Institutional and Policy Landscape for Solar-Plus-Storage Deployment by Electric Cooperatives

Solar-Plus for Electric Co-ops

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SPECs
Solar-Plus for Electric Co-ops

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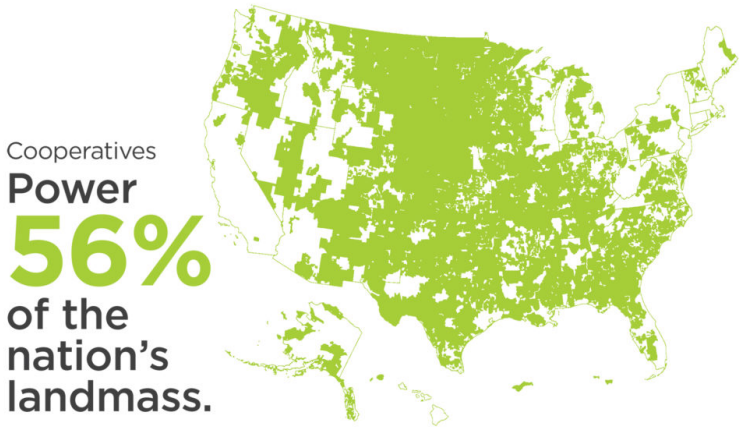
Executive Summary

As co-location with battery storage has become a significant solar project-design trend across the United States, policies at all levels have started to adjust. Generally, these policies address battery storage development in major, urban markets, served by large investor-owned utilities (IOUs). Yet all kinds of utilities nationwide are seeking ways to tap into the fast-growing battery storage market, and they are all stakeholders in the federal, state and local policies that impact the storage market's development. The electric cooperative sector, which includes some 830 distribution utilities and 63 generating and transmission (G&T) utilities across a mostly rural landscape, is no exception. It is impacted by federal, state, and local government policy requirements and incentives, as well as by policies that are controlled by the sector's own institutions. The objective of this paper is to identify and discuss the various policy and institutional factors that are relevant to the electric cooperative sector, and especially to local, distribution-level electric cooperatives (co-ops) that may be interested in procuring energy storage.

Given this, the paper is largely written from the local co-op perspective. It also may be useful to wholesale G&T cooperatives. Other parties that may find the paper useful include storage developers, who are often unfamiliar with co-ops; local and state policymakers addressing policy options for this sector, and local renewable or storage stakeholders, who wish to understand the policy landscape affecting their local utility. Although co-op energy storage programs may tap customer-side batteries, this examination is focused on utility-side "front of the meter" projects and the policy issues they raise.



Source: National Rural Electric Cooperative Association (NRECA)

Electric co-ops serve more than half of the U.S. landmass, though in all, distribution co-ops serve only about 12% of all U.S. electricity needs. (Source: NRECA)

This paper is produced as part of the Solar-Plus for Electric Co-ops (SPECs) project, led by Cliburn and Associates and including partners at North Carolina Clean Energy Technology Center (NCCETC) and three electric co-op storage leaders (Cobb EMC, Kit

Carson Electric Cooperative, and United Power), with assistance from a range of industry stakeholders. SPECs is part of the Solar Energy Innovation Network (SEIN) of the National Renewable Energy Laboratory (NREL), which is supported by the U.S. Department of Energy's Solar Energy Technologies Office. The majority of work under the SPECs project is focused on increasing the speed and impact of co-op solar-plus-storage procurement. However, the authors recognize policy as setting the context for procurement. Any solar-plus development work must be approached with an eye toward current policies that affect storage use-cases, as well as toward new policies that could further solar-plus development goals.

The authors examine three levels of policy that impact solar-plus-storage development in the electric co-op sector. These are 1) state and local policies, 2) federal policies and the regional policies they oversee, and 3) policies and conventions that stem from institutions in the co-op sector, and especially those stemming from the relationship between local distribution co-ops and the state or regional G&T co-ops.

A review of state and local policies that affect solar-plus-storage development, from renewable portfolio standards (RPS) and integrated resource planning (IRP) requirements to more recently developed clean peak standards, indicates how co-ops and the co-op sector as a whole are often treated differently from IOUs. IOUs are state-regulated, whereas in most states, co-ops are considered to be self-regulated by boards that are elected from the co-op membership. There are exceptions to self-regulation for certain policies and in certain states. Further, state legislation and regulations often recommend that co-ops consider voluntarily adopting statewide policies, such as RPS targets. Exemption from state regulation sometimes frees the co-op sector to innovate and customize energy solutions, but it also may result in lagging innovation. In some cases, co-ops and other self-regulated, public power utilities are excluded from state programs that offer technical assistance or funding to investor-owned utilities for solar-plus-storage innovation.

Federal policies, such as those put forth by the Federal Energy Regulatory Commission (FERC) in support of regional energy markets, generally apply to all wholesale market players, including co-op G&Ts and other wholesale power suppliers. However, markets are developed and implemented by independent system operators (ISOs), and thus vary from region to region, affecting the co-op sector differently in turn. The recent choice by Colorado-based Tri-State G&T to join the Southwest Power Pool (SPP) suggests that when a choice of markets is available, G&Ts will carefully weigh their alternatives.

Other emerging aspects of federal policies that impact solar-plus-storage development in the co-op sector which are reviewed in this paper include:

- The eligibility guidelines for using solar-plus-storage incentives, and in particular, use of the solar and solar-plus-storage Investment Tax Credit (ITC), which has unique impacts on non-taxable electric co-ops. In the past, co-ops benefited from incentives that were not tied to tax liability (e.g., a short-lived Grant in Lieu of Tax Credit). Currently however, co-ops tend to use alternative financing, such as power purchase agreements (PPAs) and energy storage

agreements (ESAs), or other work-around financing strategies, to obtain partial ITC benefits. Congressional passage of an ITC for stand-alone storage would benefit co-ops, but also increase the competitive advantage of taxable utilities and developers, unless alternative incentives are offered.

- The electric co-op sector awaits full implementation of tariffs in keeping with FERC Order 841, which allows storage to participate in energy, capacity, and ancillary service markets. In some regions the development of ISO guidance is not yet complete, leaving co-ops to guess whether new storage developments should be planned to tap certain market-based value streams.

- Implementation of FERC Order 2222 and related developments in distributed energy resource (DER) aggregation will determine how electric co-ops pursue solar-plus-storage partnerships with their customers and whether they will face competition from non-utility aggregators

The long-standing relationship between local distribution co-ops and the wholesale G&T cooperatives that serve them is being reexamined due to the emergence of DERs. These include customer-owned technologies as well as solar-plus-storage resources that are on the distribution co-op's side of the meter. Such resources play a key role in local grid modernization; by the same token, they require a re-examination of G&T policies, contracts and services.

