RURAL ELECTRIFICATION 2.0: THE TRANSITION TO A CLEAN ENERGY ECONOMY

ERIK HATLESTAD, CURE (CLEAN UP THE RIVER ENVIRONMENT MINNESOTA)
KATIE ROCK, CENTER FOR RURAL AFFAIRS
LIZ VEAZEY, WE OWN IT

CENTER *for* RURAL AFFAIRS
CURE
WE OWN IT

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ERIK HATLESTAD

Energy Democracy Organizer,
CURE (Clean Up the River Environment Minnesota)

KATIE ROCK

Policy Associate,
Center for Rural Affairs

LIZ VEAZEY

Network Director,
We Own It

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Erik Hatlestad, CURE (Clean Up the River Environment Minnesota)
Katie Rock, Center for Rural Affairs
Liz Veazey, We Own It

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CURE | 117 South 1st St. | Montevideo, MN 56265
320.269.2984 | info@cureriver.org | cureriver.org

Center for Rural Affairs | 145 Main Street, PO Box 136 | Lyons, NE 68038
402.687.2100 | info@cfra.org | cfra.org

We Own It | 1325 East Dayton St. Suite 100 | Madison, WI 53703 | weown.it

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Report design and editing by Kylie Kai, Rhea Landholm, and Liz Daehnke, of the Center for Rural Affairs.

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I. PURPOSE

This report was produced by an action team made up of members of the RE-AMP Network. The RE-AMP Network consists of more than 130 nonprofits and foundations working across eight Midwestern states on climate change and energy policy with the goal to equitably eliminate greenhouse gas emissions in the Midwest by 2050. By thinking systemically and acting collaboratively as peers, funders, and advocates, we have been working diligently over the last decade toward our shared goal of a carbon free energy future. One of the pathways to reach zero-emission goals and achieve deep decarbonization is to retire all coal plants in the Midwest. This report investigates pathways for coal plant transition at rural electric cooperatives in the Midwest, and we see this as a starting point for conversations about how to best facilitate coal transition at electric cooperatives.

II. INTRODUCTION

Rural America faces a conundrum in the expanding development in renewable energy. Many rural areas in the country are providing the infrastructure for a clean energy future through transmission lines, wind turbines, and utility-scale solar. But, much of the power itself is not used locally in rural communities. Many rural communities are dependent on the energy resource mix of their rural electric cooperative. Nationally, these cooperatives derive 67 percent of their energy from fossil fuels.[1]

The U.S. public is increasingly demanding clean energy to pursue energy independence and reduce greenhouse gas emissions. As the price of renewables has dropped, investments in new clean energy generation have accelerated. Generation from solar and wind is expected to grow by 6 percent and 14 percent respectively in 2019.[2] Maintaining flexibility in energy resources is key to controlling costs as the U.S. shifts to carbon free energy.

For years, electric cooperatives have argued the costs of transitioning to clean energy have been too high for them to move forward. Now, drops in the price per megawatt of wind and solar, even at an unsubsidized level, challenge that claim.[3,4] A recent financial modeling of the energy mix of Colorado showed that transitioning to clean energy is affordable.[5] Another report demonstrated 42 percent of the world's coal capacity is unprofitable, and the U.S. could save $78 billion by closing coal plants, concluding that utilities can build new wind farms at a lower cost than the operation of existing coal plants.[6] One recent analysis calculated that most U.S. coal power plants could be replaced by nearby wind and solar resources, at an immediate savings to customers.[7] A 2018 report from Rocky Mountain Institute shows Tri-State Generation and Transmission Association, which includes 43 electric cooperatives and public power districts in Colorado, Nebraska, New Mexico, and Wyoming, could save at least $600 million by 2030 and reduce their risk by using their coal plants less and investing in more renewable energy.[8]

1 Cash, Cathy. "Co-op Fuel Mix Trends Away From Coal." National Rural Electric Cooperative Association, Feb. 2, 2018, electric.coop/co-op-fuel-mix-trends-away-from-coal/. Accessed April 2019.

2 "Short-Term Energy Outlook." U.S. Energy Information Administration - EIA, Independent Statistics & Analysis, April 9, 2019, eia.gov/outlooks/steo/report/renew_co2.php. Accessed April 2019.

3 "Levelized Cost of Energy and Levelized Cost of Storage 2018." Lazard, Nov. 8, 2018, lazard.com/perspective/levelized-cost-of-energy-and-levelized-cost-of-storage-2018/. Accessed December 2018.

4 Fialka, John. "How Co-ops Are Bringing Solar Power to Rural America." Scientific American, March 22, 2019, scientificamerican.com/article/how-co-ops-are-bringing-solar-power-to-rural-america/?fbclid=IwAR2fBJioEYr8hLL40_opWJbYslvQcrtWH5S1o9IAxYzUWf4Xa8f7s7COmpk. Accessed April 2019.

5 Lehr, Ron. "Analysis Finds Wind Could Replace 6,000 Gigawatt-Hours of Coal in Colorado." GreenTech Media, Aug. 19, 2016, greentechmedia.com/articles/read/wind-could-replace-6000-gigawatt-hours-of-coal-in-colorado#gs.o=JZKE4. Accessed April 2019.

6 Gray, Matt, et al. "Powering down coal." Carbon Tracker Initiative, Nov. 30, 2018, carbontracker.org/wp-content/uploads/2018/12/CTI_Powering_Down_Coal_Report_Nov_2018_4-4.pdf. Accessed March 28, 2018.

7 Gimon, Eric, et al. "The Coal Cost Crossover: Economic Viability of Existing Coal Compared to New Local Wind and Solar Resources." Energy Innovation Policy & Technology LLC, March 2019, energyinnovation.org/wp-content/uploads/2019/03/Coal-Cost-Crossover_Energy-Innovation_VCE_FINAL.pdf. Accessed April 2019.

8 Dyson, Mark, and Alex Engel. "A Low-Cost Energy Future for Western Cooperatives: Emerging Opportunities for Cooperative Electric Utilities to Pursue Clean Energy at a Cost Savings to Their Members." Rocky Mountain Institute, 2018, rmi.org/wp-content/uploads/2018/08/RMI_Low_Cost_Energy_Future_for_Western_Cooperatives_2018.pdf. Accessed April 2019.

The U.S. public is increasingly demanding clean energy to pursue energy independence and reduce greenhouse gas emissions. Maintaining flexibility in energy resources is key to controlling costs as the country shifts to carbon free energy.

Beyond the powerful report conclusions, major utilities are making big commitments to renewable energy. Xcel Energy, an investor-owned and profit-driven utility, recently committed to 100 percent carbon free electricity by 2050.[9] Also in 2018, Great River Energy, a generation and transmission cooperative serving 28 electric distribution cooperatives in Minnesota, committed to 50 percent renewable energy by 2030.[10] In a fact sheet, Great River Energy says, "Renewable energy, particularly wind, is Great River Energy's lowest-cost option for new generation resources… Great River Energy's average wholesale rates will remain flat in 2019 with projected increases below the rate of inflation for the next decade."[11]

In 2016, Kit Carson Electric Cooperative bought themselves out of their Tri-State Generation and Transmission Association contract to transition to 100 percent daytime solar generation, which is projected to save at least $30 million over 10 years.[12] And, other Tri-State Generation and Transmission Association member cooperatives are looking into buying themselves out or increasing the association's 5 percent cap on local renewable energy generation. Cooperatives across the country are locked into similar long-term, 40-plus year contracts with their generation and transmission cooperatives, some allowing only a couple dozen kilowatts or zero local renewable energy generation. These long-term contracts are often driven by outstanding debt for coal plants.

With the rapidly declining cost of clean energy and the rise in the cost of coal and other fossil fuel sources of energy, continuing to operate these plants is becoming increasingly costly. Rural communities beholden to these uneconomic assets held by cooperatives are on the path to higher utility rates, as well as insolvent and unstable utility organizations without a change in direction.

In 1989, the Colorado-Ute Electric Association encountered financial trouble resulting in bankruptcy. Tremendous trust was placed in two very strong-willed managers for the 30 years prior to filing bankruptcy. In hindsight, the situation could have been avoided but for a strong manager/weak board corporate culture. The managers failed to address the growing financial situation, and board leadership failed to adjust its vision of the future

9 "Xcel Energy aims for zero-carbon electricity by 2050." Xcel Energy, Dec. 4, 2018, xcelenergy.com/company/media_room/news_releases/xcel_energy_aims_for_zero-carbon_electricity_by_2050. Accessed January 2019.

