.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/recognizing-the-full-value-of-energy-efficiency/

9 Intergovernmental Panel on Climate Change. (2021, August 7). *Climate Change 2021: The physical science basis.* Working Group I contribution to the Sixth Assessment Report. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf. See also: Intergovernmental Panel on Climate Change. (n.d.). IPCC WGI interactive atlas. https://interactive-atlas.ipcc.ch/

Benefits to Rural Electric Cooperatives	
Cost Savings	A cooperative can save money through improved electricity system efficiency by strategically deploying solutions to fix perennial stressors on the system. Measures such as reducing total electrical consumption; shaving peak demand and otherwise shaping load; deploying automated demand management; strategically positioning resources within the distribution grid to reduce the need for substation and transmission upgrades; and utilizing storage to extend the benefits of renewables enable the cooperative to build a safe, reliable, resilient, flexible, affordable and efficient system.
Lower Financial Risk	Clean energy projects can have shorter lead times, easier permitting and less onerous financial requirements, thus making investment decisions simpler and subject to less risk. Instead of developing and being responsible for a centralized plant or even entering into a long-term contract to acquire power from such sources, a cooperative can enjoy greater control of its system through investments in clean distributed local resources.
Reduced Policy Risk	States and municipalities are setting greenhouse gas reduction targets and clean energy standards. Although cooperatives are typically less subject to regulation and oversight, these trends should be closely watched. These requirements may require or request that a cooperative directly or indirectly contribute to emissions reductions. Member-owners may also ask their cooperative to increase investment in cleaner energy resources. Even where such legislation or targets are not in place today, cooperatives can anticipate such requirements and choose to act now to mitigate future risk in their resource planning.
Energy Security	Unlike larger, centralized resources that can threaten grid stability issues when unexpected outages occur, distributed resources can boost grid resilience.[10] Distributed, flexible resources are less likely to leave the cooperative vulnerable to reliability concerns when one central generating resource stops producing.
Resilience to Weather Disasters	Higher-intensity storms, unprecedented heat waves and deep freezes, more widespread and prolonged droughts and floods and more frequent and severe wildfires are making the grid harder to operate and maintain and are introducing unprecedented liabilities for utilities, such as the loss of life and property Pacific Gas and Electric encountered with the Camp Fire. Distributed technologies such as rooftop solar photovoltaics, community solar gardens, distributed cooperative-owned generation and local storage, including electric vehicles and microgrids, can provide power locally (and/or to critical loads like first responders and hospitals) during times when the grid is down, flexibly keeping critical services going in emergency situations.
Protection from Fuel Supply Shortages	Events like the 2021 winter Texas freeze and natural gas price spike demonstrate how vulnerable utilities are to wild swings in fuel availability and cost. Renewables have a fixed operating cost that removes risk exposure to global fuel markets, saving cooperatives and ratepayers money.

10 Intergovernmental Panel on Climate Change, 2021. The events in Texas in the winter of 2021 demonstrate the domino effect that can occur when some fossil-fueled generation is not available. Although that event was especially unfortunate, it is not unprecedented; fossil-fueled resources are subject to numerous insecurities due to weather, transmission availability, price increases and even geopolitics. The electric system is vulnerable to attacks and natural disasters. Using diverse domestic energy efficiency and renewable energy resources enhances energy security by minimizing the vulnerability of the electricity system when attacks or natural disasters occur.

The Clean Energy Toolkit

Cooperative directors set the strategic direction for their utility and establish the policies that staff will execute to reach the cooperative's goals. In doing so, leaders work closely with staff to ensure they have the relevant information and resources needed to make decisions that will benefit the member-owners in the communities they serve.

Directors have a responsibility to shepherd their cooperative through the changes in technology, generation mix, policy and community demands that are shaping the energy sector today and the opportunity to lead the way toward a 100% clean energy future that serves member-owners, the cooperative and the local community well.

The remainder of this Executive Summary opens the door to these topics. Each is explored in greater depth in the full report. Examples are included throughout the document offering proven models to follow.

Planning

Planning is the process by which a cooperative prepares for the future, seeks community input, articulates the values that it wishes to deliver for its community, ensures its financial health and defines an operational plan to deliver services to its member-owners. Planning has always been a critical aspect of cooperative operations, but its importance is heightened during periods of high technological, societal and policy change like we see today.

The importance of planning has increased significantly due to several macro trends happening concurrently. In their planning processes, today's cooperatives are incorporating demands for 100% clean energy, advances in technology of both generation and demand-side resources, the need to make infrastructure more resilient to weather disasters and renewed calls for direct economic benefits to the communities they serve.

Goal Setting and Benchmarks

Planning begins with an understanding of where the cooperative needs to go. Utilities can set many different types of goals, such as those focused on economic performance, reliability, affordability and other key topics. The best goals are specific, measurable, ambitious and time bound and built upon a deep understanding of current and future community needs, economic realities and technological progress.

An increasingly common goal for a cooperative is a carbon-free electricity goal or carbon-reduction target. Holy Cross Energy in Glenwood Springs, Colorado, for example, has announced a 100x30 plan to deliver 100% carbon-free electricity by 2030 to their 44,000 member-owners. Holy Cross set this goal with a "clear line of sight to success"[11] in achieving its prior goal of 70% carbon-free energy ahead of schedule. In 2017, Kit Carson Electric Cooperative in Northern New Mexico set a goal of 100% daytime solar by 2022 for its 29,000 members, a goal it will exceed.[12] Many cooperatives serve members within the 30 states that have set a renewable portfolio standard or other clean energy goal, leading to heightened awareness and attention on increasing renewable energy.

These cooperatives are responding to technological changes, policy signals, local economic opportunities and member-owner demands to set goals that will guide their planning processes and decision-making.

Integrated Resource Planning

The cooperative board already oversees resource development, and most cooperatives have a resource planning process in place, often referred to as integrated resource planning. An integrated planning process becomes increasingly important at a time of changing resources and in particular for integrating various flexible and dynamic resources. In such a process, the staff and board work together to define the utility's future generation mix and design programs advancing energy efficiency, demand management, beneficial electrification and other community benefits.

Technological advances are continuing to drive a paradigm shift across the utility landscape — including cooperatives — in the planning process from an almost exclusive focus on energy supply to a more integrated analysis that includes both supply-side and demand-side levers. These tools include energy efficiency, demand management, large- and small-scale renewables,

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11 Holy Cross Energy. (2020, December 14). *Holy Cross Energy announces "100×30" carbon-free electricity goal part of new strategic plan to lead the responsible transition to a clean energy future* [Press release]. https://www.holycross.com/holy-cross-energy-announces-100x30-carbon-free-electricity-goal-part-of-new-strategic-plan-to-lead-the-responsible-transition-to-a-clean-energy-future/

12 Kit Carson Electric Cooperative. (n.d.). *100% daytime solar energy by 2022.* https://kitcarson.com/electric/100-daytime-solar-energy-by-2022/

smart meters, connected household devices, storage, beneficial electrification, member-owner engagement programs and other solutions further discussed below. These changes are unlocking opportunities to save money for cooperatives and the people they serve. In a time of rapid change, such as our own, the planning process becomes all the more important.

This process is most effective when built upon a strong working relationship between the board and staff. Both the board and staff have crucial roles to play in the planning process, in which the board sets strategic direction, represents the community and asks the right questions and the staff works diligently to surface all the needed information and operational knowledge to inform smart policies. The staff then incorporates the policies the board has established to create the best integrated resource plan based on an analysis of multiple scenarios.

Ideally, the planning process is transparent and follows good governance practices, such as having a clearly structured calendar, opportunities for member-owners to comment and open meetings to educate member-owners on possible options and recommended directions.

Resource Development and Procurement

A cooperative must develop a resource portfolio to procure the energy resources that will achieve the plan's objectives. Resource development should be done hand in hand with planning to ensure that resource procurement decisions align with the cooperative's goals and modeling.

Clean energy technologies are often more modular and typically involve shorter project timelines, easier permitting and lower project costs than traditional generating facilities. In addition, there are now a variety of options to structure ownership of generation assets. For example, a cooperative might own and build its own large-scale renewable energy facility; work with its generation and transmission cooperative to contract for clean power; contract for power from another third party such as a utility-scale solar or wind developer; develop a community solar garden within its distribution

Clean energy and a cooperative's relationship with its generation and transmission cooperative

In the past, distribution cooperatives banded together to pool their financial resources to invest in large-scale energy supply projects like coal or natural gas power plants. To do so, they formed generation and transmission (G&T) cooperatives. Today, many cooperatives still buy their power from a G&T cooperative. The contracts that govern these relationships often limit distribution cooperatives' energy options — typically for several decades — by requiring that all or a very high percentage of the power needed to serve their demand is purchased from the G&T cooperative, many of which still produce that power largely from fossil-fueled energy resources.

Tri-State Generation and Transmission Association, which serves customers in New Mexico, Colorado, Wyoming and Nebraska, provides a case study of how this relationship is changing. After two of Tri-State's distribution cooperative members, Kit Carson Electric Cooperative and Delta-Montrose Electric Association, found that they could acquire or develop clean energy resources at a substantial savings to their member-owners, they severed their contracts with Tri-State. Although they had to pay significant exit fees[13] to do so, the two cooperatives still enjoyed savings by having greater flexibility through clean energy options. Other distribution cooperatives are pursuing or considering a similar path, thus threatening the economic viability of the current G&T model. In response, Tri-State developed a responsible pathway to 100% clean energy by 2040.[14] The G&T model can continue to work as it traditionally has, but only if these organizations respond to and support their member cooperatives' needs sustainably and economically, including renewable resources and load flexibility, instead of continuing their reliance on expensive fossil-fueled generation.

13 The amount of exit fees that Tri-State charged and continues to assert is appropriate for other exiting distribution members has been the subject of significant litigation at the Federal Energy Regulatory Commission. See, for example, Howland, E. (2021, December 15). *Will Tri-State's exit fee dispute at FERC shake up the cooperative utility model?* Utility Dive. https://www.utilitydive.com/news/will-tri-states-exit-fee-dispute-at-ferc-shake-up-the-cooperative-utility/611030/

14 Brehm, K., Dyson, M., & Siegner, K. (n.d.). *Tri-State's responsible energy plan.* RMI. https://rmi.org/wp-content/uploads/2020/05/tri_states_responsible_energy_program_case_study.pdf

grid; or encourage member-owners to install behind-the-meter generation, owned by the member-owner, a third party or the cooperative.

To navigate these options, cooperatives can utilize all-source competitive bidding. This process surfaces least-cost market-based opportunities across a variety of technologies and economic models to meet cooperative needs at low cost and low risk. In a single solicitation, a cooperative can evaluate the trade-offs between specific utility-owned and -built generation, third-party offerings, member-owned resources and demand-side resources to make the best choice for its member-owners.

In resource planning, development and procurement, it is important to return to the goals the cooperative has set. Through local economic development and construction, it is often possible, for example, for a cooperative to drive job growth in the community it serves. It is also possible through good planning and resource development for a cooperative to lower bills, increase grid resiliency and flexibility and reduce emissions — or bring any combination of such benefits that a its board desires to its community.

A Clean and Equitable Energy Future

To meet the needs and goals identified in the planning process, a cooperative has a menu of resource options that it can use to maximize benefits for itself and its member-owners.

Energy Efficiency

Energy efficiency programs provide the greatest value for cooperatives and member-owners, as they provide savings to both. The U.S. Department of Energy estimates that the average household could save $200-$400 per year through a basic efficiency upgrade.[15] The cheapest electrons, after all, are the ones you do not use. In promoting efficiency, cooperatives can directly improve quality of life for residents by making homes healthier, lowering energy bills and making interior spaces more comfortable. These benefits are particularly transformational for low-income families, who experience the highest energy burden, spending on average 8.6% of their income on energy costs, which is almost three times the 3% spent by the average U.S. household.[16]

For the cooperative, strategic and well-targeted investments in energy efficiency can decrease total energy needs, saving the cooperative from maintaining, purchasing or developing the highest marginal cost power it uses. Cooperatives are also shielded from price volatility within fuel markets and can sometimes avoid substation and transmission upgrades through efficiency measures. Moreover, as energy efficiency is modular and flexible to implement, so programs can be low-cost, easily scaled and readily targeted to achieve the desired grid benefit.

Cooperatives can design and implement a number of energy efficiency programs to achieve different goals and provide multiple benefits to different member-owner segments. Efficiency programs rely on member-owner participation, so it is critical to include community voices in the planning process early to ensure that programs maximize benefits to members-owners.

Energy efficiency programs typically incorporate an energy audit, a menu of solutions for a homeowner or other building owner and a financing mechanism to fund upgrades or weatherization. The energy audit identifies inefficiencies in current appliances, drafts within the building envelope and other opportunities for energy savings. Proposed solutions may include upgrading to more efficient models of appliances — such as refrigerators, stoves, air conditioners, furnaces or boilers — or adding insulation and caulking. Cooperatives can look ahead to demand management and incentivize the adoption of grid-integrated appliances that can be utilized to shape loads and thereby reduce costs.

To pay for these programs, cooperatives have a suite of financing mechanisms available to them, including low-cost capital from U.S. Department of Agriculture Rural Development programs. The mechanism used is often dependent upon the targeted beneficiary of the program, with several financing mechanisms specifically structured to advance solutions to low- and moderate-income member-owners and rural communities.

The dominant financing mechanism for energy efficiency is to factor the cost of programs into a

15 U.S. Department of Energy. (n.d.). *Why energy efficiency upgrades.* https://www.energy.gov/eere/why-energy-efficiency-upgrades

16 Rose, E., & Hawkins, B. (June, 2020). *Background data and statistics on low-income energy use and burden for the Weatherization Assistance Program.* Oak Ridge National Laboratory. https://weatherization.ornl.gov/wp-content/uploads/2021/01/ORNL_TM-2020_1566.pdf; and U.S. Department of Energy. (n.d.) *Low-income community energy solutions*. https://www.energy.gov/eere/slsc/low-income-community-energy-solutions#:~:text=According%20to%20DOE's%20Low%2DIncome,be%20as%20high%20as%2030%25

member-owner's electricity rate, just as purchasing power or building a power plant would be. This ratepayer charge is favored by investor-owned utilities, especially when they are able to recover their costs in a rider in a more contemporaneous manner. Cooperatives may also finance efficiency programs themselves or institute on-bill financing, in which the utility can receive payments toward the upfront cost of an efficiency upgrade via the member-owner's monthly utility bill. These on-bill programs can be direct debt repayment — in which the charge is additional to the cost of electricity — or tariffed. In either event, on-bill financing should be structured so the member-owner repays the debt through the savings in energy consumption. The member's bill should be lower than it was prior to the efficiency upgrades, however, so that the member can experience some of the benefits of the upgrade. The member makes payments for the efficiency upgrades until the debt is repaid in full, after which the member will see a more sizable reduction in electric bills. Tariff-based on-bill financing, such as the Pay As You Save (PAYS) program, is designed to increase the accessibility of efficiency programs for low- and moderate-income households because credit checks are not required.

Rural electric cooperatives have tested and championed PAYS programs to reduce low-income energy burden, improve housing quality and lower energy demand. These programs have been deployed at Ouachita Electric Cooperative in Arkansas with over 409 completed projects; by six cooperatives through the How$martKY program in Kentucky, including Big Sandy, Grayson and Licking Valley rural electric cooperatives; and through Roanoke Electric Cooperative's Upgrade to $ave program, which has completed 654 efficiency projects in its community.[17]

For low-income residents, there are also specific programs designed to help reduce energy burden. Federal weatherization programs like the U.S. Department of Energy's Home Weatherization Assistance Program uses a formula to distribute funding across the nation for home weatherization. For cooperatives specifically, the U.S. Department of Agriculture Rural Development program offers several grant and loan programs targeted at cooperative investments in efficiency and low-income programs. These programs may be supplemented by state and local programs. Cooperatives can deliver meaningful community value by prioritizing low-income member-owners in their own efficiency program design, in addition to equitable consumer protections, such as disconnection moratoriums, extended payment plans,

17 LibertyHomes & Energy Efficiency Institute Inc. (2021, December 30). *2021 PAYS status update* [Table]. http://www.eeivt.com/wp-content/uploads/2021/12/2021-PAYS-Status-Update_12.30.21rev.pdf

and bill assistance through discounted rates, grants and debt forgiveness.

Across efficiency programs, the keys to well-designed and successful measures include: member-owners incur little or no upfront cost; cooperatives wisely utilize low-cost financing for improvements; and the project's cost is recovered through savings over time. Education and community outreach are essential to the success of these programs. The outreach a cooperative does with its member-owners will have a material impact on how many and which member-owners take advantage of any given program.

Capturing Demand-Side Flexibility[18]

Demand Management, Time-of-Use Pricing and Net Metering

As emphasized earlier, a paradigm shift is underway in the energy sector. After decades of focusing on supplying enough energy to meet instantaneous demand, cooperatives must now actively manage supply and demand.

With this change, bringing member-owners along in the transition to the clean energy system is critical for achieving a cooperative's goals because their behavior and program participation will directly affect grid flexibility, efficiency and activity. In managing demand, member-owners are active stakeholders whose trust, decisions and purchases will influence the success of the cooperative's programs and policies.

For example, through technologies and member-owner engagement, cooperatives can now leverage tools like time-of-use pricing and other demand management — in which member-owners shift or reduce their energy usage in response to a cue from the cooperative and often compensation — and behind-the-meter generation to add flexibility, resiliency and cost savings to their operations. In doing so, cooperatives are shaping energy demand in new ways that were not previously possible but that will create value for member-owners and cooperatives for years to come.

Through time-of-use pricing, for example, cooperatives can guide member-owners to make choices that shift load from peak hours, when the marginal cost of energy is high, to off-peak hours, when the marginal energy cost is less. Traditionally, cooperatives design their generation supply around the peaks of daily use, typically in the late afternoon and early evening when businesses are still operating but workers and schoolchildren begin to return home to turn on the air conditioner or turn up the heat, cook dinner, watch TV, do laundry and engage in other high-energy activities.[19] Time-of-use rates can incentivize member-owners to lower their peak usage and do high-energy tasks during other hours. These shifts can be manual choices prompted by a request from the utility but increasingly are automated by smart appliances able to schedule their usage around pricing information. Kankakee Valley REMC's PowerShift Program in Indiana, for example, provides volunteer members with a load control receiver installed on their electric water heater, central air conditioner or other specific high-load device (drainage pump, grain dryer). The rural electric cooperative monitors electrical demand and weather conditions 24 hours a day. When demand reaches extreme levels, a signal is transmitted from the cooperative to the load control receivers to temporarily switch off power to the units for a short period of time. Participants then receive monthly credits on their bills.[20] A similar program at Adams Electric Cooperative in Pennsylvania seeks to shift the use of participating electric water heaters, heating and cooling units and other equipment to off-peak hours. Members are asked to conserve energy by shifting their use of major appliances during peak hours. Participants who shift their use of major appliances during peak hours benefit from lower off-peak rates and receive bill credits for doing so.[21]

18 See Budhiraja, D. (2019, January 24). *Demand response 101: Understanding how utilities balance energy supply & demand.* GridPoint. https://www.gridpoint.com/understanding-demand-response/ and Linvill et al., 2019.

19 See Budhiraja, D. (2019, January 24). *Demand response 101: Understanding how utilities balance energy supply & demand.* GridPoint. https://www.gridpoint.com/understanding-demand-response/ and Linvill et al., 2019.

20 Another program is Beat the Peak, which helps reduce power usage during peak times by relying on member commitments to reduce power when demand is high, typically 4 to 7 p.m. during the hot summer months. When a peak situation exists, participating members will be notified and asked to conserve energy in the following ways: turning off lights, adjusting thermostats up three degrees, delaying use of hot water and delaying use of appliances such as dishwashers, washing machines, clothes dryers and electric ovens. Beat the Peak participants do not receive any bill credit incentives. Kankakee Valley REMC. (n.d.). *PowerShift.* https://www.kvremc.com/services/powershift

21 Adams Electric Cooperative. (n.d.). *U-Shift, U-$ave.* https://www.adamsec.coop/u-shift-u-save. Utility also offers Time Of Day rates: https://www.adamsec.coop/time-day-rate

In addition to managing load, cooperatives also grapple with significant weather events that put extreme pressure on grid systems for longer periods of time. These events, such as the 2021 Pacific Northwest heat wave or the 2021 Texas freeze, are becoming increasingly common due to climate change and they can lead to brownouts and blackouts. The Texas freeze created such system disruption that the generation and transmission cooperative Brazos Electric declared bankruptcy soon thereafter because gas price spikes led to unaffordable power supply costs. Over $1.9 billion in unpaid power bills still await court decisions.[22]

Many cooperatives have built (or kept old) power plants known as peaker plants, which are only called upon when the grid approaches maximum capacity. These expensive options can potentially be replaced by well-designed demand management programs, which can reduce utilities' peak demand by an average of 10%.[23]

With an increasing percentage of renewables on the grid, demand management is also highly useful for absorbing peak solar and wind production through timely electric vehicle charging, space heating or water heating.

Net metering, which enables behind-the-meter generation and storage, is another engagement tool that utilities can use to shape member-owner behavior. Through net metering and user-friendly interconnection regulations, member-owners can install solar photovoltaic and storage systems, which can provide cost savings, grid benefits and security for members. Through net-metering programs, member-owners are compensated for the energy they produce that is sent to the grid. Where present, net metering, driven by state and local policies, has been very successful at increasing the amount of distributed resources. Combining time-of-use rates with net metering can more accurately ensure that the benefits to the grid from a member's system are properly priced.

Net-metering policies are typically set up differently for different member-owner groups and can be targeted to different technologies like solar, geothermal, storage and wind. Within a cooperative's service territory, net metering can also be subject to caps on the size (in kW) of individual systems or program caps that limit the total capacity of net-metering systems installed.

There is high variability in how cooperatives credit excess behind the meter generation when it goes to the grid. Ideally, net metering rates should be equivalent to the value to the utility of that energy at the time and location it is made available to the distribution grid.

Promoting Beneficial Electrification for Buildings and Transportation

Beneficial electrification is a pillar of the clean energy transition. Electrification will increase demand for electricity from the utility, provide the utility greater flexibility to meet that demand and allow for end uses to be met more efficiently, which can decrease carbon

22 Leal, J. (2022, February 22). *Brazos Electric opens bankruptcy case against ERCOT, fighting $1.9 billion in unpaid bills.* 25 ABC. https://www.kxxv.com/hometown/texas/brazos-electric-opens-bankruptcy-case-against-ercot-fighting-1-9-billion-in-unpaid-bills

23 Nadel, S. (2017, February 9). *Demand response programs can reduce utilities' peak demand an average of 10%, complementing savings from energy efficiency programs.* American Council for an Energy-Efficient Economy. https://www.aceee.org/blog/2017/02/demand-response-programs-can-reduce

emissions. Electrification can also help offset reductions in energy demand from energy efficiency programs and any demand or revenue reductions from increased distributed energy resources.

End uses traditionally powered by gas or oil — such as transportation, cooking, home heating and certain industrial processes — can be switched to run on electricity. For many end uses, electrification already makes economic sense, such as electrification of space and water heating and cooling in many locations, and technology trends are rapidly opening new doors to electrification. For example, 2019 marked the first year in which more than 2 million electric vehicles and plug-in hybrid vehicles were sold in a single year; by 2030, they are expected to make up more than 25% of the global new car market.[24] The electrification of heavy industry, including smelting and kiln processes, is witnessing significant research and development investment today.

Upon installing electrified appliances, member-owners typically see an immediate financial benefit, as these technologies are typically more efficient than those powered by combustion. In addition, member-owners increasingly link electrified appliances to an improved quality of life: they are quieter, healthier, can be operated remotely and have finer degrees of control.

Electrification trends provide an incredible growth opportunity for electric cooperatives because of the resulting impact on electricity demand, which by 2050 is expected to rise by at least 30% and as much as 80%.[25] This trend can help offset reductions in energy demand from energy efficiency programs and any demand or revenue reductions from increased penetration of distributed energy resources.

In addition to driving electricity demand, electrified vehicles and appliances will offer substantial load flexibility to the cooperative. Electrified and grid-connected water heaters, space heaters and vehicles are prime demand levers for the utility to manipulate to reduce or shift demand over various time spans. With electrified end uses, utilities can tailor charging to occur during times of day with high renewable supply, functionally storing that energy for later use. Similarly, through networked water and space heaters, cooperatives can shift demand within the day, shaving peak loads during the busiest time of day and shifting loads to times when the grid is underutilized.

The electrification trend provides benefits for member-owners too. It is likely to reduce long-run costs because many electrified appliances are more efficient and thus cheaper to run than their fossil-fueled counterparts and offer quieter and more finely controlled operation. There are also significant health benefits to removing combustion from homes and neighborhoods. Replacing a gas stove with an induction cooktop or a gas furnace with a heat pump improves indoor air quality by reducing nitrogen dioxide levels. Homes without combustion appliances have about half the levels of nitrogen dioxide as homes with combustion appliances, with indoor levels often exceeding those outdoor. Nitrogen dioxide is an irritant for the eyes, nose, throat and respiratory tract and can cause bronchial and lung issues, including increased risk of respiratory infections, especially in young children.[26] Replacing internal combustion engine vehicles with electric vehicles similarly improves local air quality by reducing air pollution and toxic emissions.[27]

Cooperatives can incentivize more rapid adoption of electric technologies through rebates, education, pricing and other mechanisms. As with other programs, they can target different policies and programs for different member-owner classes. For example, Cherryland Electric Cooperative in Michigan and New Hampshire Electric Cooperative encourage EV purchases with a $2,000 rebate for the car and an additional rebate for installing a charging station.[28] Gunnison County Electric Cooperative has a loaner car so member-owners can test-drive an electric vehicle before purchasing one, and it built the first cooperative-owned public EV charging

24 Walton, B., Hamilton, J., Alberts, G., Fullerton-Smith, S., Day, E., & Ringrow, J. (2020, July 28). E*lectric vehicles: Setting a course for 2030.* Deloitte. https://www2.deloitte.com/us/en/insights/focus/future-of-mobility/electric-vehicle-trends-2030.html

25 Zhou, E. & Mai, T. (2021). *Electrification futures study: operational analysis of U.S. power systems with increased electrification and demand-side flexibility.* National Renewable Energy Laboratory. NREL/TP-6A20-79094. https://www.nrel.gov/docs/fy21osti/79094.pdf

26 U.S. Environmental Protection Agency. (2022, March 3). *Nitrogen dioxide's impact on indoor air quality.* https://www.epa.gov/indoor-air-quality-iaq/nitrogen-dioxides-impact-indoor-air-quality#Health_Effects

27 Driscoll, C., Fallon Lambert, K., Wilcoxen, P., Russell, A., Burtraw, D., Domeshek, M., Mehdi, Q., Shen, H., & Vasilakos, P. (2021, July 12). *An 80x30 clean electricity standard: Carbon, costs, and health benefits.* Clean Energy Futures. https://cdn1.sph.harvard.edu/wp-content/uploads/sites/2343/2021/07/CEF-80x30-7.15.21.pdf

28 Solar United Neighbors. (n.d.) *Best practice solar policies for rural electric cooperatives.* https://www.solarunitedneighbors.org/wp-content/uploads/2020/09/REC-Solar-Best-Practices-FINAL.pdf

stations in Colorado. Gunnison also supports the installation of home charging stations with a rebate.

Clean Energy Generation

Solar and wind are among the lowest-cost, if not the lowest-cost generation resources today. Between 2009 and 2021, the cost of wind energy declined 72% and the cost of utility-scale solar declined 90%.[29] In 2020, renewable energy became the second-most prevalent source of electricity in the United States.[30] Long dominated by coal and gas facilities, cooperatives are now responding to economics, member-owner demands and environmental benefits by procuring more renewable power by the day.

Given the modular and flexible nature of renewables, wind and solar open up new ownership structures for cooperatives seeking to procure power. Cooperatives can opt to build and own their own clean energy facilities, either at large or utility scale or as smaller resources or community solar gardens on the distribution grid.

Community solar is currently offered to member-owners — for example, by Lake Region Electric Cooperative in Minnesota and Trico Electric Cooperative in Arizona. These community solar gardens allow residents who might not be able to effectively site or afford an individual rooftop solar system to receive the economic and clean energy benefits of solar thanks to the economy of scale of a community system. These developments further benefit the community through the creation of local jobs.[31]

In addition to building their own resources, rural electric cooperatives can procure utility-scale renewable power from third-party providers or bid for it on the open market. Distribution cooperatives served by a G&T cooperative can work with it to increase the percentage of clean energy in its generation mix, as Tri-State is doing in its service area.

Renewable energy, in particular solar, provides an opportunity for utility collaboration with local municipal authorities. Local governments can help foster a positive environment for renewable energy developers through

29 Lazard. (2021a, October 28). *Levelized cost of energy, levelized cost of storage, and levelized cost of hydrogen*. https://www.lazard.com/perspective/levelized-cost-of-energy-levelized-cost-of-storage-and-levelized-cost-of-hydrogen/

30 U.S. Energy Information Administration. (2021, July 28). *Renewables became the second-most prevalent U.S. electricity source in 2020.* https://www.eia.gov/todayinenergy/detail.php?id=48896

31 Solar United Neighbors, n.d.

transparent siting requirements, effective permitting processes, the use of municipal open space for utility or community-scale energy installations and the use of municipal rooftop or parking lot space for solar photovoltaic systems.

Good Governance

As local utilities owned by their members, electric cooperatives are a manifestation of community members coming together to meet their needs. By virtue of their local control and democratic governance, cooperatives have a special ability to reflect hometown values.[32]

It is not always simple for member-owners to know how to engage, however, so it is helpful for cooperative leadership to open the doors to engagement as a living example of the seven cooperative principles in action.

Cooperatives represent a diverse and sometimes confusing governance structure. Without outreach and education, it can be difficult for member-owners to fully understand their role in electing board members and participating in the governance of their cooperative.

In earning local trust, cooperatives must build strong community relationships and engage their member-owners and community in their planning processes and decision-making. At the most basic level, this effort means demystifying their processes in a clear and transparent way so that member-owners know how to find the information they need and how to provide input, including through open meetings. It is helpful for the cooperative to provide an easily searchable public overview of its by-laws, articles of incorporation, oversight structure, senior management and financial information for its member-owners, ideally on an easily navigable website. Fair elections can help to ensure that every member-owner can have their voice heard.