Contracts between local co-ops and G&Ts or other wholesale power suppliers often limit the amount of generation capacity that distribution co-ops and their customers can own or place on the grid. In the past, "all-requirements" contracts were commonplace. Today contracts may cover partial requirements or offer options for local solar and solar-plus development. It is still common for G&T contracts to limit local electric co-ops to meeting only a small percentage (commonly 5% or less) of their peak load with self-generation—and often storage is considered in this context as generation. In general, G&Ts have protected their role as the aggregator for local co-ops' generation and transmission needs, with an ability to share the benefits of scale and to provide financing and technical expertise that would be beyond the grasp of most local co-ops. G&Ts wish to preserve these strengths, even as they adapt and change. This paper cites several cases where the relationships between local co-ops and their G&T providers are opening up so that storage could become part of a flexible grid resource and renewable energy integration strategy, even extending to programs on the customer side of the meter.

The case of Kit Carson Electric Co-op (KCEC), in Taos, New Mexico, provides a glimpse of how local co-ops may use storage and solar-plus-storage strategies to achieve high renewables goals. KCEC recently acquired 15 MW of battery storage as it reached a milestone of serving daytime needs entirely with renewables. However, KCEC began implementing its high-renewables strategy with its departure from Tri-State G&T, in part because of the G&T's constraints on DERs. The G&T has since offered alternatives

that could relieve remaining Tri-State member co-ops from at least some of those constraints and support a more diverse set of resource options.

The paper explores other promising strategies, highlighting collaboration on local solar-plus-storage development. For example, North Carolina Electric Membership Corporation (NCEMC) has procured a total of five energy storage microgrids on its members' distribution systems, especially to meet storm-related resiliency needs. One key to NCEMC's success so far lies in attention to detail as local co-op stakeholders have expressed priorities that may differ somewhat from the more centralized G&Ts view. Other G&Ts, such as Oglethorpe Power Corporation, working through its affiliated Green Power EMC, remain focused on developing wholesale renewable energy resources, but also have reached out to provide technical assistance for local projects.

As the electric co-op sector explores many facets of achieving grid modernization and high-renewables goals, solutions are beginning to emerge from every region. This paper provides an introductory view of these developments. As local co-ops review the full range of relevant federal, regional and state policies, as well as established and emerging G&T policies, they may see new ways to advance local storage and solar-plus-storage project development in ways that increase benefits for a range of stakeholders.

Looking beyond the direct impact of policies on co-ops and on their relationships with wholesale G&Ts, the storage industry itself can benefit from a better understanding of how policies uniquely affect project development in this sector. Developers in particular are cautioned to double-check how federal and state policies, as well as wholesale relationships, may impact specific co-op projects. An overarching conclusion of this paper is that to be effective partners, local co-ops and other stakeholders in storage and solar-plus-storage development need a baseline understanding of relevant technologies and policies on which to build a foundation of trust.

Keywords: electric cooperatives, co-ops, generation and transmission cooperatives, G&Ts, solar-plus-storage, solar-plus, energy storage, battery, policy, wholesale power contracts

Summary Table
Policies, G&T Relationships and Regional Market Rules Affecting Local Co-op Solar-Plus Projects, By Project Value Streams Affected

	Government Policies	G&T Issues	Wholesale Market Rules
All Value Streams	- Tax and other direct incentives - Local permitting and zoning	- All-requirements provisions - Storage categorization	- Storage ownership rules - Market participation requirements - Aggregation rules
Local Demand Reduction	- Resource planning	- Rate design	
Coincident Peak Demand Reduction	- Resource planning	- Rate design	- Existence of capacity market - Capacity market participation limits for storage
Ancillary Services	- Compensation rules	- Rate design	- Market participation requirements - Presence or absence of ancillary service markets
Energy Arbitrage	- Compensation rules	- Rate design	- Market participation requirements
Local Grid Reliability	- Distribution System Planning		
Distribution Deferral/NWS	- Compensation Rules - Distribution System Planning		- Rules on storage as a T&D asset

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Further information posted at Solar Plus for Electric Co-ops

Disclaimer

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1 Introduction

The U.S. electric cooperative sector includes some 830 local distribution cooperatives (co-ops) and 63 generating and transmission (G&T) utilities. About 12% of the nation's total retail electricity is delivered by local electric co-ops. The challenges of serving electricity needs across a mostly rural landscape, including most of the nation's persistently impoverished counties, have not deterred the sector from addressing renewable energy and grid modernization needs. However, markets for renewable energy and specifically solar-plus-storage development and the policies that guide them are often designed primarily with large investor-owned utilities and their regulatory structures in mind.

The objective of this paper is to identify and discuss the various policy and institutional factors that are relevant and particular to the electric cooperative sector, and especially to local, distribution-level co-ops that may be interested in procuring energy storage. Although co-op projects that tap customer-side battery storage represent a viable program option, this examination is focused on utility-side "front of the meter" battery storage and solar-plus-storage projects and the policy issues that they raise.

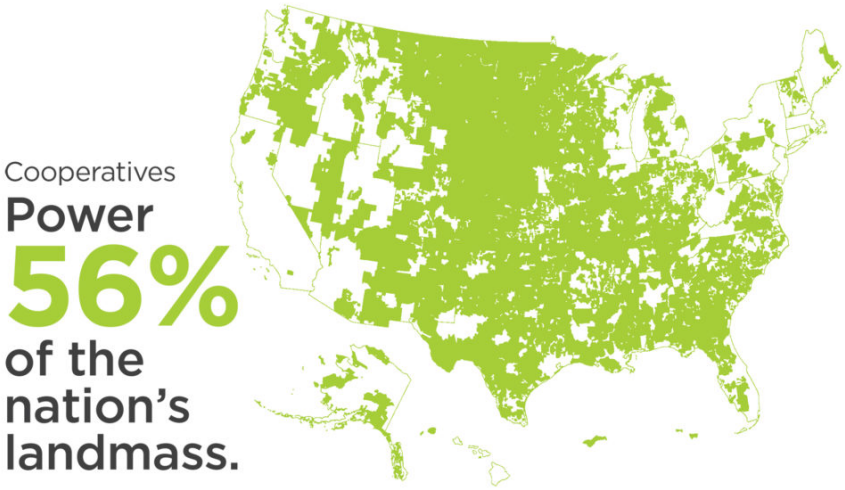

Figure 1. Electric co-ops serve more than half of the U.S. landmass, though in all, co-ops serve only about 12% of all U.S. electricity needs.

The work is produced as part of the Solar-Plus for Electric Co-ops (SPECs) project, which was co-funded by the U.S. Department of Energy, National Renewable Energy Laboratory and the Solar Energy Innovation Network (SEIN). The SPECs project was one of eight collaborative projects chosen for SEIN Round 2 (2020-21), and completed by Cliburn and Associates, with partners at North Carolina Clean Energy Technology Center (NCCETC) and three local electric co-op storage leaders (Cobb EMC, Kit Carson Electric Cooperative, and United Power), as well as with participation from a range of industry stakeholders. The majority of work under the SPECs project is focused on solar-plus-storage procurement. However, the authors recognize policy as setting the context for procurement. Any solar-plus development work must be approached with an

eye toward current policies that affect storage use-case development and toward emerging policy needs.