10 "Great River Energy sets 50% renewable energy goal for 2030." Great River Energy, June 6, 2018, greatriverenergy.com/great-river-energy-sets-50-renewable-energy-goal-for-2030/. Accessed January 2019.

11 "50% by 2030 renewable energy." Great River Energy, June 5, 2018, greatriverenergy.com/wp-content/uploads/2018/06/50x30_Fact_Sheet.pdf. Accessed April 2019.

12 Stewart, Donna. "The Rising Tide of Renewable Energy." San Juan Citizens Alliance, May 2, 2017, sanjuancitizens.org/climate-change/rising-tide-renewable-energy. Accessed April 2019.

to emerging realities. Once the financial troubles grew to a crisis, creditors and regulators were unsympathetic to Colorado-Ute Electric Association's pleas for help.[13] This bankruptcy provides a lesson and opportunity for cooperative board members to ensure they are asking the right questions, staying grounded in the latest energy technology and market trends, and standing up for member-owner interests. This kind of forward-looking leadership will be required to usher in an equitable coal transition at electric cooperatives that takes workers, communities, and member-owners into account.

Rural communities could better pursue a clean energy future if current debt on existing coal plant infrastructure could be eliminated in exchange for a requirement to invest in clean energy and energy efficiency. Such a deal would incentivize the retirement of existing coal plants. These investments would help rural communities transition to energy independence and clean energy, but it could also provide cost savings through energy efficiency upgrades.

Instead, incoming cash from ratepayers is being used to pay off debts from old, uneconomic coal plant infrastructure. By being relieved of these debt-laden assets, cooperatives would have more resources to invest in clean energy, although there is a need to ensure that member-owners see economic benefits of these policies. In this report, we describe successful efforts and a path forward to expanding such efforts.

III. HISTORY

Prior to the 1930s, only 3 percent of farmsteads had electricity.[14] Utility companies were reluctant to extend their coverage to rural areas because they viewed them as less profitable than other opportunities. Many have also suggested that the city-based companies thought farmers and rural people too simple to use electricity. The Edison Electric Institute stated in 1935, "Only in the imagination… does there exist any widespread demand for electricity on the farm or any general willingness, or ability, to pay for it."[15] While some rural communities came together on their own and formed electric cooperatives, rural electrification faced both opposition from private utility companies as well as the sheer cost of providing electric service to rural areas. It wasn't until the Rural Electrification Act of 1936, a New Deal program, that these barriers were surpassed.

President Franklin Delano Roosevelt created the Rural Electrification Administration, which is known today as the Rural Utility Service, under the Public Works Administration which focused on work relief. Unhappy with slow progress, the Rural Electrification Act shifted the focus of this program to administering federal loans to member-owned rural electric cooperatives, resulting in their formation across the country. By 1959, 90 percent of farmsteads had electricity serviced through rural electric cooperatives.

During the 1960s and 1970s, rural electric cooperatives were incentivized by the federal government's offer of low-interest loans to purchase resources to form generation and transmission cooperatives. These cooperatives were tasked with the generation of electricity and the transmission of it to their member cooperatives. To accomplish this, cooperatives took on massive amounts of new debt to finance high-voltage transmission lines and many coal generation plants (although some invested in nuclear plants). In one case, Basin Electric Power Cooperative had a loan for coal infrastructure which took up the entire Rural Utility Service budget for a year.[16] This initial buildout left the nation's cooperatives deeply in debt and reliant on coal for decades. At the time, this was done with the interest of delivering electricity at the lowest cost possible. Much has changed in the utility space since. Today, relying on coal powered generation is no longer the lowest cost option.

IV. PROBLEM

As prices for new wind and solar generation have dropped, a new reality has emerged. Many existing coal generators are operating at a higher cost than cleaner renewable sources of energy, even without including the external costs tied to pollution. But, these generators remain in place due to the finan-

13 Palmieri, Victor H. "Better Answers than Bankruptcy." Management Quarterly, 00251860, Winter 91/92, Vol. 32, Issue 4.

14 Anderson, Paul E. "Sam Rayburn and Rural Electrification," East Texas History, easttexashistory.org/items/show/73. Accessed January 2019.

15 Doyle, Jack, and Vic Reinemer. "Lines Across the Land: Rural Electric Cooperative: The Changing Politics of Energy in Rural America." Environmental Policy Institute, Rural Land & Energy Project, Washington, D.C., 1979.

16 Ibid.

cial reality of utilities, and the culture and inertia of enormous past investments in fossil fuels. To recognize the need to replace equity investments in power plants, depreciation schedules are created termed "plant in service" accounts. Over time, the value of these existing plants is reduced through depreciation, in recognition of the need to replace them.

However, depreciation schedules rarely, if ever, run down to a zero balance. Investor-owned utilities earn returns on the remaining equity of undepreciated balances in these accounts. And, investor-owned utilities are incentivized to build these accounts by continuing to invest in in-service plants to keep them running, repair damages, and for other purposes such as upgrades and pollution control equipment. Rural electric cooperatives differ in that the equity of any capital assets reverts back to cooperative members, so any financial incentive structures are tied to management and membership.

Rural electric cooperatives are monopolies in their service territories like most other electric utilities in the U.S. However, they are set up as nonprofit cooperatives with a mission to serve their members and not to make profit for shareholders. Cooperatives commit to seven principles including democratic member control, concern for community, as well as values of equity, equality, solidarity, social responsibility, and more.[17] Because rural electric cooperatives are seen as member-governed, they have little to no regulation in many states; these and all other electric utilities are required to meet federal standards. Many rural electric cooperatives do not have to submit integrated resource plans, follow state renewable portfolio or energy efficiency standards, nor have their rates approved by a state utilities board.[18]

Although rural electric cooperatives are technically set up with member governance and a mission to serve their members, many act like investor-owned utilities which are focused on selling more power and bringing in more revenue. However, some are showing leadership on serving their members and making investments in energy efficiency and renewable energy including large generation and transmission cooperatives like Great River Energy, with a commitment to 50 percent renewable energy by 2030, and Central Iowa Power Cooperative, which is currently 60 percent carbon free. Distribution cooperatives have made commitments as well, including: Farmers Electric Cooperative in Iowa that is 20 percent solar, La Plata Electric Association in Colorado that committed to cut carbon pollution 50 percent by 2030, Holy Cross Energy in Colorado that committed to 70 percent renewable by 2030, and Kit Carson Electric Cooperative in New Mexico that will be 100 percent daytime solar powered. Ouachita Electric Cooperative in Arkansas is another with a range of energy efficiency and solar programs as well as a focus on serving members and not on selling more power. See Table 1 on page 5.[19,20]

While some cooperatives and leaders are pushing the envelope in transitioning to clean energy, many major cooperatives are wedded to their existing coal plants and promote pro-coal dogma. As recently as 2014, cooperatives helped turn out 1.2 million comments against the Clean Power Plan. For example, Basin Electric Power Cooperative, which serves 141 cooperatives in the West, noted in their 2016 Annual Report, "We faced challenges like the Clean Power Plan… We put a lot of effort into fighting the rule legally, legislatively, and in the states we serve."[21] Local cooperative newsletters pump pro-coal and anti-clean energy messages into the homes of member owners, and pro-coal cooperative staff have the ears of state and national policymakers across the country. This fervor is seemingly driven by the billions of dollars tied up in existing coal plants and the debt service on those pieces of infrastructure. In 2019, coal plants are increasingly uneconomic to operate, yet many cooperatives lag in defining plans to retire existing coal plants.

17 "Cooperative identity, values & principles." International Co-operative Alliance, 2018, ica.coop/en/cooperatives/cooperative-identity. Accessed January 2019.

18 As of 2015, only 16 states had some sort of state regulation of electric cooperatives. A map from the Institute for Local Self-Reliance can be referenced at ilsr.org/wp-content/uploads/2016/03/state-regulation-of-electric-cooperatives-2015-768x576.jpg from the report Remembering the Electric Cooperative, ilsr.org/report-remembering-the-electric-cooperative/, using data from U.S. Government Accountability Office, accessible at gao.gov/assets/670/669881.pdf. Accessed April 2019.

19 Shinn, Mary. "Electric co-op sets ambitious goal to cut carbon by 50 percent." The Durango Herald, Jan. 20, 2019, durangoherald.com/articles/259634. Accessed April 2019.

20 Hayle, Clarisse. "Revitalizing Ouachita: How One Electric Co-op is Moving Forward." Appalachian Voices, Front Porch Blog, 2018, appvoices.org/2018/11/15/revitalizing-ouachita-how-one-electric-co-op-is-moving-forward/. Accessed April 2019.