This transparency is critical for member-owned entities, particularly as they navigate the significant changes created by advancing technologies and the clean energy transition.

Cooperatives can foster a democratic and collaborative spirit by making transparency a cornerstone of their operating culture — hosting meetings open to member-owners, documenting and sharing meeting minutes, providing well-structured and publicized opportunities for comment and offering clear recaps of their decision-making to member-owners.

The clean energy transformation is exciting, and it is something that member-owners and communities are demanding. Cooperatives have a superb opportunity to bring their key stakeholders into the room and to leverage their collective expertise and experience to realize the diverse community benefits discussed in this Executive Summary.

Conclusion

The trends, technologies, policies and programs highlighted in this paper form a complete package that can help cooperatives develop the lowest cost options while providing safe, clean, reliable and affordable electricity to their member-owners and communities. The clean energy transition likewise provides numerous cobenefits that elected directors can seek out and celebrate, from local jobs to greater resilience better health that will materially improve their community and its quality of life.

Power sector transformation creates challenges for all utilities, including cooperatives, but not insurmountable ones. In fact, cooperatives have advantages over investor-owned utilities due to their closer relationship with their member-owners. We hope this guide and the examples within it will provide a grounded technical resource for cooperative directors seeking to lead their communities proactively and effectively through this unprecedented clean energy transition.

In the end, these best practices can point the way to positive results for cooperatives, their member-owners and their communities.

* * *

We welcome your feedback on these materials as we work to build useful tools for directors seeking information on the clean energy transition. Please reach out to education@climatecabinet.org.

32 American Public Power Association. (n.d.). *What is public power?* https://www.publicpower.org/system/files/documents/municipalization-what_is_public_power.pdf

Full Report

I. Introduction

The energy sector is in a period of significant transformation. The confluence of technology advances, decarbonization requirements to address climate change and the numerous cost and other benefits of transitioning is driving utilities and regulators to transform how they serve customers. This transition can benefit energy users through lower utility bills, healthier homes and a reduced energy burden, in particular for low-income residents.

Rural electric cooperatives are subject to the same forces. And as custodians – at least in large part – of their member-owners economic and community well-being, their bear a special obligation to respond effectively, consistent with the seven cooperative principles. Cooperatives' member-owners and communities can benefit from investment in local energy, including creation of local jobs, investment staying within the community, greater resilience, and healthier communities with cleaner air and water, and lower costs. Rural electric cooperatives can also benefit from a shift in approach: a transition to a greater focus on energy efficiency, distributed energy resources, electrification and clean and local energy generation can result in cost savings for the cooperative, lower financial risk, avoid carbon and other policy surprises, provide greater security of energy supply, increase resilience to extreme weather and protect from fuel supply disruptions. In short, rural electric cooperatives can take advantage of changing circumstances to better serve their member-owners and communities, not to mention strengthening the cooperative itself.

This guide provides resources and guidance for rural electric cooperative directors and others who wish to engage in a shift toward a clean energy transition. Directors are, after all, the principal "regulators" of electric cooperatives. This guide explores the many elements involved in this transition, beginning with robust resource planning, then provides information about building a clean and equitable energy future, and finally discusses principles of good governance necessary to guide the cooperative's future success.

Throughout this guide, examples of what other rural electric cooperatives are doing provide concrete ideas, challenges and solutions. We welcome your input into this guide and examples for possible inclusion in future editions.

II. Resource Planning: The Cornerstone of a Smart and Equitable Energy Transition

Planning has always been a critical aspect of utility operations, but its importance has grown during periods of high technological and policy change like we see today. Planning is the process by which a utility prepares for the future, seeks community input, articulates the values that it wishes to deliver for its community, ensures its financial health and defines an operational plan to serve its customers.

A. A Changing Planning Landscape

Several trends are changing the way that utilities plan, including advances in technology that allow for supply- and demand-side planning, clean energy goals and emissions benchmarks, changing and more extreme weather patterns driven by climate change, and recognition that utilities can drive significant community value with a focus on equity and inclusive process. These trends set the context in which the utility must develop a plan for future operations.

1. Advances in Technology: Managing Supply and Demand

Traditionally, utilities, including rural electric cooperatives, have managed their electrical systems by evaluating customer demand and procuring supply to meet that demand. Today, technological advances enable utilities to manage both supply and demand. This shift opens the door for cooperatives to find solutions that meet a variety of community and member-owner needs, as well as solutions that minimize their own costs.

These technological changes offer new ways for a cooperative to provide value for its member-owners and community, but fully realizing the benefits these technological changes enable requires thoughtful planning. For example, on the supply side, cooperatives are developing or purchasing more renewable resources from both large utility-scale facilities and distributed generation sources. Many are enabling behind-the-meter generation options like rooftop solar. These technologies may have a different generation curve than fossil-fueled plants. The availability of behind-the-meter resources that do not operate 24 hours a day, seven days a week, is leading to reconsideration of the paradigm whereby generation follows load. Instead, as more demand management and rate design options are made available through technological gains, load can follow supply.

On the demand side, energy efficiency programs can decrease load, while vehicle charging and space and water heating can be shifted to allow load to match supply. Demand management programs can shave demand off the highest peaks and can shift newly electrified load to times of the day when less-expensive renewable resources are abundant, such as programs that take advantage of grid-connected water heaters. Smart meters and grid-connected appliances, combined with helpful rate structures, are making such programs more feasible.

Energy storage can further enable the ability to shift demand to match supply and maximize the use of renewable energy. Energy storage is becoming a major factor as storage costs, particularly battery costs, drop. Storage offers a way in which a utility can take greater advantage of low-cost renewable resources by utilizing those resources to charge storage when renewable resources are available and using that storage when renewable generation is limited. Storage can thus deliver renewable energy even when renewable resources are not physically available. In addition, storage resources can provide many grid services, such as balancing and ancillary services, and thus reduce the need for distribution or transmission system upgrades.

Smart pricing structures compound storage opportunities by enabling electrified water heaters and electric vehicles (EVs) to act as storage, which incentivizes charging when renewable resources are plentiful and provides a resource to the grid during peaks.

Many of these technologies are discussed in more detail in Section III-B, "Capture Demand-Side Flexibility," alongside financing options and program design examples. Cooperatives can use the planning process to determine how these options can come together to serve member-owners' needs.

2. Clean Energy's Emergence as a Least-Cost Resource

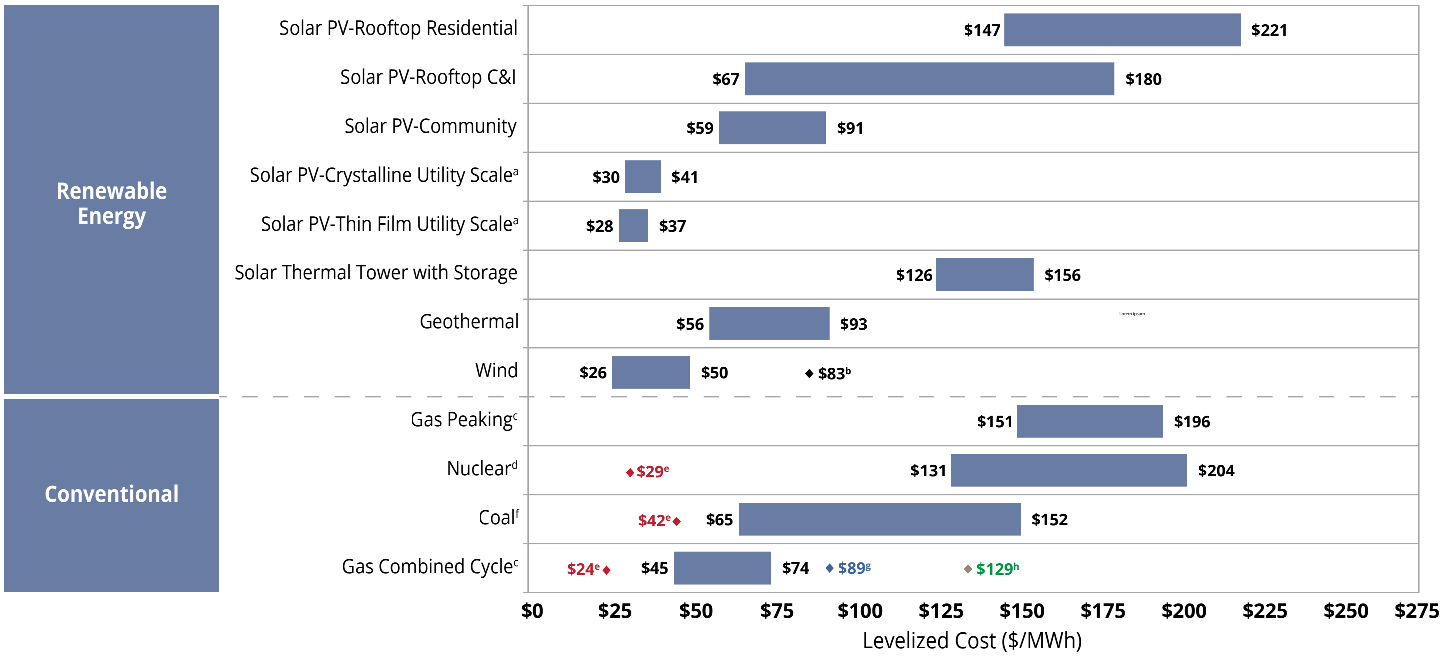
The costs of clean energy resources have dropped exponentially in recent years, and they are now the least-cost resources in many situations. As a result, utilities are no longer procuring these resources solely in response to renewable energy targets. As the analysis below demonstrates, clean energy resources can be less expensive than both new-build fossil-fueled resources (as shown in Figure 1[33]) and the marginal cost to run existing fossil-fueled resources (Figure 2[34]).

33 Lazard. (2021b, October). *Lazard's levelized cost of energy analysis — Version 15.* https://www.lazard.com/media/451905/lazards-levelized-cost-of-energy-version-150-vf.pdf

34 Lazard, 2021b.

Figure 1. **Levelized cost of energy comparison—unsubsidized analysis**

Selected renewable energy generation technologies are cost-competitive with conventional generation technologies under certain circumstances



Source: Lazard estimates.

Note: Here and throughout this presentation, unless otherwise indicated, the analysis assumes 60% debt at 8% interest rate and 40% equity at 12% cost. Please see page titled "Levelized Cost of Energy Comparison—Sensitivity to Cost of Capital" for cost of capital sensitivities. These results are not intended to represent any particular geography. Please see page in the original source titled "Solar PV versus Gas Peaking and Wind versus CCGT—Global Markets" for regional sensitivities to selected technologies.

a Unless otherwise indicated herein, the low case represents a single-axis tracking system and the high case represents a fixed-tilt system.

b Represents the estimated implied midpoint of the LCOE of offshore wind, assuming a capital cost range of approximately $2,500 – $3,600/kW.

c The fuel cost assumption for Lazard's global, unsubsidized analysis for gas-fired generation resources is $3.45/MMBTU.

d Unless otherwise indicated, the analysis herein does not reflect decommissioning costs, ongoing maintenance-related capital expenditures or the potential economic impacts of federal loan guarantees or other subsidies.

e Represents the midpoint of the marginal cost of operating fully depreciated gas combined cycle, coal and nuclear facilities, inclusive of decommissioning costs for nuclear facilities. Analysis assumes that the salvage value for a decommissioned gas combined cycle or coal asset is equivalent to its decommissioning and site restoration costs. Inputs are derived from a benchmark of operating gas combined cycle, coal and nuclear assets across the U.S. Capacity factors, fuel, variable and fixed operating expenses are based on upper- and lower-quartile estimates derived from Lazard's research. Please see page titled "Levelized Cost of Energy Comparison—Renewable Energy versus Marginal Cost of Selected Existing Conventional Generation" for additional details.

f High end incorporates 90% carbon capture and storage. Does not include cost of transportation and storage.

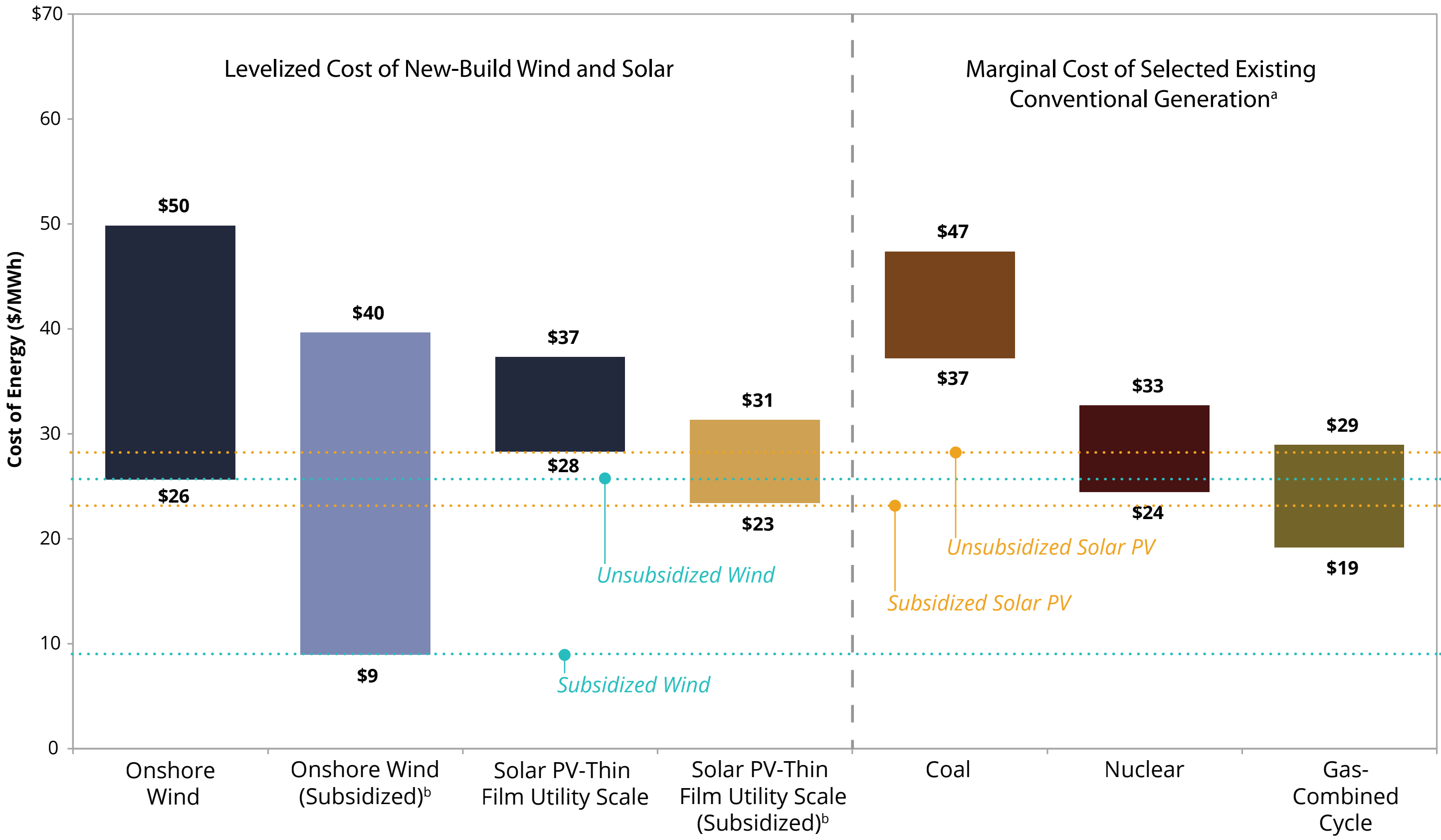
g Represents the LCOE of the observed high case gas combined cycle inputs using a 20% blend of "Blue" hydrogen, (i.e., hydrogen produced from a steam-methane reformer, using natural gas as a feedstock, and sequestering the resulting CO2 in a nearby saline aquifer). No plant modifications are assumed beyond a 2% adjustment to the plant's heat rate. The corresponding fuel cost is $5.20/MMBTU, assuming ~$1.40/kg for Blue hydrogen.

h Represents the LCOE of the observed high case gas combined cycle inputs using a 20% blend of "Green" hydrogen, (i.e., hydrogen produced from an electrolyzer powered by a mix of wind and solar generation and stored in a nearby salt cavern). No plant modifications are assumed beyond a 2% adjustment to the plant's heat rate. The corresponding fuel cost is $10.05/MMBTU, assuming ~$4.15/kg for Green hydrogen.

Source: Lazard. (2021, October). *Lazard's Levelized Cost of Energy Analysis — Version 15*

Figure 2. **Levelized cost of energy comparison—renewable energy versus marginal cost of selected existing conventional generation**

Certain renewable energy generation technologies have an LCOE that is competitive with the marginal cost of existing conventional generation



Source: Lazard estimates.

Note: Unless otherwise noted, the assumptions used in this sensitivity correspond to those used in the global, unsubsidized analysis as presented on the page in the original source titled “Levelized Cost of Energy Comparison—Unsubsidized Analysis”.

a Represents the marginal cost of operating fully depreciated gas combined cycle, coal and nuclear facilities, inclusive of decommissioning costs for nuclear facilities. Analysis assumes that the salvage value for a decommissioned gas combined cycle or coal asset is equivalent to its decommissioning and site restoration costs. Inputs are derived from a benchmark of operating gas combined cycle, coal and nuclear assets across the U.S. Capacity factors, fuel, variable and fixed operating expenses are based on upper and lower quartile estimates derived from Lazard’s research.

b See page in the original source titled “Levelized Cost of Energy Comparison—Sensitivity to U.S. Federal Tax Subsidies” for additional details.

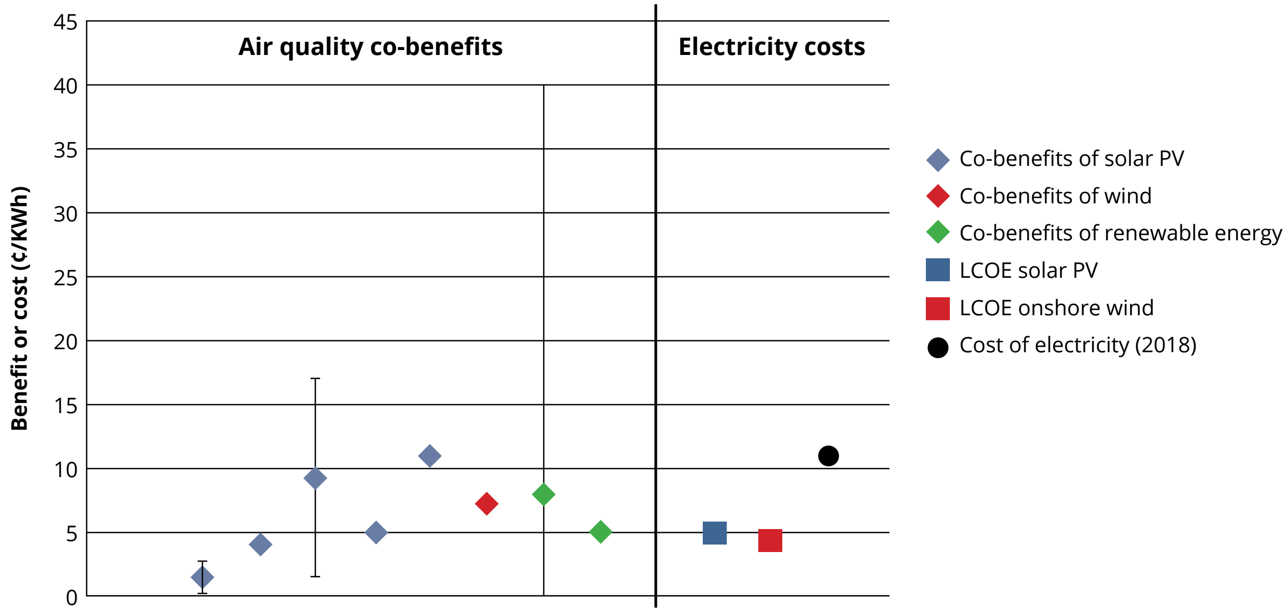
Source: Lazard. (2021, October). *Lazard’s Levelized Cost of Energy Analysis — Version 15*

At the same time that the costs of renewable energy resources are decreasing, utilities are responding to calls for cleaner energy coming from customers and policy mandates. Nationally, the United States has committed to a 100% clean energy electricity system by 2035. At least 21 states and Puerto Rico have set 100% clean energy goals,[35] and numerous cities, municipalities and rural electric cooperatives have set similar targets. Regulators and utilities must respond to these requirements. Even where specific targets are not yet a factor, other influences are leading regulators and utilities to consider clean energy. Vocal customers, citing the climate and health impacts of fossil-fueled generation, are demanding more clean energy and more direct involvement with their energy supply. Utilities and regulators are seeing the risks of extending the life of or installing new fossil-fueled generation when future regulatory actions would likely result in stranded assets. As Figure 3 demonstrates, the benefits of investment in clean energy rapidly exceed the costs.[36]

35 Clean Energy States Alliance. (n.d.). *100% Clean Energy Collaborative — Table of 100% clean energy states.* https://www.cesa.org/projects/100-clean-energy-collaborative/guide/table-of-100-clean-energy-states/

36 Gallagher, C. L., & Holloway, T. (2020, November 19). Integrating air quality and public health benefits in U.S. decarbonization strategies. *Frontiers in Public Health, 8,* 563358 (Figure 4). https://doi.org/10.3389/fpubh.2020.563358. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7717953/

Figure 3. **Comparison of selected benefits and costs of renewable energy**



"Graph of the five studies that include air quality and public health co-benefits monetized as cents per kWh (c/kWh) as well as levelized cost of energy (LCOE) for solar PV and onshore wind and U.S. average electricity costs in July 2018 (77, 81-83, 85)."

Source: Gallagher, C. L., & Holloway, T. (2020, November 19). *Integrating Air Quality and Public Health Benefits in U.S. Decarbonization Strategies*

As clean energy resources — which have different characteristics than traditional fossil-fueled supply — become a larger share of a cooperative's portfolio, cooperatives will need to change their operations and planning to maximize the benefits of these resources. Greater demand flexibility creates opportunities for utilities to match more malleable demand with supply.[37] These changes can reduce costs and increase resiliency.

3. A Heightened Need to Plan for Resilience to Extreme Weather

Extreme weather is becoming more common in many places. Severe weather can not only endanger communities, they can also endanger the reliability of utility systems those communities rely upon. Flooding from more severe hurricanes and other storm events and larger and hotter forest fires have caused extensive outages. Utility equipment and operations that do not keep up with the threats of more extreme conditions can cause utility systems to break down.[38] These outages have been costly: Fires caused by Pacific Gas and Electric in California, for example, led to prolonged outages that resulted in the loss of human life, loss of fauna and flora, extreme discomfort, property loss for residents and businesses, financial burdens due to spiking prices[39] and disruptions to the economic health of communities and businesses unable to operate for extended periods of times. Utilities have also felt the consequences: increased costs, civil liability for causing outages and even criminal liability for deaths.[40] Adding to the challenge, outages reduce utility revenues needed to cover costs, which can result in rate increases.

To ensure reliable service for member-owners, utilities, including cooperatives, are increasingly seeing the need to make their systems more resilient. Resilience can come in many forms, including investing in infrastructure, ensuring a diversity of resources and enabling flexible resources.[41] Experience in the past decade has shown that the key to resilience is to enable flexible resources and demand management so that during extreme

37 Murphy, C., Yinong Sun, T. M., Jadun, P., Muradori, M., Nelson, B., & Jones, R. (2021, January). *Electrification futures study: Scenarios of power system evolution and infrastructure development for the United States.* National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy21osti/72330.pdf

38 *United States of America v. Pacific Gas & Electric.* (2022). Final comments of district court upon expiration of PG&E'S probation, No. CR 14-0175 WHA (N. Dist. CA Jan. 19, 2022). https://www.courthousenews.com/wp-content/uploads/2022/01/show_temp.pdf

39 *United States of America v. Pacific Gas & Electric,* 2022; see also Hogan, M. (2021, February 26). *Real-life drama: Learning from a Texas tragedy.* Regulatory Assistance Project. https://www.raponline.org/blog/real-life-drama-learning-from-a-texas-tragedy/

40 United States of America v. Pacific Gas & Electric, 2022.

41 Hogan, 2021.

weather a larger variety of resources are available.

For example, after Greensburg, Kansas, experienced an EF-5 tornado in 2007 that severely damaged or destroyed "more than 90% of structures in the community," the town set a Long-Term Community Recovery Plan with a comprehensive planning process.[42] Now, Greensburg has rebuilt its municipal utility infrastructure and boasts "100% renewable, 100% of the time," with more resilience to withstand future extreme weather events.[43]

4. Community Economic Considerations

Alongside economic benefits for the utility itself, the decisions that a cooperative makes determine whether investments in energy stay within the community. Through local renewable generation development, energy efficiency programs and many other tools, a utility can take advantage of existing local companies or bring additional jobs into the community. In addition to the jobs themselves, such investment keeps member-owner payments within the community economy, thus compounding benefits. To realize such benefits, cooperatives have good reason to forge relationships with anchor community institutions like local schools and community centers, to provide energy efficiency upgrades, smart building controls, on-site solar, or two-way chargers. These benefits can be both near term and long term, through dedicated workforce development, sustainable programming and more.

B. Goal Setting and Benchmarks

To set planning processes within the broader context of long-term objectives, rural electric cooperatives can set goals and benchmarks for their energy mix. Setting energy efficiency goals can be a useful place to start, as reducing energy usage is the cheapest way to meet member-owner demand. Cooperatives can then move on to goals and benchmarks to plan for increasing amounts of clean generation or for decreases in emissions. For example, in early 2021, Vermont Electric Cooperative committed to 100% carbon-free power supply by 2023. Vermont Electric had already developed a power supply in 2021 that was 75% carbon-free. To meet the remaining portion, its strategic plan calls for peak-shaving, management of member storage (such as EVs) and additional renewable energy.[44] Such goals and benchmarks can help set a framework for cooperatives as they plan for the future.

Rural electric cooperatives have a number of ways to meet the clean energy goals and emissions reductions benchmarks they set. Some of these options focus on the cooperative's ability to build, procure or permit clean energy. Other options to meet these goals focus on the cooperative's ability to engage member participation through rate design signals and incentives.

1. Understanding the Status Quo

Setting goals and benchmarks helps cooperatives to keep track of progress. To measure that progress, prior to setting goals, cooperatives can first conduct an energy audit to establish usage and the cost of supplying existing energy usage. This data becomes a baseline. Such an audit or inventory enables cooperatives to make comparisons, measure success and make new recommendations. This analysis creates a valuable feedback loop for fine-tuning the estimated impact of existing policies and programs on energy reductions and savings.[45]

This information also helps a cooperative to set goals. With baseline information, the cooperative can set energy reduction long-term goals and shorter-term benchmarks for what can be obtained through energy efficiency (Section III-A), emissions reductions goals, clean or renewable energy goals for new generation and any electrification goals or benchmarks.

2. Types of Goals and Benchmarks

A cooperative can utilize different types of goals and benchmarks. Some options are listed below, but a utility may choose to develop others.

- **Energy reduction goals** focus on energy efficiency measures that decrease energy use. Some of these goals can focus on reduced energy use from the

42 Greensburg, KS. (2007, August). *Long-Term Community Recovery Plan.* https://www.greensburgks.org/residents/recovery-planning/long-term-community-recovery-plan/view

43 Greensburg, KS. (n.d.). *5 ways we put the "green" in Greensburg.* https://www.greensburgks.org/sustainability/how-we-put-the-green-in-greensburg

44 Vermont Electric Cooperative (2021, April 4). *VEC commits to carbon-free power supply by 2023* [Press release]. https://vermontelectric.coop/latest-news/vec-commits-to-carbon-free-power-supply-by-2023-04-06-21. See also Vermont Electric Cooperative. (n.d.). 2021 strategic planning [Table].

45 For more information on setting baselines, see Morse, E., Allan, D., & Frushour, G. (2015). *Best practices in municipal energy management and efficiency.* South Bend Green Ribbon Commission Energy Group. https://clas.iusb.edu/pdf/sustainability-studies/white-papers/SB%20Energy%20Management%20White%20Paper_Final%2012-7-15.pdf

cooperative's members; others can set benchmarks for cooperative buildings to achieve.[46] Goals can range from a modest 0.5% per year reduction in energy consumption to 2% per year or greater to achieve significant cumulative energy reductions over a span of 10 to 20 years. Increasing the efficiency with which the utility can meet end uses creates additional flexibility to meet demand.

- **Climate action goals** usually focus on carbon reduction targets, such as emissions reduced by a certain percentage relative to a previous level, to be reached by a specific date in the future. To avoid the worst impacts of climate change, RMI models that the U.S. electricity sector needs to reduce emissions 80% to 83% by 2030, compared with 2005 levels.[47] Many cooperatives have incorporated this type of data into their climate action goals. Examples:
  - Delaware Electric Cooperative has set a target to reduce the carbon intensity of the electricity used by its members of 50% by 2025 and a goal of 75% by 2050 compared to 2005 levels.[48]
  - Grand Valley Power in Colorado has set a goal of providing members with 60% clean energy by 2030.[49]
- **Renewable energy goals** require that a certain percentage of energy come from renewables, which may include wind, solar, biomass, geothermal and some hydroelectric facilities. State renewable portfolio standards may apply to cooperatives in the state as well.[50]

C. Integrated Resource Planning 101

There are several names for utility resource planning: integrated resource planning, least-cost planning, resource planning. But they all describe the same concept: a process by which many different energy resource options, on both the supply and demand

Beneficial Electrification as a path to meeting climate and other goals

Historically, adding load to the grid meant increased emissions. However, the carbon intensity of the electric grid in many states is decreasing as states set standards requiring clean energy to replace fossil fuels by specific dates. Even in places that have not set such goals, the grid is becoming cleaner as renewable energy, frequently the cheapest option, replaces fossil fuels and as demand and supply are coordinated to meet needs more efficiently.