The paper examines three levels of policy that impact solar-plus-storage development in the electric co-op sector. These are 1) state and local policies, 2) federal policies and the regional policies they oversee, and 3) policies and conventions that stem from institutions in the co-op sector, and especially those stemming from the relationship between local distribution co-ops and the state or regional G&T co-ops.

2 Policies Impacting Solar-Plus-Storage Development

2.1 State and Local Policy Provisions

Deployment Requirements

Many states have requirements for utility deployment of renewable energy resources. Typically, those requirements have come in the form of renewable portfolio standards, also called RPS policies (NCSL, 2021). The application of RPS policies to electric co-ops is often different than for investor-owned utilities (NCSL, 2021). Energy storage is not, in itself, a renewable generation resource, but states that require a high percentage of renewables recognize the need to accompany renewable resources with storage, and thus, storage is being addressed in a growing number of state RPS policies. Some states have adopted policies targeting deployment of energy storage specifically (Colthorpe, 2020). Leading states among these include New York, New Jersey, California, Nevada, Massachusetts, Oregon and Virginia, and with the speed of the renewable energy transition underway, it pays to check for updates in any given state. For electric co-ops, key questions are whether or how state RPS policies apply to them. For example, one state with aggressive storage deployment targets, New York, does not apply these targets to the co-op sector (Gallant, 2019). In other states, RPS policies may require actions by co-ops that affect their wholesale power contracts—for example if they have all-requirements provisions (NCEMC and DEP, 2020).

Clean Peak Policies

A few states have adopted or considered clean peak policies, which aim to increase the amount of renewable energy being used to meet demand during peak times. As many renewable energy sources cannot be dispatched on demand without storage support, energy storage plays an important role in complying with clean peak standards. Clean peak policies are similar to RPS policies in that they require a certain percentage of electricity to come from renewable or carbon-free sources, except that these policies pertain to electricity specifically used during peak times.

The first state to adopt a clean peak standard was Massachusetts, which adopted the policy in March 2020 (Maloney, 2020). Its relevance to the electric co-op sector is minimal at this time, because Massachusetts does not have electric co-ops, and the standard does not apply to municipal utilities (munis). However, Arizona, California,

North Carolina, and New York have considered the policy. If these or other states adopt clean peak policies, they could affect co-ops. Compliance in Massachusetts requires that utilities purchase a percentage of their electricity from resources designated as clean peak resources. The designation and management of these resources is done by state regulators, so utilities that are affected are automatically brought into compliance. (CPS, 2020).

Incentives

States have adopted tax credits, exemptions, and other incentives for deployment of energy storage (ESA, 2019). State tax credits are not directly applicable to electric co-ops, due to the co-ops' non-profit, non-taxable status. Co-ops may receive a portion of such benefits indirectly, e.g., third-party power purchase agreements (PPAs) and energy storage agreements (ESAs), or through alternative incentives aimed specifically for them, e.g., low-interest loans (NRECA, 2021). Other state incentives have been designed specifically to address large, investor-owned utilities, bypassing electric co-ops (NYSERDA, 2021). Project planners are advised to check a database, such as the Database of Incentives for Renewable Energy (https://www.dsireusa.org), to verify which incentives apply to the co-op sector in their state or region.

Utility Compensation Policies

Compensation policies refer to policies such as net metering and Public Utility Regulatory Policy Act of 1978 (PURPA) contract rules that govern how utilities must pay for electricity supplied by non-utilities, and most often by customers. While the focus of this paper is on projects on the utility side (front of the meter), some co-op programs may involve behind-the-meter customers or other non-utility partners.

States that have considered compensation generally have ruled that paired solar-plus-storage projects are eligible for net metering. A few states, e.g., Hawaii and New York, have introduced separate policies for compensation of paired systems in order to manage the ability of storage to draw electricity from the grid (Zinaman et al., 2020). As with many other state policies, these apply variously to electric co-ops, and checking a current policy database is advised.

Resource Planning

Some states require utilities to undertake integrated resource planning (IRP) as a means to submit longer-term plans for electricity supply for regulatory review (Wilson & Peterson, 2011). IRP objectives differ, but they often seek to minimize resource costs and customer rates, minimize environmental impacts, maintain resource diversity, and minimize risks. In states that require IRP, the rules do not always apply to electric co-ops. Furthermore, some states require utilities to create resource plans, but do not require regulatory approval of these plans. IRPs may also be required for customers of power marketing agencies; customers of the Western Area Power Administration (WAPA), for example, are required to submit IRPs every five years (WAPA, 2020). Even in areas where IRPs are required, these requirements are typically more stringent for G&Ts than for distribution co-ops, as distribution co-ops typically have few generation

assets. Nevertheless, IRP processes may affect interactions, including contract terms, between distribution co-ops and their G&Ts.

IRP processes are variously useful for assessing the practical value of batteries or other storage strategies at the distribution or wholesale level. For example, a recent study of 21 utility IRPs, led by Pacific Northwest National Laboratory (PNNL), found that "comparing storage resources in a traditional IRP model alongside other resource options results in a process that identifies all of the costs of energy storage, but few of the benefits." (Cooke et al., 2019) As states update their IRP processes, they are likely to address multiple storage-value streams, as well values for a range of DERs.

Distribution System Planning

As an analog to IRP, some states have begun to implement requirements for long-term planning for the distribution system (Cooke et al., 2018). Local co-ops operate on the distribution grid, so distribution system planning may apply to them more directly than IRP does (Awadallah, 2019). In the co-op sector, there is a trend toward more detailed grid modernization. Local utilities may incorporate utility-side energy storage to tap multiple value streams, including those that address modern grid integration.

Local Permitting and Zoning

Electric co-ops are often located in rural areas. Therefore, they might be expected to face fewer obstacles regarding local land use than utilities and storage developers working in more densely populated areas. In fact, land use issues may be an important consideration for electric co-ops considering storage deployment, particularly when storage is planned with solar or other generation resources that use a relatively large amount of land.

Paired solar-plus-storage projects may face permitting at both the state and local levels, although smaller facilities may be exempt from some elements of the permitting process. For instance, Virginia has a less strict permitting process for solar facilities below 5 MW (Church, 2020), which generates more potentially viable candidate sites. However, local permitting processes still apply, and residents with concerns about impacts on agricultural land use or amenity value may present obstacles for these projects (Marcilla, 2021). Fire safety issues are also considerable for battery storage, and because some local departments are not familiar with battery storage, co-ops may need to play an educational role, in order to achieve the comfort level that local officials require. A review of co-op energy storage case studies suggests that they can often succeed at easing opposition to solar and storage development when they plan to share benefits with local stakeholders (NRECA, 2020).

2.2 Federal Policies

Investment Tax Credit

A corollary to state tax credits, discussed above, is the federal Investment Tax Credit (ITC). Although the ITC is primarily a solar incentive, it may be applied to energy storage investments, provided that annual storage operations are at least 75% charged by on-site solar generation. Assuming the project meets this threshold, storage benefits are proportional to solar charging. For instance, a battery that would be charged by solar 90% of the time is eligible for 90% of the ITC. The solar ITC was extended in late 2020; it had previously been scheduled to step down to 22% in 2021, but will now remain at 26% until 2023, when it declines to 22%, and then 10% in 2024 and later years (for residential solar, the credit goes to 0% in 2024).

