CLIMATE CABINET EDUCATION

RAP®

Pace Energy and Climate Center
ELISABETH HAUB SCHOOL OF LAW

RURAL ELECTRIC COOPERATIVES AND THE TRANSITION TO A CLEAN ENERGY FUTURE

A Guide for Cooperative Leaders

Climate Cabinet Education combines data science with policy expertise, local partnerships and cross-state experience to support climate leadership in local governments across the US — working towards a clean energy economy that creates jobs, improves community health, and unlocks local opportunity and leadership.

The Regulatory Assistance Project (RAP)® is an independent, global NGO advancing policy innovation and thought leadership within the energy community. RAP provides clarity, vision and new ideas to decision-makers and the broader energy community, by developing and sharing global best practices tailored to local priorities, acting as a trusted advisor to promote implementation. Our team focuses on the world's four largest power markets, responsible for half of all power generation: China, Europe, India, and the United States. raponline.org

Ken Colburn retired as RAP's director of US programs in 2020. He continues to contribute to the clean energy transition part-time through his LLC, Symbiotic Strategies.

The Pace Energy and Climate Center is a project of the Elisabeth Haub School of Law at Pace Universiy. More than a think tank, the Pace Energy and Climate Center turns ideas into action. We believe thoughtful engagement of government and key stakeholders leads to better public policy. We conduct research and analysis on legal, regulatory and policy matters because thorough, objective analyses are essential to finding solutions to today's complex energy and climate change challenges. We are lawyers, economists, scientists, and energy analysts, committed to achieving real-world progress. For more information, visit energy.pace.edu or contact pecc@law.pace.edu.

Pleiades Strategy works with mission-driven leaders striving to build an open, democratic, climate-safe future rooted in justice and equity. Experienced in policy research, communications, and partnership development, we assist organizations in understanding and shaping the policy landscape to accelerate the clean energy future and realize energy justice. We are deep systems thinkers who relish bringing clarity to complex situations through listening, strong communications, and collaborative building. We operationalize big ideas and thrive when working on multidisciplinary challenges in fast-moving, dynamic environments.

Authors, Researchers and Contributors:

Regulatory Assistance Project (lead author)
- Megan Anderson
- Camille Kadoch
- Ken Colburn
- Ruth Hare
- Donna Brutkoski

Pace Law
- Janine Midgen-Ostrander
- Craig Hart
- Jessica Laird

Climate Cabinet Education
- Emma Fisher
- Nick Arnold
- Ethan Kirkham

Pleiades Strategies
- Frances Sawyer

Acknowledgements:

We would like to acknowledge and thank the many people who reviewed and provided insights for this toolkit, including:
- Erik Hatlestad, CURE
- Gabe Pacyniak, University of New Mexico School of Law
- Matthew Popkin, RMI
- Lauren Shwisberg, RMI
- Katerina Stephan, RMI
- Dr. Leah Stokes, Rewiring America
- Rick Weston, Regulatory Assistance Project
- And many others

Design: Tim Newcomb, Newcomb Studios

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,

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