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## **Solar and storage - Lower costs, back-up power, and sustainable energy all in one package - by John Mosher**

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Solar energy has entered the mainstream over the last several years with rapid adoption by businesses, schools and other institutions. More recently, energy storage systems are being deployed with solar energy systems giving consumers a complementary array of benefits. Over the last several years, we have seen dramatic declines in the costs of both solar energy and battery storage systems. Combined with rapidly increasing state and federal incentives, this has created a tremendous opportunity for building owners to drive down their energy costs, increase resilience and meet their sustainability goals.

A solar and storage system is simply a traditional solar energy system (often sited on a rooftop), paired with a battery system and managed by a system of integrated electronics and software. Systems can be designed to remain “grid-tied” during a power outage or have an “islanding” capacity, which means the system can be disconnected from the grid during power outages allowing the battery to provide power, and in some cases the array may continue to provide energy as well. These systems can be sized to keep a subset of critical systems such as lighting, communications equipment or refrigeration units in operation, or they can be sized up to power an entire building for longer periods.

Although the ability to produce your own power, store it, and use it as needed provides building owners with peace of mind during power outages, the bigger driver is cost savings. Specifically, in reducing electric demand charges from your utility. Because of the expense of managing peak demand, many utilities pricing structures encourage consumers to “flatten” their load; i.e., avoiding dramatic energy surges that will trigger the need to call upon more expensive generating assets.

The most common way that utilities discourage intermittent peak loads is through demand charges. Although these charges can vary in the way they are calculated, typically a utility will look at a consumer’s peak load each month for a short duration of time, usually a 15-minute window. The demand charge is calculated by taking the peak usage for each month and multiplying it by a certain rate. Unlike energy consumption charges, demand charges look only at a snapshot in time and thus

are based on kilowatts (kW) as opposed to the volumetric charges which are based on kilowatt-hours (kWh).

For example, a small manufacturing company may have a big order due at the end of the month and need to utilize all of its machinery in a short period of time causing a spike in its energy consumption. Let's say its typical load is 750 kW but during the end of the month surge it ramps up to 1200 kW. The rate for demand charges can vary from zero to as high as \$50+/kW. Let's assume \$40/kW. This would translate to a monthly charge of \$48,000, just for that one spike in energy consumption. Typically demand charges are anywhere from 30%-70% of a customer's bill.

So now, let's turn back to the solar and storage system. These integrated systems will allow you to charge up your batteries while your energy (kWh) consumption is relatively low. Then as your energy demand surges, the energy from the battery can be deployed and will lower the amount of power (kW) you will need to draw from the utility. This reduces your demand peaks and in turn lowers your demand charges. Over the course of a year this can add up to a substantial amount! Depending on your region there may be other sources of revenue as well.

There are also several incentives that are extremely attractive to building owners, including the 30% Federal investment tax credit (ITC); state programs like the Massachusetts SMART program that provides another incentive for solar energy paired with storage; and demand response programs like Connected Solutions from Eversource and National Grid.

Today's battery systems are self-contained and easy to site. Energy Storage is an ideal complement to a solar energy system, giving greater control to property owners and facility managers to reduce their demand charges, provide back-up power for critical systems and of course, lowering their environmental impacts.

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