NREL Tools and Partnership Opportunities for Rural Electric Cooperatives in the United States

Rural electric cooperatives (co-ops) provide electricity to more than 40 million people across rural communities in the United States. Covering 56% of America's landmass, co-ops own and maintain more than 42%—or 2.7 million miles—of the nation's distribution lines that serve large, sparsely populated areas.[1]

Rural electric cooperatives face growing affordability and reliability pressures from severe weather such as wildfires and the expansion of energy-intensive industries such as data centers. Despite these challenges, many co-ops have pioneered innovative solutions to cut costs while strengthening systemwide resiliency—ranging from investments in new types of firm generation such as small modular nuclear reactors[2] to demand-side strategies that aggregate existing distribution-side resources.[3] At the same time, federal programs such as the United States Department of Agriculture's (USDA's) Empowering Rural America (NEW ERA) and the Powering American Clean Energy (PACE) program Rural Energy for America Program (REAP) are making historic investments to help co-ops modernize their energy systems and unlock abundant, affordable power across their service areas. As co-ops pursue these funding opportunities and invest in energy system upgrades, they can partner with the National Renewable Energy Laboratory (NREL) to leverage the lab's expertise, tools, and datasets to support their decision-making and investment processes. This fact sheet outlines key NREL tools and their use cases for rural electric cooperatives along with case studies that illustrate how co-ops can collaborate with NREL to modernize their electricity infrastructure.

	Power Supply & Delivery	System Operations & Engineering	Planning & Procurement	Member Services	Regulatory & Market Affairs	Administrative & Human Resources
Advanced Distribution Management System Test Bed	●	●				
Capacity Expansion Decision Support tool for Distribution Networks (CADET)	●	●	●			
Database on State Policies and Programs for Community Solar				●	●	
Distributed Generation Market Demand (dGen) tool		●	●			
Distribution Grid Integration Unit Cost Database	●		●		●	
Jobs and Economic Development Impact (JEDI) Model			●	●	●	
OptGrid Model	●	●	●			
PREconfiguring and Controlling Inverter SEt-points (PRECISE)	●	●	●			
REopt Tool	●		●			
Renewable Energy Potential (reV) Model	●		●			
Resource Planning Model (RPM)	●		●			
Sharing the Sun Community Solar Project Database			●	●	●	
Solar Automated Permit Processing Plus (SolarAPP+) Tool				●	●	

[1] "America's Cooperative Electric Utilities: The Nation's Consumer Owned Electric Utility Network." National Rural Electric Cooperative Association, February 2025. https://www.cooperative.com/programs-services/bts/Documents/Data/Electric-Co-op-Fact-Sheet.pdf

[2] "Some Co-ops Are Making Early Moves on Small Nuclear Reactors." Reed Karaim, *Rural Electric Magazine*, November 30, 2022. https://www.cooperative.com/remagazine/articles/Pages/Some-Co-ops-Are-Making-Early-Moves-on-Small-Nuclear-Reactors.aspx

[3] "Co-ops register 'virtual power plant' in regional capacity market." Great River Energy, May 19, 2023. https://greatriverenergy.com/power-generation-resources/co-ops-register-virtual-power-plant-in-regional-capacity-market/

NREL Tools and Their Use Cases for Rural Electric Cooperatives in the United States

This section provides an overview of key NREL tools and datasets along with their use cases for rural electric cooperatives. These resources can support decision making across a range of functional areas—including planning, procurement, system operations, member services, and regulatory affairs. The following table maps these tools to the departments within a typical rural electric cooperative that are most likely to use them.

Optimizing Renewable Energy Technologies at the Grid Edge (OptGrid) Model

Designed to manage distributed energy resources (DERs) to their full potential for grid efficiency and resiliency, OptGrid model (nrel.gov/grid/optgrid-controls) allows real-time management of DERs like grid edge devices such as smart meters and inverters. Given increased adoption of grid edge technologies across many co-op territories, rural co-ops can use OptGrid to coordinate grid edge technologies across their entire service territory. To be deployed effectively, OptGrid would typically integrate with advanced distribution management systems (ADMS) and distributed energy resource management systems (DERMS). Because OptGrid can pair with a wide range of technologies, co-ops can use this model to manage various configurations of aggregated DERs in real time, manage supply and demand, and increase systemwide reliability and affordability.