The tax rules affecting electric co-ops may limit their ability to use the ITC. Co-ops are non-profit and non-taxable; they cannot receive the ITC directly (NRECA, 2016). This limitation is eased for co-ops that have a taxable development partner with sufficient tax liability. Such a provider, including, potentially a taxable subsidiary of the electric co-op, can claim the tax credit and share the benefit through more advantageous pricing for the PPA or ESA. Alternative financing arrangements, e.g., the tax-equity flip, also allow non-taxable co-ops to take advantage of the tax credit.

In past years, federal incentives have included special options that appeal to the co-op or public power sector, e.g., low-interest loans or a grant in lieu of tax credit. Project planners may check the current status of available incentives. If passed, the recently proposed American Jobs Plan would make stand-alone energy storage systems eligible for the ITC (Plautz, 2021). Several bills introduced in 2021 also have proposed this policy change. (Balaraman, 2021). This may reduce hybrid solar-plus-storage development in the short term, but the synergies of pairing solar-plus-storage go beyond the ability to access a financing incentive.

FERC Orders

The Federal Energy Regulatory Commission (FERC) is the main federal agency responsible for rules governing electricity markets. FERC has jurisdiction over wholesale electric sales that involve interstate commerce. FERC jurisdiction has an exception for electric co-ops that sell less than 4 million MWh of electricity per year, as well as for the agencies of these co-ops; as a result, few G&T cooperative associations actually are regulated by FERC. Most electric co-ops are instead regulated by state entities (Smyth, 2019). FERC decisions nevertheless influence energy market trends, and FERC can impact co-ops through its rulings on upstream energy market participants.

Several FERC decisions issued in recent years have implications for energy storage. The first of these decisions is Order 841, issued in 2018. This order required wholesale electricity markets to take steps to facilitate the participation of energy storage. The specifics of implementation among the different market regions differ, but this order

generally resulted in the adoption of rules allowing storage to participate in energy, capacity, and ancillary service markets (Kamaluddin et al., 2019).

Another major decision with implications for energy storage is FERC Order 872, issued in summer 2020. This order affects state rules implementing PURPA (FERC, 2020). Order 872 in effect weakened PURPA requirements, as it reduced the maximum capacity that qualified facilities must reach before being presumed to have access to wholesale markets, and it allowed for utilities to use competitive procurement processes to pay for power from qualifying facilities (QFs) in more cases (Morehouse, 2020).

The most recent FERC order with implications for energy storage is Order 2222, issued in September 2020. This order requires wholesale markets to allow participation by aggregators of DERs (CPower, 2020). Rules implementing this order have not yet been issued at the independent system operation (ISO) or regional transmission organization (RTO) level, so the full implications are not yet clear. Order 2222's effects are not necessarily confined to areas with an ISO or RTO, however; the Order's definition of wholesale markets may result in it applying to additional regions, with implications for utilities at all levels of the electricity system. FERC amended Order 2222 in March 2021 in order to also include demand response as part of DER aggregation packages (Morehouse, 2021). Front-of-the-meter utility storage is not the focus of this ruling, but the ruling may affect the co-ops' distribution-level storage and how co-op-provided or customer-provided services, such as frequency regulation, could be aggregated and sold in regional markets.

Another issue that FERC may address soon relates to the treatment of energy storage capacity under PURPA. FERC has not yet clarified whether energy storage capacity counts as generation capacity for PURPA qualified facilities (Morehouse, 2020). Although few co-op projects involve applications of PURPA, FERC's opinion on whether energy storage capacity counts as generation under PURPA would have implications for how this issue is treated in other legal forums. For now the issue remains unresolved.

2.3 Regional Market Rules

For local electric co-ops in most states, the impacts of regional market rules are felt secondarily, as they primarily affect G&Ts, other wholesale suppliers and developers that offer value-aggregation services. However, local co-ops are increasingly aware of secondary impacts, and some co-ops that are not members of G&Ts, may face decisions about whether their solar-plus-storage projects could provide upstream values (e.g., ancillary services), and if so, whether it would be wise to work with a given wholesale provider or storage aggregator.

As a result of FERC Order 841, the nation's ISOs and RTOs have issued rules to facilitate the participation of energy storage resources in their energy, capacity, and ancillary service markets. Beyond the general imperative to allow greater participation by storage, the different wholesale market operators have taken various approaches to storage, with some more restrictive than others.

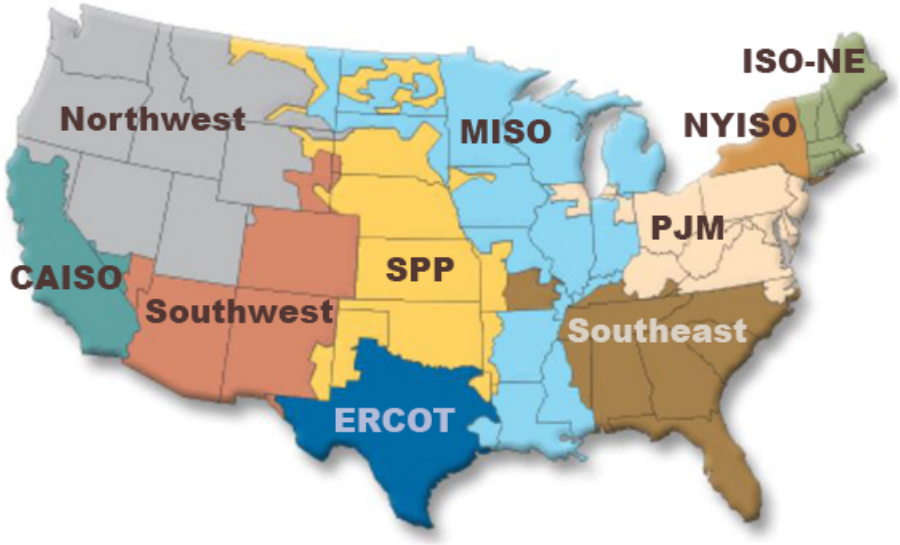

Figure 2. U.S. electric utility Independent System Operators (ISOs) and Regional Transmission Organizations (RTOs) in 2021. Source: FERC

PJM

- PJM received approval for most of its rules implementing Order 841 in October 2019. FERC has yet to rule on its capacity market minimum run-time requirement.

- PJM currently requires resources entering into its capacity market to meet a 10-hour minimum run-time requirement. Resources that do not meet this standard can still bid into the market, but receive a discounted price for the capacity they provide. Because most battery storage systems are not designed to supply electricity for periods that long, this run-time requirement limits the ability of storage to participate in the PJM capacity market.

