

Battery storage allows plentiful, low-cost solar energy to be stored and deployed when it is needed. *Photo by Joe DelNero, NREL*

# Utility Programs Supporting Customer-Sited Battery Storage: Program Design to Ensure Mutual Benefits

Behind-the-meter (BTM) battery storage, when paired with solar, can benefit customers, utilities, and the electric grid. Some utility-sponsored programs have been implemented to offset the cost of customer-owned batteries and recognize the value of batteries to the utility and the grid. This factsheet summarizes existing utility-sponsored battery programs and the value to the stakeholders. It then highlights Wattsmart, the customer-owned battery program offered by Rocky Mountain Power in Utah, and provides lessons learned from a close look at the impact of the program design on commercial customer participation. This work was conducted by a multi-stakeholder team as part of the Solar Energy Innovation Network (see text box).

## The Value of Batteries

Distributed solar provides an inexpensive, renewable source of electricity. However, as more solar resources have come online, it has created a temporal imbalance in the electricity grid—with excess resources when the sun is shining, and fewer resources when the sun sets. Battery storage (whether at the utility scale or behind-the-meter), allows low-cost and plentiful solar energy to be stored and later deployed when utilities need it—for example, to keep the grid within the acceptable operational range. Furthermore, utility net metering reforms increasingly mean that solar energy is less valuable for customers to export than to consume on-site, and batteries facilitate increased self-consumption. Commercial customers, who often pay demand charges based on their period of greatest electrical demand, can also realize financial value from batteries by strategically employing them to lower their peak demand and thereby reduce demand charges. Additionally, when designed to do so battery backup can provide resiliency benefits by allowing homes and businesses to continue operating through power outages. Community

## About the Solar Energy Innovation Network

The Solar Energy Innovation Network (SEIN) seeks to overcome barriers to solar adoption by connecting teams of stakeholders that are pioneering new ideas with the resources they need to succeed. Teams that participate in SEIN receive direct funding and analytical support from U.S. Department of Energy national laboratories and participate in peer-to-peer learning with other teams tackling similar challenges.

These teams are developing and documenting their solutions for solar adoption with scale in mind, so that others can adapt those solutions to their own contexts. Ultimately, the true impact of these teams' efforts will be to enable a wide array of communities to adopt solar solutions that meet their needs in their contexts.

The Salt Lake City Team, led by Utah Clean Energy and Salt Lake City Sustainability, has been working on a project addressing barriers to equitable deployment of solar and battery storage in Salt Lake City's underserved Westside Businesses. The team received invaluable insights through working sessions with NREL staff, and partnerships with community partners, Suazo Business Center, NeighborWorks Salt Lake, the Utah Division of Multicultural Affairs, Zions Bank, Rocky Mountain Power, and Intermountain Healthcare Impact Investing.

centers with battery backup can provide important health and safety benefits during widespread power outages, by providing cool shelter in the summer or warm shelter in the winter for residents. The various value streams of battery storage are detailed in Figure 1. The Federal Energy Regulatory Commission's Order 2222 sought to unlock additional value of distributed energy resources (DERs), like batteries, by allowing them to participate in regional energy markets through aggregators, which bundle the output of many DERs into a single product. These markets for aggregated DERs are



# Potential Benefits of On-site Battery Energy Storage to Different Stakeholders



Figure 1: Potential Battery Storage Benefits to Different Stakeholders

still nascent and not available in all locations. Businesses will typically weigh the cost of a battery installation against its financial and/or resiliency benefits. Because power outages are difficult to predict, the resiliency benefit can feel more speculative than other financial benefits like self-consumption and demand charge reduction.

## Utility-Sponsored Customer Battery Programs

Incentive programs for behind-the-meter (BTM) battery storage exist in 15 states to encourage adoption.<sup>1</sup> Some of

these programs are run by utilities, and some by the state or region. Additionally, there is a 30% Federal Investment Tax Credit<sup>2</sup> for batteries that meet certain size requirements. Most of the battery incentive programs are either rebates or utility programs used to meet system peak in the case of significant strain on the electricity grid. However, as seen in Figure 1, utilities can also use batteries to balance electricity supply and demand and improve power reliability. Programs offered by states and utilities can vary on a number of factors (e.g., the state has clean energy goals, the utility has reliability concerns, or the region has extreme weather and/or wildfire risk). Table 1 summarizes battery incentive programs as of 2023.

