# Solar energy storage system 390 kWh

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Energy storage technologies are rapidly entering the marketplace, with tremendous potential to expand the benefits and uses of solar energy. Annual energy storage deployment is expected to increase nine-fold in the next few years, reaching 34,784 Mwh in 2026.[1] Many of these systems are expected to be paired with renewable energy, especially solar power.

Energy storage allows solar energy to be deployed at all times of the day or night, making the electricity grid more flexible to changes in demand. Solar coupled with battery storage also improves grid resiliency by providing a backup energy source for homeowners and businesses when storms or other emergencies cause a power failure.

Local governments have many tools at their disposal to help encourage solar and battery storage in their communities. This section of the Solar Energy: SolSmart"s Toolkit for Local Governments will explain how solar-plus-storage systems work, followed by guidelines for communities on how to foster the development of this technology and successful examples at the local level.

Communities seeking additional detail are invited to read the SolSmart Issue Brief, Solar + Storage: A Guide for Local Governments. View the issue brief here.

Behind-the-meter storage can also provide these benefits, but market structures may not allow these systems to integrate into the grid. Independent system operators (ISOs) may have capacity requirements to participate in grid services programs, which may exclude distributed or behind-the-meter projects that tend to be smaller. However, behind-the-meter storage provides other benefits to the electricity consumers. These benefits include:

The Solar PV Construction section of this toolkit describes ways to make the permitting process faster and more efficient in order to lower the cost of a solar energy system. Similar strategies can also encourage the growth of solar-plus-storage at the local level. The primary factors to consider when designing permitting processes for storage include the location of the energy storage system (inside or outside) and the fire and safety requirements and regulations that vary by energy storage type.

The storage component of a system can be placed either inside or outside of a building. Typically, systems located inside a building have more stringent permitting and inspection requirements, particularly if a property is inhabited.[3] These precautions are due to fire and safety considerations. In contrast, outdoor systems often have less stringent permitting and inspection requirements, as there tends to be greater ventilation outside and the systems are more easily accessible for service in times of emergency.

Communities should engage with their local utilities to encourage the deployment of solar-plus-storage

systems. Utilities can facilitate this process through streamlined interconnection procedures, and utility-led initiatives such as demand response programs or incentives.

In 2017, Green Mountain Power (GMP) in Vermont implemented a residential battery storage program, which offered its ratepayers the option to lease a Tesla Powerwall battery. Participating homeowners lease systems for $15/month and receive 8-12 hours of backup power. Green Mountain Power aggregated these systems to reduce overall grid load during peak times to save on capacity and transmission expenses. After 500 of these batteries were deployed, GMP saved $500,000 in a single-day by reducing peak demand during a July heat wave.

The program followed up by offering 500 spots in its Resilient Home pilot program, which offers two Tesla Powerwall batteries, which amounts to 12-24 hours of backup power. GMP also offers financial incentives through its Bring Your Own Device program for battery devices bought from a Vermont retailer.

Local governments are increasingly looking to solar energy resources and microgrids to support grid resilience. In the wake of recent hurricanes, wildfires, and other natural disasters, disaster preparedness is a frequent topic of discussion. One of the essential components of resilience is the need to keep critical facilities -- those needed for medical, public safety, and national defense -- operating during prolonged grid outages.

The use of solar energy to improve resiliency is not limited to buildings. Table 1 outlines other applications of resilient solar. Note that these applications may include storage, but do not necessitate its use.