21 "Basin Electric Power Cooperative: Strong & United: 2016 Annual Report." Basin Electric Power Cooperative, July 26, 2017, issuu.com/basin_today/docs/annual_report_2016_web. Accessed April 2019.

TABLE 1. ELECTRIC COOPERATIVE LEADERSHIP ON CLEAN ENERGY

Co-op name and type	State	Commitments/outcomes	More
Kit Carson Electric Cooperative (distribution cooperative)	New Mexico	100 percent daytime solar powered by 2022	Projected to save members at least $30 million and increase local economic development. They left Tri-State Generation and Transmission Association to do this.
Farmers Electric Cooperative (distribution cooperative)	Iowa	20 percent solar powered now	They are not part of a generation and transmission cooperative.
Central Iowa Power Cooperative (generation and transmission cooperative)	Iowa	60 percent carbon free now	Announced 100 megawatt solar project in December 2018. It would be largest in Iowa.
Great River Energy (generation and transmission cooperative)	Minnesota	50 percent renewable energy by 2030	
Ouachita Electric Cooperative (distribution cooperative)	Arkansas	On-bill energy efficiency program that is increasing access to efficiency, on-bill program for rooftop solar launching soon, community solar, and broadband (which facilitates smart grid technology and local economic development)	"It seems counterproductive; why would any utility supplier want to sell energy at a lower price and decrease their profit? Well, we're in the business of serving our members, not selling electricity." – Mark Cayce, CEO of Ouachita Electric Cooperative
La Plata Electric Association (distribution cooperative)	Colorado	Cut carbon 50 percent from 2018 by 2030	Some board members say the cooperative may be able to do this as a member of Tri-State Generation and Transmission Association.
Holy Cross Energy (distribution cooperative)	Colorado	70 percent renewable energy by 2030, but expect to meet the goal by 2021	They are not part of a generation and transmission cooperative. They made a deal with Guzman Energy to trade their share of a coal plant for more renewable energy.

The entire electric cooperative system is under duress due to the high levels of debt, reliance on uneconomic coal, and the demand for clean energy motivated by economic security. Public and economic pressure are demanding a rapid transition to clean energy. Results of a national survey completed in 2018 for Edison Electric Institute indicate 74 percent of those polled think we should use solar "as much as possible" and 70 percent agree that "in the near future, we should produce 100 percent of our electricity from renewable energy sources such as solar and wind." Fifty-one percent said it was a pretty good or very good idea to go 100 percent renewable, even if it led to a 30 percent bill increase.[22] There's also an annual national survey of electric cooperative members showing that half of members are interested in learning about the costs of renewable energy, half of members feel their cooperative is committed to using renewable energy sources, and more than two-thirds of members are interested in community solar.[23]

The transition to clean energy has been challenging. Delays have resulted from a multitude of different factors. Despite the massive decline in the price of wind and solar enhancing their price competitiveness, cooperatives have been particularly slow to adopt clean energy generation. These challenges are spelling disaster for the future of rural communities, not only in transitioning to clean energy sources but in driving conflict in the siting and routing of clean energy infrastructure projects for investor-owned utilities. Rural electric cooperative customers are aware the clean energy infrastructure they carry on private land does not necessarily make their direct energy consumption cleaner.

22 Roberts, David. "Utilities have a problem: the public wants 100% renewable energy, and quick." Vox, Oct. 11, 2018, vox.com/energy-and-environment/2018/9/14/17853884/utilities-renewable-energy-100-percent-public-opinion. Accessed April 2019.

23 "Greatest Hits: The National Survey on the Cooperative Difference 2004-2018—14 years." Touchstone Energy Cooperatives, 2018, tseservices2.cms.coopwebbuilder2.com/sites/tseservices2/files/PDF/Retrospect%20Greatest%20Hits.pdf. Accessed April 2019.

First, rural communities will be among the hardest hit by the impacts of climate change. Rural communities, where livelihoods are more tightly interconnected with the land, are particularly vulnerable to the agricultural volatility related to climate change.[24] The most recent National Climate Assessment, published in 2018, identified four key concerns for rural communities regarding climate change. See Figure 1 on page 7.[25]

Second, rural communities' utility rates will continue to rise as coal becomes more expensive. Approximately 41 percent of households in rural areas have incomes below 200 percent of the federal poverty level, which is $51,500 for a family of four in 2019. Nationally, rural low-income households spend 9 percent of their household income on energy bills, almost three times the urban average of 3.1 percent.[26] With rural economies already struggling, higher utility rates will continue to damage the economic viability of these areas and push energy intensive businesses out of the service territories of rural electric cooperatives.

Last, rural communities rural communities often host the infrastructure for large clean energy projects and high-voltage transmission lines, but they have limited say in using clean energy from those sources themselves. From an equity perspective, rural communities deserve to invest in and benefit from clean energy just like their metropolitan neighbors. In the last five years, corporations have invested in 15.4 gigawatts of clean energy projects to meet their sustainability goals.[27] These investments have transformed the rural landscape through the siting and routing of numerous projects resulting in millions in new local tax revenues.[28] However, these private infrastructure investments have not necessarily resulted in more clean energy generation through publicly-owned municipal utilities and rural electric cooperatives. Focusing narratives on how metropolitan areas are shifting their consumption to include more clean energy denies the effects and politics of this regional growth.[29] Rural areas have always acted as the source for new demands on natural resources. A holistic, regional approach to our shifting demands for clean electricity is more appropriate.

Being tied to long-term debt service on coal plants prevents many cooperatives from making new clean energy investments. The lingering presence of some coal plants identified as stranded assets presents an economic justice issue for rural communities, especially in regard to how coal ash is handled. The U.S. has more than 1,400 coal ash dump sites with hundreds of contaminated sites and spills as tracked by Earthjustice.[30]

In early August 2018, we submitted a Freedom of Information Act Request to the Rural Utility Service section of the U.S. Department of Agriculture (USDA) to access more specific data on government held coal debt at electric cooperatives. In December 2018, we received a fee waiver and commitment from USDA that they would provide us the information we requested. However, due partly to the 35-day government shutdown from late December 2018 to late January 2019, we did not receive the information until April 2019. The data we received included information from the Financial & Operating Report: Electric Distribution (formerly Form 7) and the Financial & Operating Report: Electric Power Supply (formerly Form 12). The data notes utility plant assets, but it does not differentiate between coal plants and other generation assets. In a precursory review of the data, we found there were 53 generation and transmission cooperatives with Rural Utility Service loans approved of almost $3.4 billion in 2010 with a total of $41.8 billion in loan guarantees, and 47 generation and transmission cooperatives in

24 "Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States." U.S. Global Change Research Program, Washington, D.C., 2018, nca2018.globalchange.gov/downloads/NCA4_Report-in-Brief.pdf. Accessed April 2019.

25 Ibid.

26 Ross, Lauren, et al. "The High Cost of Energy in Rural America: Household Energy Burdens and Opportunities for Energy Efficiency." American Council for an Energy-Efficient Economy, July 18, 2018, aceee.org/research-report/u1806. Accessed December 2018.

27 "Corporate Renewable Deals: 2014-2018 YTD." Rocky Mountain Institute: Business Renewables Center, Dec. 14, 2018, businessrenewables.org/corporate-transactions/. Accessed January 2019.

28 Collins, Timothy, and Johnathan Hladik. "Generation and Delivery: The Economic Impact of Transmission Infrastructure in Rural Counties." Center for Rural Affairs, October 2017, cfra.org/GenerationAndDelivery. Accessed April 2019.

29 Needham, Andrew. "Power Lines: Phoenix and the Making of the Modern Southwest." Oxford, Princeton University Press, 2014.

30 "Map Feature: Coal Ash Contaminated Sites & Hazard Dams." Earthjustice, March 4, 2015, earthjustice.org/features/map-coal-ash. Accessed January 2019.

FIGURE 1. KEY CLIMATE CHANGE CONCERNS FOR RURAL COMMUNITIES

Message 1: Reduced agricultural productivity

Food and forage production will decline in regions experiencing increased frequency and duration of drought. **Shifting precipitation patterns, when associated with high temperatures, will intensify wildfires that reduce forage on rangelands, accelerate the depletion of water supplies for irrigation, and expand the distribution and incidence of pests and diseases for crops and livestock.** Modern breeding approaches and the use of novel genes from crop wild relatives are being employed to develop higher-yielding, stress-tolerant crops.

Message 2: Degradation of soil and water resources

The degradation of critical soil and water resources will expand as extreme precipitation events increase across our agricultural landscape. **Sustainable crop production is threatened by excessive runoff, leaching, and flooding, which results in soil erosion, degraded water quality in lakes and streams, and damage to rural community infrastructure.** Management practices to restore soil structure and the hydrologic function of landscapes are essential for improving resilience to these challenges.