As this trend continues, many analyses find that beneficial electrification will be a necessary prerequisite to meeting climate goals.[51] Electrification is beneficial if it reduces consumer costs over the long term, reduces negative environmental impacts or enables better grid management for a more flexible grid.[52] Beneficial electrification can be included in a cooperative's energy efficiency goals because energy-saving electric vehicles and advanced electric space and water heating technologies use less energy than their fossil-fueled counterparts. It can also be included in cooperative climate action plans because beneficial electrification reduces greenhouse gas emissions, particularly when incorporated with increased renewable energy and energy efficiency policies. Other cooperatives may include beneficial electrification within renewable energy goals, similar to states including storage and other nonrenewable goals in their renewable portfolio standard policies.

46 U.S. Environmental Protection Agency. (2021, February). *State & local government coordination: Benchmarking and building performance standards*. https://www.epa.gov/sites/default/files/2021-02/documents/benchmarking_building_performance_standards_section3.pdf

47 Teplin, C., Subin, Z., Corvidae, J., Guccione, L., Hansen, L., Jhaveri, K., Mulvaney, K., & Rea, J. (2021). *The United States' role in limiting warming to 1.5C.* RMI. https://rmi.org/insight/scaling-US-climate-ambitions

48 Delaware Electric Cooperative. (n.d.). *Clean Energy Plan.* https://www.delaware.coop/sites/default/files/2021-01/DEC%20Clean%20Energy%20Plan_0.pdf

49 Grand Valley Power. (2019, February 7). *Grand Valley Power sets 60 percent clean energy target.* https://www.gvp.org/60-percent-clean-energy-target-announced

50 For a full list of state renewal portfolio standards statutes, see National Conference of State Legislatures. (2021, August 13). *State renewable portfolio standards and goals.* https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx

51 For examples of electrification goals, see American Council for an Energy-Efficient Economy. (n.d.). *Beneficial electrification and energy efficiency policy.* https://www.aceee.org/sites/default/files/electrification-dc.pdf

52 For more information on beneficial electrification, see Farnsworth, D., Shipley, J., Lazar, J., & Seidman, N. (2018). *Beneficial electrification: Ensuring electrification in the public interest.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/beneficial-electrification-ensuring-electrification-public-interest/

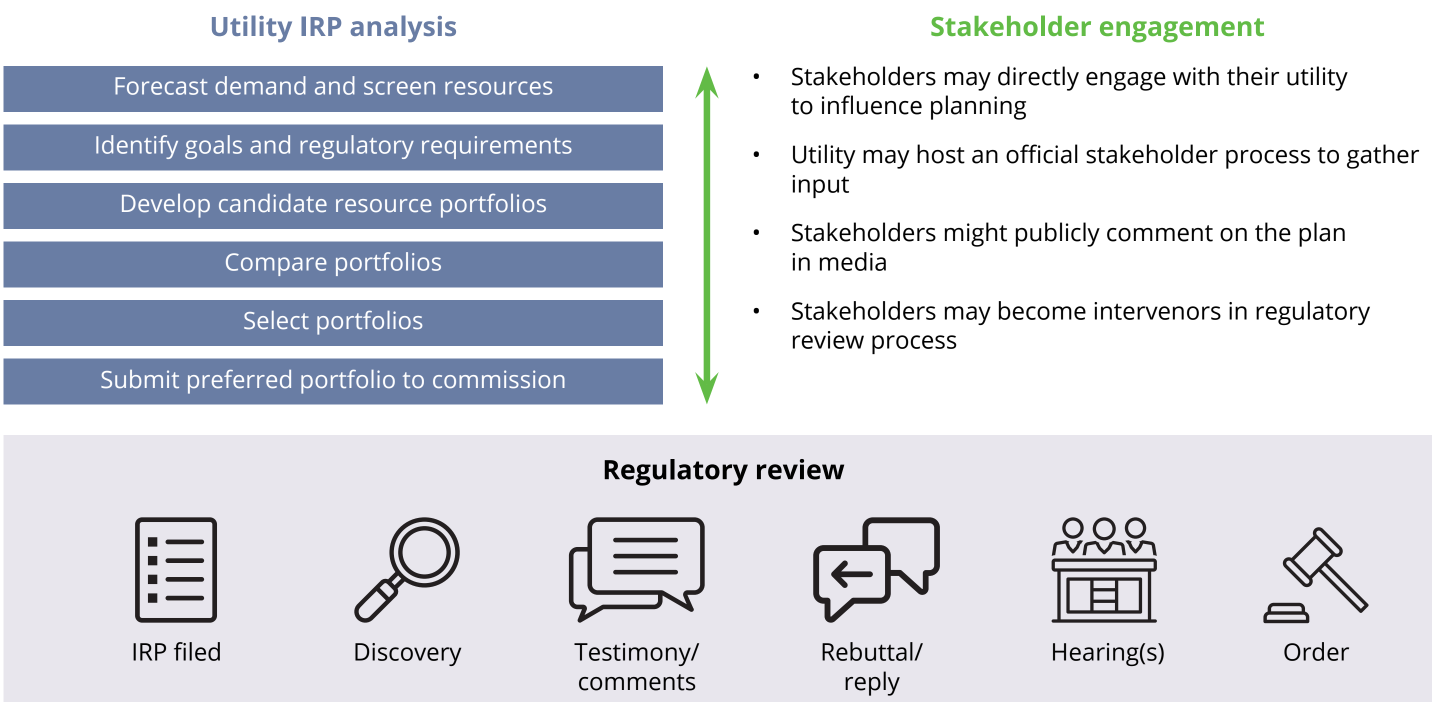
side, can be evaluated in an integrated fashion, with the participation of stakeholders, to arrive at a plan with the least overall cost, within whatever constraints are imposed. For simplicity, and because it is the most recognized term, we will use the term "integrated resource planning" (IRP) to describe the planning processes. It is important to note that the IRP process may vary in size and complexity depending on the size of the cooperative and the complexity of the system. Developing an IRP process, even if it starts off simply, is a key part of designing a system ready for the energy transition.

All utilities engage in some sort of long-range planning exercise to determine how to acquire the supply and infrastructure needed to serve customers with affordable, reliable and safe electricity. Although IRP processes may have been traditionally the province of generation and transmission cooperatives, as distribution cooperatives develop supply options and further integrate demand-side resources, system planning will become increasingly important for distribution cooperatives. In some jurisdictions, an integrated resource plan is required and must be submitted to the regulatory authority for review and/or approval. Rural electric cooperatives may have their own internal requirements for the review of an integrated resource plan by the board and/or elected officials. Even where such requirements do not exist, an IRP process is a valuable tool for utilities addressing changing circumstances and for planning for the future. IRP processes provide a robust way to do that planning by putting all information on the table, comparing different scenarios to meet demand, exploring options to manage and shape demand and allowing stakeholder input throughout the process to ensure that other perspectives and ideas are included.

The IRP process can create an opportunity for a cooperative to engage its members and other stakeholders in the distribution cooperative's planning processes and related processes of the G&T cooperative. In doing so, the utility can both share information about its system, including challenges and opportunities, and receive ideas, input and perspective from outside the utility. We discuss fostering community input in more depth in Section IV, "Good Governance."

There are usually several stages to an IRP process,

Figure 4. **Elements of an IRP development process**



Note: This graphic shows a generalized example of the IRP development process. It does not capture all the variations of analysis, review, or stakeholder engagement, nor the iterations between steps. In this graphic, the regulatory review processes illustrated reflect states in which the regulator has a high level of regulatory oversight.

Source: Based on Bonugli, C., & Ratz, H. (n.d.). *Integrated Resource Plan (IRP) Support Package* summarized in Figure 4.[53] First, the cooperative lays the groundwork by providing information to the board about the planning process alongside key information about existing operations, an explanation of constraining factors and a menu of solutions to meet cooperative and member needs. The cooperative staff and perhaps the board then articulate values and desired outcomes of the planning process. Next, the cooperative, ideally in coordination with stakeholders, develops various scenarios to meet cooperative goals in line with any constraining factors. Finally, the cooperative and stakeholders weigh the pros and cons of those options to arrive at short- and long-term plans for utility operations.

The integrated resource plan itself usually outlines all of these parts of the planning process. Typical elements include the following.

1. Assess Current Operations and Financial Health

- **Planning environment.** How does the utility currently operate? Information needs to be gathered about the utility and the context of the planning process.
- **Financial health.** What are the utility's financial constraints? As not-for-profit, member-owned corporations, rural electric cooperatives have flexibility in reinvesting in their community but must reliably maintain their own financial health.
- **Current demand and supply.** To plan for the future, it is important to understand where the cooperative is today. What demand does it serve and what is the current generation portfolio? This assessment includes member-owner sources of generation, such as member-sited distributed generation, and an assessment of increasing demand, such as electric vehicle penetration and future targets. Attention to changes in demand and in the supply resources over the planning horizon, such as plant retirements, are critical components.

2. Identify Goals and Regulatory Requirements

- **Utility goals.** At the start of the planning process, cooperatives can set forth any relevant goals and benchmarks, which might include committing to clean energy or net-zero operations by a certain date, reducing energy bills, decreasing the low-income energy burden, supporting affected community members in the transition from fossil fuels, ensuring a transparent community-based planning process or other goals.
- **Regulatory requirements.** Depending upon the jurisdiction, cooperatives may be responsible for meeting regulatory requirements set by city, state or federal agencies. These may include clean air and water provisions or clean energy benchmarks.
- **Values.** Underappreciated but helpful in the planning process is an articulation of the cooperative's values, such as a commitment to transparency, reliability, sustainability, equity, economic development or any number of other factors. For a rural electric cooperative, this task may be accomplished through reference to the cooperative principles.[54] Articulating values as part of the process can help with later decision-making, particularly when identifying trade-offs within scenarios.

3. Define Inputs for Resource Planning

There are multiple inputs into a robust scenario plan. During the planning process, it is important for a cooperative to share information about the assumptions, input and rationale for various scenarios. Those assumptions may be tested through stakeholder input and information. These inputs include:

- **Load forecast.** This predicts future member demand for energy. Including more than one load forecast will enable the cooperative to consider how load may change in response to various factors such as energy efficiency programs, climate impacts, electric vehicle uptake, building electrification, population growth or decline, industrial development or member adoption of solar photovoltaics (PV) and distributed generation.
- **Resource options.** Cooperatives should explore a full range of resources available to meet their goals. These resources include:
  - **Existing supply- and demand-side resources.** Current generation, including existing power purchase contracts, and demand-side resources. These options may continue to provide value, or the cooperative can consider whether they are no longer cost-effective.
  - **New demand-side programs.** Potential new

53 Bonugli, C., & Ratz, H. (n.d.). *Integrated resource plan (IRP) support package.* American Cities Climate Challenge Renewables Accelerator. https://cityrenewables.org/resources/integrated-resource-plan-irp-support-package/. For more information, see Duncan, J., Eagles, J., Farnsworth, D., Shenot, J., & Shipley, J. (2021, October). *Participating in power: How to read and respond to integrated resource plans.* Regulatory Assistance Project and Institute for Market Transformation. https://www.raponline.org/knowledge-center/participating-in-power-how-to-read-and-respond-to-integrated-resource-plans/

54 National Rural Electric Cooperative Association, 2016.

- demand-side resources or the expansion of current programs, such as energy efficiency potential, demand management programs, rate designs to influence behavior and member-sited distributed resources.
- **New supply.** New supply-side options, including new power purchase contracts, development of utility-owned resources in the service territory and possibilities for storage and microgrids as well as the development of member-sited generation.

- **Distribution and transmission system interplay.** Some integrated resource plans may include an analysis of the interaction of the distribution and transmission networks. Cooperatives will largely be focusing on the distribution system, but an analysis of transmission available to serve the cooperative may also be useful in considering available resources, especially if the cooperative is buying generation from power plants located outside its service territory.

4. Develop Candidate Resource Portfolios

- **Resource portfolio creation.** These portfolios include a selection of existing and new resources that can meet member needs during the planning period. By creating various portfolios of resources and accepting such portfolios from stakeholders, a cooperative can consider different ways that it can meet member needs, utilizing different sets of resources or demand-side measures.
- **Resource portfolio modeling.** Typically, the utility then models the various scenarios so it can then compare the costs and impacts of the different scenarios to determine a preferred path forward.

5. Compare Portfolios

- **Scenario selection.** The cooperative then compares the baseline scenario to one or more alternative scenarios. By considering several scenarios side by side, the cooperative can evaluate costs and benefits of several scenarios. This process is also an important time to stress-test different assumptions within the model to understand the effect of forecasted fuel prices, policy changes, demand fluctuations, operating conditions and other factors on each resource portfolio.
- **Analysis.** The core of the IRP process is to analyze the information gained through the process to determine

Rural cooperative jurisdiction and authority

Rural electric cooperatives, as member-owned not-for-profit entities, have a unique history that informs their authority and governance structure.[55] The authority for electric cooperatives comes from state law; the federal Public Works Administration and the Rural Electrification Administration provided the first versions of model legislation for states to authorize electric cooperatives. This model legislation, adopted in many states, granted the authority for cooperatives to electrify rural areas, including the authority to provide generation, transmission and distribution services and the power to exercise eminent domain. The legislation outlined that rural cooperatives would have strong democratic control, with governance coming from a board of directors elected by the cooperative's members. Because of this self-governance structure, rural cooperatives were largely exempted from regulation by state public utility commissions, an outcome confirmed in the courts even in states without explicit exemptions. The Federal Power Act similarly did not extend federal jurisdiction to rural cooperative power generation.[56] Because they are subject to limited, if any, state regulation, rural electric cooperatives have the freedom to operate relatively independently as their boards allow. Generally, cooperative staff oversees operations and energy procurement, with direction and approval coming from the board of directors. Member-owners can also provide input in open meetings or through direct outreach to the board of directors or cooperative staff.

Although the boundaries of a cooperatives' authority and the regulatory jurisdiction over them are similar across states, there are substantial differences depending on the state's authorizing legislation and other state laws that may subject cooperatives to additional requirements, such as disconnection limitations or renewable portfolio standards. It is therefore imperative that each cooperative clearly recognize the parameters of its authority: what it can do independently, when it must seek approval and what is subject to review.

55 Pacyniak, G. (2020, October 16). Greening the old New Deal: Strengthening rural electric cooperative supports and oversight to combat climate change. 85 *Missouri Law Review 409.* UNM School of Law Research Paper No. 2020-12. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3605515

56 Pacyniak, 2020.

a best path forward to meet member-owner needs. Stakeholder input at this stage is especially valuable to ensure that various perspectives are considered.

6. Select a Preferred Portfolio and Recommend an Action Plan

At the end of the IRP process, the cooperative can choose a preferred portfolio and then develop a plan to determine next steps needed to implement the portfolio. This plan can then guide priorities and next steps for the utility, including determining how to procure the resources or implement the programs that make up the preferred portfolio.

7. Submit the Preferred Portfolio to the Board or Commission for Authorization or Approval

The cooperative may then need to submit the plan to its board and, in some states, to the state public utility commission for review or approval. In addition to ultimately approving the plan, rural cooperative board members may wish to participate throughout the planning process to provide input and weigh different options as the process proceeds. State law and regulation may mandate that the plan include certain elements, and the public utility commission may review solely for inclusion of those pieces, or it may take a broader look depending on state law, regulation and the practice of the commission.

D. Resource Development and Procurement

Once the cooperative has developed a plan to meet its member-owners' needs, the second step is to obtain the resources to meet those needs through resource development and procurement.[57]

In today's energy marketplace, utilities have tools to manage both supply and demand. Traditionally, utilities have managed the generation supply by estimating peak load demanded by the customer base and then building centralized generating plants to meet that load. These plants were large-scale and capital-intensive projects with long time frames for permitting and construction. In constructing them to meet demand, utilities took on sizable financial and project risk.

With changes in technology — particularly advancements in smart meters, connected household devices, beneficial electrification, demand management, storage and renewables — utilities now have tools that can shape demand as well as supply. In addition, these technologies are more modular, with lower average project cost. Using these distributed energy resources, cooperatives can develop a diverse, situation-specific blend of resources to meet their needs with less upfront financial outlay and far less financial, policy and project risk.

In today's energy sector, generation can be developed and owned by several different players:

- Cooperatives can develop supply resources on their distribution grid.
- Cooperatives can develop or contract to procure generation delivered via the transmission grid, such as from a utility-scale wind farm.
- Member-owned distributed energy resources, such as residential solar systems, can contribute to supply and offer other services to the distribution grid, such as helping with power quality or voltage control.
- Generation and transmission cooperatives can supply distribution cooperatives. Cooperatives can enter into agreements to purchase power generated by solar panels, wind turbines or other forms of energy generation. Sometimes these agreements are part of a consortium in which several utilities own a portion of the plant.
- Cooperatives can develop and engage demand-side flexibility through energy efficiency and demand management programs.

By combining resource planning with resource procurement, cooperatives can test their preferred scenarios to determine whether those resources can be acquired and meet demand consistent with what scenario modeling has shown. Cooperatives can also use results from previous procurement, adjusted for changes in costs, to inform scenario planning and modeling. In short, resource planning and resource procurement are most effective when done in an iterative and integrated manner.

We explore these technologies in depth in the following section. One takeaway is that given the diverse options available to a contemporary utility, it is possible through good planning for a utility to lower bills in the long term, increase grid resiliency and flexibility, reduce emissions, work to minimize energy burden and create local jobs or any series of such benefits that a utility seeks to achieve.

57 Of note, it can be advantageous to combine or otherwise link planning and procurement processes so that information about the availability and cost of different options to meet customer needs inform the utility's planning.

Useful Resources on Planning and Procurement

Duncan, J., Eagles, J., Farnsworth, D., Shenot, J., & Shipley, J. (2021). *Participating in Power: How to Read and Respond to Integrated Resource Plans.* Regulatory Assistance Project and Institute for Market Transformation. https://www.raponline.org/knowledge-center/participating-in-power-how-to-read-and-respond-to-integrated-resource-plans/

Lazar, J. (2016). *Electricity Regulation in the US: A Guide* (Second Edition). Regulatory Assistance Project. https://www.raponline.org/knowledge-center/electricity-regulation-in-the-us-a-guide-2/

Shwisberg, L., Dyson, M., Glazer, G., Linvill, C., & Anderson, M. (2020). *How to Build Clean Energy Portfolios: A Practical Guide to Next-Generation Procurement Practices.* RMI. https://rmi.org/how-to-build-ceps/

III. Building a Clean and Equitable Energy Future

One of the foundational electricity sector rules, that has operated for over a century, is that overall within a grid system, electricity generated must "equal" or balance the electricity consumed in the same amount at precisely the same time. Based on this rule, grid operators have determined load on a system and adjusted supply to meet it by adding available generation: first using the lowest-cost units, then adding more expensive ones until total electricity demand was satisfied. This is known as economic dispatch. Today, this basic rule has been modified to allow the entrance of new and economical technologies that are smaller and more flexible. New technologies on both the demand and supply side allow for system operators to balance demand and supply in new ways. On the demand side, technologies like controlled water heating and storage, as well as improved transmission capabilities and system operations, allow demand to become flexible. For example, EVs or water heaters can charge during the night when power costs are low or at midday when renewable generation is plentiful and may face curtailment. The customer's needs are met, whether water was heated or the car battery charged five minutes or five hours before it was needed. The flexibility to meet those demands over longer time periods creates new possibilities for grid operators to meet end-use needs while integrating more renewables, realizing cost savings and improved reliability and using existing grid resources more efficiently.[60]

On the supply side, renewable energy resources, fast-ramping and fast-cycling generation, storage and distributed generation allow for generators to produce power more cleanly, closer to load, and matched more precisely to demand. These changes have opened up new opportunities to meet members' needs.

Electricity is an essential component of modern life. Yet at least 79.5 million American adults live in households that struggle to pay their usual household expenses, such as utility bills, rent, food and medicine, according to the latest U.S. Census Bureau Household Pulse Survey. That is 33% of the 249 million Americans over the age of 18.[58] In the United States in 2021, **13.4%** of the national population was living below the poverty line. That rate represents more than approximately **42.5 million** Americans.[59]

This shift in focus from large, central generating plants to a network of smaller, modular and economic resources on both the supply and demand side allows the electric system to operate reliably in a more nimble manner. It is also an opportunity to incorporate energy end-users into the energy transition and to do so in an equitable manner. Increasingly, member-owners will buy distributed energy resources such as solar PV, storage and microwind or heat pumps and electric vehicles. Cooperative programs that reduce barriers to access to clean energy technologies for low-income members and that provide robust and inclusive outreach programs to engage these members are important both to ensure equitable access and to maximize community benefits.

Program design will need to address the specific barriers low-income communities face to be successful. For instance, many low-income households rent rather than own their homes and therefore do not have the ability to make decisions about appliances like water heaters and stoves, or the installation of distributed energy resources. Landlords, meanwhile, have little or no incentive to spend money on equipment upgrades that would only benefit renters who pay the utility bills. Low-income households also tend to live in buildings that are in relatively greater need of weatherization and other basic upgrades and repairs, which can pose a challenge to electrifying their energy uses in ways that increase their home comfort and lower their bills. Successful utility clean energy transition programs will recognize these barriers along with other challenges, including language preferences and cultural barriers such as a lack of trust in government and utilities. These and other community-specific factors will affect the success of

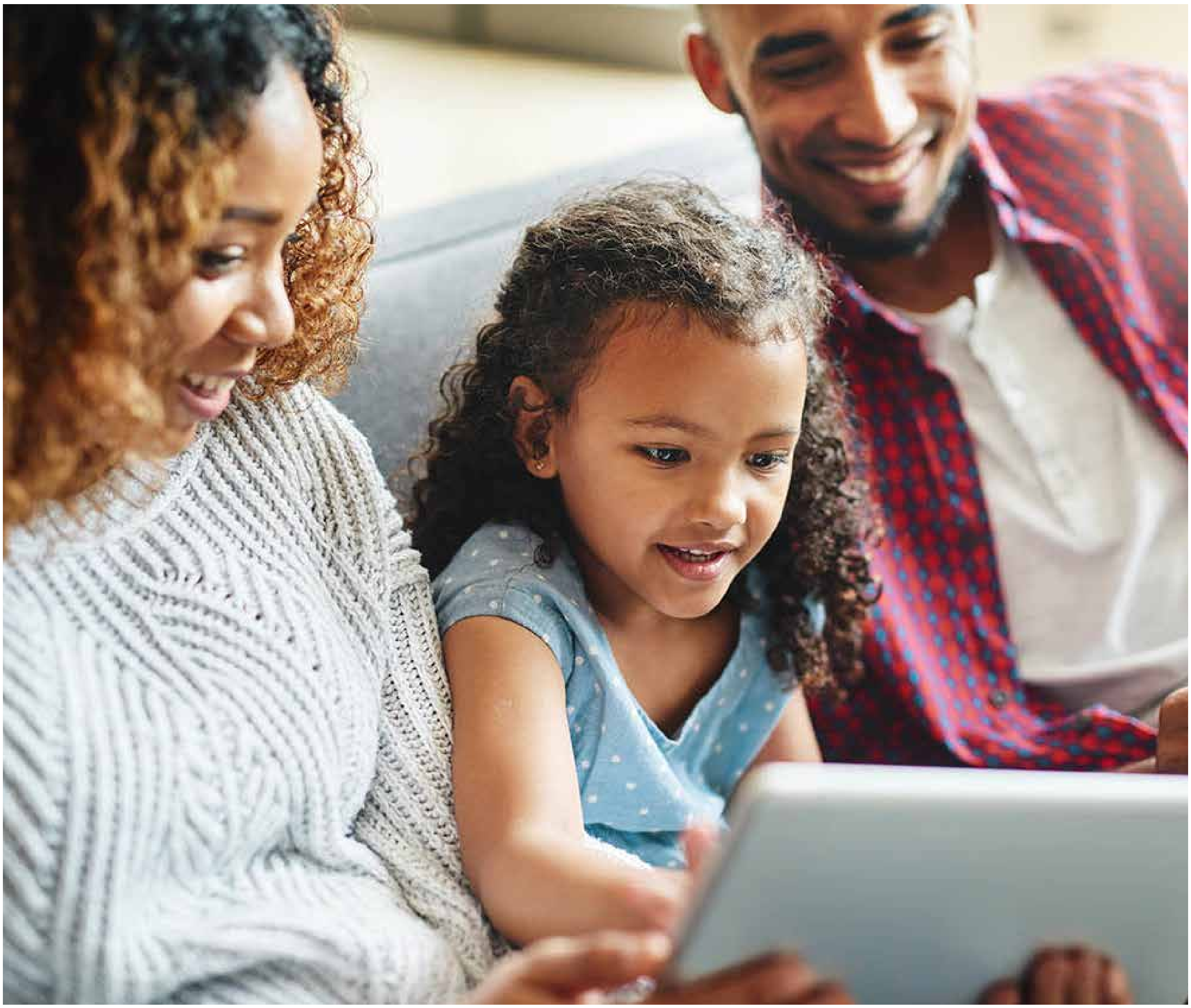
58 Lee, L. (2020, November 12). *An estimated 205 million Americans are at risk of utility disconnection. Here's how you can get help.* CNN. https://www.cnn.com/2020/11/12/us/utility-disconnection-help-covid-iyw-trnd/index.html; and U.S. Census Bureau. (2021, December 22). *Measuring household experiences during the coronavirus pandemic*. https://www.census.gov/data/experimental-data-products/household-pulse-survey.html

59 DePietro, A. (2021, November 4). U.S. poverty rate by state in 2021. *Forbes.* https://www.forbes.com/sites/andrewdepietro/2021/11/04/us-poverty-rate-by-state-in-2021/?sh=7e58250d1b38

60 Linvill, C., Lazar, J., Littell, D., Shipley, J., & Farnsworth, D. (2019). *Flexibility for the 21st century power system.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/flexibility-for-the-21st-century-power-system/

efforts to equitably electrify buildings.[61]

With these changes to the rules of system operation, a cooperative can build an energy system that can flexibly rely on resources on the demand and supply side to meet member-owner needs. This section will discuss these building blocks. We highlight energy efficiency first because of its importance as the first and most cost-effective option. Additional opportunities to manage demand, including engaging member-owners through rate design, demand response and incentives for distributed energy development, are then explored. Next, we discuss beneficial electrification of end uses including buildings and vehicles, which will both affect load and create additional opportunities for flexibility. We then outline options for clean energy generation, including methods to procure and develop those resources. Because addressing energy burden is a critical part of ensuring that the clean energy transition benefits all members of a community, we include a discussion of policies and programs to reduce energy burden. Finally, this section includes a summary that discusses how all these pieces have roles to play in balancing a decarbonized system to meet member-owners' needs.



61 Shipley, J., Hopkins, A., Takahashi, K., & Farnsworth, D. (2021). *Renovating regulation to electrify buildings: A guide for the handy regulator.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/renovating-regulation-electrify-buildings-guide-handy-regulator/

A. Put Energy Efficiency First

Energy efficiency is the first option for cooperatives to consider and implement. Energy efficiency is not only the least-cost resource option, it can also simultaneously provide savings to the electric system and to individual member-owners who participate in programs, including decreasing the risk of fluctuations in energy prices. In addition to monetary savings, energy efficiency programs can increase the quality of life for participants by creating tighter building shells that provide more comfortable indoor living environments. Energy efficiency programs are modular and flexible in that they can be scaled to budget, targeted to member groups, and easily expanded. Energy efficiency programs can also create jobs within the local community.

To put this in perspective: Energy efficiency has become the nation's third-largest electricity resource. Without energy efficiency, an additional 313 large power plants would be needed to meet our energy needs.[62] With energy efficient appliances and home upgrades, member-owners can save anywhere from 5% to 30% on their utility bills, according to the U.S. Department of Energy.[63]

Despite these benefits, energy efficiency programs are often overlooked and underutilized. Programs can and should be evaluated to ensure they are cost-effective and to determine which programs provide the most savings. Industry tools are available to help the cooperative determine which programs are best for its community. *The National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources* provides an excellent guide for how to screen programs, taking into account the goals of the cooperative, as discussed in Section III-A-2 regarding cost-effectiveness screening.[64]

62 Beadle, R. (2019, May 8). *Benefits of energy efficiency go beyond saving energy and money.* Resource Innovations. https://www.resource-innovations.com/resources/benefits-energy-efficiency-go-beyond-saving-energy-and-money; and EnergySage (2021, August 30). *Why conserve energy: The top benefits of energy efficiency.* https://www.energysage.com/energy-efficiency/why-conserve-energy/

63 EnergySage, 2021.

64 National Energy Screening Project. (2020, August). *National standard practice manual for benefit-cost analysis of distributed energy resources.* https://www.nationalenergyscreeningproject.org/national-standard-practice-manual/

A key piece of making efficiency investments equitable is prioritizing lower-income members of the community. Key to achieving this goal is better targeted outreach to low-income communities so that they are aware of the programs available. Further, greater flexibility is needed in providing people with the opportunity to participate in programs — for example, scheduling energy audits on a weekend so residents do not have to take off from work. Recognizing this, recent legislation in Colorado called for a task force to recommend improved access to state agencies and programs that schedule variable times of day and days of the week for public input and that use different methods of outreach, including language options.[65]

Growing the clean energy workforce

Partnerships between cooperatives and community colleges to develop clean energy job training or retraining enable community members to build skills and attract clean energy employers or help community-based employers grow. Workforce issues are a major concern for cooperatives across the nation, particularly as key long-serving employees like lineworkers approach retirement, and as new technology needs arise like load shaping and cybersecurity. As a result, NRECA has initiated significant workforce development efforts for the cooperative community.[66] Cooperatives are also partnering with community colleges and other schools to build these workforces through apprenticeships and tuition assistance programs.[67] Already, over 2.3 million Americans work in energy efficiency jobs, including in heating, ventilation, air-conditioning, electrical work, insulation and plumbing.[68]

1. Financing Mechanisms

Energy efficiency programs can be funded in numerous ways. The most common method that investor-owned utilities use is to fund energy efficiency through a ratepayer charge. Rural cooperatives can utilize this option or, depending on the size and scale of the programs, other approaches such as cooperative-financed programs, on-bill financing or property assessed clean energy programs or take advantage of federally funded weatherization programs.

a. Cooperative-Financed Programs: Energy Audits and Rebates

The most common mechanism for financing customer energy efficiency programs is to absorb costs in rates, in the same way that purchasing power or building a new power plant would be. Typically, the cooperative budgets for these costs and incorporates them contemporaneously in its electricity rates. If its energy efficiency program is financed in this way, the cooperative would develop a portfolio of programs and a budget for implementation. For example, Clay Electric Cooperative in Florida offers rebates for ceiling insulation, as well as the installation of high-efficiency heat pumps, solar water heating systems, window film, spray foam insulation, heat pump water heaters and heat recovery units. The rebate includes conventional and manufactured homes and small commercial facilities. Rebates are paid directly to Clay Electric members. [69] Intentional outreach is important to ensure all member-owners are aware of programs like this when they exist.