Table 1. Types of Battery Incentives (columns) and Related Attributes (rows)

	Rebate Program <sup>3</sup>	State or Federal Tax Credits <sup>4</sup>	Utility Programs for Peak Events <sup>5</sup>	Utility Programs for Frequency Response and Potential for Extreme Events <sup>6</sup>
Designed to reduce battery cost, increase uptake, support applicable clean energy goals, and incentivize self-consumption	YES	YES	YES	YES
Compatible with peak demand shaving cost reduction strategy	YES	YES	MAYBE*	MAYBE*
Compatible with battery backup / resilience strategy	YES	YES	MAYBE*	MAYBE*
Provides utility bill credits	NO	NO	YES	YES
Actively managed by electric utilities to support grid stabilization and reliability	NO	NO	YES	YES

\* MAYBE: Cost savings for peak shaving or battery availability for outage resilience will depend on how much of the battery capacity the utility is allowed to use and whether they will compensate for financial loss due to utility battery use. Net metering cost savings should not be impacted.

<sup>1</sup> The number of battery incentive programs is changing rapidly, as new ones are created and others expire.

<sup>2</sup> [www.energy.gov/eere/solar/federal-solar-tax-credits-businesses#\\_ednref25](https://www.energy.gov/eere/solar/federal-solar-tax-credits-businesses#_ednref25)

## Rocky Mountain Power Wattsmart Battery Program Goals and Design<sup>7</sup>

### Utility goals for using residential and commercial BTM batteries:

- Meet utility frequency response needs
- Integrate higher levels of low-cost renewable generation

### Program design:

- Solar required
- Only specific battery manufacturers and models are eligible
- Utility may discharge customer battery at any time
- Utility may use <50% capacity for first year & <90% capacity in subsequent years
- 4-year commitment
- Customer receives \$600/kW of battery power up to 70% of cost + \$15/kW of battery power as an annual bill credit

## Rocky Mountain Power's Wattsmart Battery Program<sup>8</sup>

As described in Table 1, Rocky Mountain Power's (RMP's) Wattsmart Battery Program is unique in its primary use of BTM batteries to maintain grid frequency within the acceptable range. The RMP Wattsmart Battery Program was piloted in 2020 and became an established program in 2021. RMP has historically used batteries participating in the program for frequency response events, during which enrolled batteries are called upon for 5 minutes at a time as much as daily. Each 5-minute event typically draws the battery down 1%-2%. This usage would go unnoticed by most customers, but it provides significant grid benefits to the utility.

While RMP's Wattsmart Battery Program has achieved significant uptake from residential customers with over 2,700 installations, only eight commercial customers have taken advantage of this program as of Q1 2023.<sup>9</sup> We explored the reasons for limited commercial participation in the program by surveying installers, businesses, and community advocates. The themes and recommendations discussed below emerged from these conversations.

## Commercial Customers Require Clear Understanding of Costs and Benefits of Batteries and Battery Programs

Installers noted that residential customers typically do not require a thorough accounting of financial costs and benefits before deciding to install a battery. Rather, homeowners are motivated by a general desire to have battery backup in case of a grid outage and felt comfortable enrolling in the Wattsmart Battery Program without needing to thoroughly review its terms and conditions. By contrast, commercial customers typically require an accounting of costs and benefits. For example, businesses might want to understand how a battery could reduce product spoilage during a grid outage or reduce their power bill via peak shaving. The following program design recommendations developed through conversations among a diverse group of stakeholders allow commercial customers to evaluate the costs and benefits of battery installation and program enrollment.

### Clearly state how the utility intends to use the customer's battery:

Batteries can have multiple value-streams, but they cannot serve all value-streams simultaneously. Consequently, it is important for a commercial customer to understand how frequently and to what extent the utility plans to discharge the customer's battery. A utility can provide historical battery usage data to help customers estimate the operational and financial impacts of program participation.