Inputs: Distribution system models and configurations, DER location and type, co-op's planning objectives and goals (e.g., desired reliability and affordability goals, customer comfort), typical systemwide load profiles.

Outputs: Real-time coordination of DERs in the co-op territory that optimally balances both co-op and customer objectives.

Questions OptGrid can answer:

- How can DERs and other grid edge technologies within a co-op's service area be aggregated to meet the utility's reliability and affordability goals?
- How can a co-op leverage its fleet of DERs and grid edge technologies to invest in virtual power plants?

Co-op relevant use cases: Distribution system planning, DER aggregation, Volt/VAR optimization, microgrid development.

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Renewable Energy Optimization Tool (REopt)

The REopt tool (nrel.gov/reopt) enables rural electric cooperatives to design energy systems that maximize cost savings, enhance resilience, and reduce emissions. Co-ops can evaluate various technology combinations—generation, storage, heat pumps, combined heat and power, and hydrogen technologies—to determine the optimal mix, sizing, and operations for buildings, campuses, communities, or microgrids within their service territory.

Inputs: REopt requires three basic inputs—site location, utility rates, and load profiles—while offering hundreds of customizable assumptions with default values: financial inputs (e.g., discount rate, analysis period, inflation, cost escalation rate projections), technology cost and performance assumptions (e.g., capital costs, operations and maintenance [O&M] costs, tax credits, efficiencies), energy goals (e.g., financial, resilience), and critical load and outage duration (for resilience analyses only).

Outputs: Cost-optimal mix and system sizing, operations, financial metrics (e.g., net present value [NPV], payback period, projected cash flows), probability of meeting critical load over an outage duration, CO_2 emissions.

Questions OptGrid can answer:

- How can co-ops determine the optimal mix of energy resources to meet specific performance goals for specific sites and microgrids within a service territory?
- What technology combinations best support cost savings and emissions reductions in their service areas?
- How can potential energy systems enhance system resilience and overall energy performance?

Co-op relevant use cases: Microgrid planning, site-level energy system optimization, resilience planning.

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Advanced Distribution Management System Test Bed

The Advanced Distribution Management System (ADMS) Test Bed (nrel.gov/grid/adms-test-bed) Test Bed helps rural electric cooperatives test and evaluate new grid management technologies in a realistic, risk-free environment. Co-ops can use this platform to explore how ADMS and DERMS can improve grid reliability, integrate renewable energy resources, and enhance overall system efficiency. By simulating real-world conditions—including how DERs such as rooftop solar interact with the grid—co-ops can make informed decisions about adopting new technologies without disrupting service to members.

Inputs: NREL's ADMS evaluation platform takes a collaborative approach, involving the utility, the vendor, and NREL. The utility identifies the operational question it would like answered, including any performance objectives and metrics, and provides the necessary data (e.g., load profiles, generation profiles).

Outputs: Based on the information provided by the cooperative utility and vendor partner, NREL uses the ADMS Test Bed to provide utilities with monitoring and control strategies for grid edge technologies, virtual power plant coordination, and design strategies to meet system affordability and reliability needs—for example, evaluating the performance of a fault location, isolation, and restoration application of a co-op's ADMS or developing strategies to manage microgrid operations and electric vehicle (EV) charging.

Questions ADMS can answer:

- How can rural electric cooperatives test new grid management technologies before deploying them?
- How will DERs such as solar and storage enhance grid reliability and operations?
- What advanced grid management strategies can improve efficiency and resilience in their service areas?

Co-op relevant use cases: Grid modernization, reliability and resilience improvement, transmission and distribution asset deferral.

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Jobs and Economic Development Impact (JEDI) Model

The Jobs and Economic Development Impact (JEDI) (nrel.gov/analysis/jedi) allows rural electric cooperatives to estimate the local economic benefits from new energy projects. Co-ops can use JEDI to analyze how construction and operational spending on renewable facilities, microgrids, or other energy investments will impact local job creation, earnings, and supply chain activities. By incorporating project-specific data, co-op staff can allow their board members, executive staff, and other decision makers to make informed decisions with transparent economic projections tailored to their regional context.

Inputs: Construction costs, equipment costs, annual O&M costs, financing parameters, project size.

Outputs: Project costs (i.e., specific expenditure), number of jobs, earnings (i.e., wages and salary), value of production resulting from the project.