Another innovative program is one at Southern Pine Electric Cooperative in Alabama, which offers devices for sale to all member-owners that may help to reduce or in some cases eliminate problems caused by fluctuating voltage. Charges for certain equipment may be added to members' bills and repaid over time on a monthly basis.[70]

65 General Assembly of the State of Colorado. (2021). HB 21-1266. https://leg.colorado.gov/sites/default/files/2021a_1266_signed.pdf

66 National Rural Energy Cooperative Association. Workforce Solutions. https://www.cooperative.com/programs-services/hr/Pages/default.aspx

67 LaBerge, J. (2016). The Next Generation of Lineworkers. https://crea.coop/2016/07/04/the-next-generation-of-lineworkers/

68 National Association of State Energy Officials. (2020). 2020 U.S. energy & employment report. https://static1.squarespace.com/static/5a98cf80ec4eb7c5cd928c61/t/5ee78423c6fcc20e01b83896/1592230956175/USEER+2020+0615.pdf

69 Clay Electric Cooperative. (n.d.). Energy rebates & loans. https://www.clayelectric.com/member-information/energy-information/energy-rebates-loans.

70 Southern Pine Electric Cooperative. (n.d.). Surge protection equipment. https://southernpine.org/surge-protection-equipment

b. On-Bill Financing

On-bill financing is a loan made from the cooperative to member-owners to pay for energy efficiency improvements.[71] The cooperative collects the regular monthly payments through the electricity bill until the loan is repaid. This mechanism can be designed to apply to one or more member classes. In most cases, the loan funds are provided by the cooperative or a program administrator.[72] There are generally two kinds of on-bill financing: one in which the financing is a loan with debt repayment added to the member-owner's bill, and another that is tariff-based. With the Pay As You Save (PAYS) program, the costs of the energy efficiency are recovered through a tariff. The benefit of a tariff-based program is that all member-owners can be eligible for the program, reaching a larger group since many low- and moderate-income (LMI) members are routinely disqualified from other debt-based on-bill financing programs.[73] The PAYS program can therefore serve typically hard-to-reach households such as single-family-home renters, mobile home residents, multifamily apartment renters and low-income members.[74] Utilities with tariffed on-bill programs have reported estimated kWh savings of greater than 20%.[75]

Although there are differences between on-bill financing programs and tariffed-based programs, they essentially work in the same manner:

1. Energy savings are installed in a home or building with no upfront cost from the member-owner.
2. The cooperative pays for it either by self-financing the program or through low-cost financing, recovering a monthly set amount in the member-owner's bill and remitting it to the lender.
3. Once the costs are recovered, the payment ceases, and the member enjoys larger bill savings.

Some key elements of on-bill financing include:

- All residential member-owners are eligible.
- There are no upfront costs.
- To make this work for low-income member-owners, there are no credit scores or debt-to-income ratios.
- An energy audit is performed to determine the most cost-effective measures.
- The cost-recovery charge is established to be less than the estimated savings from reduced use so that members get a bill reduction benefit from the beginning.
- The member-owner is subject to disconnection for nonpayment.
- The charge for repayment remains with the dwelling should the member move.

The benefit for member-owners is that it creates no loan debt that would occur if the member procured energy efficiency installations or products independently, and it allows the member-owner to repay over time while still saving on energy bills. For utilities, it provides a mechanism to finance energy efficiency at the lowest-cost resource option without having to raise rates. The risk of nonpayment is reduced because if structured correctly, the member's overall bill goes down. For society, it accelerates the adoption of clean energy options and improves the environment and the health and productivity of its citizens.

Ouachita Electric Cooperative in Arkansas offers a PAYS to finance energy efficiency. An energy auditor performs an energy audit on individual buildings and recommends energy efficiency upgrades. No upfront payment is required; upgrades are paid back on member-owners' monthly bills over an extended period of time. Energy savings are calculated to be more than the monthly payments.[76] Member-owners of Roanoke Electric Co-op in North Carolina can opt into a voluntary tariff that allows the utility to pay for energy

71 For more information, see Energy Efficiency Institute Inc. (2021). *PAYS essential elements & minimum program requirements.* https://www.eeivt.com/pays-essential-elements-minimum-program-requirements-2/; Henderson, P. (2013, July). *On-bill financing overview and key considerations for program design.* National Resources Defense Council. https://www.nrdc.org/sites/default/files/on-bill-financing-IB.pdf; and Gardner, J. W. (2017, February 12). *On-bill financing with tariffed on-bill program in Kentucky: How$martKY* [Presentation]. National Association of Regulatory Utility Commissioners Winter Committee Meetings. https://pubs.naruc.org/pub/0BCFCDDC-DDA6-7D08-AE1D-A077B87835D3

72 A program administrator can be an independent nongovernmental entity; a utility administrator, in this case a specialized group within the cooperative; a governmental administrator; or a hybrid of the above.

73 Hummel, H., & Lachman, H. (2018). *What is inclusive financing for energy efficiency, and why are some of the largest states in the country calling for it now?* ACEEE Summer Study on Energy Efficiency in Buildings. https://www.aceee.org/files/proceedings/2018/assets/attachments/0194_0286_000158.pdf

74 Hummel & Lachman, 2017.

75 Hummel & Lachman, 2017.

76 Ouachita Electric Cooperative Corp. (n.d.). *HELP PAYS (Pay As You Save — energy efficiency program).* https://www.oecc.com/help

efficiency upgrades that provide immediate savings on a member's electric bill. Roanoke recovers its costs through a fixed charge on the bill that is less than the total estimated savings.[77]

Other cooperatives have established different kinds of loan programs. Access Energy Cooperative in Iowa offers members low interest financing for energy efficiency improvements. Loans are available for up to 80% of total costs of the project with a minimum of $500 and a maximum of $10,000 per member-owner. As of early 2022, the annual interest rate is 1.85% on the unpaid balance of the loan.[78] New Hampshire Electric Cooperative's SmartSTART program, allows member-owners to pay for energy efficiency products in monthly payments on their electric bill, up to 75% of the savings resulting from the upgrades.[79]

2. Cost-Effectiveness Screening for Energy Efficiency Programs

Energy efficiency programs decrease the demand on the system and can reduce the need for new, more expensive supply-side resources. To maximize the benefits of energy efficiency, programs should be screened through a cost-effectiveness test to determine which programs provide the most savings. The *National Standard Practice Manual* provides an excellent guide for how to screen programs taking into account the goals of the cooperative as the energy efficiency provider.[80] The manual does not prescribe one test but rather creates parameters for jurisdictions to include their own inputs in accordance with their needs. It includes a five-step process: (1) articulate goals, (2) include utility system impacts, (3) decide which nonutility system impacts to include (such as improvements in air quality and health), (4) ensure that benefits and costs are properly addressed and (5) establish comprehensive and transparent documentation.

A secondary test can also be deployed for discrete purposes, such as to ensure program availability for low-income member-owners by reallocating program costs so that the bulk, if not all, of the costs are borne by the cooperative and its members instead of the low-income member-owner, who would otherwise not be able to participate. These programs may include measuring the societal benefits of reducing trips to the hospital, absenteeism from work or school and service disconnections.

The *National Standard Practice Manual* also includes a list of potential impacts from the utility, customer and societal perspective that can be very helpful in cataloging the full benefits to be included in the benefit-cost analysis.

3. Weatherization for Low-Income Customers

Energy affordability is a significant problem for low-income member-owners, who typically pay 13.9% of their income on energy, compared with the 3% that other households pay.[81] Energy efficiency targeted for low-income households can therefore have a significant positive impact on monthly household energy expenditures. A big efficiency opportunity is weatherization, or weather-proofing buildings to limit leaking of air-conditioning or heating.

77 Roanoke's program is modeled on the trademarked Pay As You Save (PAYS) program. To pay for the investments, Roanoke draws upon low-cost financing available through the Energy Efficiency & Conservation Loan Program. Southern Environmental Law Center. (n.d.) *Members save money while saving power: Roanoke Electric Cooperative leads the way with a debt-free on-bill program for energy efficiency.* https://www.southernenvironment.org/wp-content/uploads/legacy/infographics/SELC_Roanoke_Electric_OBF_Handout_Final.pdf

78 Access Energy also provides rebates for heat pumps, energy efficiency improvements, and efficient appliances. Access Energy Cooperative. (n.d.). *Low interest financing for energy efficiency improvements.* https://www.accessenergycoop.com/low-interest-financing-energy-efficiency-improvements

79 For example, if a member-owner installs $1,000 in efficiency upgrades and those products save them $100 per month on their electric bill, the member is responsible for $75 per month. The program can be used for weatherization (including air sealing and insulation), lighting and lighting controls and other energy-saving measures. New Hampshire Electric Cooperative. (n.d.-a). *SmartSTART project financing.* https://www.nhec.com/smartstart-project-financing/

80 "The *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (NSPM for DERs)* provides a comprehensive framework for cost-effectiveness assessment of DERs. The manual offers a set of policy-neutral, non-biased, and economically-sound principles, concepts, and methodologies to support single- and multi-DER benefit-cost analysis (BCA) for: energy efficiency (EE), demand response (DR), distributed generation (DG), distributed storage (DS), and (building and vehicle) electrification. It is intended for use by jurisdictions to help inform which resources to acquire to meet their specific policy goals and objectives." National Energy Screening Project. (n.d.) *National Standard Practice Manual (NSPM).* https://www.nationalenergyscreeningproject.org/national-standard-practice-manual/

81 U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy. (n.d.). *About the Weatherization Assistance Program.* https://www.energy.gov/eere/wap/about-weatherization-assistance-program

One of the main sources of weatherization is the U.S. Department of Energy Home Weatherization Assistance Program, which provides funding to all 50 states, the District of Columbia, Native American tribes and U.S. territories through an allocation formula.[82] The funds can be used for specific mechanical, building shell, energy and water, and health and safety measures as well as client education.[83] This program is able to fund approximately 35,000 homes per year and helps save approximately $283 in energy costs per year per dwelling. (The average weatherization cost is $4,695 per unit.) Thus, this program alone is not sufficient to cover the energy efficiency needs of low-income member-owners and needs to be supplemented with state and local programs as well as programs offered by the cooperative in order to reach a larger portion of the population.

Cooperatives can work with the community action agencies or local groups that provide the weatherization programs for low-income member-owners by offering additional funding to expand on the program or to provide specific weatherization measures. This approach is an efficient way to reach more members with minimal use of utility staff and resources. For example, Mohave Electric Cooperative, in coordination with the Western Arizona Council of Governments, offers a free home repair program designed specifically for qualifying low-income families. Participants receive a free energy audit and are eligible for up to $3,000 worth of energy efficiency measures.[84] New Hampshire Electric Cooperative offers a program whereby income-qualified members living in an apartment or house, either rented or owned, can receive up to $8,000 in services, including a free customized audit report. Measures identified in the audit are then installed by community action agencies (contractors managed by the cooperative or cooperative energy specialists).[85] Sun River Electric Cooperative in Montana provides funding to weatherize residential homes for low-income households. Insulation, window replacement, weather stripping and furnace repair or replacement qualify under this program. The Universal Systems Benefit Program dollars collected from the cooperative fund the program.[86]

Useful Resources on Energy Efficiency

Berry, D. (2010). *Delivering Energy Savings: Innovative Energy Efficiency Strategies for Rural Electric Cooperatives and Small Public Power Utilities.* Western Resource Advocates.https://westernresourceadvocates.org/wp-content/uploads/dlm_uploads/2015/07/deliveringenergysavings.pdf

Bickford, A., & Geller, H. (2016). *Review of Leading Rural Electric Cooperative Energy Efficiency Programs.* Southwest Energy Efficiency Project. https://www.swenergy.org/data/sites/1/media/documents/publications/documents/Leading_REC_Energy_Efficiency_Programs_Jan_2016.pdf

Wheeless, A., Grant, C. & Keegan, P. (2016). *Practical Partnerships: Collaborative Approaches to Energy Efficiency.* National Rural Electric Cooperative Association. https://www.cooperative.com/programs-services/bts/Pages/TechSurveillance/collaborative-approaches-energy-efficiency.aspx

82 U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy. (2021, January). *Weatherization Assistance Program* [Factsheet]. https://www.energy.gov/sites/default/files/2021/01/f82/WAP-fact-sheet_2021_0.pdf

83 U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, 2021.

84 Mohave Electric Cooperative. (n.d.). *Weatherization.* https://www.mohaveelectric.com/energy-solutions/weatherization/

85 Hampshire Electric Cooperative. (n.d.-b). *Home energy assistance.* https://www.nhec.com/home-energy-assistance/

86 Sun River Electric Cooperative. (n.d.). *Weatherization.* https://sunriverelectric.coop/weatherization. The Universal Systems Benefit Program is a state-mandated program that requires a utility spend a minimum amount on certain social programs such as low-income assistance, energy conservation and renewable resources. A portion of these expenses is funded through a program charge on each member’s bill.

B. Capture Demand-Side Flexibility

Rural electric cooperatives are required to provide member-owners with reliable energy around the clock. To do so, the cooperative matches energy supply with the highest expected energy demand that may be needed at a given time. The need for supply at these high demand times means that at times of low demand, typically nighttime hours, excess energy capacity is available. It also means that there are times of high demand on the grid each day, similar to rush-hour traffic. High-traffic energy times occur predictably in the late afternoon and early evening when people start returning home and using air conditioners, cooking, watching TV and doing laundry, while commercial buildings and offices are still open and industry is operating.

In addition to daily peaks of energy usage, there are also extreme events, usually due to weather, such as very hot summer days or extreme winter storms, that can stress the grid, causing member-owners to use more energy than usual to heat or cool their buildings. These events can lead to demand that exceeds the utility's available energy supply. Unresolved, this mismatch between energy supply and demand can lead to brownouts and blackouts.

Different options are available to cooperatives to fill both daily peak demand and these periodic, unexpected shortfalls of energy supply. Historically, cooperatives or their G&T built excess generation that could be called upon during times of grid stress. Many utilities have built (or kept old) power plants known as peaker plants, which are rarely called upon but are available when the grid approaches maximum capacity. Using peaker plants is a costly option, both in terms of finances and environmental impacts; peaker plants have high fuel costs when operated, so the power they supply can be very expensive. Additionally, if they are older plants that are mothballed and kept mainly to meet periodic energy shortfalls, they may not meet current emissions requirements but are nevertheless allowed to run in emergency situations.[87] An alternative supply option is for a utility to purchase power if it is in a regulated market.

A more efficient approach involves managing demand to more fully utilize existing grid capacity and

87 This practice is known as "reliability must run" exceptions.

to effectively integrate interconnected devices to create a smart two-way grid. In short, to meet these variations in supply and demand, cooperatives can engage their member-owners. Member-owners can be encouraged to change or shift the time they use energy through time-varying pricing and demand management programs, which are discussed below. The pricing policy can also encourage member-owners to invest in distributed energy resources, which cooperatives can encourage by providing net metering. Pricing and demand management programs can also shift the energy load of member-owners' electric vehicles or space or water heaters to absorb excess renewable energy. Further, cooperatives can offer energy efficiency programs — the most effective option to decrease peaks and manage demand.

Policies that are used to engage member-owners to capture demand-side flexibility include:

- Demand management programs (load flexibility or "load shaping").
  Time-varying pricing.
  Net energy metering and interconnection policies.
  Beneficial electrification programs.

These policies are not meant to be used in isolation, and they work well together. For example, time-of-use (TOU) pricing is a rate design that may be incorporated in demand management and beneficial electrification programs.

1. Managing Demand to Realize Utility and Member-Owner Benefits

A key to realizing system flexibility is to successfully engage member-owners. Because shaping energy demand previously was not technologically possible, cooperatives have not focused on methods to engage member-owners or communicate grid needs. Now, changes in technology allow the member-owners to save money and the utility to make the most effective use of grid assets through demand management.

Demand management[88] occurs when member-owners intentionally reduce or shift their electricity usage in response to a signal from the utility, usually with financial incentives to do so. Historically, the technology has not been available to store energy or shift energy use. Consequently, management of the grid was largely a one-way option — namely, to build more power generation to meet peak load requirements. Today, rather than dispatching supply to

Benefits of demand management

- Reduces peak demand by an average of at least 10%.[89] This reduction:
  - Saves customers money.
  - Enables the cooperative to avoid or defer the need to build or purchase additional generation capacity, which also leads to savings for customers.
  - Provides environmental benefits through reduced emissions, particularly if demand is able to be shifted to times when cleaner generating sources are abundant.[90]
- Helps integrate zero-emissions electric generation and end uses.
  - The flexibility of demand management enables the integration of variable energy resources like wind and solar by shifting electric vehicle charging and appliance use to times when these resources are abundant.
- Reduces greenhouse gas emissions.
  - When demand management programs reduce peak load, they also help to reduce air pollutants from existing fossil-fueled generating sources.
  - Demand management programs can provide flexibility to support growth of zero-emissions generation.[91]

88 Demand management has been known by various terms over the decades, including demand response and demand-side management. "Demand response" is a historical term used when such programs were used to provide cost-effective energy and capacity resources to help defer the need for new sources of power, including generating facilities, power purchases and transmission and distribution capacity additions. However, due to changes that are occurring within the industry, electric utilities are also using demand management or demand-side management as a way to enhance customer service. See U.S. Energy Information Administration. (n.d.). *Electric utility demand side management.* https://www.eia.gov/electricity/data/eia861/dsm/

75 Nadel, 2017.

76 Hurley, D., Peterson, P., & Whited, M. (2013). *Demand response as a power system resource.* Regulatory Assistance Project. https://www.raponline.org/wp-content/uploads/2016/05/synapse-hurley-demandresponseasapowersystemresource-2013-may-31.pdf

77 National Association of Clean Air Agencies. (2014). Improve demand response policies and programs. Chapter 23 in *Implementing EPA's clean power plan: A menu of options.* https://www.4cleanair.org/wp-content/uploads/Documents/Chapter_23.pdf

meet uncontrolled demand, technology advances allow management of the demand side to meet available supply. Demand management is not new, but traditional demand response programs focused on simply shedding load during periods of grid stress. Today, demand management includes the ability to respond to other grid needs. Now, average residential customers are increasingly able to control their energy usage through efficiency upgrades and energy management tools and even to become grid resources themselves through behind-the-meter solar or storage. The ability for demand to play a role in balancing grid operations is a fundamental shift from the 20th-century era of large, centrally operated generating plants.

Managing the demand for electricity is now an option that can be utilized to make more efficient use of the grid, reduce member costs and reduce environmental harm. Demand management programs are common and are fairly simple to implement. They rely on two types of mechanisms: (1) sending quantity signals to member-owners' appliances and devices (direct load control programs) and (2) sending price signals to member-owners to alter their consumption habits (time-varying rates). Utilities, municipalities and electric cooperatives have used these types of programs for decades.

Demand management programs today can provide load flexibility over different time frames, as illustrated in Figure 5.[92] It is useful to think about these types of flexibility within the time frames they can operate, moving from the longest span of years and days for shaping down to time frames of minutes and even seconds for shimmying.

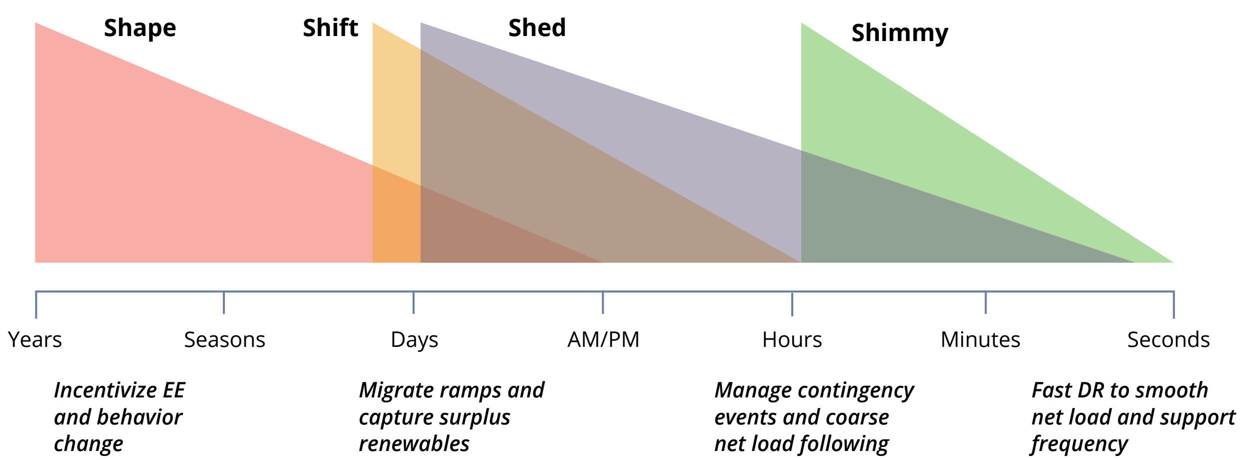
In practical terms, this means demand management can shape load away from expensive peaks. It can then shift load and grow load at times when renewable energy is available and energy is less expensive. It can shed load in a controlled manner during critical energy events, and it can shimmy load back and forth to meet short-term grid needs. EV charging is an example of a technology that can shimmy because it can occur all at once or can be turned on and off as the need arises.[93]

a. Methods to Obtain Flexibility

Encourage member-owners to shift load through time-based rates.

Methods of engaging member-owners in demand management efforts include offering **time-based rates**. Member-owners are able to see the cost savings they can achieve if they reduce air-conditioning load, turn off lights or program their dishwasher or washing machine

Figure 5. **Shape, shift, shed and shimmy — time frames of flexibility**



Source: Alstone, P., Potter, J., Piette, M. A., Schwartz, P., Berger, M. A., Dunn, L. N., Smith, S. J., Sohn, M. D., Aghajanzadeh, A., Stensson, S., Szinai, J., Walter, T., McKenzie, L., Lavin, L., Schneiderman, B., Mileva, A., Cutter, E., Olson, A., Bode, J., ... Jain, A. (2017). *2025 California Demand Response Potential Study — Charting California's Demand Response Future: Final Report on Phase 2 Results*

92 Alstone, P., Potter, J., Piette, M. A., Schwartz, P., Berger, M. A., Dunn, L. N., Smith, S. J., Sohn, M. D., Aghajanzadeh, A., Stensson, S., Szinai, J., Walter, T., McKenzie, L., Lavin, L., Schneiderman, B., Mileva, A., Cutter, E., Olson, A., Bode, J., ... Jain, A. (2017). 2025 *California demand response potential study — Charting California's demand response future: Final report on Phase 2 results* (LBNL-2001113), Figure 19. Lawrence Berkeley National Laboratory. https://eta.lbl.gov/publications/2025-california-demand-response

93 Linvill et al., 2019.

to less expensive, off-peak times of day. Examples of demand management in response to price signals include dynamic pricing programs, peak-time rebates, smart EV charging and smart thermostat programs. (For more detail, see Section II-B-2, "Time-varying pricing.")

Encourage member-owners to control load through smart devices that can respond to smart rates.

Controllable load, often electrified load, means that virtually all major household electricity uses can be at least partly shifted away from peak periods using smart, responsive technologies. Smart thermostats make it possible for heating and cooling uses to participate in programs like Google Nest's Rush Hour Rewards, which provide incentives to customers that let their thermostat automatically be turned down by a very small amount during peak times.[94] Electric vehicles are a controllable load and can be set to charge at certain times or price points. Grid-integrated water heaters can respond to signals from the utility or demand-side aggregator, and major appliances, such as the refrigerator, dishwasher, washer and dryer, can be grid interactive or scheduled.[95] Smart customer systems such as in-home displays or home area networks can make it easier for member-owners to change behavior and reduce peak period consumption. These programs also have the potential to help the utility save money through reductions in peak demand, which in turn enables the cooperative to defer construction of new power plants.[96] The load avoided for a single home may be small, but when many members participate, it creates a large reduction in energy demand for the cooperative.[97]

Advanced metering infrastructure (smart meters) expands the types of time-based rate programs that can be offered to member-owners.[98] The ability to institute various types of time-varying pricing is somewhat dependent on the types of meters used. Retail electricity meters are now available in a spectrum of complexity and capability. Simple conventional meters measure only kWh consumption and are read at intervals, such as monthly, to note the member-owners' consumption since the last reading. These meters are not able to provide time-of-use price signals. Somewhat more complex meters are capable of not only recording kWh consumption but also of dividing that usage between two or a few preset time periods (a TOU meter), recording the peak load since the previous reading (a demand meter) or both.

At the other end of the metering spectrum, advances in communications and digital technology are bringing down the costs of advanced metering infrastructure and smart meters for the mass market. These innovations are increasing opportunities to send not only long-term average price signals (already possible using conventional meters) but also price signals that reflect weekly, daily, hourly or even real-time variability in system costs and conditions and to record customer usage over time intervals as short as five minutes. Today, just over half of the public power meters installed in the United States are smart meters.[99] Installation of smart meters is just the start, as merely installing smart meters does not alone facilitate advanced pricing; meter data management systems investments, billing engine modifications and rate studies are needed to develop advanced pricing.

Manage member-owners' load for them through utility direct load control.

Demand management also includes **direct load control programs** which allow a cooperative or private aggregators to directly alter a member-owner's energy consumption during periods of peak demand in exchange for a financial incentive and lower electric bills for the members.[100] Radio or internet-controlled switches on residential air conditioners or electric water heaters are but one of many methods used.[101]

94 Linvill et al., 2019.

95 Linvill et al., 2019.

96 U.S. Department of Energy, Office of Electricity. (n.d.-a). *Demand response.* https://www.energy.gov/oe/activities/technology-development/grid-modernization-and-smart-grid/demand-response

97 Budhiraja, D. (2019, January 24). Demand response 101: *Understanding how utilities balance energy supply & demand.* GridPoint. https://www.gridpoint.com/understanding-demand-response/

98 New Hampshire Electric Cooperative, for example, used advanced metering infrastructure to determine whether it could offer lower rates to certain member segment that were already less expensive to serve. Bidgely. (2022). *Advanced rate design with analytics: A New Hampshire Electric COOP case study.* https://www.bidgely.com/resources/advanced-rate-design-nhec-whitepaper/?utm_campaign=2022-03-02-UD&utm_medium=utilitydive&utm_source=ud-email&utm_content=NHEC-Case-Study-WP

99 Zummo, P. (n.d.). *Moving public power forward.* American Public Power Association. https://www.publicpower.org/system/files/documents/Moving-Public-Power-Forward-Community-Driven-Solutions-for-Industry-Transformation_0.pdf

100 U.S. Department of Energy, Office of Electricity, n.d.-a.

101 U.S. Department of Energy, Office of Electricity. (n.d.-b). *Demand response — Policy.* https://www.energy.gov/oe/services/electricity-policy-coordination-and-implementation/state-and-regional-policy-assistanc-4

Direct load control programs represent some of the initial approaches to demand management that existed prior to much of the technology that is available today. These programs result in overall savings for the cooperative and an incentive payment for participating member-owners.[102] The majority of direct load control programs are for residential central air-conditioning switches, but some offer a credit for each controlled electric appliance the member-owner registers with the utility. Electric water heaters and pool pumps are also commonly incentivized with fixed bill credits and cycled by the utility in a similar manner. With air-conditioning, when the cooperative expects a high peak load day due to very warm weather forecasts, it will notify the member-owner in advance. When energy demand peaks, the utility will send a signal to a member's air conditioner (or other appliance) that causes it to operate for a shorter period of time.

A common feature among direct load control programs is that member-owners have a choice between the level of service interruption they will accept and the amount of an incentive they receive. Typically, these are directly variable: The more interruption a member-owner will tolerate, the higher the incentive. Residential direct load control programs with cycling options and fixed monthly bill credits offer a simple and understandable method for member-owners to reduce their addition to peak load without tying the benefit to abstract concepts like kW demand charges or kWh shifting. Until recently, cooperative direct load control programs have been enabled by a control switch installed on an individual appliance, but with advances in technology, cooperatives are now able to use programmable communicating thermostats to control household energy use.

In some areas, access to high-speed broadband is a barrier to implementing some demand respond and direct load control solutions. Cooperatives are addressing this hurdle through the installation of internet solutions, which both open new economic opportunities and energy solutions for communities.

Obtain flexibility through regional markets.

Planning and market processes are another tool for adding fflexibility to the power system. In regions with a regulated market, more innovative uses of demand management are able to bid into the market to maintain reliability by providing capacity or energy reductions or to reduce wholesale electricity prices and provide economic benefits.[103] Cooperatives may also be able to work with demand management aggregators to bid demand management programs into a regulated market and provide further economic benefit to cooperative members.[104]

b. Important Elements of Successful Demand Management Programs[105]

Experience reveals several key elements to successful demand management program design and implementation, which include the following.

- **Member education.** Not only does education through effective marketing enable meaningful demand reduction, it also leads to improved member-owner satisfaction in both the program and the cooperative. Member-owner education is key toward ensuring that demand response mechanisms are properly used by members to optimize the results. Cooperatives should prepare a budget specifically for member education.
- **Incentives and tools.** The cooperative must provide member-owners with incentives to participate and the tools needed to achieve savings. Member-owners are more likely to participate when:
  - They earn a reward, so it is important to show them their measurable savings.
  - The cooperative provides physical hardware such as thermostats and switches, as well as reliable communication of peak events and tips on how and when to conserve energy.
  - The cooperative provides immediate feedback on how much member-owners saved following a peak event.
  - The cooperative shows member-owners their savings on their monthly bill.
    - For direct load control programs, a set monthly bill credit (i.e., $4 during summer months) rather than a varying rate discount gives the member-owners confidence in future savings.
    - For TOU rates, the cooperative should use historical member-owner data to calculate the

102 Customers respond to utility signals, often with very limited notice, and most often using preheated or cooled water.