Message 3: Health challenges to human populations and livestock

Challenges to human and livestock health are growing due to the increased frequency and intensity of high temperature extremes. **Extreme heat conditions contribute to heat exhaustion, heatstroke, and heart attacks in humans. Heat stress in livestock results in large economic losses for producers.** Expanded health services in rural areas, heat-tolerant livestock, and improved design of confined animal housing are all important advances to minimize these challenges.

Message 4: Vulnerability and adaptive capacity of rural communities

Residents in rural communities often have limited capacity to respond to climate change impacts, due to poverty and limitations in community resources. **Communication, transportation, water, and sanitary infrastructure are vulnerable to disruption from climate stressors.** Achieving social resilience to these challenges would require increases in local capacity to make adaptive improvements in shared community resources.

2017 with the total loan amount redacted. We plan on drafting a follow-up report to make this information available in late 2019.

Of the $41.8 billion in loan guarantees in 2010, we estimate that approximately one-fifth, or $8.4 billion, is directly tied up with coal infrastructure.[31] Further complicating the matter is an unknown amount of debt held by cooperative financiers such as CoBank and the National Rural Utilities Cooperative Finance Corporation as well as other private financiers, such as Goldman Sachs Group.

Looking across the country, cooperatives and their members are already experiencing the impacts of uneconomic coal generation assets. Basin Electric Power Cooperative, which serves 141 cooperatives across a large swath of the western U.S. from Minnesota to New Mexico, is a prime example.

Basin Electric Power Cooperative, which is among the top five most carbon intensive utilities in the U.S., and generates more than 44 percent of its electricity from coal, has begun to feel the pressure of stranded assets and outstanding debt. The coal reliant generation and transmission cooperative, which holds approximately $5 billion in debt, started to show cracks in 2016. According to Basin Electric Power Cooperative's 2016 Annual Report:

> "Fitch Ratings downgraded its A+ rating to an A with an outlook change from stable to negative. Though Standard & Poor's affirmed its A rating of Basin Electric, the agency also changed its outlook for the cooperative from stable to negative. While Moody's gave Basin Electric a stable outlook, they downgraded the cooperative two notches, from A-1 to A-3."[32]

The same year, Basin Electric Power Cooperative significantly increased wholesale power rates. One member, Northwest Iowa Power Cooperative claimed the 12 percent increase is the "biggest hurdle facing Northwest Iowa Power Cooperative."[33] This also seems to be a considerable hurdle for Basin Electric Power Cooperative itself. Since summer 2018, the cooperative laid off approximately 300 employees from its Bismarck, North Dakota, headquarters.[34] Some cooperatives in the Basin Energy Power Cooperative have ultimately chosen to sever ties with the generation and transmission cooperative and pursued more affordable, clean energy options.

Kit Carson Electric Cooperative, in New Mexico, predicts that leaving Basin Electric Power Cooperative affiliate Tri-State Generation and Transmission Association will save their member-owners $70 million.[35] Specifically, Kit Carson Electric Cooperative saw increases of 106 percent in their rates from Tri-State Generation and Transmission Association starting at $39.06 per megawatt hour in 2000 and increasing to $79.17 per megawatt hour in 2016. Kit Carson Electric Cooperative locked in rates in their new contract for 10 years, averaging $75 per megawatt hour from 2019 to 2022 to pay off the $37 million exit fee, then dropping to $47 per megawatt hour until 2026 including much greater local economic development benefits than the Tri-State Generation and Transmission Association contract.[36] "Tri-State… has shown limited interest in developing a truly post-coal generation model. While it has invested some in renewables, it still gets most of its power from coal-fired generation, [and] is heavily invested in coal plants and coal mines—with significant ownership stakes at plants and mines in Arizona, Colorado, and Wyoming."[37]

31 This is a rough calculation estimating half of the debt is for transmission and nongeneration infrastructure, and half of it is for generation assets, with coal averaging 40 percent of electric cooperative generation nationally, which would put it at 20 percent of the debt.

32 "Basin Electric Power Cooperative: Strong & United: 2016 Annual Report." Basin Electric Power Cooperative, June 26, 2017, issuu.com/basin_today/docs/annual_report_2016_web. Accessed April 2019.

33 "Teamwork Works: Northwest Iowa Power Cooperative: 2016 Annual Report." Northwest Iowa Power Cooperative, 2017, s3.amazonaws.com/coop-nipco-cdn/content/2016-NIPCO-Annual-Report.pdf?mtime=20170413203343. Accessed April 2019.

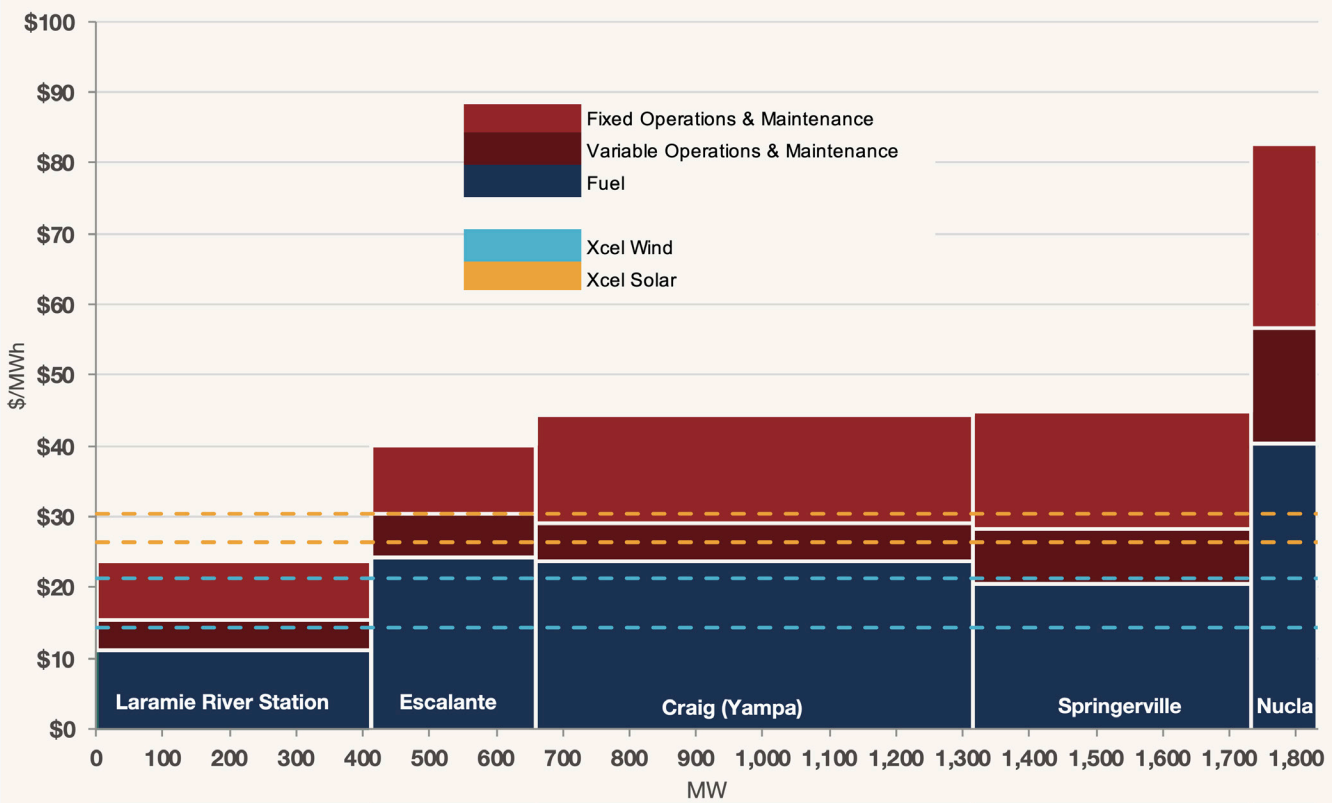
34 "Hundreds of Basin Electric Power Employees Taking Buyouts." U.S. News & World Report, Aug. 6, 2018, usnews.com/news/best-states/north-dakota/articles/2018-08-06/hundreds-of-basin-electric-power-employees-taking-buyouts. Accessed March 2019.

35 Jaffe, Mark. "Fight over prices, renewable energy spurs second rural cooperative to leave Tri-State Generation." The Colorado Sun, Oct. 18, 2018, coloradosun.com/2018/10/18/dmea-breakup-tri-state-renewable/. Accessed April 2019.