Questions JEDI can answer:

- How can rural electric cooperatives quantify the local job creation and revenue impacts from a new energy project?
- What are the projected economic benefits from investing in renewable or conventional energy facilities in a co-op's service area?
- How can project-specific data be used to refine the expected local economic outcomes from proposed energy developments?

Co-op relevant use cases: Economic impact assessment, local job forecasting, project feasibility and investment justification, community engagement and strategic planning.

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PREconfiguring and Controlling Inverter SEt-points (PRECISE)

PRECISE (nrel.gov/grid/precise-tool) is a software platform created by NREL in collaboration with the Sacramento Municipal Utility District. It automates technical evaluations for connecting DERs such as rooftop solar, battery storage, and EVs to the electric distribution system. In its most sophisticated configuration, PRECISE works with integrated utility databases and can perform detailed, time-series power flow simulations. These simulations enable accurate, location-specific, and time-dependent analysis. However, PRECISE is designed to scale and adapt to varying levels of data availability. Even with limited datasets, it can still conduct a simplified evaluation to quickly screen interconnection requests and improve process efficiency.

Inputs: PRECISE combines grid and customer data with technical information about proposed DERs to simulate their impact on the distribution system. The inputs listed next enable PRECISE to develop models and accurately evaluate each proposed DER's impact on the distribution grid. When full, high-resolution data are not available, PRECISE can operate with a limited dataset, such as the following, to conduct simplified evaluations:

- DER technical parameters such as capacity, location, and technology type from interconnection application
- Feeder topology (including secondaries) and equipment data from GIS, asset databases, and/or existing power-flow models such as Windmill or CYME
- Load and voltage measurements from advanced metering infrastructure and/or supervisory control and data acquisition
- Irradiance and weather data
- Customer and location data from customer information systems.

Outputs: PRECISE produces automated, repeatable evaluations that may include pass/fail evaluation results, reduced capacity recommendations if requested capacity cannot be accommodated, smart inverter setting recommendations to mitigate constraints, flexible interconnection schedules to limit DER exports during constrained times, and nodal hosting capacity estimates (maximum DER size at a specific location without violations). If time-series data are available, PRECISE can also identify when constraints occur (by hour or season), enabling targeted mitigation strategies.

Questions PRECISE can answer:

- How can utilities reduce interconnection delays while ensuring grid safety and reliability?
- Can a given DER be connected without violating grid constraints?
- If the requested DER size fails, what is the acceptable reduced capacity?
- Could smart inverter functions or flexible schedules enable more capacity without upgrades?
- What is the maximum DER capacity (nodal hosting capacity) possible at this location?
- When do system constraints occur if time-series data are available?

Co-op relevant use cases: Streamlining DER interconnection review, which can reduce turnaround time from days/weeks to minutes; increasing hosting capacity with smart inverter settings and flexible interconnection, allowing more DER integration without major grid upgrades; and scalable deployment to start with available data and expand to advanced capabilities over time.

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Capacity Expansion Decision Support tool for Distribution Networks (CADET)

The Capacity Expansion Decision Support Tool for Distribution Networks (CADET) (nrel.gov/grid/cadet) is best described not as a single tool but as a library and framework for creating distribution capacity expansion planning tools. Rather than a one-size-fits-all solution, CADET provides modular building blocks—optimization interfaces, data managers, constraint and objective libraries, change-tracking systems, and validation layers—that allow researchers and utilities to design customized planning tools that address their unique challenges. This flexibility makes CADET especially useful in a research and demonstration space where planning needs vary across utilities.

Inputs: CADET leverages NREL's grid data models and can draw on feeder models, load forecasts, candidate investment options (substations, reconductoring, storage, demand response, non-wires alternatives), and time-series data. Inputs are structured through modular managers (e.g., for distributed resources, transformer options, or edge capacity), which provide flexibility in adapting CADET to various planning contexts.

Outputs: CADET generates solution sets of investment strategies that are consistent, repeatable, and defendable. Outputs include least-cost or resilience-focused upgrade pathways, hosting capacity scenarios, cost-benefit analyses of DERMS, and integration of distributed resources for right-sizing or deferral of traditional upgrades.

Questions the tool can answer:

- How can we design a custom distribution planning tool to match our specific objectives (e.g., resilience, affordability, hosting capacity)?
- How can utilities right-size or defer investments under deep uncertainty about future loads (e.g., EV adoption, electrification, data centers)?
- How can DER targets be met using non-wires alternatives or other grid edge solutions?