- PJM recently proposed a new method for allowing storage resources to participate in its capacity markets, called the Effective Load-Carrying Capability (ELCC) construct. This method is proposed to go into effect on July 1, 2021, and has the support of storage industry advocates. (See Docket ER21-278). More detail on applications of ELCC is provided in task force reports from the PJM and other agencies (Rocha Garrido, 2020)

- PJM also has a provision called the Minimum Offer-Price Rule, or MOPR, which prevents bidders that offer state-subsidized resources to its capacity markets from offering prices below a certain level. This rule may limit the ability of renewable and renewable-plus-storage resources to sell into this market (Dennis, 2020).

MISO

- MISO received approval for its approach for implementing Order 841 in 2019, but it has delayed implementation, with the most recent request for delay coming in March 2021. That request sought a delay until March 2025. It was denied, and the implementation deadline currently is in early June 2022 (Plautz, 2021).

- MISO has a non-mandatory capacity market; most states in MISO's territory are traditionally regulated, and utilities supply most of their own capacity needs; however, a yearly auction allows utilities to acquire supplemental capacity resources.

- In August 2020, MISO received approval to allow storage facilities to receive cost-recovery as transmission-only assets. This ruling opens up additional revenue opportunities for storage in the MISO region, outside of its energy, capacity, and ancillary service markets. MISO is the first ISO/RTO to seek this treatment for storage.

SPP

- SPP received approval for its Order 841 implementation rules in 2019, but it has delayed implementation until August 2021.

- SPP does not offer a capacity market. However, it offers ancillary services markets for supplemental, spinning, and regulatory reserves.

- Efforts to expand the SPP market to include more utilities in the Mountain West region stalled in 2018, with the decision by Xcel Energy, a major investor-owned utility in Colorado, to exit the Mountain West Transmission Group. However, several utilities in the region, including Tri-State G&T, joined a new energy imbalance market opened by SPP in February 2021.

CAISO

- CAISO received approval for its rules implementing Order 841 in November 2019. CAISO primarily referred to its existing rules in complying with Order 841, stating that it was already largely in compliance.

ISO-NE

- ISO-NE received approval for its rules implementing Order 841 in November 2019.

- ISO-NE previously allowed new bidders into its capacity market, including energy storage providers, to lock in prices received in their initial auction. This provided

a guaranteed revenue stream for new market entrants. However, FERC overturned this rule in late 2020 (Thill, 2020).

NYISO

- NYISO was the first ISO to fully implement its rules complying with Order 841; its rules went into effect in August 2020.

- New York has extensive state-mandated energy storage deployment goals, with a target of 1,500 MW by 2025 and 3,000 MW by 2030. A Dynamic Load Management (DLM) program, encompassing demand-response and storage technologies, was introduced in 2020 to support NYISO implementation towards this goal. As the program is aimed for IOUs, and there are few co-ops in the state, the state goal and DLM program serves co-ops primarily as a pace-setting demonstration.

- Utilities in New York may not directly own battery storage, placing primarily responsibility for development of the state's storage market on independent developers and customer-side projects.

- NYISO's buyer-side mitigation rules are similar in concept to PJM's MOPR. NYISO attempted to exempt renewables and storage from these rules but was rejected by FERC in September 2020.

ERCOT

The Electric Reliability Council of Texas (ERCOT) is a unique regional market in that, being entirely within the state of Texas, it is not subject to federal regulation. Compliance with FERC orders is not required for ERCOT. However, the absence of federal regulation does not mean that the issues prompting those regulations do not exist, and ERCOT has been dealing with many of the same issues concerning energy storage integration as the other wholesale markets. ERCOT serves a significant number of public power agencies and electric co-ops, including Pedernales Electric Cooperative, which commissioned a large utility-side battery in 2020.

Unlike most other regions, ERCOT does not offer a capacity market, instead using only energy and ancillary service markets. Investor-owned transmission and distribution utilities in the ERCOT region are generally prevented from owning generation assets, which are defined to include energy storage. However, independent power producers (IPPs) have opportunities to develop storage, and electric co-ops and public power utilities won an amendment to the law in 2019, allowing them to own storage assets. Additional policy changes in Texas are likely, too, in the wake of reliability issues that surfaced in 2021; co-ops and solar-plus development partners are advised to keep abreast of these changes.

3 Electric Cooperative Institutional Factors

This section discusses policies and contractual requirements that define local electric co-op relationships to their power suppliers. Most local co-ops belong to G&T cooperatives. In some cases, those wholesale G&Ts themselves have formed regional cooperative G&Ts. The contractual relationships among these providers and their members can be complex and varied. The discussion here is focused on aspects of these relationships and contracts that affect storage and solar-plus-storage development. Note that in some cases, local co-ops do not belong to a wholesale G&T, but they still have wholesale power contracts and relationships with other players in regional power markets.

3.1 Wholesale Power Contracts

All-Requirements Provisions

Since the arrangements between G&T wholesale power providers and their distribution co-op members were not developed with energy storage and grid-integration in mind, the contractual norms that guide G&T and member relationships around solar-plus-storage are beginning to change to facilitate higher-value solutions.

Contracts between distribution utilities (e.g., co-ops and munis) and G&Ts or other wholesale power suppliers often limit the amount of generation capacity that distribution co-ops and their customers can own or place on the grid. Power supply contracts can either be "partial-requirements" contracts or "all-requirements" contracts. Under partial-requirements contracts, the wholesale G&T supplies a distribution utility with some defined amount of electricity and possibly other services. Such contracts generally do not limit the generation sources that the distribution utility may own and use, except to the extent that they would cause the distribution utility to have so much generation capacity that it prevents the G&T from supplying its contracted quantities. Partial-requirements contracts allow distribution utilities more flexibility and ability to self-supply their generation needs (Tri-State, 2020). However, contract specifics vary; even partial-requirements contracts may not meet the distribution co-op's flexibility needs. (United Power, 2020).

The more restrictive arrangement between distribution co-ops and wholesale suppliers is the all-requirements contract. All-requirements contracts generally state that the G&T supplies all of the distribution utility's generation and capacity needs, save for certain defined exceptions (Chan, 2019). All-requirements contracts provide distribution utilities with security that all of their generation needs will be met, while limiting their ability to use their own or third-party generation sources (Veazey, 2019).

Categorization of Storage as Generation

Because it is generally dispatchable, but is not original-source generation, the treatment of energy storage under wholesale power contracts has been open to various interpretations. Some G&Ts do not treat energy storage as generation for the purpose of

wholesale contract limitations. In that case, all-requirements provisions limiting distribution utility-owned generation do not restrict a local co-op's ability to own and operate storage at all (NCEMPA & DEP, 2017). Other G&Ts treat storage as analogous to generation and do count storage against distribution utility capacity allocations (I. Bhattacharya et al., personal communication, March 4, 2021). As storage is a recent entrant into electricity markets, some wholesale contracts are subject to renegotiation to more explicitly address storage (J. Stallman, personal communication, February 11, 2021).