36 Cates, Karl, and Seth Feaster. "Case Study: How Kit Carson Electric Engineered a Cost-Effective Coal Exit." Institute for Energy Economics and Financial Analysis, April 2019, ieefa.org/wp-content/uploads/2019/04/How-Kit-Carson-Electric-Engineered-a-Cost-Effective-Coal-Exit_April-2019.pdf. Accessed April 2019.

37 Ibid.

FIGURE 2. TRI-STATE'S COAL FLEET VERSUS REGIONAL RENEWABLE ENERGY BENCHMARKS



Existing generation costs are assumed to be constant in real terms. Comparator lines for Xcel bids are for fixed-price contracts with 2023 in-service dates, and include estimated transmission and other integration costs. Copyright 2018, Rocky Mountain Institute. From "A Low-Cost Energy Future for Western Cooperatives." Used with permission.

In Figure 2, Rocky Mountain Institute shows the costs of continuing to operate many of Tri-State Generation and Transmission Association's coal plants are higher than recent utility-scale renewable energy bids in Colorado.[38] With other cooperatives likely to follow Kit Carson Electric Cooperative's lead, the entire generation and transmission cooperative system becomes weaker, and the financial situation of remaining members becomes that much more precarious. Another Tri-State Generation and Transmission Association member, La Plata Electric Association, in Colorado, recently raised concerns about the specter of increasing rates because Tri-State Generation and Transmission Association is not paying down some of its debt and there is "a likely decrease in the value of Tri-State's coal fleet."[39] According to a Standard & Poor's 2016 report on Tri-State Generation and Transmission Association, "The utility's 2014 refinancing transactions replaced Rural Utility Service debt with capital market debt, extended portions of existing debt balances, and thereby reduced debt service for about 10 years. Transactions in 2010 and 2014 also deferred about 30 percent of principal to later years through the use of bullet maturities that postpone $250 million of principal repayment to 2024, $500 million to 2040, and $250 million to 2044. Total debt at Dec. 31, 2015, was nearly $3.4 billion."[40]

38 Dyson, Mark, and Alex Engel. "A Low-Cost Energy Future for Western Cooperatives: Emerging Opportunities for Cooperative Electric Utilities to Pursue Clean Energy at a Cost Savings to Their Members." Rocky Mountain Institute, 2018, rmi.org/wp-content/uploads/2018/08/RMI_Low_Cost_Energy_Future_for_Western_Cooperatives_2018.pdf. Accessed April 2019.

39 Smyth, Joe. "La Plata Electric concerned Tri-State debt will lead to higher rates." Clean Cooperative, Feb. 22, 2019, cleancooperative.com/news/la-plata-electric-concerned-tri-state-debt-will-lead-to-higher-rates. Accessed April 2019.

40 Dyson, Mark, and Alex Engel. "A Low-Cost Energy Future for Western Cooperatives: Emerging Opportunities for Cooperative Electric Utilities to Pursue Clean Energy at a Cost Savings to Their Members." Rocky Mountain Institute, 2018, rmi.org/wp-content/uploads/2018/08/RMI_Low_Cost_Energy_Future_for_Western_Cooperatives_2018.pdf. Accessed April 2019.

With the rapidly declining cost of clean energy and the rise in the cost of coal and other fossil fuel sources of energy, continuing to operate these plants is becoming increasingly uneconomical. Rural communities are on the path to higher utility rates without a change in direction.

V. BENEFITS

There are multiple benefits on the macro and micro levels resulting from relieving rural electric cooperatives from their fossil fuel debt and positioning these utilities and the rural communities they serve to a clean energy economy.

The need to shift to a zero-carbon energy future is dire. In its latest report, the Intergovernmental Panel on Climate Change presented an ultimatum and timeline for this shift, saying drastic action is needed between now and 2030 to limit warming under 1.5 degrees Celsius.[41,42] Providing an economic pathway for cooperatives to retire all remaining coal plants would push the country and the world closer toward our carbon reduction goals to avoid a more than 2 degree Celsius rise in global temperatures. Beyond curbing carbon emissions, the restructuring of coal debt to create the conditions favorable to total cooperative coal retirement would have a myriad of economic benefits across rural America.

With the closure of old, expensive coal plants and the expansion of rural electric cooperatives' wind and solar capacity, significant economic development would be accomplished across rural America. Already, new wind and solar installations are bringing new sources of property tax revenue into rural counties and school districts.[43] Along with increased property taxes are lease payments to farmers and landowners where the wind and solar installations are sited. Especially in a time with mounting economic pressures in the current farm economy, new revenue streams for farmers are vital. Renewable energy offers a path forward. The 2017 U.S. Census of Agriculture indicated the number of farms producing renewable energy, 133,176, more than doubled the total number in the 2012 report.

Second, through trading high cost fossil fuels for increased investments in energy efficiency and lower cost generation capacity, cooperative members and ratepayers can expect lower and more stable utility costs. Lower utility bills would mean significant economic relief for many low-income rural families. Further, it would keep rural businesses more competitive and offer an appeal for new business development.

There is a huge potential for member savings, but policy proposals will need to prioritize lowering burdens through energy efficiency investments and

41 An Intergovernmental Panel on Climate Change special report on the impacts of global warming of 1.5°C above preindustrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

42 "Global warming of 1.5°C." The Intergovernmental Panel on Climate Change, World Meteorological Organization, Geneva, Switzerland, 32 pp.

43 Nelsen, Lu. "Fact Sheet: Nebraska Wind Energy Tax Revenue." Center for Rural Affairs, Dec. 11, 2018, cfra.org/publications/WindEnergyTaxRevenueNE. Accessed April 2019.

ensuring low-income access to energy efficiency to address equity. Currently, as electric cooperative demand has leveled off, we are hearing that some have reduced their energy efficiency offerings as they worry about decreased sales. Across the U.S., investor-owned utilities are leading a push to undo energy efficiency requirements.[44] However, some electric cooperatives like Ouachita Electric Cooperative and Roanoke Electric Cooperative are focused on serving their members and not just selling more electricity. Historically, efficiency programs for higher-income households have a lower average cost per kilowatt hour saved than those for lower-income households, partially due to the need to invest in health and safety upgrades to make low-income households ready to accept efficiency upgrades.[45,46,47,48] While low-income efficiency may be more expensive, it "offers real and viable opportunities to realize multiple social, economic, and health co-benefits—that is, energy efficiency can result in health and economic improvements for families, as well as community revitalization."[49] Energy efficiency programs that ensure access for low-income member-owners can demonstrate electric cooperatives' commitment to their principles and values, increase member satisfaction, and enhance how the cooperative is perceived in the community. The programs provide monetary benefits as well, by reducing peak power demand and administrative costs associated with chronically late bill payers, in conjunction with reduced energy burden for cooperative members.

Finally, through a larger buildout of clean energy would come a more distributed energy system as wind, solar, and storage take up more space than a centralized coal plant, and can be located closer to electricity demand. This more distributed system could reduce transmission losses and pave the way for national grid modernization. This upgrade in infrastructure could facilitate more energy efficiency, demand reduction, reliable service, and energy security.

VI. POTENTIAL SOLUTIONS

A. FEDERAL REGULATORY ACTION

The Rural Utility Service, as the USDA administrator for electricity programs, has the ability to take certain regulatory action on rural electric cooperatives. The Rural Utility Service has done this in the interest of cooperative member-owners in the past.

In the mid-1990s, a generation and transmission cooperative of 12 distribution electric cooperatives in Louisiana, Cajun Electric Power Cooperative, went bankrupt due mainly to an investment in nuclear generation that they were not allowed to recover through their rates. "U.S. District Judge Frank Polozola has settled 22 lawsuits involving bankrupt Cajun Electric Power Cooperative and Gulf States Utilities Company over the River Bend Nuclear Generating Station. The settlement turns Cajun's 30 percent share of River Bend over to the Rural Utilities Service, which holds liens on most of Cajun's assets."[50] In the case of bankruptcy, Rural Utilities Service traded bad debt for ownership of the assets. Today, Rural Utilities Service could do some-

44 Examples include the rollback of energy efficiency standards in Indiana in 2014, Iowa in 2018, and proposed legislation in 2019 in Ohio. For more, see: Walton, Robert. "Indiana cost consumers $140M by nixing energy efficiency program, AEC says." Utility Dive, July 26, 2019, utilitydive.com/news/indiana-cost-consumers-140m-by-nixing-efficiency-program-aec-says/528722/.; Gilleo, Annie. "ACEEE debunks the myths behind the Ohio bill that would gut efficiency programs." American Council for an Energy-Efficient Economy, April 22, 2019, aceee.org/blog/2019/04/aceee-debunks-myths-behind-ohio-bill.; and Scull, Leah. "Iowa's EE Rollback Explained." Midwest Energy Efficiency Alliance, June 26, 2018, mwalliance.org/blog/iowas-ee-rollback-explained.