103 National Association of Clean Air Agencies, 2014.

104 National Association of Clean Air Agencies, 2014.

105 State of Michigan. (n.d.). Common demand response practices and program designs. https://www.michigan.gov/documents/energy/Common_Practices_Feb22_522983_7.pdf

potential impact.

- Multiple demand management programs are marketed together (i.e., a direct load control switch and TOU rate) rather than in separate marketing campaigns, which can reduce program costs.
- Third-party demand management program administrators participate, which provides greater variety in program design and limits the cooperative's exposure to program-related risks, such as marketing, hardware and software updating costs.
- TOU rates are the default rate for eligible member-owners (i.e., smart-metered members); this leads to very high participation.

There are some important considerations beyond reflecting costs when designing demand management programs and TOU rates. Usually, demand management programs decrease emissions. However, demand management based on price signals can shift usage from one time period that has generation with lower emissions to another time period when generation has higher emissions. Cooperatives can design the program to avoid this result by considering not only peak periods but also to send price signals to shift demand to times when generation is cleaner, such as when wind or solar resources are plentiful. Awareness of the generation resources available during certain periods of the day and night and providing demand management signals to member-owners to shift load to beneficial times will yield both economic and environmental benefits.

Demand management programs can provide an excellent opportunity to reduce peak demand and cut costs by avoiding the need for expensive peaking capacity. Great River Energy in Minnesota has long been a proponent of the flexibility and energy storage benefits of water heaters. Great River touts access to the "Midwest's largest battery," namely access to the electric water heaters located in the basements of 110,000 Minnesota homes. Great River Energy is promoting the idea of "community storage," which uses aggregated electric water heaters to build local energy-storage capability.[106] Additionally, Great River offers member-owners load management opportunities for air conditioning, water heating, space heating, EVs, interruptable irrigation and commercial and industrial uses.[107]

Program administration: The third-party option

Third-party administrators can be a valuable resource for cooperatives that do not have the specific expertise or staff resources to take on new projects. The third party can be a contractor hired by the cooperative to administer energy efficiency or demand management programs, or it can be an independent company that is authorized to perform the services. Payment can be made by the cooperative's including this cost in its budget, or payment can be made based on the administrator keeping a percentage of the savings or some combination thereof, such as payment of the cost for the service with the profit or return coming from a percentage of the savings. For a third-party administrator under contract and paid directly, the cooperative can add requirements such as using a local workforce to implement the program. Where it is an independent company that provides the services, it will be important for the cooperative to work with the company to provide it with the data it needs. The cooperative will need to develop protocols for addressing member privacy; many utilities have done this already. In fact, the U.S. Department of Energy launched in 2012 its Smart Grid Data Privacy Voluntary Code of Conduct, which provides guidance on balancing data needs and customer privacy.

Useful Resources on Customer Data

Navigant Consulting. (2015). *Value of Customer Data Access: Market Trends, Challenges, and Opportunities.* National Association of Regulatory Utility Commissioners. https://pubs.naruc.org/pub/536E2D7C-2354-D714-5129-435231D889E0

U.S. Department of Energy & Office of Electricity. (n.d.). *DataGuard Energy Data Privacy Program.* https://www.energy.gov/oe/activities/technology-development/grid-modernization-and-smart-grid/dataguard-energy-data-privacy

106 Great River Energy. (n.d.-a). Community storage. https://greatriverenergy.com/smart-energy-use/beneficial-electrification/community-storage/

107 Great River Energy. (n.d.-b). Load management programs. https://greatriverenergy.com/smart-energy-use/demand-response/great-river-energy-load-management-programs/

Useful Resources on Demand Management

Alstone, P. Potter, J., Piette, M. A., Schwartz, P., Berger, M. A., Dunn, L. N., Smith, S. J., Sohn, M. D., Aghajanzadeh, A., Stensson, S., & Szinai, J. (2016). 2015 *California Demand Response Potential Study – Charting California's Demand Response Future: Interim Report on Phase 1 Results.* Lawrence Berkeley National Laboratory (LBNL-2001115). https://eta.lbl.gov/publications/2015-california-demand-response

Hurley, D., Peterson, P., & Whited, M. (2013). *Demand Response as a Power System Resource.* Regulatory Assistance Project. https://www.raponline.org/wp-content/uploads/2016/05/synapse-hurley-demandresponseasapowersystemresource-2013-may-31.pdf

Linvill, C., Lazar, J., Littell, D., Shipley, J., & Farnsworth, D. (2019). *Flexibility for the 21st Century Power System.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/flexibility-for-the-21st-century-power-system/

Michigan New Energy Policy. (n.d.). *Common Demand Response Practices and Program Designs.* https://www.michigan.gov/documents/energy/Common_Practices_Feb22_522983_7.pdf

National Association of Clean Air Agencies. (2014). Improve Demand Response Policies and Programs. Chapter 23 in *Implementing EPA's Clean Power Plan: A Menu of Options.* https://www.4cleanair.org/wp-content/uploads/Documents/Chapter_23.pdf

Examples of cooperative demand response programs:

- Great River Energy. *Member Cooperative Load Management Programs.* https://greatriverenergy.com/smart-energy-use/demand-response/great-river-energy-load-management-programs/
- Minnkota Power Cooperative. *Rebates & Energy Incentives.* https://www.minnkota.com/our-programs/rebates-energy-incentives
- North Carolina's Electric Cooperatives. *Advanced Grid Operations.* https://www.ncelectriccooperatives.com/energy-innovation/grid-operations/
- Northern Electric Cooperative. *Understanding Demand and the Monthly Co-incident Billing Peak.* https://www.northernelectric.coop/loadmanagement

2. Time-varying pricing

Rate design refers to the elements of electricity prices that form the basis of member-owners' bills. For most retail and small commercial member-owners, the designed rate typically appears on a monthly utility bill as a fixed monthly charge and a usage component, which is generally a per-kWh charge.[108] Most member-owners rates are still flat rates, meaning that the amount members pay does not vary across the day, and member-owners pay the same price per kWh no matter how much electricity they use during peak times. A flat rate does not accurately reflect the changes in cost that the cooperative faces to serve member-owners over the course of the day.

Time-of-use electricity pricing, one of many types of time-varying pricing options, provides better price signals to member-owners by more accurately aligning rates to cooperative costs. It gives members the opportunity to take control of their energy use and electricity bills. TOU pricing enables people to choose when they power up appliances or electric vehicles based on electricity prices and to make decisions that can both save them money and reduce harmful pollution. In contrast to rates that do not change with the time of day, TOU rates give member-owners a view of varying electricity costs so they can plan ahead to avoid expensive time periods. By paying more attention to the timing of energy use, or programming charging devices to do so, members could have a new means of lowering energy bills and reducing the strain on the electric grid, while the cooperative gains flexibility in supply options.

A public power example that puts this theory into action is from Fort Collins, Colorado, where the municipal utility adopted a residential rate that is well designed because it allows customers to achieve bill savings through shifting their load. The utility moved all residential customers to TOU rates that have a very low off-peak rate and a peak rate that is three times higher than the off-peak rate. This incentivizes energy usage in off-peak hours. It also has a tier charge that applies to all usage over 700 kWh per month, which also provides an energy conservation incentive (see Table 2).[109]

108 Lazar, J. (2013). *Rate design where advanced metering infrastructure has not been fully deployed.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/rate-design-where-advanced-metering-infrastructure-has-not-been-fully-deployed/

109 City of Fort Collins. (n.d.). *Residential electric rates.* https://www.fcgov.com/utilities/residential/rates/electric/. The Fort Collins rate is beneficial for several reasons. First, by moving all customers onto the TOU rate as a default, the utility maximizes the benefits but still allows those who want to opt out the ability to do so. The rate is useful because, first, the low customer charge increases the amount that a customer can change the bill. Second, the very low off-peak rate creates noticeable bill savings for switching usage to that period. Third, setting the peak rate at three times the off-peak rate signals the extra costs to the utility during peak hours. See Linvill et al., 2019.

Table 2. **Fort Collins, Colorado, residential time-of-use rate**

Customer charge	$6.78	
	Summer	**Winter**
Off-peak	$0.069	$0.067
On-peak	$0.241	$0.216
Tier charge (0ver 700 kWh)	+0.0194/kWh	

Source: City of Fort Collins. (n.d.). *Residential Electric Rates*

a. Member-owners and TOU

What does TOU pricing mean for member-owners? When Sacramento Municipal Utility District implemented TOU pricing, people reported greater satisfaction with this plan compared to existing electricity rates, noting that TOU provides "fairer pricing" and "more opportunities to save money."[110] However, some member-owners are unable to shift demand as much as others to realize lower rates, particularly the elderly, those with disabilities and low-income households. Low-income customers still saved money under TOU rates but less than average customers. TOU rates have the potential to achieve big system benefits and many customer benefits, but for those living in leaky homes with old, inefficient appliances, those benefits are far harder to realize. Utilities build into their rates the risk of recovering their costs for procuring power during periods of high peak usage. TOU rates help mitigate that risk and can reduce the price member-owners pay.

With strong supporting policies, TOU rates can be implemented and ensure that all communities can participate in the benefits. These supporting implementation procedures include the following.[111]

Prioritize vulnerable member-owners for energy efficiency, electrification and appliance upgrade programs. Vulnerable populations, such as low-income members, elderly people and people with disabilities, may find TOU rates to be more expensive because of leaky, inefficient homes and old appliances. Cooperatives should specifically reach out to these members with weatherization and appliance upgrade programs and prioritize these members for energy efficiency and electrification programs. Note also that upgraded appliances may include timers, which allow member-owners to set an appliance, such as a washing machine or dishwasher, to operate after they have gone to bed. This is especially useful for disabled people and older adults.

Provide bill protection for up to one year. Cooperatives may want to implement bill protection whereby members will not face bill increases under a TOU rate for a period of time, preferably up to a year. This allows members to benefit from TOU savings if they are able but will not harm those who find themselves unable to adequately shift consumption during peak hours. This lead time enables members to see if they are able to shift their usage. If they are not, they have time to opt out of the program. A variant on this approach is shadow billing, where a member remains in the non-TOU program but receives a shadow bill showing what they would have paid using TOU rates. The cooperative could allow members to opt in to the program sooner and then make the program mandatory after a period of time.

Start with opt-in TOU policies with customer education. Most TOU policies are voluntary and apply only to members who opt in. Member-owner education about TOU policies and the effect of the policies is incredibly important to help members understand their current bill and the effect of TOU rates. Shadow billing, discussed above, is an effective tool to help members see the effect on them of TOU rates. Education on behavioral changes to receive more benefits under TOU rates is also important.

Allow TOU policies to be opt-out. As noted above, most TOU programs are opt-in; however, few member-owners do, particularly where member education on the benefits of TOU is poor. Thus, education about how the program works is the most critical step to encouraging more member-owner participation and ensuring that members understand how to use the program to their advantage. Putting members on TOU without them understanding how it works can have adverse consequences when they start getting bills that are higher because they did not properly use the TOU rate. Allowing members to opt out provides an important option to ensure equitable outcomes from more advanced electricity pricing, particularly for low-income renters. Opt-out provisions are preferable from

95 Environmental Defense Fund. (n.d.). *Time-of-use electricity pricing: Savings when they matter* [Factsheet] https://www.edf.org/sites/default/files/ca_tou_fact_sheet_091514.pdf

96 For more information on the suggestions referenced here, see Spiller, B. (2020, March 9). *How we can make time of use pricing work for everyone.* Environmental Defense Fund. http://blogs.edf.org/markets/2020/03/09/how-we-can-make-time-of-use-pricing-work-for-everyone/

a system benefits and cost-savings perspective because they drive cost-effective behavior, and members tend to change their behavior rather than opt out.

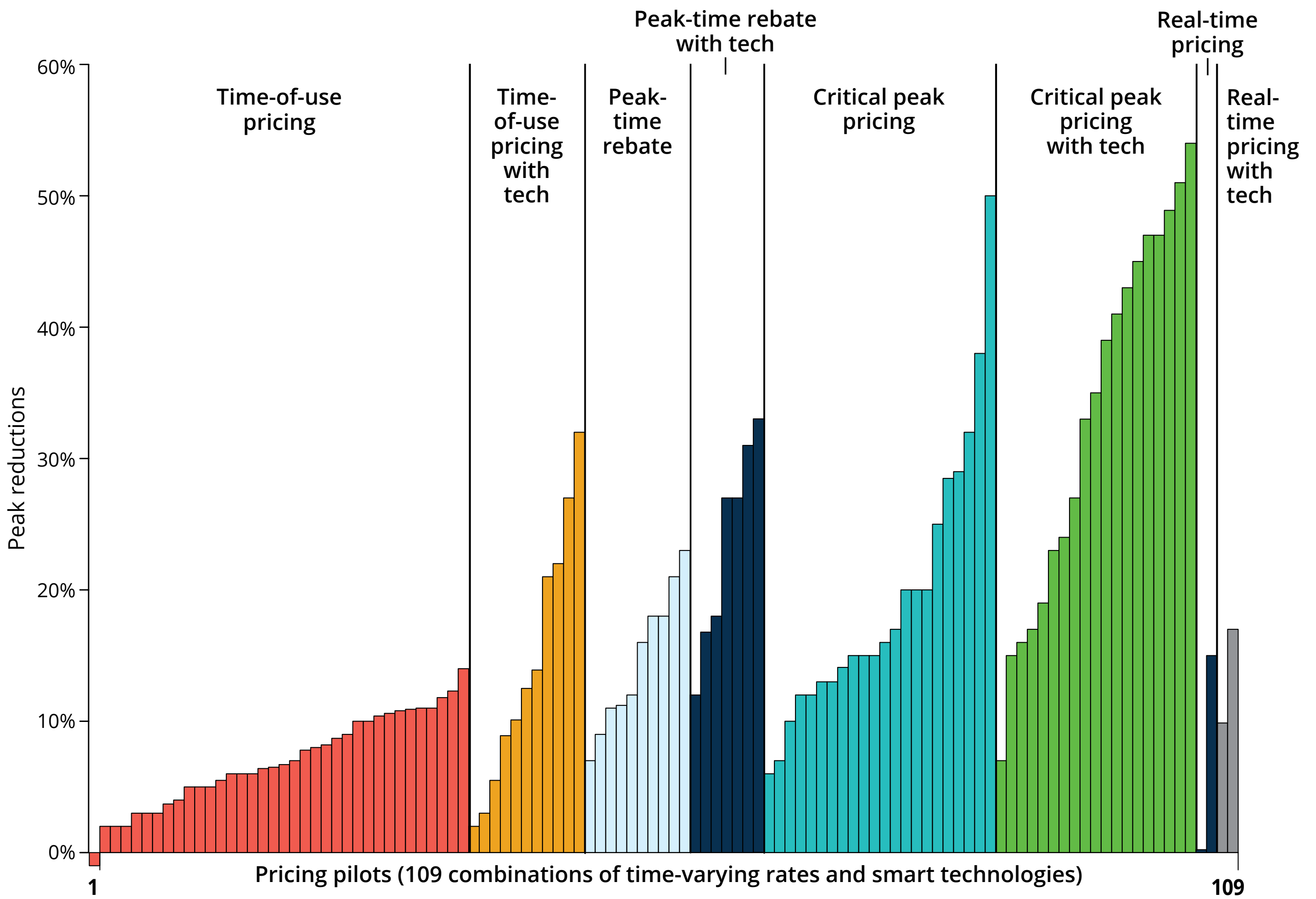
Ensure TOU rates are actionable. For TOU rates to be most effective at reducing consumption during peak hours, the price difference of peak to off-peak needs to be significant and the length of the peak hours manageable.[112] For example, peak hours cannot be so long that member-owners find it difficult to comply, and members must see real financial benefit to switching to off-peak hours. TOU time blocks should provide ample space for members to shift away from peak times and benefit from a greater number of low-cost hours.

b. Forms of Time-Based Rate Programs

The options for electricity pricing based on time of use include the following.[113]

- **Time-of-use pricing.** This pricing typically applies to usage over broad blocks of hours (e.g., on-peak equals six hours for summer weekday afternoon; off-peak equals all other hours in the summer months) where the price for each period is predetermined and constant. Rough time-varying blocks can be accomplished with traditional meters.
- **Real-time pricing.** These rates fluctuate hourly based on the hourly price of electricity.
- **Variable peak pricing.** This pricing is a hybrid of time-of-use and real-time where the different periods for pricing are defined in advance (e.g., on-peak equals six hours for summer weekday afternoon; off-peak equals all other hours in the summer months), but the price established for the on-peak period varies.
- **Critical peak pricing.** These substantially increased prices occur during periods when cooperatives observe or anticipate power system emergency conditions or a specific critical time period (e.g., 3 p.m.

Figure 6. **Average peak reduction under time-varying rate pilot programs**



Source: Faruqui, A., Hledik, R., & Palmer, J. (2012). *Time-Varying and Dynamic Rate Design*

112 Spiller, 2020.

113 Smart Grid. (n.d.). *Recovery act: Time based rate programs.* https://www.smartgrid.gov/recovery_act/time_based_rate_programs.html

to 6 p.m. on a hot summer weekday). Two variants of this type of rate design exist: one where the time and duration of the price increase are predetermined when events are called and another where the time and duration of the price increase may vary based on the electric grid's need to have loads reduced.

- **Critical peak rebates (also known as peak-time rebates).** These refunds are made to the member-owner at a single, predetermined value for any reduction in consumption during a utility-declared critical event, relative to what the utility deemed the member was expected to consume. The price for electricity during these time periods remains the same.

Figure 6 shows the average peak reduction from various pricing models in pilot programs.[114]

Among variable rate pricing options, TOU pricing is the most common and the easiest to implement. Studies have found that TOU rates can lead to demand reductions of 16% and average reductions in consumption of 2.1%, which can also provide customer savings.[115]

Useful Resources on Time-Varying Pricing

American Public Power Association. (n.d.). *Moving Ahead with Time of Use Rates.* https://www.publicpower.org/system/files/documents/Moving-Ahead-Time-of-Use-Rates.pdf

Colgan, J., Delattre, A., Fanshaw, B., Gilliam, R., Hawiger, M., Howat, J., Jester, D., LeBel, M., & Zuckerman, E. (2017). *Guidance for Utilities Commissions on Time of Use Rates.* https://votesolar.org/wp-content/uploads/2020/12/TOU-Paper-7.17.17.pdf

Huber, L. (n.d.). *TOU Pilot Strategies and Lessons.* Strategen Consulting. https://e21initiative.org/wp-content/uploads/2018/01/e21_Forum_TOUPilotBestPractices_5.05.17.pdf

Lazar, J., & Gonzales, W. (2015) *Smart Rate Design for a Smart Future.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/smart-rate-design-for-a-smart-future/

U.S. Department of Energy. (2016, November 16). *Final Report on Customer Acceptance, Retention and Response to Time-Based Rates from the Consumer Behavior Studies.* https://www.smartgrid.gov/document/CBS_Results_Time_Based_Rate_Studies.html

3. Net Metering

Net metering is a policy that allows member-owners with their own on-site generation capacity (e.g., rooftop solar) to be financially compensated by their by their cooperative for the energy they produce. Net metering, also called net energy metering, is widely regarded as having an important role in deployment of distributed generation, especially solar energy. Depending upon state law, cooperatives may have the authority to establish net-metering policies.[116] Net metering has been very successful at increasing the amount of distributed resources, but as it has increased and as utilities develop more and more of their own renewable resources, it has also posed challenges for some cooperatives. Planning processes will help the utility to prepare for the increase in member-owners generation (whether through residential solar rooftops or through larger distributed generation facilities) and to determine the amount and location of additional distributed generation resources that could be useful to the distribution grid.

Net metering allows cooperative members with on-site generation sources, such as solar PV, to offset the electricity they draw from the grid. The cooperative member pays for the net energy consumed from the utility grid. If the amount of electricity the member's system produces is more than the amount of electricity that member can use, the excess amount is exported to the cooperative's electric grid. If the net-metering member uses more electricity than the distributed generation system produces, the member imports electricity from the grid and pays the full retail rate for that electricity, just like a traditional cooperative member.[117]

Net metering requires either a single bidirectional meter (with an optional export validation meter, if gross generation measurements are desired) or two unidirectional meters. Today, net metering is the most commonly used tariff design for customers who have solar PV or any other customer-owned generation resources.[118]

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114 Faruqui, A., Hledik, R., & Palmer, J. (2012). *Time-varying and dynamic rate design.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/time-varying-and-dynamic-rate-design/

115 Baatz, B. (2017, March). *Rate design matters: The intersection of residential rate design and energy efficiency.* American Council for an Energy-Efficient Economy. https://www.aceee.org/sites/default/files/publications/researchreports/u1703.pdf

116 Congressional Research Service. (2019, November 14). *Net metering: In brief.* https://sgp.fas.org/crs/misc/R46010.pdf

117 National Renewable Energy Laboratory. (n.d.). *Net metering.* https://www.nrel.gov/state-local-tribal/basics-net-metering.html

118 Zinaman, O., Aznar, A., Linvill, C., Darghouth, N., Dubbeling, T., & Bianco, E. (n.d.). *Grid-connected distributed generation: Compensation mechanism basics.* National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy18osti/68469.pdf

Net metering benefits and challenges

Utilities in the United States first began offering net-metering tariffs in the early 1980s. In those early days, digital smart meters were not available. Limitations in metering capabilities, paired with billing system challenges and the desire to keep tariffs simple enough for member-owners to easily understand, led to the design of what we will call traditional net metering tariffs. Many U.S. utilities still offer traditional tariffs today. However, smart meters are now widely available that are capable of monitoring net exports and net imports of energy in small time intervals for use in a variety of distributed generation tariff designs, including those relying on time-varying rates. A growing number of utilities, including cooperatives (and the public utility commissions and legislatures that regulate them), are considering alternatives to traditional net metering. Net metering has successfully encouraged more members to install distributed generation. Net metering experience in states with high distributed energy adoption indicates that adding large amounts of these resources will cause system demand to shift, which can in turn shift peak periods and periods with significant ramping. Time-of-use rates and the redefinition of the peak period have proven to be important tools to fully utilize the higher solar production. A number of higher-adoption states, such as California, are implementing these tools. Other strategies can create more manageable load profiles, such as the robust demand management programs discussed above.[119]

Net-metering policies commonly vary with regard to the following elements:

- **Eligible technologies.** Specified renewable energy technologies may include solar PV, wind, geothermal electric, biomass and fuel cells.
- **System size caps.** A system size cap is the maximum individual system size that can be net metered. Caps can be capacity (e.g., kW) or percentage based (e.g., 120% of maximum daily load).
- **Program size caps.** These caps are the total amount of net-metering systems installed in a region or utility service territory. Net-metering program caps can be calculated in many ways, including percent of peak demand or load and capacity. Some states have no program caps, and some states have trigger mechanisms that require net-metering policies to be reevaluated when certain thresholds are met.
- **Member-owner type type.** Eligible member classes for net metering include residential and commercial.
- **Net excess generation**. Member-owners are credited for net excess generation. This varies by:
  - The rate (e.g., full retail, less than retail, no compensation) paid for excess generation to the member-owner. Rates should reflect the value to the cooperative of distributed generation.
  - The term for using credits for excess generation in a particular billing cycle and whether the credits expire. It is common for them to expire after a finite number of billing cycles (e.g., 12 months) or at the end of a calendar year, after which they are either forfeited or credited at a predetermined net excess generation rate, usually between zero and the full retail electricity rate.[120]

Interconnection policies, the process through which customers with distributed generation connect to the grid, have an impact on the number of distributed generation customers there are in a utility district. Typical barriers to interconnection are the costs and the lack of specified timelines in the utility approval process, which can cause excessive delays. If the policies are cumbersome and difficult to figure out, customers with distributed generation may not interconnect to the grid. In some cases, customers may even disconnect or defect from the grid. The decreased cost of residential distributed generation resources and improved technology of storage systems makes defection more possible. What was a theoretical risk for utilities may become an issue that cooperatives need to address as defection deprives the utility of the distributed resource and the revenues it would have collected from that customer. If the utility instead considers how distributed generation resources can serve both the customer and

119 For more on net metering evolution, see LeBel, M., Shipley, J., Linvill, C., & Kadoch, C. (2021). *Smart rate design for distributed energy resources.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/smart-rate-design-distributed-energy-resources-2/

120 National Renewable Energy Laboratory, n.d.

the utility and streamlines interconnection policies to encourage resource development in that vein, more distributed generation options, such as solar PV or customer-owned or -sited storage, will contribute as system resources.

Useful Resources on Net Metering

Lawson, A. (2019). *Net Metering: In Brief. Congressional Research Service.* https://sgp.fas.org/crs/misc/R46010.pdf

LeBel, M., Shipley, J., Linvill, C., & Kadoch, C. (2021). *Smart Rate Design for Distributed Energy Resources.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/smart-rate-design-distributed-energy-resources-2/

Institute for Local Self-Reliance. (n.d.). *Municipal Financing for Renewables and Efficiency.* https://ilsr.org/rule/municipal-financing-for-renewables-and-efficiency/

Institute for Local Self-Reliance. (n.d.). *Net Metering*. https://ilsr.org/rule/net-metering/

National Renewable Energy Laboratory. (n.d.). *Interconnection Standards.* https://www.nrel.gov/state-local-tribal/basics-interconnection-standards.html

National Renewable Energy Laboratory. (n.d.). *Net Metering.* https://www.nrel.gov/state-local-tribal/basics-net-metering.html

Office of the New York State Comptroller. (2008, April). *Green Best Practices: How Local Governments Can Reduce Energy Cost and Minimize Impact on Global Climate Change.* https://www.osc.state.ny.us/files/local-government/publications/pdf/researchbrief_green.pdf

Zinaman, O., Anzar, A., Linvill, C., Darghouth, N., Dubbeling, T., & Bianco, E. (2017). *Grid-Connected Distributed Generation Compensation Mechanism Basics.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/grid-connected-distributed-generation-compensation-mechanism-basics/

C. Promote Beneficial Electrification for Buildings and Transportation

Among the wide-ranging changes taking place in the power sector, one of the more striking is the opportunity for beneficial electrification: electrifying end uses historically powered by natural gas or oil. Beneficial electrification provides one of the biggest opportunities in the power sector today to connect member-owners with more affordable and cleaner resources and to improve management of the grid and reduce harm to the environment and public health. Beneficial electrification can reduce members' costs in the long run and help make more effective and efficient use of the electric grid and is a necessary prerequisite to eliminating carbon emissions from the power and transportation sectors by replacing oil and gas combustion, especially when utilizing generation from renewable sources. For electrification to be considered beneficial, it must provide a net benefit that (1) saves members money over the long run, (2) enables better grid management or (3) reduces negative environmental impacts.

First, electrifying end uses can reduce members' long-run costs because most forms of electrification are more efficient than their fossil-fueled counterparts. These efficiencies decrease overall energy use and operating costs. Additionally, depending on the level of adoption of these end uses, all electricity member-owners can enjoy these benefits through the associated system benefits, not just those who installed these innovative electrification technologies.

Due to the flexibility of many forms of electrification in buildings — including water heating, some forms of space heating and transportation electrification via EVs — these end uses can help increase grid flexibility. Because EVs and electric water heaters are flexible in when they draw power and are used, they can function like batteries. This flexibility enables a shift in load to times when there is less demand for electricity, when electricity is cheaper or when renewable energy generation is abundant and away from times when there is greater demand and the need to draw upon more expensive and often more polluting generation resources. With the electrification of EVs and space and water heating, cooperatives are in a position to improve their ability to manage loads and share cost savings with member-owners.

Beneficial electrification can help reduce environmental impacts by using less energy than fossil-fueled alternatives, by providing the ability to reduce reliance on often dirtier resources used to serve electric system peaks and by adding the flexibility that can make the grid more capable of accommodating variable generation resources like wind and solar. A key point here is that as long as we are reducing the carbon intensity of the grid, as we have been doing since 1990, every electrical device powered by the grid is getting cleaner throughout its lifetime.[121]

All of the electrification options below may benefit from incentives to encourage member-owner adoption. Financial incentive programs for member-owner adoption of EVs, electric heat pumps and electric water heaters are widely used around the country. Incentives can come from the cooperative (typically through rebates), third-party energy efficiency providers or governmental agencies or programs (through rebates, loans or tax incentives). Riverland Energy Cooperative in Wisconsin provides members with detailed information on rebates for Energy Star appliances; electric water heaters; heating, ventilation and air-conditioning; efficient lighting; and EV chargers. Additionally, the cooperative provides links to state and federal rebates in addition to cooperative rebates.[122]

One way cooperatives can incentivize electrification is through rebates for more efficient appliances. Hutchinson Utilities Commission in Minnesota has a joint website with Bright Energy Solutions that provides information for their many rebate programs, both residential and commercial, covering multiple Energy Star appliances, air-conditioning and more — all in one convenient place.[123]

Cooperative-financed early appliance retirement programs (aka “cash for clunkers”) can also motivate members to make more reasoned decisions about water heater or space heater replacement. Rather than having to make a purchase decision under duress when an appliance breaks down, member-owners can consider replacing aged appliances in a more thoughtful and reasoned manner. Early retirement programs can identify appliances that are nearing the end of their useful lives and then work with members to replace them before an emergency purchase is required.[124]

Electrification of buildings, through space and water heating, and transportation offers cooperatives a lot of flexible load that can be shifted to accommodate renewable energy and to decrease peak load. It is also an opportunity for members to save money on more efficient appliances and vehicles and is an important step in meeting clean energy goals and achieving the clean energy transition. Below are some options cooperatives may consider for beneficial electrification of buildings and transportation.

