

ONSITE RENEWABLE ENERGY AND STORAGE - BUILDINGS

Onsite renewable energy and storage is a key decarbonization strategy for commercial building owners. As part of the Better Climate Challenge, DOE hosted the **Onsite Renewable Energy and Storage** Working Group from 2023 to 2024 to understand industry experiences and develop pathways to overcome barriers to implementing these technologies.

Over the course of seven sessions, more than 40 Better Climate Challenge partners from 10 different sectors learned about and shared valuable perspectives on solar photovoltaic technologies, other renewable energy technologies, battery storage, and thermal energy storage.

KEY TAKEAWAYS

- ▶ The working group shared their experiences and challenges with onsite renewable energy and storage systems. Most experiences focused on solar photovoltaics with challenges associated with financial issues, utility concerns, and finding internal champions.
- ▶ The working group's collaboration and discussions led to the development of a series of resource primers that focus on the ability to [assemble an effective team](#) to streamline the implementation of onsite renewable energy and storage systems. Other resource topics include [renewable energy certificates](#) and [portfolio screening and prioritization for onsite energy](#).
- ▶ Many partners have experiences with solar photovoltaics. Other renewable technologies have less deployment penetration. Storage technologies are of high interest, but the business case and information resources are needed to increase penetration.

Discussion Topics and Outcomes

The working group brought partners together to discuss the successes, challenges, and opportunities of incorporating onsite renewables and energy storage. Working group outcomes are summarized below:

▶ Onsite renewables – solar photovoltaics

Most partners indicated experience with solar photovoltaics (PV). However, several barriers were cited that prevent partners from achieving PV-related goals. These barriers include the cost of panels and infrastructure, poor payback time of PV panels, varying budget priorities, increased cost of financing with higher interest rates impacting Power Purchase Agreements (PPAs) and other financing methods, inexperience in procuring and using PV panels, timing of utility approvals, utility interconnection limitations, space availability, finding internal project champions, inconsistent policies across regions making it difficult to standardize across a portfolio, and complex procurement structures.

▶ Additional onsite renewables

Partners were interested in additional renewable energy technologies beyond PV, such as urban wind turbines, carbon capture and storage, renewable hydrogen, biofuels, and recovered landfill gas. In some rare cases, partners could use onsite wind generation, but it is limited by geographic locations and equipment size. Some partners expressed interest in procuring renewable natural gas through recovered landfill gas, but this is considered off-site and outside the boundaries of this working group. In general, there was little experience with renewable sources outside of PV.

▶ Onsite energy storage

A few partners currently use onsite energy storage especially with batteries and thermal storage with water tanks. Some partners have some experience using energy storage in conjunction with demand response strategies including shaving peaks with water tanks, battery systems, as well as using generators with fossil fuels (storage is the fossil fuel in the tank). These systems are either manually controlled and in some cases include agreements with the local utility. As partners set goals related to energy storage, additional information is needed. Diesel fuel alternatives, simple estimation tools for cost and space requirements, and information on structural impacts of thermal and battery storage are also needed.

Partner Highlights

Active participation and support from Better Climate Challenge partner and ally organizations was instrumental in advancing the goals of the Onsite Renewable Energy and Storage Working Group. All working group members contributed to discussions, and the following organizations formally presented their experiences and approaches in onsite renewable energy and storage:

▶ Tower Companies

- Office building LEED™ Gold certified and ENERGY STAR™ certified
- Net-metering, Renewable Energy Certificates (RECs), and demand management helped make the business case
- Because little space was available on the roof, the best location for solar was on top of the carport. The 571-kW array has helped avoid 4 million pounds of greenhouse gas (GHG) emissions since installation
- Much of the energy savings accrues to tenants, but the lower utility costs for new tenants was an added benefit

▶ Fairfax County, Virginia

- Two case studies were presented, one was a 180-kW direct purchase system that offset 70% of energy, one was a 50-kW system from an Energy Savings Performance Contract (ESPC) that offset 20% energy
- Small annual fee for the Energy Services Company (ESCO) contractor to service equipment regularly, can end this service periodically, contractors train on site staff to maintain solar array
- Performance guarantee - if panels do not produce minimum guaranteed amount, ESCO pays back the difference

▶ MetLife Investment Management

- Increased the amount of solar by relying on regional office training, feedback for new acquisitions and developments, tracking policy as new solar markets open
- Incentives based in Federal legislation (e.g., Inflation Reduction Act) has made more projects feasible

These partner highlights reflect the active engagement and contributions from organizations across a range of sectors.

Working Group Outcomes

The working group outcomes include a set of planning primers focused on the stages of implementing onsite energy projects. All topic areas were identified as needs by commercial and industrial working group participants and developed collaboratively across working group teams. These ten primers aim to be actionable, usable guidance documents to support the high-quality decision-making for onsite energy deployment. The primer documents can be accessed on the Better Buildings Solution Center website: <https://betterbuildingssolutioncenter.energy.gov/climate-challenge/working-groups>.

- ▶ [Portfolio Screening and Prioritization for Onsite Energy](#)
- ▶ [Site-Level Screening and Technology Selection](#)
- ▶ [Assembling an Effective Team for Renewable Generation and Storage Projects](#)
- ▶ Financing and Incentives (coming soon)
- ▶ Utility Considerations (coming soon)
- ▶ Ownership Options (coming soon)
- ▶ Working with Third-Party Design and Engineering Firms (coming soon)
- ▶ Deployment Strategies (Integration Pathways) (coming soon)
- ▶ “After the Installation” Considerations (coming soon)
- ▶ Onsite Case Study Collection (coming soon)

Summary

The use of onsite renewable energy and storage is a key part of decarbonization. The Onsite Renewable Energy and Storage Working Group was successful in identifying barriers and challenges, circulating existing solutions, and guiding multiple resources. These resources focus on guiding organizations to overcome challenges. The support and involvement of partners was essential in advancing the collective understanding and implementation of onsite renewable energy and storage.