45 A Michigan University study in 2017 found "on average, utilities invested three times less on low-income (electric) programs per capita, and near equitable levels for low-income gas programs."

46 Stacey, Ben, and Tony Reames. "Social Equity in State Energy Policy: Indicators for Michigan's Energy Efficiency Programs." University of Michigan, Urban Energy Justice Lab, 2017, justurbanenergy.files.wordpress.com/2017/12/equity-in-energy-efficiency-investment-and-savings-report-2017.pdf. Accessed April 2019.

47 "Table 3. Savings-Weighted Average Total Cost of Saved Electricity by Sector" shows the total cost of low-income energy savings at $0.142 per kilowatt hour, which is more than four times the average residential cost of energy savings at $0.033 per kilowatt hour, with data from 2009 to 2013.

48 Martinez, Cecilia. "Environmental Justice and the Clean Power Plan: The Case of Energy Efficiency." Vol 41, William & Mary Environmental Law & Policy Rev. 605, 2017, scholarship.law.wm.edu/wmelpr/vol41/iss3/4.

49 Ibid.

50 Burkhart, Lori A. "Cajun Nuclear Assets Go to RUS." Public Utilities Fortnightly, Nov. 1, 1996, fortnightly.com/fortnightly/1996/11/cajun-nuclear-assets-go-rus. Accessed April 2019.

thing similar at a larger scale and take ownership of rural electric cooperative coal assets in exchange for forgiving the debt and rural electric cooperative investments in energy efficiency and renewable energy. Then, Rural Utility Service could work to quickly retire the use of these fossil fuel assets in the interest of the American people.

Since this option is a regulatory action with legal precedent, this option is worth consideration as it would require no legislative action. It could be possible without the passage of new legislation. However, this option might be limited in scope due to the current available Rural Utility Service budget. A budget with more money allocated to reducing stranded assets of rural electric cooperatives could deliver a more rapid response from cooperatives that would deliver larger investment in clean energy and a scaling down of fossil fuel resources.

B. DEBT ABSOLUTION (BAILOUT)

To remove the barriers of debt to electric cooperatives reducing their fossil fuel generating capacity, one potential option is to simply absolve rural electric cooperatives of their debt associated with coal plants.

As major holders of rural electric cooperative debt, the federal government could create a fund to absolve rural electric cooperatives of their coal debt, with the goal of incentivizing cooperatives to make new investments in clean energy generation capacity. By eliminating federally held debt, cooperatives could, in theory, retire their stranded assets (coal plants) and invest in cost preferential wind and solar. However, it is unlikely the simple elimination of federally held debt would result in the desired clean energy transformation. Currently, the amount of debt held by non-government financiers is unknown. This private debt would still drive future resources decisions by many cooperatives. Further, there is no guarantee cooperative decision makers would take the lowest cost options of wind and solar. It is possible that board and management culture at many cooperatives could lead to perpetuated notions about the unreliability of wind and solar.

While the elimination of federally held coal debt would certainly impact cooperatives' decision making, it would need to be delivered in conjunction with another solution or with strict stipulations to guarantee the desired outcome.

C. CREDIT ASSET SWAP

Adjacent to the concept of debt absolution would be the approach of a credit asset swap, the trading of new lines of credit for the retirement of coal assets held by rural electric cooperatives. A thorough argument for such an asset swap would require a more complete record of the debt and generation capacity held by rural electric cooperatives than the authors of this report were able to procure. A federal credit asset swap policy would need to be designed in such a way that there would be some guaranteed clean energy and energy efficiency outcomes.

First, the credit asset swap would need to demand that newly extended credit would only be offered to wind, solar, and storage projects, and not natural gas. Many utilities still find "base load" natural gas appealing either for the return on investment guarantee in regulated markets, the background of their current management and workforce, or the argument that wind and solar are unreliable.

Second, the policy would need to be constructed in an advantageous way to allow cooperatives to retire all their coal resources. A very rough, simple way to express this would be to find the total value of electric cooperative debt (both public and private) tied up in coal and/or fossil fuel infrastructure. Another way to express this would be identifying the ratio of net asset value of fossil fuel assets relative to total assets, multiplied by the total outstanding debt, to give us a measure of the fraction of cooperative debt associated with fossil fuel assets. Then, find the total necessary fossil fuel megawatt capacity that would need to be replaced. With those two numbers in place, one could identify a dollar per megawatt number that could guide the creation of a credit asset swap policy. Ideally, this calculation would include an estimate of the electric load that could be reduced with greater investments in energy efficiency and shifted to better match supply with demand response.

Challenges arose for the authors of this report in researching this number. The 2018 to 2019 federal government shutdown delayed the receipt of the lion's share of any publicly available data reflecting debt held by the Rural Utility Service. Further complicating matters, the authors of this report could not identify a reporting infrastructure on privately held debt by rural electric cooperatives. Therefore, a more robust recommendation, formula, or process on a best path forward remains for future discussion.

D. SECURITIZATION

Securitization is a financial strategy which allows utilities to use future ratepayer revenues as collateral for new bonds, which can finance more economic, read clean, generation assets.[51] Securitization is a way for utilities to raise low-cost debt for near-term financing needs, providing utilities compensation for the unrecovered value of their stranded assets. It allows the utility to gather the value of stranded assets in retiring coal and nuclear plants while minimizing the impact on ratepayers without increasing rates on customers.

By pooling future ratepayer revenue and selling them as a private bond to investors, ratepayers can pay the same rates for electricity service while paying off the bond, rather than paying higher rates required to raise capital to finance a given project. While this keeps rates low for ratepayers, it may not direct new investment into clean energy on a faster schedule specifically named in the policy.

Securitization has been a strategy that utilities have used for quite some time for financing new utility projects including investments in wind and solar. The strategy, according to a Sierra Club Report, protects both ratepayers from rate increases and shareholders (in the case of investor-owned utilities) from profit loss. Securitization, therefore, can be effective at leveraging existing coal assets for new wind and solar projects.[52] See Figure 3.[53,54]

51 Varadarajan, Uday, David Posner, and Jeremy Fisher. "Harnessing Financial Tools to Transform the Electric Sector." Sierra Club, 2018, sierraclub.org/sites/www.sierraclub.org/files/sierra-club-harnessing-financial-tools-electric-sector.pdf. Accessed April 2019.

52 Ibid.

53 Ibid.

54 Lehr, Ron. "From Coal to Clean: How Utilities Can Manage the Inevitable Financial Transition." Forbes, Dec. 12, 2018, forbes.com/sites/energyinnovation/2018/12/12/from-coal-to-clean-how-utilities-can-manage-the-inevitable-financial-transition/#7e02c84179e1. Accessed January 2019.