1. Building Electrification Components

While we tend to think of buildings as stationary, inflexible structures, they have the potential to dynamically interact with the electric grid. Electrification of space and water heating is key to this flexibility.

a. Electrification of Space heating

Because space heating represents such a sizable proportion of energy use in the average home, it is a key focus for electrification efforts. Electric space heating, especially with new heat pump technology, will reduce member costs, enable better grid management and lessen environmental impact. Most space heating currently relies on fossil fuels, such as home heating oil, propane and gas. Beneficial electrification of space heating represents multiple opportunities for members to save on their total energy bills by switching to a more efficient heating technology (depending on the housing type and region); for cooperatives and grid operators to secure valuable grid management benefits; and for a significant reduction of greenhouse gas emissions.[125] The Beneficial Electrification League of Colorado launched a Love Electric campaign to accelerate the adoption of heat pumps, heat pump water heaters and other efficient electric technologies in Colorado homes and businesses. The initiative connects home and business owners with rebates, financing options and registered installers.[126]

121 Roberts, D. (2017, October 27). *The key to tackling climate change: Electrify everything.* Vox. https://www.vox.com/2016/9/19/12938086/electrify-everything. For more information on beneficial electrification, see Farnsworth et al., 2018.

122 Riverland Energy Cooperative. (n.d.). *2022 rebate programs.* https://www.riverlandenergy.com/rebates

123 Bright Energy Solutions. (n.d.). *Hutchinson Utilities Commission.* https://www.brightenergysolutions.com/municipalities-container/mn/hutchinson-utilities-commission/

124 Farnsworth et al., 2018.

125 Shipley, J., Lazar, J., Farnsworth, D., & Kadoch, C. (2018). *Beneficial electrification of space heating*. Regulatory Assistance Project. https://www.raponline.org/knowledge-center/beneficial-electrification-of-space-heating/

126 Love Electric. (n.d.). *About Love Electric.* https://loveelectric.org/who-we-are/

b. Electrification of Water Heating

Water heating accounts for almost 20% of residential energy bills, and put simply, today it can take far less energy to heat a gallon of water with electricity than directly with fossil fuel. Transitioning from fossil-fueled water heaters to electric resistance and heat pump water heaters is an important step in achieving a low-carbon economy. Electric water heaters also enable improved grid management through control of their energy use or charging. Electrification load is often relatively flexible for when it draws power from the grid. Generally, as long as members can take a hot shower when desired, they do not care about when their water heater is drawing power. As a result, water heaters can serve as thermal storage of energy supplied at other times of the day, helping to balance the grid.[127] La Plata Electric Association in Durango, Colorado, will install air-source heat pump water heaters for income-qualified members to help manage local power demand. During the pilot project, the cooperative will install the water heaters in 30 homes in the Animas View Mobile Home Park, as well as other energy efficiency measures. The water heaters will run on a schedule to help the cooperative avoid the higher cost of power during peak periods, which will lower costs for all members. Availability of hot water will not be affected by this scheduling, given that water heaters typically store enough hot water for a whole day.[128]

2. Activating a Grid-Interactive Building

Buildings can be made into a valuable grid resource by focusing their energy demand reductions at high-cost times or shifting load to times of day when excess renewable energy is being produced. For buildings to be grid interactive and provide value to the grid, space and water heating needs to be electrified; however, electrification alone doesn't automatically yield grid benefits. Building electrification could adversely impact the grid if those new loads are exacerbating peaks.[130] Conversely, if electrified buildings are also grid interactive through controlled technology and policy programs, they can be part of a strategy to increase energy savings, manage grid resources and integrate more renewable energy, reduce system costs and improve member economics and productivity.

Dakota Electric Association and Great River Energy in Minnesota partnered with a home developer, Country Joe Homes, to install grid-interactive water heaters in 81 homes in a new Minneapolis-St. Paul area subdivision. The grid-interactive water heaters will have real-time controls that have the flexibility to take advantage of intermittent and variable generation from wind farms or solar arrays whenever costs dip.[129]

Incorporating building electrification as a valuable resource to cooperative actions involves many of the strategies we have discussed above, including energy efficiency, demand management and rate design. A fundamental first step, however, is to ensure that building electrification programs are able to reach all member-owners. This will first require an understanding of all of the communities being served and the barriers different communities may face.

All building electrification programs face challenges such as the upfront costs of appliances, electrical upgrades and other building modifications, depending on local circumstances. One of the issues that needs to be addressed is assuring that the conversion from gas to electric will save members money. This can be determined by comparing the total cost of an electric and gas bill with the cost of an all-electric bill. Low-income and environmental justice communities often face additional challenges.[131] As noted in *Renovating Regulation*

127 Farnsworth, D., Lazar, J., & Shipley, J. (2019). *Beneficial electrification of water heating.* Regulatory Assistance Project. https://www.raponline.org/wp-content/uploads/2019/01/rap-farnsworth-lazar-shipley-beneficial-electrification-water-heating-2019-january-final.pdf

128 Herald Staff Report. (2022, January 14). Tri-State funds electric water heating project for La Plata County residents. *Durango Herald.* https://www.durangoherald.com/articles/tri-state-funds-electric-water-heating-project-for-la-plata-county-residents/. See also La Plata Electric Association. (2022, January 12). *Tri-state contributes $50,000 to help fund LPEA's air-source heat pump pilot project.* https://lpea.coop/tri-state-contributes-50000-help-fund-lpeas-air-source-heat-pump-pilot-project

129 Holly, D. (2017, November 17). *Unique partnership, modern energy savings.* National Rural Electric Cooperative Association. https://www.electric.coop/minnesota-grid-interactive-water-heaters

130 Shipley et al., 2021.

131 Environmental justice communities are communities that are disproportionately affected by pollution and other environmental hazards. Their residents are more likely to be people of color. See Mikati, I., Benson A. F., Luben, T. J., Sacks, J. D., & Richmond-Bryant, J. (2018, March 7). Disparities in distribution of particulate matter emission sources by race and poverty status. *American Journal of Public Health*. https://ajph.aphapublications.org/doi/10.2105/AJPH.2017.304297

to Electrify Buildings, "many low-income households rent rather than own their homes and therefore do not have the ability to make decisions about appliances like water heaters and stoves. Landlords, meanwhile, have little or no incentive to spend money on equipment upgrades that would only benefit renters who pay the utility bills. Therefore, creating programs that allow landlords to replace gas appliances with electric appliance and providing the landlord with the cost differential if there is one or providing a rebate could be helpful to incentivize landlords. Low-income households also tend to live in buildings that are in relatively greater need of weatherization and other basic upgrades and repairs, which can pose a challenge to electrifying their energy uses in ways that increase their home comforts and lower their bills. But without electrification, these households will potentially be left behind, relying on an increasingly unaffordable fossil gas system and bearing a larger and larger share of that system's fixed cost — while wealthier members electrify and disconnect from fossil gas."[132] Addressing these barriers will take explicit focus.

As not-for-profit, community-owned entities, cooperatives are uniquely situated to address many of the challenges of building electrification by working with members and local governments and without the bias toward capital investments that for-profit utilities face. To electrify buildings, cooperatives can take the following steps:

- Ensure that building electrification benefits reach everyone, including low-income members and environmental justice communities. Doing so will require an affirmative effort to reach out to affected communities to ensure that solutions will address the specific barriers to electrification that they are facing. Working with local governments to target financial incentives and address coordinated efforts on energy efficiency and weatherization along with electrification may be useful.
- Illuminate and reveal the value that demand flexibility can provide. Because all utility systems are different due to various factors — generation mix, climate and weather, member base and economics, among others — it is important to understand the value that electrified grid-interactive buildings can provide for a specific utility. Pilots or programs starting with cooperative buildings can help illuminate the various value streams produced by demand flexibility from reducing things like peak demand, grid congestion and renewable curtailment.
- Structure rate design to communicate the system value of flexible load so members are able to respond and receive benefits if they reduce demand at times of system stress and help utilities avoid associated costs (see Section II-B, "Capture Demand-Side Flexibility").
- Reassess programs and goals. Incorporating review opportunities into programs and policies can allow for reassessment and improvements in the future.

3. Transportation Electrification

Electrification of the transportation sector (cars, trucks, buses, taxis, ports, etc.) provides an opportunity to save citizens money on transport, increase local jobs and businesses, address national security concerns, improve public health and combat climate change. Real-world experience and studies show that these benefits can be achieved, but proactive policies are needed to realize the full magnitude of these benefits. Without an early and comprehensive approach, potential benefits will be lost. High levels of EV adoption with smart charging can provide benefits to all of society — not just EV owners — and the grid. The converse is also true. Inaction in this area could lead to slow penetration of EVs, problems with uncontrolled EV charging, sporadic access and forgone societal benefit.

a. Understand the Federal and State Context

Experience shows that government policies can accelerate the transition to EVs. By early 2019, 48 states plus the District of Columbia had taken action on regulation, financial incentives or market development initiatives related to electric vehicles.[133] Cooperatives should maintain awareness of federal and state activities that can augment or support cooperative actions on EVs, including checking:

- **Federal and state goals.** Federal funding requires certain state plans. If a state has set EV goals, cooperatives may need to build those goals into their planning processes. If not, cooperatives can take steps to create a plan of their own. If a cooperative has adopted EV goals, these goals may affect the utility, both for vehicles used and the amount of

132 Shipley et al., 2021.

133 Carr, A., Lips, B., Proudlove, A., & Sarkisian, D. (2019, May). *50 states of electric vehicles: Q1 2019 quarterly report.* North Carolina Clean Energy Technology Center. https://nccleantech.ncsu.edu/wp-content/uploads/2019/05/Q1-19_EV_execsummary_Final.pdf

vehicle charging the cooperative should provide and plan to provide in the future. If federal and state goals have not explicitly addressed EVs and charging infrastructure for low-income and rural communities, specific cooperative focus on this may compensate for gaps in state goals.

- **Federal and state incentives.** Cooperatives should become familiar with state and federal incentives, both for purchase of electric vehicles and EV charging infrastructure. Cooperatives can then assess gaps in incentive structure and determine in which areas to offer incentives. Cooperatives should ensure transportation benefits are shared equally, which may require incentives particularly focused on low-income communities.
- **State and third-party private EV plans.** Some states are creating statewide EV plans that may include purchase goals, infrastructure plans, and incentives. Cooperatives should also determine if any third-party private infrastructure plans would impact the utility. Understanding state-level and private EV plans, and intra-state or regional plans, particularly for EV infrastructure, can help cooperatives determine the most effective EV investments for them, such as buses or light-duty vehicles. Cooperatives, with a better focus and understanding of their community, will also be able to assess the electrification needs that will most effectively meet the needs of low-income and rural community members.
- **Public utility commission or public service commission requirements.** The regulatory commission authority over cooperatives varies by state.

Understanding of the federal and state context for EV goals, planning and incentives will help cooperatives determine the most effective steps they can take to support EVs that augment and expand state efforts.

Cooperatives have opportunities to take significant action on EVs and may provide leadership in advance of state or federal goals. Cooperative actions can also provide guidance to members to enable the benefits of transportation electrification. Key actions in the following areas are necessary to achieve this:

- Setting cooperative goals and plans for low-income, rural, urban and heavy-duty transport.
- Electrifying cooperative fleets.
- Planning for EV infrastructure development for low-income, rural, urban and heavy-duty transport.
- Ensuring benefits reach all segments of society, including low-income communities.

b. Set Cooperative Goals and Plans

After determining how state goals and policies will affect them, the first step for cooperatives committing to EVs is to make a plan for transportation electrification. For cooperatives focused on rapid decarbonization, the International Council on Clean Transportation recommends 100% EV sales for light-duty vehicles by 2035 and medium- and heavy-duty vehicles by 2040.[134] Goals set by the cooperative and local governments, along with financial incentives that help make this transition happen sooner, will enable faster decarbonization. Articulating a transportation electrification commitment in a local law or ordinance is optimal, but progress can be made even if initial local political support for a comprehensive plan or commitment is lacking at the start. For example, some cooperatives may set EV fleet goals to meet decarbonization targets, while others may start with

Rural transportation electrification

Rural America is home to 20% of the population but almost 70% of the country's road miles. This makes electrification both hugely challenging and attractive. As noted by the U.S. Department of Transportation: "Rural residents drive more than their urban counterparts, spend more on vehicle fuel and maintenance, and often have fewer alternatives to driving to meet their transportation needs. Over the long run, EVs will help residents of rural areas reduce those costs and minimize the environmental impact of transportation in their communities."[135] But ensuring charging is available to meet rural driving needs is a challenge that coordinated policy planning among federal, state and local governments will need to address. Once realized, however, rural electrification can offer individual residents lower maintenance and fuel costs and a source of power and resilience. It can also offer rural communities opportunities for economic growth, cleaner air and climate benefits.

134 Miller, J., Khan, T., Yang, Z., Sen, A., & Kohi, S. (2021, December). *Decarbonizing road transport by 2050: Accelerating the global transition to zero-emission vehicles.* The International Council on Clean Transportation. https://theicct.org/publication/zevtc-accelerating-global-transition-dec2021/

135 U.S. Department of Transportation. (2022, February 10). *Charging forward: A toolkit for planning and funding rural electric mobility infrastructure.* https://www.transportation.gov/rural/ev/toolkit

planning local infrastructure to enable EV parking. Local laws can mandate the development of a comprehensive municipal fleet electrification transition plan that starts with an assessment of the existing fleet and sets EV procurement schedules by vehicle class, special considerations for emergency and heavy-duty vehicles and infrastructure and maintenance investments. These outcomes can be achieved through a resolution, a statement of support or the adoption of a local law directing a transition to an all-electric municipal fleet by a certain date.[136] Cooperatives can facilitate local goals by ensuring the infrastructure and rate design exists to support EV integration.

Comprehensive plans and goals also need to ensure equitable access to electrified transportation. Cooperatives will need to work with low-income and rural communities to identify barriers and develop solutions that deliver on inclusivity goals specific to each cooperative. Major barriers to electrification for low- and moderate-income communities include the higher upfront cost, lack of access to EV infrastructure or payment mechanisms and lack of outreach and education. The Greenlining Institute's Equity Toolkit articulates some of the barriers these communities face:[137]

- **Cost**. EVs have a higher upfront cost than internal combustion engine vehicles but a lower total cost of ownership over the life of the vehicle. Incentives such as sales tax exemptions, after-purchase rebates and tax credits are more difficult for low-income communities to access; however, vouchers and instant rebates that reduce upfront cost are more likely to enable a low-income household to purchase an EV. It's also important to make used electric vehicles more available to the many households that cannot afford new vehicles.[138] To ensure equitable access to electric vehicles, cooperatives may want to focus first on LMI communities with fewer economic resources to ensure these communities are incorporated in the transportation electrification evolution.
- **Lack of access to charging infrastructure.** Cooperatives can overcome this barrier by working to ensure charger access in low- and moderate-income communities. Additionally, many LMI members may not have smartphones or be able to afford subscription fees, common components of private charging network applications, which can constitute an additional barrier.[139]
- **Lack of awareness and member education.** A general lack of awareness about the benefits of EVs and available vehicle purchase incentives also create barriers to adoption among lower-income households, rural populations and disadvantaged communities. Education and outreach strategies by the cooperatives that are specifically targeted to meeting the needs of underserved communities signal a strong commitment to ensuring they are prioritized in efforts to expand access to electric mobility.
- **Specific mobility needs.** Low-income rural residents may rely more on vehicle ownership or informal ride sharing because of bad public transportation services and access. Conversely, low-income residents in densely populated cities may have less of a need to own a car to get to work or complete daily tasks but may need robust public transportation.

As noted in the last point above, transport electrification will also have different implications in rural communities. Rural communities differ in significant ways from cities, and their transportation needs differ as well. In general, rural communities have significantly less EV charging infrastructure, which is largely concentrated in major cities.[140] While other factors such as limited EV models for trucks and limited dealership networks[141] are outside cooperatives' scope of influence, cooperatives can help increase EV charging in rural areas. Rural residents may be more likely to be physically or financially dependent on shared transit rather than private car ownership.[142] Broad and ongoing

136 Electrify NY. (n.d.). *EV municipal toolkit.* https://electrifyny.org/ev-municipal-toolkit/#1595974225040-92bfb940-320e

137 The Greenlining Institute. (n.d.). *Electric vehicles for all: An equity toolkit*. https://greenlining.org/resources/electric-vehicles-for-all/

138 The Greenlining Institute, n.d.

139 Northeast States for Coordinated Air Use Management. (2020, September 21). *Expanding equitable access to electric vehicle mobility: Examples of innovative policies and programs.* https://www.nescaum.org/documents/expanding-equitable-access-to-ev-mobility-examples_9-21-20.pdf/

140 Tolbert, J. (2021, October 22). *Beyond cities: Breaking through barriers to rural electric vehicle adoption.* Environmental and Energy Study Institute. https://www.eesi.org/articles/view/beyond-cities-breaking-through-barriers-to-rural-electric-vehicle-adoption

141 Northeast States for Coordinated Air Use Management, 2020.

142 Kadoch, C. (2020). R*oadmap for electric transportation: Policy guide.* Regulatory Assistance Project. www.raponline.org/EV-roadmap

Electric cooperatives can also work together to meet gaps. Twenty-nine electric cooperatives have created a regional EV charging network across Wisconsin, Minnesota, Illinois and Iowa. The Charge EV network provides 40 Level 2 and Level 3 chargers installed near major highways and interstates across the upper Midwest.[143]

stakeholder engagement and specific outreach to these communities will help cooperatives develop EV plans that meet the needs of all member-owners.

c. Electrify Cooperative Fleet Vehicles

Cooperatives will need to consider their particular needs, the scope of state fleet electrification and the type of provision that will work best for their particular cooperative. Fleet electrification can be achieved through various actions at the state or local level. Some jurisdictions have set goals to electrify a certain percentage of fleet vehicles by a certain date. A variation of this type is to specify a rate of purchase of electric, hybrid or alternative fuel vehicles — for example, 5% of all new motor vehicles per year.[144] Others require the purchase of an electric vehicle if the total cost of ownership is less than that of a comparable internal combustion engine vehicle. The total cost of ownership of electric versus internal combustion vehicles will vary depending upon the financial incentives for EVs, but as technology costs decrease, the total cost of EVs will also decrease. Others simply require the purchase of electric and hybrid vehicles "to the maximum extent feasible." This approach allows more discretion in determining which vehicles should be electric or hybrid and which can be internal combustion.

d. Plan for EV Infrastructure

Member concern about the lack of available charging infrastructure is a significant barrier to electrification of the light-duty transport sector. The lack of widespread charging stations leads to a chicken-and-egg problem for EV adoption. Federal funding may provide an opportunity to promote more widespread EV infrastructure. Optimally, states would facilitate a coordinated planning process on provision of EV infrastructure among state agencies, investor-owned utilities, third-party providers, private interests and cooperatives. Some states are in the process of starting or planning for this type of coordinated plan, and cooperatives should check with state energy offices or other state agencies to determine whether a process exists or suggest implementing one. Regardless of whether a statewide effort exists, cooperatives can plan for their own EV charging infrastructure needs and may incorporate or consult many of the stakeholders listed above.

Particular attention must be paid to low-income communities for EV charging infrastructure planning. Low- and moderate-income communities may have fewer EVs due to higher upfront cost. The state or cooperative may also create policies aimed at lowering the cost for LMI members through rebates at the time of sale that directly reduce the cost of the EV. Lack of charging infrastructure in LMI areas, perhaps as a result of there being fewer EVs per capita, would lock in the status quo and provide a significant barrier to transportation electrification. A specifically coordinated effort on the part of the cooperative and state or local efforts is necessary to ensure that LMI communities have equitable access to electric vehicles and the charging infrastructure to support them. The cooperative also needs to be sensitive to the impact that cooperative-built infrastructure may have on electric rates for LMI members. With good planning, a cooperative can ensure that all members receive the benefits and that costs

Seventeen electric cooperatives and the National Rural Electric Cooperative Association are applying for federal grants to bring electric vehicles to low-income rural communities. These cooperatives recognize the need to install public EV charging stations at various locations, such as low-income apartment complexes, medical facilities, parks and highway corridors.[145]

143 Kelly, E. (2021, January 14). *Co-ops create electric vehicle charging network in upper Midwest.* National Rural Electric Cooperative Association. https://www.electric.coop/co-ops-create-electric-vehicle-charging-network-in-upper-midwest#:~:text=A%20coalition%20of%2029%20electric%20cooperatives%20has%20created%20a%20regional,provided%20by%20ZEF%20Energy%20Inc. See also Charge EV. https://charge.coop/

144 An act relative to green communities, Chapter 169, 191st General Court, (Mass. 2008). https://malegislature.gov/laws/sessionlaws/acts/2008/chapter169

145 Kelly, E. (2021, July 19). NRECA, *Co-ops apply for federal grants to bring EVs to low-income rural areas.* National Rural Electric Cooperative Association. https://www.electric.coop/nreca-co-ops-apply-for-federal-grants-to-bring-evs-to-poor-rural-areas

are shared equitably, which may mean LMI members do not pay for EV infrastructure because it would prohibitively increase costs on the members that can least afford it. Electrification has the opportunity to provide LMI members with clean, reliable and affordable transportation. Proactive planning now can make this a reality.

Cooperatives' goals will likely guide EV infrastructure planning and needs, along with identifying gaps in the infrastructure plans of the state, utilities or third-party providers. Cooperatives may also want to think of EV infrastructure planning in phases, recognizing that EV adoption will increase. The resources at the end of this chapter provide more information on developing EV infrastructure plans, but a few considerations will help development of an EV infrastructure plan:

- Develop a plan to switch cooperative internal combustion engine vehicles to EVs by a certain date.
- Develop plans for EV-powered public transportation and school buses. For example, the Beneficial Electrification League is offering to help 300+ cooperatives bring electric school buses to their communities.
- Assess cooperative service area needs. Understanding EV driver and cooperative demographics and existing needs will help cooperatives prioritize EV charging needs. This includes specific outreach to diverse residents of a cooperative. Ensuring that the benefits of transportation electrification are shared equitably will require states to consider the degree to which all members have access to electricity as a transportation fuel, regardless of their economic and geographic circumstances.
- Plan for steady growth in EV charging infrastructure needs. State and cooperative goals could spur EV growth. Although EVs are currently 2% of global sales, they are projected to grow to 24% of global sales or higher by 2030, even absent specific EV goals.[146]
- Assess gaps in existing EV charging infrastructure, ideally after consultation with state agencies, commercial third-party providers and utilities. Cooperatives should also engage EV drivers, local councils, low-income communities, rural communities, public and private fleet owners and EV advocates to identify barriers and opportunities and specifically prioritize equitable access to EV charging.[147]
- Assess grid infrastructure to determine the sites with the greatest grid capacity for installing EV charging infrastructure, particularly direct-current fast chargers.
- Streamline permitting processes and identify preapproved sites. Streamlining and expediting permitting and installation of charging infrastructure can improve the business case for private EV infrastructure construction.[148] This can be further expedited by identification of preapproved sites, which may also encourage charging in locations that are ideal from a cooperative grid perspective.
- Secure investment from local businesses. Communities and businesses that host public charging stations may also see economic benefits as EV drivers eat or shop while their vehicles charge.[149] Cooperatives can engage local coalitions of businesses to install EV charging at their businesses and promote awareness of the business case for their investment. Strategic use of incentives can also increase charging infrastructure.[150]

e. Empower Members Through Rate Design

Because electric vehicles do not need to be charged at the same time they will be used, they are inherently flexible and can serve as energy storage. As a result, the power system can serve this new load at cleaner and less expensive times of the day. This flexibility means that EVs can actually improve the utilization of the transmission and distribution system, shifting loads that would otherwise add to system peaks, which ultimately drive grid investment and increase cost. The need for

146 Shepardson, D. (2021, August 4). *U.S. automakers to say they aspire to up to 50% of EV sales by 2030-sources.* Reuters. https://www.reuters.com/business/autos-transportation/us-automakers-say-they-aspire-up-50-ev-sales-by-2030-sources-2021-08-04/

147 The International Council on Clean Transportation & C40 Cities Climate Leadership Group. (n.d.). *Electric vehicle charging infrastructure: A quick guide for cities* [Factsheet]. https://c40.my.salesforce.com/sfc/p/#36000001Enhz/a/1Q000000Mp2p/2r2iFhMbXlgoqFFnxWsycjub2dEp.PKxHbs0_tFHhyI

148 Hall, D., & Lutsey, N. (2020). *Electric vehicle charging guide for cities.* The International Council on Clean Transportation. https://theicct.org/sites/default/files/publications/EV_charging_guide_03162020.pdf

149 Crotty, F., Jordan, B., McFarlane, D., Sexton, T., & Simons, S. (2019). *Accelerating electric vehicle adoption: A vision for Minnesota.* Minnesota Department of Transportation, Minnesota Pollution Control Agency and Great Plains Institute. http://www.dot.state.mn.us/ sustainability/docs/mn-ev-vision.pdf

150 C40 Cities Climate Leadership Group. (2021, August). *How to build an electric vehicle city: Deploying charging infrastructure.* https://www.c40knowledgehub.org/s/article/How-to-build-an-electric-vehicle-city-deploying-charging-infrastructure?language=en_US. In Berlin, small- and medium-sized businesses can get a 50% subsidy for building public charging stations.

system upgrades can be minimized if EVs are charged during off-peak periods, either through smart charging, time-of-use pricing or some combination of both.

Shifting the load to less expensive times can produce savings that members can share in through appropriately designed electricity rates. Cooperatives can develop smart charging programs and rate designs to encourage members to charge their EVs at lower-emission and lower-cost times of the day and year. Given that members will typically charge their cars overnight after they get home, the member charging time is compatible with taking advantage of off-peak pricing. (See Section II-B-2 on rate design.) For example, Cobb Electric Membership Corp in Georgia offers NiteFlex, which allows EV drivers to pay a lower rate for electricity during certain times of the day and provides 400 kWh of free energy use each month for overnight charging.[151]

f. Financing and Incentives

Federal funding under the National Electric Vehicle Infrastructure Formula Program is available to build out national EV infrastructure.[152] Competitive funding is available for electric cooperatives, also funding opportunities for rural transportation electrification that focuses on disadvantaged communities. NRECA is working with cooperatives to apply for federal funding for big electric vehicle projects.[153]

Electrification of transportation is a multisectoral effort and provides benefits across the energy, transport and building sectors, as well as environmental and health benefits. Cooperatives can think broadly in terms of how these costs and benefits are paid for and shared. Although transportation electrification is often thought of as an expense that is worthwhile to support because of the public benefits it can yield, cooperatives can also think of targeted use of electrification (transportation and otherwise) as a means to reduce costs they would otherwise face. Targeting is possible in a number of areas:[154]

- Air quality is a significant concern in many regions, and transportation-related emissions are a main contributor to regional pollution. Targeted transportation electrification in these areas can address air quality issues, often at a lower cost than other options. Federal funding is also available for air quality improvement through transportation projects. The Congestion Mitigation and Air Quality Improvement Program is one element of the Federal-Aid Highway Program that provides a funding source for states, local governments and transit agencies to fund transportation projects and programs that help meet the requirements of the Clean Air Act and help reduce regional congestion in transportation networks.[155]
- State efforts to spur job growth generally focus on building things for public benefit, such as hospitals and roads that provide construction jobs and tax breaks for corporations relocating to a state. In cooperation with states and municipalities, cooperatives can provide EV incentives and infrastructure as a method to increase local jobs or focus on encouraging EV manufacturing and related industry jobs throughout the state.
- Private investment is a largely untapped source of funding for EV charging infrastructure. Installing charging infrastructure at retail locations allows EV owners to power up while shopping, eating and resting, as well as providing local business owners with an additional marketing tool and a revenue source.
- Additional federal funding may also become available through further efforts on infrastructure. Electric cooperatives with existing EV plans may be better situated to apply for and receive federal money when it becomes available.[156]

151 Cobb EMC. (n.d.). *NiteFlex.* https://cobbemc.com/niteflex

152 U.S. Department of Transportation. (2022, February 10). *President Biden, USDOT and USDOE Announce $5 Billion over Five Years for National EV Charging Network, Made Possible by Bipartisan Infrastructure Law.* https://highways.dot.gov/newsroom/president-biden-usdot-and-usdoe-announce-5-billion-over-five-years-national-ev-charging#:~:text=The%20program%20will%20provide%20nearly,Formula%20Program%20is%20%24615%20million

153 Kelly, E. (2021, April 27). *NRECA seeks co-ops to apply for federal funding for big electric vehicle projects.* National Rural Electric Cooperative Association. https://www.cooperative.com/news/Pages/NRECA-Seeks-Co-ops-to-Apply-for-Federal-Funding-for-Big-Electric-Vehicle-Projects.aspx

154 Kadoch, 2020.

155 U.S. Department of Energy & U.S. Department of Transportation. (2016). *Guide to federal funding, financing, and technical assistance for plug-in electric vehicles and charging stations.* https://www.energy.gov/eere/vehicles/downloads/guide-federal-funding-financing-and-technical-assistance-plug-electric

156 See Electrification Coalition. (n.d.). *Federal funding guidance for cities.* https://www.electrificationcoalition.org/work/federal-ev-policy/federal-funding-guidance-for-cities/

Recognizing the wide range of benefits that EVs can provide, jurisdictions around the world have provided direct financial support to encourage the electrification of transportation. Cooperatives with specific EV goals may wish to provide financial incentives to encourage equitable EV adoption. Best practices for structuring EV incentives include:

- Applying incentives at the point of purchase.
- Making incentives simple, transparent and understandable.
- Making incentive programs durable.

Gunnison County Electric Association in Colorado recognizes that lack of experience with an EV is a disincentive. Accordingly, the cooperative offers an electric vehicle “test drive” program. Members can drive an EV (depending on the model) either as a loaner for a day or for a short test drive with a cooperative representative, to learn how it fits in with their lifestyle. The cooperative offers an online sign-up form.[157]

Useful Resources on Transportation Electrification

Atlas Public Policy. (2021, November). *Dashboard for Rapid Vehicle Electrification (DRVE).* https://atlaspolicy.com/dashboard-for-rapid-vehicle-electrification-drve/. DRVE is a powerful tool that equips users with decision-relevant information on the financial viability and environmental impact of light-, medium-, and heavy-duty vehicle fleet procurements across an entire fleet.