Co-op relevant use cases: Developing defendable planning tools tailored to cooperative needs, long-term distribution system planning, evaluating least-cost and resilience-enhancing distribution strategies.

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Solar Automated Permit Processing Plus (SolarAPP+) Tool

The Solar Automated Permit Processing Plus (SolarAPP+) (nrel.gov/news/detail/program/2024/automated-permitting-with-solarapp-grew-in-2023) platform (gosolarapp.org) modernizes the permitting process for residential solar and solar-plus-storage systems by providing instant approvals for code-compliant designs. Because SolarApp+ is a way to streamline local permitting for solar and storage systems, the use of this tool must be approved by local permitting authorities (e.g., city planning departments). Representatives from local permitting authorities can use the SolarAPP+ registration portal to upload relevant codes and permitting requirements governing solar and storage installations at no cost. By advocating for SolarAPP+ adoption in their service areas, co-ops can streamline interconnection processes, improve forecasting for DERs, and reduce administrative burdens for both utilities and local permitting offices. In addition, faster solar deployment can enhance grid planning efforts and support co-op goals around affordability and sustainability.

Inputs: Representatives from local permitting authorities register and upload local permits and codes governing solar installations. Solar installers submit system specifications (e.g., size, project location).

Outputs: SolarApp+ reviews system specifications for code compliance and obtains instant approval for code-compliant systems from local permitting authorities. The tool also generates checklists and electrical schematics for inspectors to confirm installed systems match preapproved designs.

Questions SolarAPP+ can answer:

- How can we reduce permitting delays that slow member adoption of rooftop solar?
- What permitting improvements can support smoother interconnection of DERs?
- How do various permitting processes impact our ability to plan for distributed solar growth?

Co-op relevant use cases: Interconnection, permitting, member engagement.

Point of contact: SolarApp+ Support Team, gosolarapp.org/contact

Distributed Generation Market Demand (dGen) tool

dGen (nrel.gov/analysis/dgen/about-dgen) is a powerful tool that uses spatially resolved data and an agent-based approach to model DER adoption by simulating customer decision making based on economic and behavioral factors. Rural electric cooperatives can use dGen to forecast DER adoption, inform resource planning, and evaluate policy impacts to ensure affordable, reliable, and renewable energy for their members. Generation and transmission co-ops can use dGen to anticipate long-term energy supply needs and assess how distributed resources affect wholesale power demand. Distribution-only co-ops can use the model to plan grid upgrades, optimize DER integration, and design customer programs. In addition, dGen can also support virtual power plant development by identifying areas where aggregated DERs could provide grid services, such as demand response or peak load reduction.

Inputs: Light Detection and Ranging (LiDAR) roof scans, building performance data, electricity consumption profiles by region and sector, historical deployment, technology and financing costs, renewable energy incentives, retail electricity rates.

Outputs: DER economics by NPV or payback periods, spatially resolved DER adoption rates, scenario-based projections, utility system costs.

Questions dGen can answer:

- How much distributed solar and storage will our members adopt over the next decade?
- How will DER adoption impact our system's load and infrastructure planning?
- What policies or incentives could encourage or discourage DER deployment in our service area?
- How can distributed resources be used to reduce peak demand and improve grid flexibility?

Co-op relevant use cases: DER adoption forecasting, integrated resource planning, policy and scenario planning, peak demand management.

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Renewable Energy Potential (reV) Model

Rural electric cooperatives can use the reV model (nrel.gov/gis/renewable-energy-potential) to plan and optimize renewable energy projects within their service areas. For instance, co-ops can pinpoint optimal sites for geothermal, solar, and wind installations by assessing resource availability alongside local grid and land use constraints. Generation and transmission co-ops may use reV for regional renewable integration and long-term capacity planning, whereas distribution co-ops can focus on localized project feasibility and grid upgrade needs. This detailed analysis enables co-ops to develop cost-effective and abundant energy strategies that enhance system reliability and member affordability.

Inputs: Renewable energy resource data (e.g., geothermal potential, solar irradiance, wind speeds), land use and land cover data, siting ordinance data, grid infrastructure data, and cost assumptions.

Outputs: Spatially resolved renewable energy deployment potential, renewable energy deployment and interconnection costs, land access limitations, and scenario-based results.

Questions reV can answer:

- Which areas in our territory have the highest renewable deployment potential and the lowest costs?
- How will local land access limitations impact project feasibility?
- Where could transmission infrastructure investment provide the greatest opportunities for new generation?