### Ensure that commercial customers can reasonably capture intended battery value:

When the utility activates a customer's enrolled battery in ways that substantially deviate from the stated intention or historical pattern, the utility could compensate commercial customers for lost battery value. For example, if a commercial customer is prevented from employing their battery for peak shaving because the utility exhausted the battery to address an atypical grid event, the utility could reduce the customer's demand charge for that billing cycle, to allow the customer to recover the expected peak shaving value of the battery.

<sup>3</sup> Examples include: Fort Collins Residential Battery Storage Program; Holy Cross Energy Colorado; Jacksonville Electric Authority (expired); NV Energy Residential Solar Program (expired); Self-Generation Incentive Program (SGIP), California; Oregon Battery Rebates

<sup>4</sup> Maryland Energy Storage Tax Credit; Massachusetts SMART program battery incentive, Federal Investment Tax Credit

<sup>5</sup> Eversource & National Grid Connected Solutions (CT, MA, NH, RI); PSEG Long Island's Battery Rewards Program (NY); Green Mountain Power (VT); Hawaii Battery Bonus Program

<sup>6</sup> Rocky Mountain Power Wattsmart Battery Program (UT)

<sup>7</sup> Current information should be obtained directly from the utility: [www.rockymountainpower.net/savings-energy-choices/wattsmart-battery-program.html](http://www.rockymountainpower.net/savings-energy-choices/wattsmart-battery-program.html)

<sup>8</sup> [www.rockymountainpower.net/savings-energy-choices/wattsmart-battery-program.html](http://www.rockymountainpower.net/savings-energy-choices/wattsmart-battery-program.html)

<sup>9</sup> 2023 Integrated Resource Plan, PacifiCorp

## Ensure program continuity:

It is helpful for customers to know that a program continues in the form that is agreed upon for the duration of the contract. If the program criteria change, customers should be given the option to remain in the program as previously stated (through a “grandfather” clause) or adopt the new terms.

## Flexible battery eligibility:

Battery prices and specifications are highly variable. It is important for customers and installers to have as much flexibility in their choice of battery as possible, as long as the technology is capable of providing the needed grid services. Providing battery manufacturer choice should increase participation in the utility’s battery program.

## Battery availability:

While there are several battery options on the market for large commercial and industrial customers, mid-size commercial-scale batteries are either unavailable or very expensive. Residential-scale batteries are not always a suitable alternative. This lack of batteries for mid-sized commercial customers constrains their participation in available utility battery programs.

## Utility Collaboration

Based on the recommendations developed by the multi-stakeholder team, Rocky Mountain Power expressed interest in making the following changes to its Wattsmart Battery Program:

- More clearly articulating how enrolled batteries are used by the utility, including publishing historical data
- Addressing how commercial customers will be compensated if the utility’s atypical use of the battery prevents a customer from realizing the value of peak demand shaving
- Clarifying how changes to the program’s terms and conditions will be communicated to enrolled customers.

## Recommendations for Utility Battery Programs

- Ensure that battery program information is specific, clear, and consistent across all marketing materials and legal terms and conditions.
- In the contract, describe how the customer will be compensated for substantial deviations from the utility’s intended battery use.<sup>10</sup>

- State how the utility intends to use customer batteries and show historical program data.
- In the contract, describe how the customer will be compensated for substantial deviations from the utility’s intended battery use.<sup>11</sup>
- If possible, provide customer options for participation to facilitate a variety of customer use cases.
- If possible, maintain continuity of program terms and conditions.

## Conclusion

Examining Rocky Mountain Power’s Wattsmart Battery Program has led to greater understanding of the utility’s and the customer’s perspective on the structure and efficacy of the program. A utility battery program can and should be designed to benefit the utility, customers, and the grid. Doing so will foster the shared benefits of customer solar generation.



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[www.nrel.gov/solar/market-research-analysis/solar-energy-innovation-network.html](http://www.nrel.gov/solar/market-research-analysis/solar-energy-innovation-network.html)

[www.utahcleanenergy.org](http://www.utahcleanenergy.org)

<sup>10</sup> <https://www.osti.gov/biblio/1854327> and <https://www.osti.gov/biblio/1854328>.

<sup>11</sup> <https://www.osti.gov/biblio/1854327> and <https://www.osti.gov/biblio/1854328>.