From the perspective of distribution utilities, wholesale contract terms that do not treat storage as generation are less limiting, as they allow distribution utilities to deploy storage outside of generation capacity limits. G&T providers may, on the other hand, seek to revise these terms, as unlimited use of storage could result in unforeseen reduction of revenue provided by demand charges or could cause other disruptions to G&T revenues or business models (J. Stallman, personal communication, February 11, 2021). Contract terms that address storage specifically, rather than treating it as either generation or exclusively as a demand-side resource, could allow for more precise treatment of storage that recognizes its unique capabilities and attributes.

FERC recently made a declaratory ruling regarding the treatment of energy storage in the wholesale contract between the North Carolina Eastern Municipal Power Agency (NCEMPA), a municipal wholesale supplier, and Duke Energy Progress (Hale, 2020). FERC ruled that the contract's terms allow storage to be used as a demand-response resource, meaning that generation capacity constraints in the contract do not apply to storage. This ruling pertains specifically to the contract between Duke Energy Progress and NCEMPA. Therefore, it is unknown whether FERC might rule similarly for disputes involving other FERC-regulated utilities and contracts. For example, FERC has upheld the rules under which Tri-State G&T governs energy storage deployment by its member co-ops (Tri-State, 2020). Yet the ruling gives a strong indication that FERC may take a relatively broad view in its understanding of storage under wholesale contracts that do not specifically address storage's role.

Exceptions for Distribution Utilities

All-requirements provisions often have limited exceptions for distribution utilities to own and operate generation assets. Some of these exceptions are related to policy requirements; all-requirements contracts may have provisions allowing distribution co-ops to meet their obligations under RPS policies (for instance, NCEMC and DEP, 2020). Other exceptions allow for distribution utility ownership of legacy generation resources or generation intended to support economic development (NCEMPA and DEP, 2017).

Many all-requirements contracts also allow a small percentage of generation resources to be owned and operated by distribution utilities more generally, without specific purpose-based exceptions. This percentage is often a single-digit percentage (commonly 5% or less) of the distribution utility's peak load. As discussed in the rate design section below, there may be caveats on the possible uses for this self-owned generation.

Partial-requirements contracts, on the other hand, do not limit distribution utilities' ability to deploy generation (or storage) beyond requiring that the distribution utility use the amount of energy and capacity supplied by the G&T.

Exceptions for Customers

All-requirements contracts may have exceptions, allowing the customers of distribution utilities to own generation. Customer-owned generation may or may not be taken out of the allocation for distribution utility-owned generation; this can also vary depending on whether the resources are in front of or behind the meter, or based on the capacity of the individual customer-owned generation facilities. (NCEMPA and DEP, 2017). State net metering and PURPA policies can influence contractual requirements in this area. For example, if a state requires that utilities allow a certain amount of their capacity to be provided by net metering customers or requires that distribution cooperatives purchase capacity offered by PURPA qualifying facilities, then wholesale contracts must accommodate that requirement. As policies that support customer-owned DERs expand, local co-ops that are prevented from adding local renewables by their wholesale power contracts may see, instead, that customers initiate new DERs, which cannot be controlled by the G&T. In this case, the wholesale provider could see a significant erosion of sales, even as it holds its local co-ops to an all-requirements contract or low limit for allowable solar-plus-storage assets. Solutions may require participation of the wholesale provider, the distribution co-op, and its customer/members.

Rate Structures

The means by which local generation and storage assets are credited under wholesale-supply contracts are varied. Sometimes, they limit the economic viability of projects, even when local ownership is technically allowed. This is the case for an early and persistent driver of energy storage project, the ability to reduce the co-ops' wholesale demand charges or a high coincident-peak demand charge in relation to regional system demand. Many local electric co-ops face high demand charges, estimated in the range of $10 to $20 per kW/month (NRECA, 2017). A significant number of solar-plus-storage projects for electric co-ops today address opportunities for demand-charge reduction. An increasing number of G&Ts are reviewing whether avoiding local demand charges may affect non-participating G&T members, and whether there are equitable alternatives to standard demand-charge rates structures.

Some wholesale power contracts do not allow distribution utility-owned resources to be used to directly reduce peak demand; instead, the contract requires the capacity of those resources to be bid into external markets, typically resulting in a lower value than would result if the resources could be used to reduce local demand. Alternatively, some wholesale contracts allow for a certain amount of peak reduction through self-owned resources, and then require the remainder to be bid into external markets. Contracts may also include additional charges for resources owned by the distribution utility. These charges may include fees for backup power, transmission requirements (including coincident peak demand charges), and charges for ancillary services that the G&T uses to support member-owned generation (CNEE, 2019). A review of the details of the local

co-op's supply contract should take place early in the project planning process, because in some cases, contract terms are unclear and subject to interpretation.

Wholesale power supply contracts typically include both energy and demand or capacity rate components, although exceptions exist. For example, Oglethorpe Power Corporation, the G&T provider for many distribution co-ops in Georgia, does not have a demand component in its wholesale rates. Yet, regional generation planners in Georgia are aware of the long-term consequences if peak demand begins to drive new capacity costs (J. Pratt, personal communication, January 14, 2021). Increasingly nationwide, more finely tuned strategies, from time-of-use rates to emerging real-time pricing options, are being applied to balance regional energy supplies. In future years, storage is likely to play a role in optimizing most of these rate and pricing strategies.

3.2 Contract Renegotiation Opportunities and Risks

Wholesale contract terms are binding, but depending on the time period these contracts cover, the provisions for exit of parties, and the willingness of parties to negotiate, long-term contract terms may be revised. In fact, a project that relies on current provisions in a wholesale contract remaining unchanged indefinitely may be assuming an unrealistic level of risk.

Rate changes are a major source of potential risk for storage projects. A storage facility that garners most of its value from peak-shifting might lose value if demand charges are replaced by a different rate structure. Conversely, storage could present a risk-hedging tool for renewable generation facilities, in case of future demand charges or time of use rates. Solar-plus-storage facilities typically produce electricity during mid-day hours, while storage can help to make solar generation's value less dependent on rate structures and load patterns. Risks presented by possible rate changes may be partly addressed through corresponding provisions and operational flexibility in the energy storage agreement, if the local co-op chooses a business model that includes working with a storage services provider. In some cases, a wholesale rate change may make the storage project even more valuable for the local co-op.

Another contract provision that is subject to change is the classification of storage as either generation or as a resource for distribution system management. Although some wholesale contracts currently do not treat storage as a generation resource and therefore do not limit the storage capacity that the distribution co-op can install, G&T utilities may seek to renegotiate these terms in the future.

The potential for contract terms to be renegotiated cautions against storage projects that rely on stringent contract terms in order to provide value. This potential also makes it important for distribution utilities to have a strong, or at least communicative, relationship with their G&T. A distribution co-op that is interested in deploying storage but is hampered by contractual rules or rates may conduct analyses of how the storage project would fare if different contractual provisions existed. In some cases, the parties can reach a mutually advantageous new agreement. In rare cases, distribution co-ops

have negotiated to leave their G&T entirely–generally for reasons that go well beyond a lack of concurrence on solar-plus-storage.