Co-op relevant use cases: Site suitability analysis, techno-economic feasibility studies, resource and grid planning.

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Resource Planning Model (RPM)

The Resource Planning Model (nrel.gov/analysis/models-rpm) is a long-term resource and capacity expansion planning model for regional electric systems. RPM can help rural electric cooperatives—particularly generation and transmission (G&T) cooperatives—explore the impact of various technology and policy scenarios within their service territory. This tool can also be used by distribution cooperatives that want to understand the impact of a policy or market intervention or analyze how the addition of new types of energy resources can impact system reliability and affordability.

Inputs: Load profiles, plant-specific generator characteristics (e.g., heat rate, minimum generation levels, ramping and cycling characteristics), existing renewable resource characteristics (e.g., generation profiles, constraints), cost of generation technologies and fuels.

Outputs: Least-cost investment and dispatch strategy over a multiyear planning horizon, grid constraints, spatial representation of renewable energy resource potential, hourly profiles, interconnection costs.

Questions RPM can answer:

- What is the optimal combination of generation assets within a co-op's service territory over the next 30 years?
- What impact would increased penetration of intermittent generation or new customers such as data centers have on grid affordability, reliability, and capacity over various time horizons?

- What is the potential for integrating distributed energy into a rural co-op's grid system given its current assets?

Co-op relevant use cases: Long-term resource and capacity expansion planning, scenario planning, power system optimization.

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Datasets

Database on State Policies and Programs for Community Solar

The State Policies and Programs for Community Solar database (data.nrel.gov/submissions/249) helps rural electric cooperatives navigate the regulatory landscape for community solar. By summarizing state policies, incentives, and low-income provisions, the database enables co-ops to design community solar programs that align with local regulations and maximize benefits for their members. G&T co-ops can use the database to assess policy-driven opportunities for large-scale projects, whereas distribution co-ops can tailor offerings to increase access and affordability.

Questions the Database on State Policies and Programs for Community Solar can answer:

- What policies and incentives are available for community solar in a co-op's state or service territory?
- How can a co-op leverage federal and local policies to design a community solar program that benefits low-income members?
- What regulatory barriers or requirements should be considered when developing a project?

Co-op relevant use cases: Community solar program development, low-income solar access and expansion.

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Sharing the Sun Community Solar Project Database

The Sharing the Sun Community Solar Project Database (data.nrel.gov/submissions/244) provides rural electric cooperatives with valuable insights into existing and pending community solar projects within their own service territories and nationwide. By analyzing project-level data—such as capacity, location, and low-income provisions—co-ops can benchmark their programs, identify best practices, and refine their community solar strategies. This resource helps co-ops design equitable, cost-effective projects that enhance energy access for members.

Questions the Sharing the Sun Community Solar Project Database can answer:

- What are the current subscription levels for existing community solar projects within a co-op's service area and in similar markets?
- What are the characteristics of successful community solar projects in similar markets?
- How have other utilities structured low-income participation in community solar?
- What trends in project size and design can inform a co-op's solar development strategy?

Co-op relevant use cases: Community solar program design, low-income solar access and expansion.

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Case Studies on Successful Partnerships Between NREL and Rural Electric Cooperatives

There are two primary ways that rural electric cooperatives can benefit from partnering with NREL to leverage the lab's renewable energy design and deployment expertise to help meet their energy and infrastructure modernization goals. First, co-ops can work either independently or with NREL researchers to use the lab's tools and datasets to plan new resources and resiliency measures. Second, rural co-ops and related organizations can leverage fully customized partnership opportunities within NREL and the U.S. Department of Energy (DOE) to design their own analytic and decision-support tools, create strategic plans, and host convenings that help them meet their system and policy goals. Organized along these two pathways, the following case studies showcase successful partnerships between NREL and rural co-ops.