FIGURE 3. STATES WITH SECURITIZATION

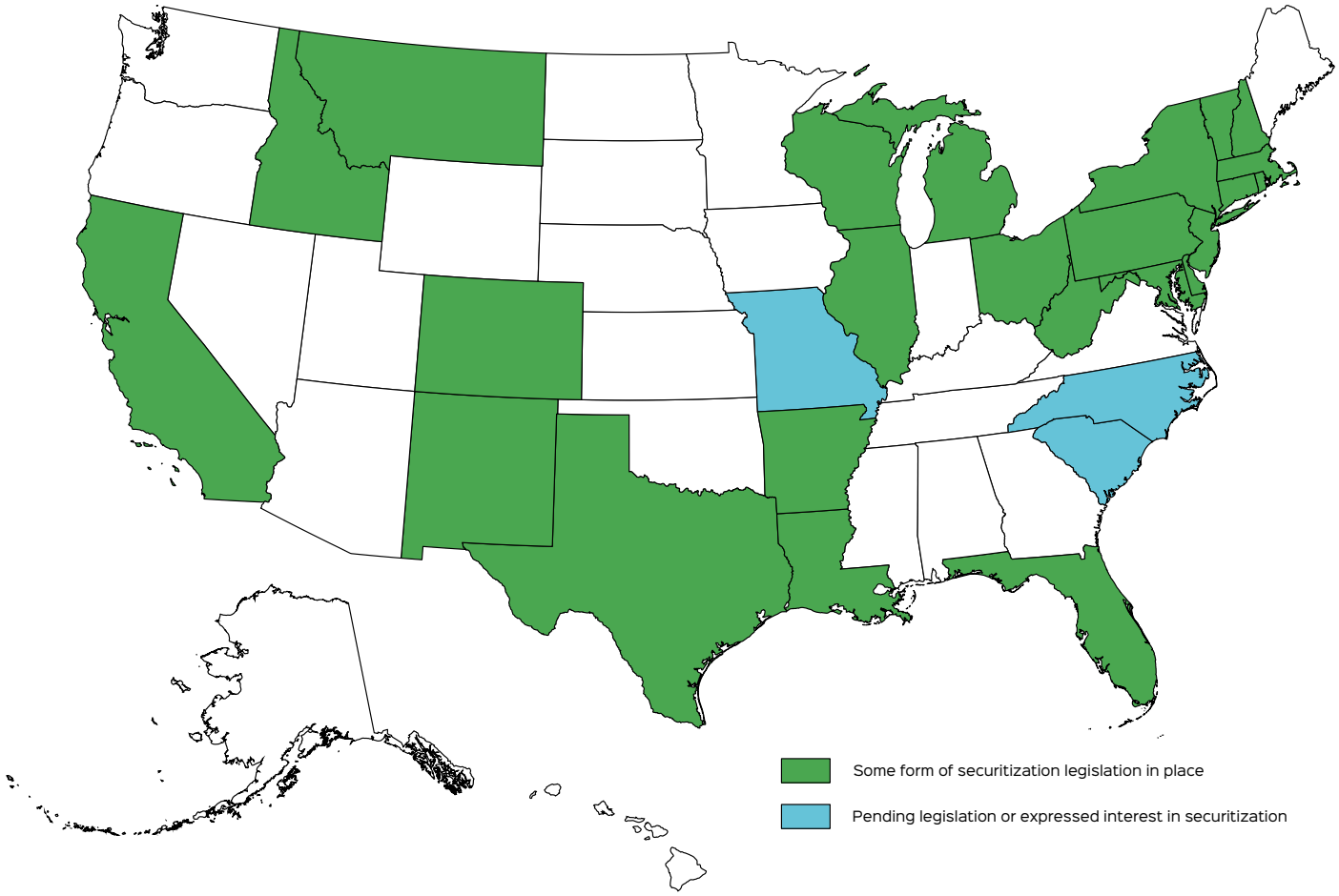


TABLE 2. POLICY OPTIONS

Potential policy solution	Precedent at Rural Utility Service	Federal legislation	Guarantee of investment in renewable energy
Federal regulatory action	Yes, at much smaller scale	Maybe not	No, but could be included
Debt absolution	No	Yes	No, but could be included
Credit asset swap	No	Yes	Yes
Securitization	No, but investor-owned utilities have done this	Enabling law in 21 states, federal law could increase availability	No, but could be included
Rural Utility Service refinancing	No	Would need to adjust Rural Utility Service electricity program in the farm bill	No, but could be included

However, securitization is not a viable option for many cooperatives across the country. More than 20 states have laws allowing utilities to securitize their assets and others are currently considering securitization legislation. A piece of national legislation could extend this financial tool to electric cooperatives across the country.

E. RURAL UTILITY SERVICE REFINANCING

Another option for drawing down electric cooperative coal debt and retiring the rural electric cooperative coal fleet would be to allow federal refinancing of the loans for the stranded assets.

For instance, the Rural Utility Service could offer advantageous refinancing of both public and private debt for cooperatives willing to meet certain terms. These terms would, of course, ensure new investments in renewables as well as other energy efficiency upgrades and modernized infrastructure.

A major advantage of this proposal is that it would be an adjustment to an existing program offered by the Rural Utility Service. An adjustment to the Rural Utility Service's Electricity Program that would offer such a shift in funding would need to be made through the farm bill.

VII. DISCUSSION

While each of these potential solutions we've addressed could potentially move the needle on electric cooperative debt and transitioning to clean energy, there are definite advantages and disadvantages to each policy. See Table 2.

The options of securitization, Rural Utility Service refinancing, and debt absolution all have the same flaw: they do not guarantee that retired coal plants will be replaced by new energy efficiency and renewable energy investments. These mechanisms rely on market-based logic to ensure clean energy replaces coal. Or, it assumes that because utility-scale wind and solar are consistently the lowest cost option, rural electric cooperatives will choose to make investments in that direction. Unencumbered with the barrier of coal debt and stranded assets, cooperative leaders may fall victim to their own dogma about fossil fuel infrastructure rather than take the more affordable wind and solar route. Despite the current economics of wind and solar versus coal and natural gas, this is already proving true.

Since 2014, electric cooperatives have reduced their reliance on coal from 54 percent to 41 percent; however, they have also increased their natural gas generation portfolio from 18 percent to 26 percent. Overall, that's a shift from 72 percent to 67 percent

fossil fuel generation. Meanwhile, nationally, cooperatives have only increased their wind and solar generation from 4 percent to 8 percent.[55] Further, some cooperatives are actively pursuing "syngas" strategies. Basin Electric Power Cooperative attributes their 12 percent rate increase in 2016 to "added costs from operating generating facilities… and reduced revenue support from non-electric or subsidiary businesses," among other reasons.[56] These subsidiaries that are losing money and costing members in higher rates include Dakota Gasification Company, a synfuels plant generating natural gas from coal, which had a 2017 financial analysis that projected losses every year for the next 10 years, but Basin Electric Power Cooperative is committed to continue operating the plant.[57]

The extension of these financialized strategies without strict stipulations directing cooperatives to invest in carbon-free energy sources makes these strategies counterproductive. Not only do cooperatives need to retire their coal plants, but they also need to skip a natural gas buildout that would result in new, expensive gas infrastructure which would slow future clean energy investment by decades and likely lead to higher rates for member-owners. A recent Rocky Mountain Institute study found that within the next 20 years, the costs of building new clean energy infrastructure are falling and will likely be lower than the costs to run only a gas-fired plant.[58]

Therefore, we propose any mechanism should include regulations or principles that ensure specific outcomes. Principles we recommend as a starting point include: decarbonization—no new fossil fuel infrastructure; economic benefits for member-owners; economic benefits for communities served by electric cooperatives; and a priority on energy efficiency investments to reduce the highest energy burdens. However, we believe the best principles would be determined by member-owners and community organizations in electric cooperative territories impacted by a coal transition.

Further, a key consideration to include around electric cooperative debt is the importance of where and who is holding the debt. Over the last several years, some cooperatives have been transferring portions of their debt from the Rural Utility Service to investment banks and out-of-country investors. It has been supposed that this step has been taken to subvert some regulatory and reporting procedures demanded by the Rural Utility Service for all of its borrowers. Beyond regulatory subterfuge, such an action represents the transfer of billions of dollars from public and cooperative institutions to private institutions. This should be avoided at all costs, and any coal debt restructuring mechanism should seek to protect publicly held capital. Anything else would be a betrayal of cooperative values.

We find the idea of swapping new investments in a certain number of megawatts of clean energy in exchange for the forgiveness of coal debt as the most appealing idea. A credit asset swap would be the most sure way to trade new renewable energy development for coal plant retirement. A more limited model of this idea could potentially be implemented as a regulatory action by the Rural Utility Service. However, a more robust model could be crafted through a legislative route.

VIII. IMPLEMENTATION

Any or multiple mechanisms discussed above could be passed as stand alone federal legislation. However, a more realistic course of action would be to package one or multiple of these strategies in existing legislation in Congress.

The Agriculture Improvement Act of 2018, generally known as the farm bill, made some minor changes to electric programs offered by the Rural Utility Service. However, most focus in recent years to Rural Utility Service financing has been concerning rural broadband. Certain clean energy programs within the farm bill, such as the Renewable Energy for America Program, historically have enjoyed strong bipartisan support.

55 Cash, Cathy. "Co-op Fuel Mix Trends Away from Coal." America's Electric Cooperatives, Feb. 2, 2018, electric.coop/co-op-fuel-mix-trends-away-from-coal/. Accessed January 2019.

56 "Basin Electric Power Cooperative: Strong & United: 2016 Annual Report." Basin Electric Power Cooperative, June 26, 2017, issuu.com/basin_today/docs/annual_report_2016_web. Accessed April 2019.

57 Bettenhausen, Tracie. "Value of an asset: Why Basin Electric will continue to operate Dakota Gasification Company." Basin Electric Power Cooperative, Dec. 31 2017, basinelectric.com/news-center/publications/basin-today/value-asset-why-basin-electric-will-continue-operate-dakota. Accessed April 2019.