It may be hard to see why a distribution co-op might be concerned about the possibility of a renegotiation that would adversely affect its storage projects. If a future proposed contract modification were not agreeable, why would the co-op have to consider it? In fact, most contract renegotiations cover terms that affect the entire utility, so the co-op might feel pressured to accept provisions that hurt some of its projects, in order to resolve unrelated issues. A general reduction in demand charges, for example, may hurt the economics of battery storage projects but help the utility's overall financial position. As such, local co-ops should keep in mind the potential for changes to contract terms when evaluating storage projects. One remedy might be for the local co-op to review its storage energy services agreement or warranty provisions, to be sure the operations of the local solar-plus-storage project could be adjusted, in case future value streams change. The range of value streams that can be combined and recombined for storage projects is broad and promising, so long as co-ops have good negotiating partners with the G&T, the storage provider, or both.

4 Acquisition Options for Solar-Plus-Storage Projects

Policy and institutional considerations, alongside economic and technical factors, influence how electric co-ops acquire or otherwise make use of solar-plus-storage. This section discusses strategies that electric co-ops in different regions have used to acquire solar-plus-storage, and it discusses the institutional and policy drivers behind those decisions.

The strategies discussed here pertain to the electricity market positions of the utilities involved (i.e., distribution-level co-op or G&T), rather than to the financing and business model for the storage system itself, such as direct ownership by the utility vs. an energy storage service agreement. Most of the models discussed here could incorporate either financing/business model, although policy and institutional factors may influence which of those models a utility might choose. For example, access to the federal ITC for non-profit electric co-ops often impacts the acquisition strategy and project finance. There are agencies in the co-op sector, such as Cooperative Finance Corporation (CFC), CoBank, or the National Renewables Cooperative Organization (NRCO), that are focused on facilitating renewable energy project development, and they are too numerous and complex to detail here. Rather, this discussion is focused on the question of how policies and wholesale-supply relationships in the co-op sector affect acquisition decisions for co-op solar-plus-storage projects.

4.1 Local Storage Assets Directly Acquired for Local Use

The most straightforward development approach is for the distribution co-op to own solar-plus-storage assets itself, deploying those assets to provide services that it needs on its own local system. To make use of this model, a co-op must have the ability, given its wholesale power contracts, to own and operate its own solar-plus-storage capacity.

In order to purchase a battery, the local co-op, which is non-taxable, may have to forego the investment tax credit. Although the cost may be higher, a battery that is not financed with the expectation of the investment tax credit could be charged from the grid to a much greater degree, relative to ITC-eligible solar-plus-battery projects. For example, United Power, a large co-op near Denver, Colorado, purchased a 4 MW battery in 2018. Although ownership brings some flexibility, the battery is still subject to operating requirements under warranty. A variation on this model is gaining prominence. Sometimes the ownership model is be driven by strictly physical factors, as with utilities that are located in geographically isolated areas, where distributed generation is the norm. It also may be driven by the need to balance high levels of renewable generation to meet policy goals, or by opportunities to defer distribution system upgrades while addressing power-quality and resilience needs.

Above: Cobb EMC, in Marietta, Georgia, partnered with a taxable subsidiary, Gas South, to monetize tax credits in acquiring a solar-plus-storage microgrid project.

An alternative model for local co-op acquisition of storage involves use of a PPA for solar energy and a battery ESA for the battery storage. A development partner in these agreements provides the tax exposure required to utilize the ITC. This partner may be a third-party or a taxable subsidiary of the co-op. Along these lines, Cobb EMC, in Marietta, Georgia, partnered with a taxable subsidiary, Gas South, to acquire its solar-plus-storage microgrid project.

Local asset ownership is more likely among co-ops that independently manage their power supplies, instead of participating in G&Ts, which often limit local asset ownership. For example, Kit Carson Electric Cooperative (KCEC) in Taos, New Mexico, recently acquired 15 MW of energy storage, divided between two sites, in order to facilitate an ambitious renewable energy goal of achieving 100% daytime solar resources. KCEC will use storage in a load balancing strategy, increasing the total amount of solar generation that the local grid can reliably accommodate. Another major value that the co-op plans to capture is the reduction of coincident peak demand charges, associated with regional transmission. The co-op also is exploring possibilities to sell storage-related ancillary services in the emerging regional power market and to use one or more battery storage projects for resilience, in the event of forest fires. The flexibility that KCEC has achieved in its storage agreements is in part due to its freedom

to negotiate outside of the conventional co-op relationship with a single G&T power provider. A corollary, of course, is the responsibility it has shouldered to work out new strategies and service agreements in a cutting-edge environment.

4.2 Local Storage Assets Acquired with G&T Support

Electric co-ops with a G&T provider may consider a storage acquisition model that makes use of the G&T's resources to support storage deployment. Under this model, the distribution utility still owns and operates the storage facility (or controls it through a contract with a service provider), but their G&T provides services to facilitate the development and economic value of the project. Such facilitation may include performance of prospective economic analyses, assistance with development and management of RFPs, or use of the G&T or a subsidiary as a storage service provider. Due to their relatively large size, G&Ts generally have more capacity to conduct such work than do distribution utilities.

Some distribution co-ops in Georgia, which receive G&T services from Oglethorpe Power Corporation, make use of this type approach. Although Oglethorpe does not procure or operate local energy storage on behalf of its members, it does assist them with their own storage procurement efforts (J. Pratt, personal communication, January 14, 2021). A partner organization, Green Power EMC, is primarily focused on wholesale renewable energy acquisitions, but it also provides services related to renewable energy to member co-ops. Member co-ops also have pursued individual storage projects, such as the microgrid project at Cobb EMC, in Marietta, Georgia. Cobb does not rely on Oglethorpe for all of its generation needs; as such, the use case for Cobb's storage facilities is based on the peak-shaving benefits that storage provides on Cobb's own system and its perception of long-term market trends, rather than immediate demand charge savings on Cobb's bills from Oglethorpe.

Minnesota's Great River Energy is another G&T that supports local storage and solar-plus acquisitions. Great River provides economic analysis and procurement resources for member co-ops that are considering such projects, based on readily accessed value streams (e.g., demand reduction). The G&T has facilitated storage project deployment at several different scales for its member co-ops (J. Stallman, personal communication, February 11, 2021).

4.3 G&T-Owned and -Operated Solar-Plus-Storage Assets

An alternative model for G&T involvement in energy storage projects is for the G&T to own and operate solar-plus and storage projects, sited to serve member co-ops. This model may be appealing for local leaders that lack confidence in their financial or technical capacity to manage a storage facility directly. It may protect distribution co-ops from some economic risks inherent in ownership. A solar-plus or storage-only facility, owned and operated by the G&T, may be designed and operated with local needs in mind. Of course, a good outcome requires the development of trust on both sides, as some local co-ops may not share their G&T's long-term vision. A review of successful

projects suggests that local co-ops do better when they are well-educated about solar-plus-storage and express their needs clearly. A modicum of tension can drive innovation.