Energy Modernization Through NREL Tools and Datasets

Identifying Cost-Optimal Pathways for Microgrid Development in Remote Alaskan Villages

NREL/DOE program: Remote Communities Renewable Energy (RCRE) Partnerships

Rural co-ops involved: Unalakleet Valley Electric Cooperative

Location: Unalakleet, Alaska

NREL tool: REopt

Description: Unalakleet Valley Electric Cooperative (UVEC) is a majority Tribally owned distribution electric cooperative that supplies power to Unalakleet, Alaska, a community that is 85% Alaska Native or American Indian. Historically, UVEC has relied on an isolated, diesel-powered microgrid system to meet the community's electricity demand—resulting in high energy costs and local health risks associated with air and noise pollution. Through the RCRE program, UVEC partnered with NREL to explore opportunities to reduce diesel fuel reliance and improve system performance using grid modernization strategies. Using REopt, NREL researchers modeled UVEC's current diesel generation and fuel oil heating systems alongside new technology options including wind, battery storage, and dispatchable electric heaters. The analysis revealed that although a 75% fuel reduction was technically achievable, a scenario targeting a 54% reduction delivered the most cost-effective balance of energy savings, fuel use reduction, and investment needs. This optimized pathway is projected to lower overall energy costs by 21% while significantly reducing fuel consumption—demonstrating how REopt can support co-ops in identifying win-win solutions tailored to their technical and economic constraints.

Related publication: docs.nrel.gov/docs/fy16osti/64491.pdf

Upgrading Local Ferry Transportation System To Meet Community Resiliency, Energy, and Transportation Needs

NREL/DOE program: Energy Transitions Initiative Partnership Project (ETIPP)

Rural co-ops involved: Tideland Membership Corporation

Location: Ocracoke, North Carolina

NREL tool: REopt, Resource Planning Model

Description: Ocracoke Island, a remote barrier island off the North Carolina coast, relies on ferries as a primary mode of transportation for residents, visitors, and essential services. Tideland Electric Membership Corporation (EMC), one of the smallest electric cooperatives in the state, supplies power to the island through an underwater transmission cable, making the community highly vulnerable to power disruptions from coastal storms and external infrastructure failures. In collaboration with NREL through the ETIPP program, Tideland EMC explored strategies for modernizing the local grid to support the anticipated transition to electric ferries while enhancing overall system resiliency. Using RPM and REopt, researchers evaluated the infrastructure upgrades needed to accommodate ferry electrification, including energy demand assessments, power capacity requirements, and charging logistics. By analyzing historical fuel usage data and ferry schedules, the project team identified optimal approaches for integrating shoreside charging while minimizing grid impacts. The study not only provided Tideland EMC with data-driven insights for long-term infrastructure planning but also facilitated new opportunities for collaboration with Hyde County and the North Carolina Department of Transportation. As Ocracoke continues to explore electrification solutions, the outcomes of this partnership will support future investment strategies to strengthen the island's energy resilience and transportation reliability.

Related publication: nrel.gov/state-local-tribal/etipp-community-ocracoke-island-north-carolina

Using Distributed Energy Resources as Non-Wires Alternatives and Peak Load Management Strategy

NREL/DOE program: Advanced Research Projects Agency–Energy (ARPA-E) Network Optimized Distributed Energy Systems (NODES) Program

Rural co-ops involved: Holy Cross Energy

Location: Colorado

NREL tool: Advanced Distribution Management System (ADMS) Test Bed

Description: Holy Cross Energy (HCE) is an electric cooperative serving Western Colorado. HCE aims to source 80% of its electricity from utility-scale solar, wind, and battery storage projects, with the remaining 20% coming from DERs on its distribution grid. To support this transition, HCE plans to become a distribution system operator, managing its local grid and coordinating diverse DERs to ensure system reliability and affordability. As a pilot for this strategy, HCE partnered with NREL to equip a new zero-energy development—Basalt Vista¬—with controllable DERs, including renewables. Using the ADMS Test Bed, NREL researchers developed a real-time optimal power flow model to create a DERMS tailored to HCE's operational needs. This partnership demonstrates how HCE can leverage NREL's DERMS platform to reduce peak demand charges, plan for future asset deferral, and serve as a model for other rural cooperatives pursuing similar DER strategies.

