Solar + Storage:

Why and when it makes sense for commercial and industrial businesses

WERNER ELECTRIC

Solar energy is a mainstream, trusted, sustainable choice that makes good business sense for commercial and industrial companies. As advancements in energy storage have taken place within the past few years, adding storage to a solar energy system further enhances the value of solar. Simply put, used in tandem, the combination allows users to leverage the energy of the sun, use it to power their businesses in real time, and store some of that energy to smooth out demand.

In this whitepaper, we'll dive into solar+storage, explaining what it is, why it might be the right solution for your commercial and industrial clients, and how we at Werner can help.

SOLAR+STORAGE TRENDS

According to the Solar Energy Industries Association (SEIA), solar energy and energy storage in the United States is a market that's growing at a rapid rate. In the last decade, the solar industry has seen an annual growth rate of 50%, and it shows no signs of slowing down. SEIA anticipates that U.S. PV installations will more than double within the next five years. The U.S. energy storage market is experiencing a 200% year-on-year growth. There are a number of factors that account for this, and they all lead to a company's bottom line.

FALLING EQUIPMENT AND INSTALLATION PRICES. Solar Energy Industries Association (SEIA) tells us the cost to install a solar system has dropped more than 70% within the last decade. Suddenly, it has become much more economical to purchase and install solar energy systems, which translates to a quicker return-on-investment for commercial and industrial businesses. Likewise, energy storage costs are declining rapidly. Researcher McKinsey & Company projects storage costs to be less than $200 per kilowatt-hour in 2025.

THE SOLAR INVESTMENT TAX CREDIT. As a means of supporting the development of solar energy in the U.S., the federal government implemented the ITC. It was passed in 2006 to give businesses and homeowners alike a tax credit for investing in solar energy. While the credit is scheduled to decrease over the next three years, installations are still eligible for the savings.

The solar ITC has helped annual solar installation grow by over 1600% in the last decade with a compound annual growth rate of 76%.

ENVIRONMENTAL, SOCIAL AND GOVERNANCE FACTORS. Corporate social responsibility continues to mature. Driven by customers, employees, and increasingly, investors, companies are expected to incorporate sustainability plans into their strategy and quantify the output. As well, there is considerable evidence that recruitment and retention of a younger workforce improves when companies are transparent and behave in a way that aligns with their stated policies and values. Conversely, ignoring sustainability increasingly signals that a company has a short-term mindset and risks public backlash.

BATTERY STORAGE. Storage has made huge strides in efficiency and type. Instead of the old gigantic lead-plate batteries that are loaded with sulphuric acid, expensive to make, and harmful to the environment, modern batteries essentially use saltwater as the only electrolyte. They are also made of lithium iron, which reduces the risk of thermal issues and fire hazards.

Renewable energy sources are now the cheapest form of power, eclipsing oil and gas even though fuel is at historically low prices.

SOLAR+STORAGE SYSTEMS FOR COMMERCIAL AND INDUSTRIAL BUSINESSES

Commercial and industrial businesses are faced with many pressures to increase profits and meet sustainability goals. A key component for this is the businesses' energy strategy. Sometimes, it makes sense for businesses to simply have a solar system alone. In general, it's when the price of energy is high and demand is low. Or, if your client has a flat load profile, with no peak usage times either night or day.

But, when demand charge is a significant amount of a business's energy bill, adding energy storage can have a very good return on investment.

Why pair solar with storage? For commercial and industrial businesses, it's about reducing their energy bills by reducing their peak demand. The

When demand charge is a significant amount of your energy bill, it's time for solar+storage.

Here's a simple rundown of how solar+storage works:

- **SOLAR ENERGY COLLECTION AND USE.** Solar panels work by absorbing the sunlight with photovoltaic cells, generating direct current (DC) energy and with inverter technology, converts it to a usable alternating current (AC) energy. Generating solar power can offset power drawn from the grid, which can reduce the energy bill by reducing kwh consumption purchased from the local utility.
- **BATTERY CHARGING.** As the solar panels generate energy for the business they are also charging the lithium batteries in the storage system.
- **BATTERY DISCHARGING.** During periods when solar is not producing, and the energy usage at the facility is high, the energy storage system will discharge to reduce the peak.

system consists of PV modules, or solar panels, and large lithium batteries. Energy storage can be integrated with lighting controls, automation control systems, building management systems, or industrial control systems — all in an effort to reduce energy costs and increase sustainability.