North Carolina Electric Membership Corporation (NCEMC) has pursued this model of storage deployment with several of its member co-ops. (J. Lemire, personal communication, December 8, 2020). NCEMC, in partnership with the National Renewable Cooperative Organization (NRCO), has procured and installed several storage systems on its members' distribution systems, especially to meet storm-related resiliency needs (NRECA, 2020). NCEMC's ownership of the storage prevents wholesale contract limitations on member-owned capacity from hindering the ability of its member co-ops to benefit from solar-plus and storage.

4.4 ISO/RTO Participation in Solar-plus Projects

Local electric co-ops that are located in regions where regional power market participation is possible may consider using storage resources to participate in those markets. Participation in a market can in some cases present an alternative to the traditional G&T model; in other cases G&T's can provide an avenue for greater connection to wholesale markets for distribution-level counterparts.

Virginia's Old Dominion Electric Cooperative (ODEC), a G&T wholesale provider, participates in the PJM wholesale market (NRECA, 2020). ODEC's participation in PJM gives its member co-ops opportunities to receive compensation for the market value of some services provided by energy storage (NRECA, 2020). This interaction with PJM does not require any direct expertise in working with wholesale markets on behalf of the distribution co-ops; PJM's market values are passed through to the distribution co-ops through ODEC's rates. Other G&Ts that participate in emerging regional markets are likely to follow ODEC in providing aggregation services.

4.5 Customer-Side Storage Programs

Some co-ops have accepted or even encouraged deployment of solar-plus-storage by their customers. Customer-sited resources are typically smaller-scale than the grid-scale resources deployed by utilities. Utility coordination on customer-sited storage technologies can result in location-specific deployment of storage that supports both the customers' and the utility's needs (NRECA, 2018, regarding Dairyland G&T). Readers who are interested in customer-side storage options are advised to check federal and state policy resources. G&Ts are generally not directly involved in customer-side co-op programs, but some, like Dairyland G&T, are providing technical support.

While the full ramifications of FERC Order 2222 are still unclear, the Order presents the possibility that aggregated customer-sited energy storage and other distributed resources may become major factors in wholesale energy markets (CPower, 2020). Electric co-ops, given their knowledge of and interaction with distributed resources on

their local grids, could be positioned to facilitate participation of distributed energy resources (DERs) in wholesale markets as more opportunities emerge.

5 Conclusion and Recommendations

Policy and institutional factors are important considerations for electric co-ops seeking to deploy solar-plus-storage or storage alone. Except in the most extreme cases, these factors do not eliminate the local co-op's identified use-case; yet they may affect choices about the relationships, acquisition strategies, and project operating agreements that make the most sense. The cases above illustrate how different models have developed in different policy and institutional settings.

Some policy and institutional issues covered in this paper are still in an unsettled state, meaning that electric co-ops need to follow new policy developments in those areas, and to check the status of these issues in their particular jurisdictions. These issues include:

- The status of storage under wholesale (G&T) contracts: Does storage count toward generation capacity limits? Will the G&T permit local storage development under current contract rules, and if not, are there specific negotiations that could create a more equitable win-win?

- Might certain storage or solar-plus use cases be impacted by changing wholesale rates and incentives? If wholesale rate structures change, will the local storage contract be flexible enough to adapt? The co-op may wish to check in with both the G&T and the storage developer for contingency planning.

- The eligibility guidelines for using solar-plus-storage incentives, and in particular, use of the ITC are key to many solar-plus developments. Further, a federal investment tax credit for stand-alone storage is under consideration by Congress and could have considerable market impacts.

- Implementation of tariffs in keeping with FERC Order 841, which allows storage to participate in energy, capacity, and ancillary service markets. In some regions (e.g., MISO, PJM), the development of ISO guidance is not yet complete.

- G&T cooperative participation in wholesale markets and other possible expansions or policy changes that involve G&Ts in particular ISOs/RTOs.

- The impact of customer-side storage, whether supported by the electric co-op or through independent DER aggregation, as a consequence of FERC Order 2222 and related developments in DER aggregation.

An overriding issue, regardless of policy specifics, is selecting the appropriate scale and institutional level for deployment of solar-plus-storage. For distribution co-ops, this

usually means determining whether to pursue solar-plus-storage projects independently or through a G&T provider, or through some combined approach.

Independent, locally led projects offer greater control and fine-tuning of project parameters to suit local needs. Solar-plus-storage developers that understand policy dimensions are increasingly responsive to such needs, often beginning with demand-charge reduction and advancing to address more customized needs, such as meeting renewable-energy targets above the G&T norm or working with non-G&T parties in emerging regional markets. Some developers are also ready to work directly with local co-ops on community resilience (microgrids) or supporting a particular business model for cost-sharing (e.g., community solar-plus-storage programs.) In the process of driving innovation, a broader range of ideas from partners within the co-op sector and beyond it must be accepted as part of the process.

This paper does not detail the local policies and priorities that often drive co-op storage and solar-plus projects, but these can be central to local project use cases. Local co-ops often are concerned with needs beyond the conventional economic use cases and beyond the immediate concerns of their wholesale suppliers. For example, local co-ops may be interested in creating resilience in the event of emergencies, supporting local economic development, job-creation, equity and renewable-energy goals, as well as local business or co-op members' interests. While detailing these is outside the scope of this paper, they are increasingly considered important to the local storage or solar-plus-storage development decision.

There is a strong trend among G&Ts to work together with local co-ops and project development partners to meet various needs in an evolving market and policy environment. G&T approaches that involve the local co-op directly in expressing local needs, could hasten progress toward a greater win-win. This has been the case with several G&Ts discussed in this paper. To be effective partners, G&Ts, local co-ops and participating stakeholders need to share a basic level of understanding about solar-plus-storage technology, policy, and institutional structures, building a foundation of trust with their local partners for increasing high-value storage and solar-plus-storage development.

Summary Table
Policies, G&T Relationships and Regional Market Rules Affecting Local Co-op Solar-Plus Projects, By Project Value Streams Affected

	Government Policies	G&T Issues	Wholesale Market Rules
All Value Streams	- Tax and other direct incentives - Local permitting and zoning	- All-requirements provisions - Storage categorization	- Storage ownership rules - Market participation requirements - Aggregation rules
Local Demand Reduction	- Resource planning	- Rate design	
Coincident Peak Demand Reduction	- Resource planning	- Rate design	- Existence of capacity market - Capacity market participation limits for storage
Ancillary Services	- Compensation rules	- Rate design	- Market participation requirements - Presence or absence of ancillary service markets
Energy Arbitrage	- Compensation rules	- Rate design	- Market participation requirements
Local Grid Reliability	- Distribution System Planning		
Distribution Deferral/NWS	- Compensation Rules - Distribution System Planning		- Rules on storage as a T&D asset

Figure 3. Government policies and G&T contractual issues and regional market rules not only impact local co-op solar-plus-storage projects as a whole, but individual policies, issues and rules affect the local co-ops' ability to access specific solar-plus-storage value streams.

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