Related publication: nrel.gov/news/feature/2019/small-colorado-utility-sets-national-renewable-electricity-example-using-nrel-algorithms

Strategic Planning, Tool Development, and Convenings Through Co-Op and NREL Partnerships

Resilient Renewable Energy Roadmap for Rural Electric Cooperatives in New Mexico

NREL/DOE program: Solar Energy Innovation Network (SEIN)

Partnership use case: Strategic planning

Rural co-ops involved: Kit Carson Electric Cooperative

Location: New Mexico

Description: Kit Carson Electric Cooperative (KCEC) is a distribution electric cooperative that serves nearly 30,000 members across New Mexico. In 2018, KCEC committed to meeting 100% of the co-op's daytime peak through solar generation by 2022. As part of this, KCEC developed a plan to add 35 megawatts (MW) of additional solar capacity by developing smaller 1-MW solar arrays and associated storage across its service territory. Through KCEC's participation in SEIN, a team of NREL researchers and KCEC staff developed an internal tool to identify the benefits and impact of solar-plus-storage at specific locations across the co-op's grid system. In addition, NREL researchers conducted complex scenario analyses across an entire distribution system and identified opportunities for infrastructure and operational cost savings and improved resilience. Using this model, the team developed a roadmap and operational plan for 35–40 MW of additional solar capacity through a fleet of smaller solar-plus-storage facilities across KCEC's system. This partnership builds internal capacity within KCEC and highlights how a distribution cooperative such as KCEC can strategically plan for long-term renewable energy investments and conduct pilot projects that can be replicated throughout its service territory. KCEC implemented 100% of its daytime solar energy projects after the project was completed.[4]

Solar-Plus for Electric Cooperatives (SPEC): Guidance and Decision Support Tools for Procurement and Operations of Solar-Plus-Storage Among Rural Electric Cooperatives

NREL/DOE program: Solar Energy Innovation Network (SEIN)

Partnership use case: Tool and resource development

Rural co-ops involved: Cobb Electric Membership Corp., Kit Carson Electric Cooperative, United Power

Location: New Mexico, Georgia, Colorado, North Carolina

Description: Under the Solar-Plus for Electric Cooperatives (SPEC) project, three rural electric cooperatives—Cobb Electric Membership Corp., Kit Carson Electric Cooperative, and United Power—partnered with NREL through SEIN and developed best practices to increase the pace and impact of solar-plus-storage procurements for rural distribution utilities. The project produced a software tool designed to screen solar and storage projects, fine-tune their design, and facilitate their procurement by local electric co-ops and public power utilities. In addition, the team provided guidance on local procurement models, sample procurement documents and service agreements, and other resources.

Project website: communitysolarvalueproject.com/decision-model

Convenings on Rural Electric Cooperative Distributed Energy Resource Business Model Development

NREL/DOE program: Rural and Agricultural Income and Savings from Renewable Energy (RAISE) Initiative

Partnership use case: Convenings and peer learning

Rural co-ops involved: Basin Electric Power Cooperative, Central Electric Power Cooperative, Chugach Electric Association, East River Electric Power Cooperative, Georgia Transmission, Great River Energy, Highline Electric Association, Hoosier Energy, La Plata Electric Association, Minnkota Power Cooperative, Mountain Parks Electric, Mountain View Electric Association, Oklahoma Electric Cooperative, PNGC Power, San Isabel Electric Association, Sangre de Cristo Electric Association, Tri-State Generation and Transmission Association, Wheat Belt Public Power District

Description: Rural electric cooperatives across the United States are increasingly exploring ways to integrate DERs to enhance grid resilience, reliability, and affordability. However, challenges such as evolving federal policies, financing constraints, and technical uncertainties create barriers to widespread DER adoption. To address these issues, NREL partnered with G&T cooperatives, distribution cooperatives, federal agencies, and industry stakeholders to host a series of workshops to develop and refine cooperative-led DER business models. The first workshop, hosted by Tri-State Generation and Transmission Association in Westminster, Colorado, and the second, hosted by Pacific Northwest Generating Cooperative in Portland, Oregon, gathered representatives from across the energy sector to share perspectives, identify challenges, and explore solutions for DER integration. Participants engaged in technical discussions, peer learning sessions, and interactive breakouts focused on cooperative business model innovation, infrastructure planning, and community engagement strategies. Through these convenings, rural cooperatives gained insights into leveraging new federal funding opportunities, developing community benefit plans, and optimizing hybrid energy systems. By fostering collaboration across sectors, these workshops provided a foundation for cooperatives to build resilient, scalable DER strategies that align with their operational needs and member priorities.

Publication link: docs.nrel.gov/docs/fy25osti/92427.pdf

How To Contact NREL

To learn more about NREL's tools, datasets, and partnership opportunities, visit www.nrel.gov/workingwithus or email Carishma Gokhale-Welch at Carishma.Gokhale-Welch@nrel.gov.

[4] https://ladailypost.com/kit-carson-electric-coop-hits-100-daytime-solar-power/

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