American Public Power Association. (n.d.). *Exploring Electric Vehicle Rates for Public Power*. https://www.publicpower.org/topic/electric-vehicles

Brinker, C. (2019, June 20). *A New Model of Energy Codes in Home Rule States.* Southwest Energy Efficiency Project. https://www.swenergy.org/a-new-model-for-energy-codes-in-home-rule-states.

Electrification Coalition. (n.d.). *Federal Funding Guidance for Cities.* https://www.electrificationcoalition.org/work/federal-ev-policy/federal-funding-guidance-for-cities/

The Greenlining Institute. (n.d.). *Electric Vehicles for All: An Equity Toolkit.* https://greenlining.org/resources/electric-vehicles-for-all/

Hall, D., & Lutsey, N. (2020). *Electric Vehicle Charging Guide for Cities.* The International Council on Clean Transportation. https://theicct.org/sites/default/files/publications/EV_charging_guide_03162020.pdf

Kadoch, C. (2020, February). *Roadmap for Electric Transportation: Legislative Options.* Regulatory Assistance Project. https://www.raponline.org/wp-content/uploads/2020/03/rap-roadmap-electric-transportation-legislative-options-2020-february.pdf. This guide and legislative kit contains state legislation, all of which can be amended to apply to a cooperative.

Kelly, E. (2021, August 2). *NRECA Report: What Co-ops Can Do to Benefit From Electric Vehicle Rise* [Press release]. National Rural Electric Cooperative Association. https://www.cooperative.com/news/pages/nreca-report-what-co-ops-can-do-to-benefit-from-electric-vehicle-rise.aspx

Northeast States for Coordinated Air Use Management. (2020, September 21). *Expanding Equitable Access to Electric Vehicle Mobility: Examples of Innovative Policies and Programs.* https://www.nescaum.org/documents/expanding-equitable-access-to-ev-mobility-examples_9-21-20.pdf/

Office of Energy Efficiency & Renewable Energy. (n.d.). *Energy Standard and Code Determinations.* https://www.energycodes.gov/

U.S. Department of Transportation. (2022, February 10). *Charging Forward: A Toolkit for Planning and Funding Rural Electric Mobility Infrastructure.* https://www.transportation.gov/rural/ev/toolkit

Cooperatives with useful EV program examples:

- Beneficial Electrification League. *Electric Cooperative School Bus Initiative: Electrifying America’s Rural School Buses.* https://be-league.org/buses/
- Cobb EMC. *Electric Vehicles.* https://cobbemc.com/electric-vehicles
- Great River Energy. *Electric Vehicles.* https://greatriverenergy.com/smart-energy-use/beneficial-electrification/electric-vehicles/

157 Gunnison County Electric Association. (n.d.). *EV test drive program.* https://www.gcea.coop/energy-efficiency/electric-vehicles/ev-test-drive-program/. For more examples of electric cooperatives’ innovative EV programs, see Kelly, E. (2019, July 31) *Getting in front of EVs.* National Rural Electric Cooperative Association. https://www.cooperative.com/remagazine/articles/pages/getting-in-front-of-electric-vehicles.aspx

D. Expand Clean Energy Generation

As load is changing due to energy efficiency and electrification and becoming more flexible through demand management, supply options are also changing and possess different characteristics than traditional sources. Cooperatives have numerous options to procure and develop supply. Ultimately, they will be able to match these sources of supply with energy efficiency and demand-side approaches. This section will first discuss how policies to procure or build clean energy sources may act as a threshold consideration for cooperative utility decisions. Next, this section will outline various options that cooperatives have to develop or procure clean energy generation.

1. Policies to Procure or Build Cooperative Clean Energy

There are a number of ways rural electric cooperatives can develop and procure clean energy to meet policy goals and as a least-cost option to meet demand. In some cases rural electric distribution cooperatives are still bound by an all-requirements contract with a G&T. As explained earlier, some distribution cooperatives are breaking these contracts, as they are finding more flexible and affordable solutions outside of the supply offered by their G&T. The procurement options listed here will be most relevant to a cooperative not bound by an all-requirements contract, but they may still be helpful for cooperatives for any partial requirements they may have, and for those contemplating changing their supply procurement practices.

Cooperatives may:

- Procure clean energy through all-source competitive bidding.
- Build or contract a third party to build their own renewable generation, such as solar, wind and storage.
- Engage members to procure flexibility from energy efficiency, demand management and time-varying rates and obtain distributed resources on the distribution grid through net metering, user-friendly interconnection regulations and electrification tariffs.

Determining which method or mix of methods to use can be daunting. The process outlined in Table 3 may help.

Table 3. **Steps to help cooperatives choose procurement methods**

Internal assessment	The cooperative should assess resource needs, including determining the optimum procurement of resources in front of and behind the meter. The cooperative should also assess whether other goals for member involvement or other goals would have a bearing on the types of resources selected beyond cost considerations. Many of these steps will take place in the planning processes we have discussed.
Issue a request for proposals for competitive all-source procurement	This process will provide cooperatives with an assessment of the variety of resources available to meet their needs and the cost of procuring it.
Get bids for self-build	Obtain bids for creating on-site renewable or clean energy.
Weigh and assess the results	The information obtained in this process will help cooperatives determine which option or mix of options is right for them.

a. Competitive Bidding of All Sources to Serve Load

Historically, energy generating sources were mainly coal, gas, or nuclear, resource types that require large, central generating plants. Given the cost of these large plants, they were usually built and owned by generation and transmission cooperatives, which then supplied their output to distribution cooperatives. Today, generation sources include renewable energy, either utility scale or distributed generation, and grid resources such as demand response and storage, all of which can be provided by third-party providers in addition to G&Ts. Renewable energy purchases by cooperatives are growing rapidly. Cooperatives now obtain 19% of their energy from renewable resources.[158] As cooperatives begin to take more control of their generation, this number will likely grow, with locally sited renewable resources growing as well.

As cooperatives have a greater ability to make choices about their energy needs, so they can readily adjust their energy purchasing practices to allow for this diversity. All-source procurement means that whenever a cooperative believes it is time to acquire new generation resources, it may conduct a unified resource acquisition process. In that process, the requirements for capacity or generation resources are neutral with respect to the full range of potential resources or combinations of resources available in the market. A competitive procurement process is usually accomplished through requests for proposals (RFPs) as part of the process of selecting adequate generation resources. In an RFP, the cooperative describes the resources it wishes to procure.[159]

Competitive bidding is not a new concept for cooperatives, as many types of contracts may have competitive bidding requirements pursuant to state law. Experience offers some best practices to follow for competitive procurement.[160]

- **Ensure that the need for new resources is well defined, transparent and linked to findings from a well-vetted resource planning process.** A need for new resources may arise from emerging electric system reliability requirements, from changing economics of resource options, or from policy goals that reflect environmental, equity, economic development and resource priorities. Modeling assumptions and tools should be as transparent as reasonably possible and accessible to all stakeholders. Resource planning scenarios should be specified and evaluated in consultation with a diverse group of stakeholders so that those needs are well understood and validated.

158 National Rural Electric Cooperative Association. (n.d.-a). *Power supply*. https://www.electric.coop/issues-and-policy/power-supply .

159 Shwisberg, L., Dyson, M., Glazer, G., Linvill, C., & Anderson, M. (2021, March). *How to build clean energy portfolios.* RMI. https://rmi.org/how-to-build-ceps/; and Wilson, J. D., O'Boyle, M., Lehr R., & Detsky, M. (2020, April). *Making the most of the power plant market: Best practices for all-source electric generation procurement.* Energy Innovation Policy & Technology and Southern Alliance for Clean Energy. https://energyinnovation.org/wp-content/uploads/2020/04/All-Source-Utility-Electricity-Generation-Procurement-Best-Practices.pdf

160 Adapted for cooperatives from Shwisberg et al., 2021.

- **Ensure that all resource providers have opportunities to offer all capabilities from each of the resource options they bid.** Bidding should be open to all resource providers that meet reasonable bidding requirements, and bidders should be allowed to submit bids that include all resource types to enable portfolios that use combinations of supply- and demand-side resources.
- **Work with bidders prior to, during and after solicitations to understand what data they need to give their best bids.** Supporting bidders to deliver diverse and competitive solutions requires cooperative contacts to be available to answer questions. In the interests of transparency and to ensure a level playing field, the cooperative should document and publish all bidder questions and the cooperative's answers and be open to modifying the solicitation and proposed contract terms if that can expand the field of competitive solutions.
- **Ensure that the bidding process is open, transparent and evaluated fairly.** Evaluation criteria used to select bids should be transparent and communicated clearly to bidders prior to bid submission deadlines. A third-party, independent evaluator could be used to supervise the utility bid evaluation to ensure that it follows published criteria. Cooperatives should consider trade-offs among bids and additional modeling of resource options if no one portfolio among finalists is clearly superior to the others.
- **Consider whether evaluation criteria for selecting the optimal resource portfolio are aligned with public policy outcomes.** Stakeholders are increasingly concerned about alignment between procurement and public policy objectives, including resilience, equity and decarbonization. Cooperatives should carefully evaluate how well their solicitation processes support their goals.

Three foundational improvements in competitive all-source procurement practices support the achievement of outcomes that are aligned with objectives and ensure the least regrets outcomes:[161]

1. **Increase transparency.** Bidders obtain the information they need to propose competitive solutions that meet solicitation objectives and reduce the likelihood of bids falling through.
2. **Engage stakeholders and members.**
   - Stakeholders may propose alternative specifications of the need or portfolio options that the cooperative did not consider.
   - Stakeholders can provide feedback about whether state and local policy objectives are adequately reflected in a solicitation's scope and evaluation criteria and build public support for outcomes.
   - Stakeholders and bidders can identify barriers that may limit participation in the solicitation.
   - Consistent engagement with bidders can reduce perceived risk, result in more competitive bids from a diverse set of resources and support market maturation.
3. **Link planning and procurement.**
   - Consider all resource options holistically, including distributed energy resources and nonprocurement pathways (i.e., energy efficiency measures or other options that could achieve resource needs without procuring new energy) to save money and reduce environmental impact. Assess the need for procurement of a resource in the context of longer-term planning objectives and risks.
   - Actual price and operational capability information from bids is used to inform planning decisions.

b. Build and Own Cooperative Clean Energy

Many cooperatives have decided to pursue clean energy that they build and own themselves. These projects can include large-scale or utility-scale renewable energy developments on land owned or leased by the cooperative. They can also include on-site solar PV systems, often installed on rooftops or parking lots, at substations or at sites where electricity is consumed. These systems are directly tied to a facility's electrical system and can reduce the facility's need for electricity from the grid.[162] Increasingly, energy storage is co-located with renewable energy systems and may be built or procured along with renewable energy.

Cooperative goals, as well as cost comparisons learned from an all-source RFP, will help inform whether to procure clean energy through third parties, build and own clean energy on-site or a combination of both.

Utility-scale clean energy projects require coordination and alignment between municipal government officials and cooperative board and staff.

161 Adapted for cooperatives from Shwisberg et al., 2021.

162 American Cities Climate Challenge Renewables Accelerator. (n.d.). *Procurement guidance: On-site solar.* https://cityrenewables.org/on-site-solar/

Cooperatives will need to:

- Ensure alignment on goals and priorities.
- Perform or oversee on-site solar siting assessment.
- Analyze and decide on ownership model.
- Run the transaction process — that is, issue an RFP using the process outlined above, select a contractor and negotiate a contract.[163]

On-site clean energy can also offer visibility and educational opportunities, lower costs and — when paired with energy storage — enhance resilience. It also has the potential to provide local jobs and economic development.[164]

"Community solar" refers to projects in which members of the community can subscribe to get the benefits from a solar facility. It is especially useful for renters who cannot install PV units and for low-income members who can't afford to purchase a PV unit but can benefit from a reduced rate by having a portion of their electricity needs come from solar energy. Community solar programs are another option for cooperatives to procure clean energy, and they can be owned and operated by the cooperative or can be owned by a developer and subject to the competitive solicitation elements outlined above. Community solar programs can be generally grouped in one of three categories: utility-owned, member-owned or third-party (developer) owned. Being more flexible and responsive to member demand allows cooperatives to occupy a unique space within the community solar market. According to industry association data, 491 cooperatives in 43 states utilize solar, which includes both utility-scale and community solar.[165] In addition to regular community solar programs, some cooperatives have partnered with state agencies to bring community solar to low-income households. In Michigan, the state Office of Climate and Energy partnered with Cherryland Electric Cooperative on a pilot low-income community solar project, which was launched in 2018. The state energy office provided matching funds, and the cooperative financed most of the project. In the city of Cadillac, state-identified participants received weatherization before subscribing to a community solar project. Participants receive a monthly bill credit of 10 cents per kWh for the output of their solar PV share, or about $350 in solar bill credits each year they are subscribed.[166]

Additionally, community solar can be a way for utilities to extend the benefits of solar to low-income members by waiving or discounting upfront costs, termination fees and subscription fees that may otherwise be prohibitive, as well as guaranteeing savings on the energy bill of income-qualified members. In states that have legislation allocating funds for low-income community solar, cooperatives have a great opportunity to link their members to those funds and help address energy burden in their communities while they expand their renewable portfolio.[167] (The following section further discusses policies that address energy burden.)

Use of energy storage is rapidly increasing as storage technology is rapidly becoming cost-effective. Storage can be implemented either in front of the meter, typically utility-scale storage, or behind the meter as a member resource, depending on the desired application. Cooperatives are increasingly pairing intermittent generation resources, such as solar PV, with energy storage to allow them to capture electricity as it is produced and discharge when it is needed, thus enabling further large-scale solar and wind development.[168] Energy storage can be built and owned by a cooperative or by a third-party developer.

163 Gonçalves, T., & Liu, Y. (2020). How US cities and counties are getting renewable energy. World Resources Institute. https://www.wri.org/insights/how-us-cities-and-counties-are-getting-renewable-energy

164 American Cities Climate Challenge Renewables Accelerator, n.d.

165 National Rural Electric Cooperative Association. (n.d.-b). *Solar.* https://www.electric.coop/wp-content/Renewables/solar.html

166 U.S. Department of Energy. (n.d.). *Promising practice: State partnerships with electric cooperatives for low-income community solar and weatherization*. Better Buildings. https://betterbuildingssolutioncenter.energy.gov/sites/default/files/PP_State%20Partnerships%20w%20Electric%20Coops%20for%20L-I%20Final%20v%202.pdf

167 Examples are Massachusett s and Washington, D.C., as shown in this report: Heeter, J., Xu, K., & Chan, G. (2021, July). *Sharing the sun: Community solar deployment, subscription savings, and energy burden reduction*. National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy21osti/80246.pdf

168 SolSmart & Cadmus Group. (2019). *Solar + storage: A guide for local governments.* https://solsmart.org/wp-content/uploads/SolSmart_SolarPlusStorage_Guide_06-25-2019.pdf.

Working with local government on clean energy

Cooperatives can work with local government to assess permitting options that can attract renewable energy or clean energy developers. Local government can incentivize and control where renewable generation is allowed through zoning and local permitting, leveraging its oversight to influence investment in renewable energy. Some towns have allowed renewable energy development on municipal land and used the associated land lease payments to invest in other infrastructure, such as roads, municipal facilities and schools, to reduce local property taxes.[169]

Providing input into community land use plans can be an ideal starting point for rural electric cooperatives wishing to pursue renewable energy objectives. The plan should identify elements that allow for community priorities around renewable energy objectives. Once a community plan is in place outlining renewable energy objectives, local governments with the authority to regulate zoning should include renewable energy development in zoning codes. Finally, providing a clear and predictable permitting process saves time and money for both contractors and cooperatives.[170]

169 Office of the New York State Comptroller. (2008, April). Green best practices: How local governments can reduce energy cost and minimize impact on global climate change. https://www.osc.state.ny.us/files/local-government/publications/pdf/researchbrief_green.pdf

170 Grow Solar. (2017). Local government solar toolkit: Planning, zoning, and permitting — Wisconsin. https://www.growsolar.org/wp-content/uploads/2017/10/WisconsinSolarToolkitOCT2017.pdf

Useful Resources on Renewable Energy Procurement

Borneo, D., Olinsky-Paul, T., Costello, M., Galbraith, S., Misas, H., & Turchak, N. (2016). *Energy Storage Procurement Guidance Documents for Municipalities*. Sandia National Laboratories. https://www.cesa.org/wp-content/uploads/Energy-Storage-Procurement-Guidance-Document.pdf

National Renewable Energy Laboratory. (2017). *Lessons Learned: Community Solar for Municipal Utilities.* https://www.nrel.gov/docs/fy17osti/67442.pdf

National Rural Electric Cooperative Association. (2016). *The Community Solar Playbook.* Cooperative.com. https://www.cooperative.com/programs-services/bts/Pages/SUNDA/The-Community-Solar-Playbook.aspx

SolSmart. (2019). *Solar + Storage: A Guide for Local Governments.* https://solsmart.org/wp-content/uploads/SolSmart_SolarPlusStorage_Guide_06-25-2019.pdf

Shwisberg, L., Dyson, M., Glazer, G., Linvill, C., & Anderson, M. (2020). *How to Build Clean Energy Portfolios: A Practical Guide to Next-Generation Procurement Practices.* RMI. https://rmi.org/how-to-build-ceps/

U.S. Environmental Protection Agency. (n.d.). *Local Government Solar Project Portal.* https://www.epa.gov/repowertoolbox/local-government-solar-project-portal

U.S. Environmental Protection Agency. (2008, October 21). *Renewable Energy Certificates: Background & Resources.* https://www.epa.gov/sites/default/files/2016-03/documents/background_paper_3.pdf

U.S. Environmental Protection Agency Green Power Partnership. (2015, April 15). *Understanding Renewable Energy Certificates (RECs) and the Green Power Procurement Process.* https://www.epa.gov/sites/default/files/2016-01/documents/webinar_20150415_critchfield.pdf

Vote Solar. (n.d.). *Community Solar Works for Rural Electric Cooperatives.* https://votesolar.org/wp-content/uploads/2020/12/Community-Solar-Works-For-Rural-Electric-Cooperatives-Vote-Solar.pdf

Wilson, J. D., O'Boyle, M., Lehar, R., & Detsky, M. (2020, April). *Making the Most of the Power Plant Market: Best Practices for All-Source Electric Generation Procurement.* Energy Innovation Policy & Technology and Southern Alliance for Clean Energy. https://energyinnovation.org/wp-content/uploads/2020/04/All-Source-Utility-Electricity-Generation-Procurement-Best-Practices.pdf

E. Address Energy Burden With Programs and Policies

Access to electricity is a prerequisite for many aspects of our lives, including refrigeration, heating and cooling and health equipment, as well as internet-based necessities that connect people to employment, education, support services and resources and even health care. In modern-day life, electricity is not optional; it is a necessity, regardless of income. The ratio of the energy bill amount to income is called the energy burden.[171] Energy burdens are typically far higher for low-income people because they have less opportunity to reduce their energy consumption in relation to income and face barriers to utilizing advances in energy efficiency. In other words, when low-income members pay their energy bills, they have much less money left for other necessities than the average member. Additionally, people of color, renters and adults 65 and older have disproportionately high energy burdens compared with members who do not fall into those categories.[172]

The following section discusses policies cooperatives can adopt to help members facing high energy burdens pay their bills. Of course, payment plans and financial mechanisms discussed in this section are not a complete solution to dealing with the problem of energy burden. Targeted energy efficiency, weatherization and distributed energy programs are critical for lowering energy usage and costs in the first place. Taking a multisolution targeted approach that combines energy

171 More than 6% of income spent on energy costs is considered a high energy burden. Drehobl, A., Ross, L., & Ayala, R. (2020, September). *How high are household energy burdens? An assessment of national and metropolitan energy burden across the United States.* American Council for an Energy-Efficient Economy. https://www.aceee.org/sites/default/files/pdfs/u2006.pdf

172 Drehobl et al., 2020.

efficiency, bill assistance and payment plans can be useful, as many utilities are doing. See Section III-A for a discussion of energy efficiency and Section II-D-1-b for a discussion of community solar.

1. Bill Assistance Programs

For people with low income, managing the various costs associated with living, including energy, is a persistent struggle. Although a cooperative's available funds can be limited, there are various ways cooperatives can help reduce the bill that members receive each month, which can afford the member a chance to keep up with the obligations the cooperative sets.

a. Low Income Home Energy Assistance Program

The Low Income Home Energy Assistance Program (LIHEAP) is a federal program that allocates funds for bill assistance on a yearly basis. In 2021, $3.36 billion was allocated among the states, territories and Native American tribes.[173] Each state determines the amount of the benefit, which can be used for winter heating, summer cooling, crisis and weatherization as determined by the state. [174] Cooperatives can and should ensure that their members are included in the state allocation of funds for LIHEAP. This is an existing program that mainly requires outreach on the part of the cooperative.

b. Income-Based Discounts

California utilities with 100,000 customers or more are eligible for the California Alternative Rates for Energy program. Customers who are enrolled receive a 30% to 35% discount on their electric bill and a 20% discount on their natural gas bill based on income eligibility criteria, established at up to 200% of the federal poverty guideline.[175] Cooperatives implement these kinds of discounts themselves, too. Seattle City Light has a program providing a 60% discount retroactive to the date of the application for income-qualifying customers, which shows up as a 2% impact on rates as a whole.[176] Flathead Electric Cooperative in Montana has a basic charge waiver program, under which eligible members receive a credit equal to half the basic charge on their bill each month. In most cases this credit is $11.36 per month.[177] Some programs offer additional support to customers who qualify for LIHEAP. For example, Fort Collins Utilities in Colorado has an income-qualified assistance program that provides a 23% discount on certain elements of service. The program also offers educational resources on energy efficiency and conservation. Households that receive LIHEAP are eligible. North Attleborough Electric Department in Massachusetts offers a discount rate to customers eligible for LIHEAP.[178] Other utilities have multiple discount tiers for different incomes, which have been designed to address energy burden as it occurs in their communities.

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173 U.S. Department of Health & Human Services, Office of Community Services. (n.d.). *Low Income Home Energy Assistance Program (LIHEAP).* https://www.acf.hhs.gov/ocs/low-income-home-energy-assistance-program-liheap. For information on your state's allocation, see Initial FY 2021 funding release of LIHEAP Block Grant Funds to states and territories under the *Continuing Appropriations Act, 2021 and Other Extension Act* (Public Law 116-159) [Table]. https://web.archive.org/web/20210327103312/https://www.acf.hhs.gov/sites/default/files/documents/ocs/corr_liheap_crfundingdclattachment_1_fy2021_110520.pdf

174 U.S. Department of Health and Human Services. (2021, March). *State low-income energy assistance snapshots*. https://web.archive.org/web/20210318001028/https://liheapch.acf.hhs.gov/snapshots.htm. This webpage has additional information on various state or utility programs and some charitable bill assistance options.

175 California Public Utilities Commission. (n.d.). *California Alternate Rates for Energy (CARE).* https://www.cpuc.ca.gov/care/. Also of critical concern are those households whose income is just above the 200% threshold and who also are struggling to make ends meet and pay utility bills. To address this concern, California created the Family Electric Rate Assistance program for households with three or more people in which the total household income is at or below 250% of the federal poverty guideline. These households receive a 12% rate discount. This program highlights the need to create discounts that help more than just the lowest income customers.

176 Seattle City Light. (n.d.). *Residential rates.* City of Seattle. https://www.seattle.gov/city-light/residential-services/billing-information/rates

177 Residential members must qualify as low income according to the guidelines set by LIHEAP (150% of the federal poverty level). Members qualifying for LIHEAP after October 1 will automatically be eligible. Flathead Electric Cooperative. (n.d.). *Low income assistance.* https://www.flatheadelectric.com/account/low-income-assistance/. Flint Energy in Georgia has a similar program that provides a $15.50 discount off the $31 customer charge. Flint Energies. (n.d.). *Residential rates.* https://www.flintenergies.com/residential-rates

177 North Attleborough Electric Department. (2018, October 1). *Rates — tariff — Rate 5, 9-18* [Rate sheet]. http://www.naelectric.com/images/TARRIF-Rate_5_10-1-2018.pdf

c. Usage-Based Discounts

There are also programs that have differentiated rates based on the amount of energy used. For example, the rate for up to 500 kWh per billing period could be discounted. This reduction gives extra incentive for members to reduce usage. This approach pairs well with energy efficiency and weatherization programs, especially those designed to benefit low-income residents.

d. Percentage of Income Payment Plan

The percentage of income payment plan (PIPP) used by investor-owned utilities in Ohio, Pennsylvania and Illinois, as well as a few other jurisdictions, allows income-eligible customers[179] to pay a percentage of their income instead of the full bill every month to keep service connected. Ohio set the percentage of income at 6% each for gas and electric service, for a total of 12%. In Illinois, 3% is used as the percentage of income, which better matches the energy burden for customers who are not categorized as low-income. The unrecovered portion of the low-income customer's bill is recovered from all customers (residential, commercial and industrial) through a rider on monthly bills that is reconciled periodically. The utilities track the unpaid bill amounts as arrears for the customer that they are required to pay back once they are no longer eligible for the program due to increased income. Depending on how long the customer was on PIPP and the size of the monthly bill, these arrearage amounts can prove to be insurmountable obstacles to a sustainable debt-free life. Therefore, a critical component of the PIPP program is the arrearage forgiveness program whereby for every month the customer pays the current bill plus a portion of the arrearage, the utility writes off one month of arrearage. In Ohio, this allows the customer to be debt free after two years.

Table 4. **Traditional percentage of income payment plan mechanism**

Customer monthly income	$1,500
Customer payment (6% of income)	$90
Customer bill [$10 customer charge + (1,000 kWh x $.12/kWh)]	$130
Customer arrearage amount collected through surcharge (bill amount of $130 minus customer payment of $90)	$40

Source: Migden-Ostrander, J. (2021, April 13). *Use Less, Save More: Adding a Conservation Incentive to Percentage of Income Payment Programs*

The significant upside of this program is that it addresses head-on the energy burden and tries to make bills more affordable. The downside is that there is no incentive to conserve, as the utility bill is based on income and not usage. Table 4 demonstrates how the traditional PIPP program works using Ohio's 6% of income.[180]

Under the above scenario, the customer pays $90 of a $130 bill, with the remainder going into the PIPP rider account. Under the conservation incentive, if the customer does not conserve, the customer continues to pay the same amount as under the traditional PIPP mechanism. There is no penalty for not conserving. However, if the customer can reduce energy consumption, the savings from that reduction are split between the customer and the utility. This means customers pay a lower energy bill for the month in which they conserved, and the utility PIPP rider account increases by a lower amount. It creates a win-win scenario as illustrated in Table 5,[181] using the same numbers as in Table 4.

179 Eligibility in Ohio is set at 150% of the federal poverty guideline. The community action agencies that provide multiple services to low-income customers determine a customer's eligibility and certify it to the utility. The utility pays the agencies a small fee for their services.

180 Migden-Ostrander, J. (2021, April 13). *Use less, save more: Adding a conservation incentive to percentage of income payment programs.* Regulatory Assistance Project. https://www.raponline.org/blog/use-less-save-more-adding-a-conservation-incentive-to-percentage-of-income-payment-programs/

181 Migden-Ostrander, 2021.

Table 5. **Percentage of income payment plan mechanism with conservation incentive**

Customer monthly income	$1,500
Customer payment (6% of income)	$90
Customer historical bill [$10 customer charge + (1,000 kWh x $.12/kWh)]	$130
Customer current bill with incentive mechanism [$10 customer charge + (900 kWh x $.12)]	$118
Value of savings due to conservation (1,000 kWh minus 900 kWh = 100 kWh x $.12)	$12
Customer share of savings on bill ($12 x $.50)	$6
Customer total bill ($90 minus $6)	$84
Customer arrearage amount collected through surcharge (bill amount of $118 minus ustomer payment of $84)	$34
Reduction in PIPP collection account ($40 minus $34)	$6

Source: Migden-Ostrander, J. (2021, April 13). *Use Less, Save More: Adding a Conservation Incentive to Percentage of Income Payment Programs*

In the example in Table 4, the customer reduced their monthly consumption by 100 kWh, which reduced the monthly bill by $12. That $12 is shared 50-50 with the customer so that the monthly bill amount goes from $90 to $84. The amount that goes into the PIPP rider account decreases from $40 to $34.

e. State and Local Community Programs

Many states, rural electric cooperatives and community organizations have programs for bill assistance. For example, HeatShare, a program of the Salvation Army, raises private money that elderly, disabled and low-income customers can apply toward heating and air-conditioning bills. When sufficient funds are available, HeatShare grants can cover emergency repairs to energy-related equipment as well as broken windows and doors. Decatur Utilities in Alabama has Operation: Warm, which provides assistance to people who don't qualify for LIHEAP. The community action agency that administers Operation: Warm decides who receives funds based on income and necessary expenses, such as medications. The program runs from December 1 through May 31, during which applicants are eligible for assistance only once.[182] Donation-based programs can be helpful but should not be relied upon as the primary way to address energy burden. Thus, in addition to facilitating charitable donations, the cooperative can also employ some of the other mechanisms discussed in this section that lower the affordability threshold for low-income members through discounted rates and significant energy efficiency, which lowers consumption and thus bills.

f. Extended Payment Plans

An extended payment plan is the key element to avert a disconnection, but it only works if the plan is flexible and realistic in terms of what a member can afford to pay each month. Plans can be designed so the member pays the current bill plus a percentage of the arrearage over a period of months (e.g., the current bill plus 10% of the arrearage) or pays a percentage of the total bill plus the arrearage over a period of months (e.g., 25% of the combined total of the current bill and arrearage, until the arrearage is paid off). Putting a member on a budget bill also helps manage the seasonal highs and lows by having the member pay one-twelfth of the estimated annual usage each month. However, it is important to provide the member with information on actual usage and energy efficiency savings, both to help keep the overall bill low and to avoid the surprise of a high reconciliation payment amount at the end of the year if actual usage exceeds estimated budget usage.

g. Moratoriums, Arrearage Management Plans and Debt Forgiveness

Disconnection moratoriums have been used in the past to avert tragedy due to disconnections during events with significant health impacts, such as cold weather. Due to the COVID-19 pandemic, an unprecedented number of members found themselves with significant unpaid utility balances. Moratoriums on disconnections protected these members who lost their incomes, but arrears still grew. This reinforced the need for better and more flexible arrearage management plans than utilities may have traditionally offered. Some members received automatic grants, but those who saw the most debt relief were members who entered into agreements, similar to extended payment plans, in which they make certain payment amounts per month related to their arrears, and the utility waives a portion

182 Decatur Utilities. (n.d.). Residential — *Bill assistance & energy efficiency.* https://www.decaturutilities.com/bill-assistance-efficiency

of their balances each time. Maine's Versant Power forgives one-twelfth of the outstanding balance, with a cap of $300, per bill, so long as the eligible member meets the payment conditions.[183] For members whose arrearages had grown to insurmountable levels, a significant amount of forgiveness was the only practical way to move forward for both the utility and the member.