58 Dyson, Mark, et al. "The Economics of Clean Energy Portfolios: How Renewable and Distributed Energy Resources Are Outcompeting and Can Strand Investment in Natural Gas-Fired Generation." Rocky Mountain Institute, 2018, rmi.org/insights/reports/economics-clean-energy-portfolios. Accessed April 2019.

The closure of old, expensive coal plants and the expansion of rural electric cooperatives' wind and solar capacity would accomplish significant economic development across rural America.

Support for rural broadband and clean energy could be provided together in a revisioning of self-sufficient, resilient rural communities for the 21st century. A vision that combines financing of microgrids, small scale wind and solar generation, storage capacity, and connectivity would redefine the rural cooperative business model to better take advantage of the natural advantages of rural communities. These new technologies will provide economic opportunity and new career opportunities as part of a just transition to a clean energy economy. Coupling these services with new financial investments would better capture the value produced for rural areas. "Just Transition" as defined by the Climate Justice Alliance "is a vision-led, unifying, and place-based set of principles, processes, and practices that build economic and political power to shift from an extractive economy to a regenerative economy."[59,60] Additionally, a quintessential part of a just transition is "deep democracy in which workers and communities have control over the decisions that affect their daily lives."[61] Electric cooperatives with a core principle of democratic member control have an opportunity to carry out this just transition through community engagement and deep democracy to plan out the transition to 100 percent renewable energy in their communities.

Future farm bills could offer a potential opportunity for a debt restructuring mechanism that could retire rural electric cooperatives' coal generation fleets in exchange for new clean energy developments. As the farm bill typically contains amendments to the Rural Electrification Act, this would be the most appropriate pathway for introduction of this idea. Further, since the farm bill draws the attention of many national groups focused on rural policy, it could be an opportunity to build a coalition in support. Rural electric cooperatives themselves would be foolish to not support a piece of policy that would relieve them of their uneconomic assets while offering a bold revisioning of what a rural cooperative could be in the 21st century.

However, such a programmatic shift in Rural Utility Service policy that would drive rural electric cooperative decision making may require a more visionary and sweeping piece of policy to accomplish. Enter the Green New Deal.

In late 2018, new progressive members of the House of Representatives began pushing the Green New Deal as a concept. Their call for a select committee on the Green New Deal reflected a long-standing conversation, considering what a massive reinvestment program would look like that could deliver a just transition to a clean energy economy. The proposal calls for the transition to a "clean, renewable, and zero-emission energy sources" through a "10-year national mobilization."[62] It also calls for a federal green job guarantee and the creation of a national fund for urban and rural resilience to pay for infrastructure upgrades.

Inspired by the New Deal Programs of the 1930s that delivered the Rural Electrification Act and rural electric cooperatives, the Green New Deal would be a major step in curbing greenhouse gas emissions and transforming the U.S. and global economy.

59 The rest of the definition follows: "This means approaching production and consumption cycles holistically and waste-free. The transition itself must be just and equitable; redressing past harms and creating new relationships of power for the future through reparations. If the process of transition is not just, the outcome will never be. Just Transition describes both where we are going and how we get there."

60 "Just Transition: A Framework for Change." Climate Justice Alliance, climatejusticealliance.org/just-transition/. Accessed April 2019.

61 Ibid.

62 Ocasio-Cortez, Alexandria. "House Resolution 109: Recognizing the duty of the Federal Government to create a Green New Deal." 116th Congress, 2019, congress.gov/116/bills/hres109/BILLS-116hres109ih.pdf. Accessed June 2019.

Due to the historic challenges of rural electrification with limited federal support as well as the clear challenges to transitioning to a clean energy economy, the country's electric cooperative leadership could help shape how a Green New Deal will work best for rural America and lead in Green New Deal implementation.

The Green New Deal would offer a comprehensive vehicle to deliver any one or multiple strategies the authors of this report have suggested. Likely through a robust conversation during the formation and throughout the process by a select committee, other potential solutions to relieve rural electric cooperatives of their coal and fossil fuel infrastructure may be uncovered. Further, this plan could offer adjacent economic strategies for transitioning communities that have been economically dependent on coal and other fossil fuels. Concerns around hardships in rural coal communities and rural communities in general resulting from a clean energy transition can fully be addressed through incorporation of a just transition framework in the Green New Deal.

IX. CONCLUSION

Rural communities and the electric cooperatives that serve them are at risk from both the consequences of climate change and a rapidly changing energy economy. For rural places to simultaneously mitigate the impacts of climate change, keep utility rates low, and transform their economic future, electric cooperatives must transition to clean energy. Restructuring of electric cooperative debt can help remove barriers and expedite this transition.

With the clock ticking on climate change, rural electric cooperative leadership, clean energy advocates, and rural communities can build a coalition to address multiple concerns that impact every corner of rural, suburban, and urban America.

We hope this report is the beginning of a robust conversation around electric cooperative reform and the transition to a clean energy economy for rural communities. We hope more advanced, technical research can be done in the interest of clarifying or identifying new coal debt restructuring mechanisms.

We hope for the future of rural America.

APPENDIX

For further reading on coal transition, coal transition finances, and the Tri-State Generation and Transmission Association, we recommend these readings.

1. Benn, Annie, et al. "Managing the Coal Capital Transition: Collaborative Opportunities for Asset Owners, Policymakers, and Environmental Advocates." Rocky Mountain Institute, 2018, rmi.org/wp-content/uploads/2018/09/RMI_Managing_the_Coal_Capital_Transition_2018.pdf. Accessed April 2019.

   This report reviews trends in coal generation, stranded assets, potential policy components to manage the coal capital transition (see the great table on page 45), and includes case studies from around the world.

2. Cates, Karl, and Seth Feaster. "Case Study: How Kit Carson Electric Engineered a Cost-Effective Coal Exit." Institute for Energy Economics and Financial Analysis, April 2019, ieefa.org/wp-content/uploads/2019/04/How-Kit-Carson-Electric-Engineered-a-Cost-Effective-Coal-Exit_April-2019.pdf. Accessed April 2019.

   This report by Institute for Energy Economics and Financial Analysis goes indepth into Kit Carson Electric Cooperative's exit from Tri-State Generation and Transmission Association in 2016.

3. "Powering Cooperatives: A primer on Colorado's local cooperative utilities and Tri-State Generation & Transmission Association." Center for the New Energy Economy, Colorado State University, 2019, cnee.colostate.edu/wp-content/uploads/2019/03/Powering-Cooperatives-CNEE-Report-on-Colorado-Cooperatives-and-TriState.pdf. Accessed April 2019.

   This report "is designed to give state legislators an understanding of some of the issues that Colorado's cooperative distribution utilities face in 2019." It outlines nine policy issues including: high fees for net-metered renewable energy systems at some cooperatives, Tri-State Generation and Transmission Association is "self-bonded" for cleanup of coal assets, and "there may be an inherent conflict of interest regarding the fiduciary responsibility of board members within the Tri-State cooperative structure."

4. Dyson, Mark, and Alex Engel. "A Low-Cost Energy Future for Western Cooperatives: Emerging Opportunities for Cooperative Electric Utilities to Pursue Clean Energy at a Cost Savings to Their Members." Rocky Mountain Institute, 2018, rmi.org/wp-content/uploads/2018/08/RMI_Low_Cost_Energy_Future_for_Western_Cooperatives_2018.pdf. Accessed April 2019.

   This report by Rocky Mountain Institute outlines how Tri-State Generation and Transmission Association members could save at least $600 million through 2030 by using their coal plants less and using more renewable energy.

5. Gray, Matt, et al. "Powering down coal." Carbon Tracker Initiative, Nov. 30, 2018, carbontracker.org/wp-content/uploads/2018/12/CTI_Powering_Down_Coal_Report_Nov_2018_4-4.pdf. Accessed March 2019.

   This report presents the results of Carbon Tracker's coal power economics portal, an online tool that tracks the economic and financial risks of coal power at the asset level throughout the world. The portal covers 6,685 coal units which represent approximately 95 percent (1,900 gigawatts) of global operating capacity and approximately 90 percent (220 gigawatts) of capacity under construction. The portal provides current and forward-looking estimates of the (short and long-run) operating cost, gross profitability, relative competitiveness, phase-out year, and stranded asset risk in a below 2°C scenario. Access to the portal and methodology document is available at carbontracker.org/reports/coalportal. "Where profitability is defined as revenues minus long-run operating costs, our analysis finds that due to high fuel costs, 42 percent of coal capacity operating today could be losing money. From 2019 onward, we expect a combination of renewable energy costs, air pollution regulation, and carbon pricing to result in further cost pressures and make 72 percent of the fleet cash flow negative by 2040."