2. Late Fees and Reconnection Fees

Late fees are meant to operate as a disincentive for being delinquent on bills. But when a member is delinquent on a bill because he or she does not have the money to pay when it is due — either because the member has not received a paycheck yet or because he or she lives on a fixed income — this is not a viable disincentive. Late fees and reconnection fees levied against low-income members only make payment plans harder to manage and further reduce their means to cover their cost of living. Cooperatives should either eliminate these charges and incorporate them into the general rate that all members pay or waive these charges for low-income members.

3. Disconnection Policy

Electricity is an essential service, and establishing policies to keep members connected is vital. By prioritizing cost-saving access to energy efficiency upgrades and distributed energy for low-income members, employing a combination of the programs listed above and fostering trust through clear communication and robust community engagement, a utility can avoid having members face disconnection in many cases.

If a member does end up facing disconnection, clear communication is vital, and certain protections should be guaranteed. Utilities should provide 30 days' notice for disconnection with ample communications to ensure members are aware of their options and know the utility is there to help them stay connected. Minimal partial payments should be set at a small percentage of the outstanding debt (e.g., 10%) while the member sets up an extended payment plan.

Some members should be protected from disconnection regardless of payment status:

- Those that have a physician's note or medical certificate that states that access to electricity is vital for the health of a household member. These policies exist in all 50 states for all investor-owned utilities,[184] and many cooperatives have adopted similar protections. Allowing for self-certification in emergencies or short-notice situations is recommended.
- Members who are already working to get assistance or take advantage of one of the utility's programs.
- All members during periods of unsafe weather conditions, including when the forecast high temperature is 32 degrees Fahrenheit or below, during a dangerous heat index and when the air quality index is at unhealthy levels.
- All members during public health emergencies, following the precedent of utility shutoff moratoriums during the COVID-19 pandemic,[185] as appropriate considering local circumstances.

Ultimately, utility service is a necessity like food and shelter. Disconnection removes access to that necessity, and all steps should be taken to work and communicate with members to avoid that outcome. Unfortunately, members are often afraid to be proactive in addressing an inability to pay, so it is incumbent for the utility to reach out and clearly communicate options that can help members stay connected. This is not only in the best interests of a member facing disconnection, but it is good for society as a whole and helps the cooperative by mitigating lost revenues from lost service.

183 Versant Power. (n.d.). *Arrearage Management Program (AMP).* https://www.versantpower.com/residential/programs-and-services/arrearage-management-program/

184 For state-specific criteria, see National Consumer Law Center. (2021). *Protecting seriously ill consumers from utility disconnections; Appendix A: Serious illness criteria in each of the 50 states and D.C.* https://www.nclc.org/images/pdf/energy_utility_telecom/consumer_protection_and_regulatory_issues/Serious_Illness_Ap_A.pdf. In some states where the utility commission has capacity to regulate cooperatives these may apply, but individual cooperatives should make sure their policy is not allowing customers to fall through the cracks.

185 For a list of states that issued moratoriums applicable to investor-owned utilities, see National Association of Regulatory Utility Commissioners. (2021, September 9). *Map of disconnection moratoria*. https://www.naruc.org/compilation-of-covid-19-news-resources/map-of-disconnection-moratoria/. Many, but not most, public power entities issued their own moratoriums.

Tracking progress on energy burden with performance incentive metrics

Performance incentive metrics are a useful tool to measure progress on issues that have been identified as public policy priorities. Reporting on metrics is a transparent way to inform the public of a cooperative's actions and progress in meeting those metrics. In Hawaii, for example, performance incentive metrics were established that required the utility to report on:

- Energy burden in terms of the typical and average annual bill as a percentage of average income for low-income households.
- Percent of customers entering into a payment arrangement.
- Percentage of disconnections due to nonpayment.

Puerto Rico has also established performance metrics to address low-income issues. The metrics include the number of:

- Disconnections by customer class.
- Customers enrolled in a payment plan by class.
- Customers defaulting from a payment plan by class.
- Customers completing a payment plan by class.

The latter two are especially important to ensure that the payment plans the utility establishes are flexible, realistic and achievable.[186]

Useful Resources on Energy Burden

Brankovic, S., Lacayo, C., McDonald, S., Spratling, D., Gumerman, E., Madhavan, S., & Cox, M. (2021). *Milwaukee: A Trailblazing City Mitigating Energy Burden.* Greenlink Analytics. https://www.equitymap.org/milwaukee-a-trailblazing-city-mitigating-energy-burden

California Energy Commission. (n.d.). Energy Equity Indicators. https://www.energy.ca.gov/data-reports/tracking-progress/energy-equity-indicators

Energy Equity Project (n.d.). *Resources.* https://energyequityproject.com/resources-2/

Farley, C., Howat, J. Bosco, J. Thakar, N., Wise, J. & Su, J. (2021, November). *Advancing Equity in Utility Regulation.* National Renewable Energy Laboratory. Future Electric Utility Regulation Series Report No. 12 (Schwartz, L., ed.). https://emp.lbl.gov/publications/advancing-equity-utility-regulation

Heeter, J., Xu, K., & Chan, G. (July 2021). S*haring the Sun: Community Solar Deployment, Subscription Savings, and Energy Burden Reduction.* National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy21osti/80246.pdf

National Rural Electric Cooperative Association. (n.d.). *Diversity, Equity and Inclusion (DEI).* https://www.cooperative.com/topics/dei/Pages/default.aspx

Silka, L., Kelemen, S. & Hart, D. (2020. September). *Assessing the Potential Equity Outcomes of Maine's Climate Action Plan: Framework, Analysis and Recommendations* (report for Maine Climate Council). Senator George J. Mitchell Center for Sustainability Solutions, University of Maine. https://climatecouncil.maine.gov/future/sites/maine.gov.future/files/inline-files/MCC_EquityAssessmentReport_201007.pdf

U.S. Department of Energy. (n.d.). *Promoting Energy Justice.* https://www.energy.gov/promoting-energy-justice

U.S. Department of Health and Human Services. (2021, March). *State Low-Income Energy Assistance Snapshots.* https://web.archive.org/web/20210318001028/https://liheapch.acf.hhs.gov/snapshots.htm

186 Puerto Rico Energy Bureau, Case No. NEPR-MI-2019-007, Resolution and Order on May 14, 2019. https://energia.pr.gov/wp-content/uploads/sites/7/2019/06/MI20190007-Resolution-and-Order.pdf

F. Summary: Putting the Pieces Together to Build a Clean and Equitable Energy Future

In this section, we have examined ways cooperatives can implement energy efficiency programs, demand management, electrification and development of clean energy resources to meet member end uses in a manner that takes into account a changing energy landscape and, in particular, a need to address climate targets. These building blocks are best thought of as a suite of tools and resources that a cooperative can use to realize an equitable, clean and cost-effective energy transition. Therefore, the cooperative will need to consider all of these resources and likely deploy all of them to meet cooperative goals. Combinations of resources and policies can result in savings of costs and emissions and create new value streams that may not exist where just one option is deployed.[187]

An example of using a suite of tools, programs and resources can be found in the Oakland Clean Energy Initiative, a program of Pacific Gas and Electric Co. and East Bay Community Energy, which replaced an aging 165-MW fossil-fueled peaking plant and avoided the need for new transmission. The resulting project is a mix of energy efficiency, demand management and photovoltaic distributed generation, electric storage, substation upgrades and line reratings. This strategy saved ratepayers money and reduced air emissions, avoiding transmission and generation solutions totaling $300 million to $600 million with a combination of distributed energy resources costing only $102 million (see Figure 7).[188]

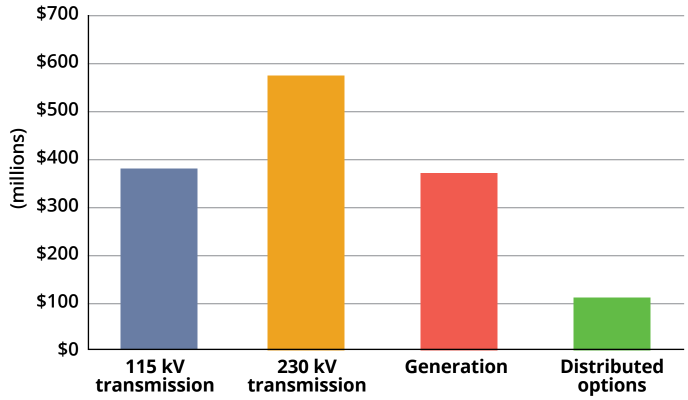
187 Shenot, J., Linvill, C., Dupuy, M., & Brutkoski, D. (2019, August). *Capturing more value from combinations of PV and other distributed energy resources.* Regulatory Assistance Project. https://www.raponline.org/knowledge-center/capturing-more-value-from-combinations-of-pv-and-other-distributed-energy-resources/

188 Linvill et al., 2019. See also East Bay Community Energy. (n.d.). *The East Bay's public power agency.* https://ebce.org/about/; and Pacific Gas & Electric. (2018). *Oakland Clean Energy Initiative (OCEI): 2018 Oakland Clean Energy Initiative RFO.* https://www.pge.com/en_US/for-our-business-partners/energy-supply/electric-rfo/wholesale-electric-power-procurement/2018-oakland-clean-energy-initiative-rfo.page?WT.mc_id=Vanity_rfo-ocei&ctx=large-business

In contrast to the traditional model that relied on large, central generation, a modern energy system can offer many paths to meet member needs that create resilience and flexibility within the system.

The options outlined in this section can offer significant benefits by themselves, but the power of a transition is combining numerous resources to meet members' end needs at least cost to the members and the community and environment supporting those members.

Figure 7. **Replacement alternatives for a gas peaking plant in Oakland, California**



Source: Linvill, C., Lazar, J., Littell, D., Shipley, J., & Farnsworth, D. (2019, October). *Flexibility for the 21st Century Power System*

IV. Good Governance

A. Foundations of Good Governance

The seven cooperative principles adopted by the International Co-operative Alliance provide the essential basis for cooperative governance. The focus of electric cooperatives on the needs of their members, their community and the public interest enables them to provide innovative leadership. Adherence to the seven cooperative principles also helps to ensure that they adhere to good governance.

The Organisation for Economic Co-operation and Development defines governance as the formal and informal arrangements that determine how public decisions are made and how public actions are carried out. The principal elements of good governance include accountability, transparency, efficiency, effectiveness, responsiveness and the rule of law.[189]

These principles are reflected in many of the seven cooperative principles.

The seven cooperative principles are:[190]

1. **Voluntary and open membership.** Membership is open to all people who can reasonably use the cooperative's services and stand willing to accept the responsibilities of membership, regardless of race, religion, gender or economic circumstances.
2. **Democratic member control.** Cooperatives are democratic organizations controlled by their members, who are involved in setting policies and making decisions. Representatives (directors and trustees) are elected among the membership and are accountable to them.
3. **Members' economic participation.** Members contribute equitably to and democratically control the capital of their cooperative. At least part of that capital remains the common property of the cooperative.
4. **Autonomy and independence.** Cooperatives are autonomous, self-help organizations controlled by their members. If they enter into agreements with other organizations, including governments, or raise capital from external sources, they do so on terms that ensure democratic control as well as their unique identity.
5. **Education, training and information.** Education and training for members, elected representatives (directors and trustees), CEOs and employees help them effectively contribute to the development of their cooperatives. Communications about the nature and benefits of cooperatives, particularly with the general public and opinion leaders, help boost cooperative understanding.
6. **Cooperation among cooperatives.** By working together through local, national, regional and international structures, cooperatives improve services, bolster local economies and deal more effectively with social and community needs.
7. **Concern for community.** Cooperatives work for the sustainable development of their communities through policies supported by the membership.

Recognizing the important interplay among these principles, they are discussed below within the following broad categories of good governance:

1. Clear governance and operations structures.
2. Clear notices of meetings.
3. Opportunities to take advantage of member-owner resources and interest.

1. Clear Governance and Operations Structures

Democratic member control, member education and deeply rooted concern for community are core cooperative principles that are best expressed best through clear governance and operations structures. Principles of transparency and public engagement, reflected in cooperative principles number 1, 5 and 7, are usually less clearly spelled out in governance structures but are vital to ensuring robust member participation, understanding and interest. They are explored more fully here.

Electric cooperatives are typically governed by a democratically elected board of directors. This body represents the interests of the cooperative's member-owners as a whole. The board of directors has five principal functions:[191]

1. **Legal.** To ensure the legal right of the cooperative to exist.
2. **Trusteeship.** To act in the best interests of the members by representing the interests of all —

189 Organisation for Economic Co-operation and Development. (2015). *The Policy Framework for Investment (PFI).* http://www.oecd.org/investment/pfi.htm

190 Based upon National Rural Electric Cooperative Association, 2016.

191 Adapted from U.S. Agency for International Development & National Rural Electric Cooperative Association International. (n.d.). *Guides for electric cooperative development and rural electrification*. https://resources.uwcc.wisc.edu/Utilities/Guide_ElectricCooperative.pdf

not any special interests.

3. **Planning.** To establish direction, develop programs and carry out plans based on values that reflect those of the cooperative's member-owners, including realistic goals.
4. **Resources.** To assure the availability of necessary resources, including personnel, financial resources, wholesale power and adequate revenue for the cooperative's size and needs.
5. **Oversight.** Monitor operations to assure compliance with board policies, budgets, member relations, loan covenants, contractual compliance and long-range planning.

As a member-owned entity, transparency is an essential cooperative attribute. Cooperative websites should make information accessible and understandable for members and provide:

- **Statutory mandate.** Generally, states define a cooperative's authority and jurisdiction in statute or code. This statute also generally sets the governance structure, oversight and functions the cooperative must perform.
- **Oversight structure.** Cooperatives should publicize for their member-owners information about their oversight authority, which could be a board of directors, governing committee, government office or division of government. Information should also be included on the identities and terms of the individuals involved in governance, and the roles, responsibilities and duties of the oversight body. Any governing principles for the board of directors should also be publicly available.
- **Cooperative management.** Information on the cooperative manager, chief executive officer or executive management of the cooperative and its major departments should be publicly available, along with contact information, including mail, telephone or internet.
- **Utility financial information.** Cooperative tax structure, including any payments in lieu of taxes to the local government, should be transparent. Unlike with investor-owned utilities, excess revenues stay in the local community and are invested in system improvements and utility reserves, shared with the local government or returned to the member in the form of lower rates or dividends. Cooperatives also generally have access to lower-cost tax-exempt financing and generally have stronger credit ratings than privately owned utilities.[192] General and nonconfidential financial information of the utility should also be publicly accessible, including compensation of top utility executives and federal 990 forms.
- **Public records and reports.** Cooperatives should make public any meeting minutes of the board of directors, oversight committee and significant cooperative meetings and other important information generated by the cooperative.
- **Cooperative goals, resource plans and strategic direction.** Section II discusses setting cooperative goals, strategic direction and resource plans. General and nonconfidential information on cooperative goals, plans and strategic direction should be accessible to the public.
- **Member program information and tariffs**. Section III discusses energy efficiency, weatherization programs and low-income bill assistance programs. It also covers the benefits of member-interactive tariffs, demand management programs and beneficial electrification, including electric vehicles, renewable energy and distributed generation programs. Information on these programs, including eligibility, benefits and program details, should also be readily available for cooperative members.
- **Member participation information.** Information on how member-owners can participate in board meetings, or otherwise obtain information should also be publicly available on cooperative websites to ensure participation and confidence of members.

CORE Electric Cooperative in Colorado is an example of a utility that is transparent in its governance and operations. The roles of the leadership figures are clearly identified, and the cooperative provides annual meeting notices and minutes, annual reports and audit reports. Its website posts cooperative bylaws, board meeting minutes, notices and schedules, as well as information on director elections. The site clearly provides members with information on rates and regulations, renewable energy compliance reports and links to more membership options and opportunities.[193]

192 American Public Power Association, n.d. Electric cooperatives and other entities are also eligible for financing from the Rural Utility Service under the Rural Electrification Act of 1936. See U.S. Department of Agriculture Rural Development. (n.d.). *Electric programs.* https://www.rd.usda.gov/programs-services/electric-programs

The Colorado State Legislature passed legislation in 2021 (HB21-1131) placing new transparency requirements on electric cooperatives; the Virginia legislature is considering similar legislation.

2. Clear Notice of Public Meetings

Rural electric cooperatives are owned by and operated for the citizens they serve and therefore are accountable to their member-owners. This local, independent regulation and governance gives cooperative policymakers greater agility in decision-making and protects the long-term viability of the utility, while permitting member involvement in the process. Member involvement ensures decisions reflect the values of the community,[194] so these benefits will not be realized unless cooperative utility meetings are open, accessible and transparent.

As noted in the section above, information included on the cooperative website and made available to members must include meeting minutes and public records. Information should also be made accessible on the following:

- **Notice of meetings.** Notices of regular and special meetings should be posted in accordance with applicable public records and meeting laws, in addition to member-owners. However, extra effort may be necessary to ensure that a diverse population is able to participate. Meetings during the day may be inaccessible to members of a cooperative. Therefore, cooperative managers should take steps to ensure that the location, timing and language of notices and materials supports the engagement of residents, including those with disabilities. Notices for meetings and information relevant to the topic should be made in the languages spoken in the community and should be posted electronically and where local member-owners usually gather, such as local community centers, libraries, faith organizations, clubs, community organizations, medical facilities, schools or other places where people commonly gather. Cooperatives should also ensure that participants have relevant information on the topic or issue at hand that is written in commonly understandable language.
- **Decisions made in member meetings.** Decisions beyond day-to-day operational decisions should be made in public meetings. This enables cooperative member-owners to participate in and understand utility processes and operations. All meetings should provide an opportunity for comment from member-owners.

3. Opportunities to Utilize Community Resources and Member Interest

As community-owned enterprises, cooperatives have the ability to focus on specific member needs and local priorities, which may include new technologies, environmental concerns or advanced communications.[195] The cooperative governance structure also typically allows greater agility in decision-making and the ability to try new programs and sources of supply and more effective utilization of local resources than investor-owned utilities can muster. In practice, this framework allows member-owners to realize the economic benefits from their cooperative as well, including receiving dividend payments, having a ownership stake in generation, saving money on utility bills, or supporting fossil plant communities through economic transitions. Cooperatives should take steps to realize these unique resources and opportunities. Methods to do this include the following.

a. Member Meetings About Potential New Programs and Resources

Cooperatives have a history of innovation and acting as leaders for their members. Many of those efforts have been incubated in smaller cooperative service areas. Familiar concepts that were first trialed in public power settings include wind generation, landfill-gas-to-energy projects, community solar, energy efficiency programs, electric vehicle infrastructure early adoption and hydroelectricity.[196] Various methods, discussed above, are available to achieve cooperative goals through energy efficiency and clean energy programs and offer a starting point for introducing new programs and resources to cooperatives. Meetings, either general or special, are an excellent venue to educate community members about these programs and new opportunities

193 American Public Power Association, n.d.

194 American Public Power Association, n.d.

195 American Public Power Association, n.d.

196 American Public Power Association. (2021). *Public power: At the forefront of innovation.* https://www.publicpower.org/blog/public-power-forefront-innovation

that cooperatives may pursue. Cooperatives may also be able to utilize their land holdings for renewable energy development opportunities or community solar gardens, or lease land for these purposes (see Section III-D).

b. Direct Member Involvement

In addition to a history of innovation, cooperatives also have a valuable resource in engaged cooperative members. The public can be included in general meetings and through specific member engagements on big cooperative decisions. But active members of the cooperative can also be engaged in other ways, including on specific topics or in outreach to other member-owners.

One important tool for engaging and utilizing cooperative members is a volunteer task force to study specific issues and make recommendations. Some issues before a cooperative may require technical expertise and require the use of paid consultants. Others, particularly at early stages of exploration, may be more suited to community-sourced research. With a clear directional charge, timeline and sufficiently detailed expectations, volunteer task forces made up of interested members of the public can provide analysis of specific issues and make recommendations. Issues particularly suited for this approach could be determined with the input of member-owners, such as researching innovative supply and demand resource options.

Lessons learned on transparency and good governance

Transparency and good governance practices are valuable tools that not only provide better outcomes for the cooperatives and individual members but also help ensure that these cooperatives are free from conflicts of interest and corruption.[197] Sharing information and inviting participation in decision-making processes provides the public a greater understanding about how and why the utility is making certain decisions. Where stakeholders do not agree with the assumptions or data upon which those decisions are based, open processes also provide an avenue to secure additional information or ideas. Without such good governance practices, members and stakeholders may feel that the cooperative's decisions are not well grounded, and without any means by which to review or contest those decisions, they may grow skeptical and distrustful, possibly leading to more costly challenges such as court challenges.

4. Transparent Policymaking Processes

Cooperatives engage in policymaking through the planning processes explored in Section II. These include integrated resource plans, energy efficiency strategies, beneficial electrification plans, renewable portfolios and distribution system plans, among others. Many of these planning processes can benefit from public engagement in some form as further discussed in Section IV-B below. Clear explanation of the specific planning processes, their schedule and the reasons for them will help the public and stakeholders participate. Additionally, current planning documents should be available to the public.

B. Ensuring Public Participation in the Clean Energy Future

Cooperative member-owners increasingly desire energy from clean energy sources. In 2019, 40% of surveyed members wanted renewable generation, up from 25% the prior year.[198] Given the increased member interest in clean energy resources and desire for input into the cooperative resource selection process, a strategy to engage in robust member-owner engagement will enable cooperatives to incorporate members in an effective and efficient manner. The cooperative principles specifically note that cooperatives are "democratic organizations controlled by their members, who actively participate in setting policies and making decisions." In support of this idea, the principles

197 Regulatory capture occurs when a regulatory body that is charged with protecting the public interest instead advances the political or commercial interests of the companies or entities it is supposed to be regulating. For more information on regulatory capture, see such resources as Carpenter, D., & Moss, D., (2014). *Preventing regulatory capture: Special interest influence and how to limit it.* Harvard University. https://www.tobinproject.org/sites/tobinproject.org/files/assets/Introduction%20from%20Preventing%20Regulatory%20Capture.pdf; and Nash, B. J. (2010). Regulatory capture. Richmond Federal Reserve. https://www.richmondfed.org/publications/research/econ_focus/2010/q3/~/media/26F9F09B51BF43BFB25FCCCB4BCFC909.ashx#:~:text=The%20ICC%20is%20now%20regarded,not%20just%20maximum%2C%20shipping%20rates

198 Escalent. (2019, April 22). *Consumer demand for clean energy significantly increases.* https://escalent.co/news/consumer-demand-for-clean-energy-significantly-increases/

recognize the need for education to ensure informed membership, stating: "Education and training for members, elected representatives (directors/trustees), CEOs, and employees help them effectively contribute to the development of their cooperatives. Communications about the nature and benefits of cooperatives, particularly with the general public and opinion leaders, help boost cooperative understanding."[199]

The American Public Power Association provides guidance to utility managers for ensuring public participation. While originally focused on engagement from municipal members, the points below work well for engaging electric cooperative members, including duties to:[200]

1. **Inform.** Provide the public with balanced and objective information to assist them in understanding the problem, alternatives and/or solutions.
2. **Consult.** Obtain public feedback on analysis, alternatives and/or decisions.
3. **Involve.** Work directly with the public throughout the process to ensure public issues and concerns are consistently understood and considered.
4. **Collaborate.** Partner with the public in each aspect of the decision-making, including the development of alternatives and the identification of the preferred solution.
5. **Empower.** Place the final decision-making in the hands of the public.

These steps are important for cooperatives to implement, particularly when facing decisions on building or procuring new resources or setting cooperative climate and conservation goals.

Typical cooperative decisions that warrant specialized effort for member-owners include, but are not limited to:

- Acquiring or procuring new generation.
- Expanding service territory.
- Siting a power plant.
- Adding a substation.
- Restructuring rates or new tariff designs.
- Designing energy efficiency, demand management, distributed generation or electrification programs.
- Revising or expanding low-income programs.
- Starting or revising green power programs.
- Building a transmission line.
- Expanding services beyond power supply.
- Selecting a general manager or other important executive position.
- Setting or revising cooperative goals for the utility.[201]

Member-owner engagement and input is also useful as a regularly recurring strategic planning effort. The following principles of member engagement can help cooperatives gather meaningful input into decisions from a variety of member perspectives.[202]

Inclusive Planning and Preparation

Robust member-owner engagement activities take planning to ensure that the goals of the engagement are accomplished and that the affected members of the cooperative are present. This means that the planning process for the member engagement itself also requires inclusive planning. Inclusive planning ensures that the design, organization and convening of the member engagement process serves the defined cooperative purpose and the needs of the participants. Developing the plan may require input from a number of other sources as well. Such early planning enables cooperatives to equitably incorporate diverse people, voices, ideas and information to lay the groundwork for an optimal outcome.

Transparency

Clear statements of the purpose of the member engagement process, the steps in the process and how the cooperative will incorporate results of the member engagement process will enhance transparency and confidence in the process. Readily available information on where members can find out more details on the topic at issue, the process and contact information is also helpful.

Authentic Intent

The primary purpose of member engagement

199 National Rural Electric Cooperative Association, 2016.

200 American Public Power Association. (2007, April). *Public participation for community-owned utilities.* http://courses.washington.edu/bse190b/data/6a_i.pdf

201 American Public Power Association, 2007. Additional items added to this list.

202 These principles of public engagement are derived from the best practices identified in National Coalition for Dialogue & Discussion. (2010). Resource guide on public engagement. https://www.ncdd.org/uploads/1/3/5/5/135559674/ncdd2010_resource_guide.pdf; and Institute for Local Government. (2015). Principles of local government public engagement. https://www.ca-ilg.org/sites/main/files/file-attachments/principles_of_public_engagement_jan_2015.pdf?1497552327

activities is to solicit views and ideas from cooperative members that will help shape the policy discussion. As noted by the Institute for Local Government, the purpose should not be to persuade members to accept a decision already made.[203] Consequently, the planning and preparation step is important to ensure that diverse viewpoints are presented and heard so that a variety of options may be considered.

Broad, Informed and Accessible Participation

Robust member engagement processes include people and viewpoints that are broadly reflective of the cooperative's population. Extra effort may be necessary to ensure that a diverse population is able to participate. This includes taking steps to ensure that the member engagement process is broadly accessible in terms of location, time and language and that it supports the engagement of residents with disabilities.

Clear and Engaging Public Process

Member-owner engagement processes that utilize discussion formats that are responsive to the needs of cooperative members and encourage full, effective and equitable participation work well. Cooperatives' engagement leaders should be clear about the public engagement process and the steps involved at each stage. They should provide a public record of the organizers, topics, range of views and ideas expressed and outcomes.

Sustained Engagement and Participatory Culture

Utilizing member engagement as a regular part of cooperative governance decisions helps to promote a culture of participation from and with the community. Consequently, participation in utility programs will be more robust, and community value from and appreciation for cooperative services will be elevated.

Useful Resources on Public Engagement

American Public Power Association. (2007). *Public Participation for Community-Owned Utilities: An Implementation Guide.* http://courses.washington.edu/bse190b/data/6a_i.pdf

Institute for Local Government. (2015). *Principles of Local Government Public Engagement.* https://www.ca-ilg.org/sites/main/files/file-attachments/principles_of_public_engagement_jan_2015.pdf?1497552327

National Coalition for Dialogue & Discussion. (2010). *Resource Guide on Public Engagement.* https://www.ncdd.org/uploads/1/3/5/5/135559674/ncdd2010_resource_guide.pdf

National Rural Electric Cooperative Association and National Rural Utilities Cooperative Finance Corporation. (2020, February). *Electric Cooperative Governance Task Force Report.* https://www.documentcloud.org/documents/6561940-Electric-Cooperative-Governance-Task-Force-Report.html

203 Institute for Local Government, 2015.

V. Conclusion

This document presents a great deal of information for cooperative directors and leadership to consider. Ultimately, many of these options may be useful to a cooperative and its member-owners, but they cannot all be implemented at once, and it can be overwhelming to think about the transformation as a whole. Instead, we recommend that cooperative directors identify some first steps to begin the process (many of which echo first steps in a planning process) and then use this document as a reference in developing solutions for their member-owners and their needs.

1. Consider where your cooperative is now. Do you have the information you need to determine what is working well and what needs to be changed? If not, how can you get that information?
2. What are your cooperative's goals and plans for the energy transition now underway?
3. What is an area where momentum, circumstances and political will enable immediate action? What areas may take longer? In other words, consider opportunities for immediate, mid-term and long-term planning.
4. Use the planning process to dig deeper into and develop these first steps and to involve member-owners in planning and possibly implementation.

The utility industry is in the midst of a transformational change. Utilities can now balance demand and supply using more member-centric, modular and distributed resources to create more flexible and resilient systems. Cooperatives are well situated to engage in this transition to realize benefits for their members, the communities they serve and their own operations. By doing so, cooperatives can also align their operations to be consistent with new technologies, member-owner preferences, the changing climate, and at the same time benefit from more efficient operations.

These opportunities require a utility to embrace new approaches and methods of operations. These changes are not always easy, and the pro-active cooperative leadership is critical to ensure that cooperatives position themselves effectively to take advantage of the benefits of this transition. This guide is intended to facilitate initial steps and to provide additional resources for cooperatives wishing to engage further.

We wish you great success in your endeavors and are glad to serve as a resource as your cooperative embarks on the clean energy transition.

We also welcome your feedback on this document. Please share any feedback you have about this resource to education@climatecabinet.org.