MAJOR COMPONENTS OF A SOLAR+STORAGE SYSTEM:

SOLAR:

- Modules
- Racking
- Inverters
- Power Electronics

STORAGE:

- Batteries
- Inverter (PCS)
- ESS controller and software

DEMAND CHARGE REDUCTION. Storing energy is especially beneficial for businesses that have peaks, or spikes, in energy use in any given 24-hour period, particularly if those peaks occur while the batteries are injecting power into the facility. By kicking in during those critical times, the stored energy can flatten those peaks, thereby reducing utility bills even more. Let's look deeper into why reducing demand charges is important.

DEMAND CHARGES

There are typically two main charges on a commercial and industrial electric bill. The "energy consumption" charge (measured in kWh) and the demand charge (measured in kw). Energy consumption is the total amount of power drawn from the grid over a billing period. Solar generation helps to reduce the kWh's drawn from the grid.

The demand charge is the maximum amount of power a given business uses for a 15-minute time period during the billing cycle. Put another way, demand is the highest instantaneous power usage at any time. Utilities usually average instantons power (second by second) over a 15-minute period for convenience. Demand is measured in KW.

A Demand Charge is the charge that the utility assesses. It is usually stated as $/KW.

How is the charge calculated? Although the figures on energy bills aren't usually so round, let's make it easy for the sake of example. Say the utility rate for demand charges is $20 per kWh and your client has a peak demand of 500 kW that month. Their demand charge would be $10,000, or 500 multiplied by 20.

Demand charges can be anywhere from 0% to 100% of a C&I business's entire utility bill. Energy storage is worth looking into if the demand charge is more than half of the total bill.

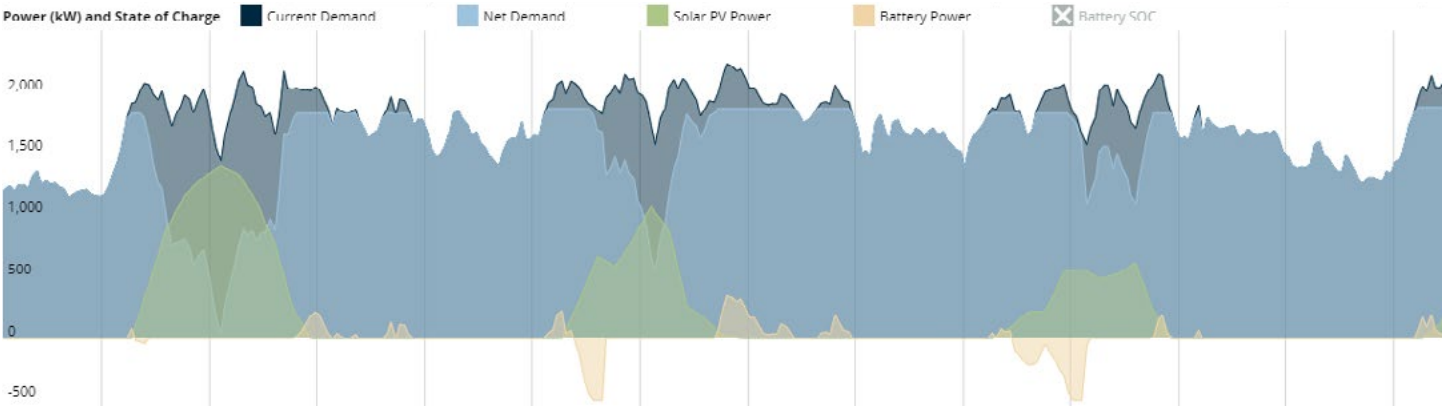
HOW SOLAR+STORAGE FIGURES INTO THE DEMAND CHARGE EQUATION

Solar alone, without storage, can do little to level off those peaks or spikes if they happen during off-solar times, such as at night, during a rainstorm, or any time the solar panels are not powering the facility. Unfortunately, those times are unpredictable. Imagine a thunderstorm during the middle of the day when your client has its highest power demand. The solar isn't powering the facility as it would be if the sun were shining, the huge spike happens anyway, and then the business is looking at a huge demand charge on the next utility bill. It will be as much as if they hadn't installed solar at all.

But if that facility had solar+storage, the system's batteries would've kicked in during that storm, reducing or eliminating that huge spike.

How would the batteries know to do that? After all, that's usually a time of day when the solar panels are on the job. That's where demand charge management comes in. It's a component of solar+storage systems that functions a bit like a smart appliance. The software is designed to detect and even predict spikes, automatically kicking on the stored energy when those spikes occur. Werner can help you design it.

ENERGY STORAGE AT WORK



Monday through Friday energy use of an industrial facility after the installation of a solar + storage system.

WERNER EXPERTISE

Solar+storage is a relatively new solution in this marketplace, and not every contractor or solar installer knows the ins and outs of these systems. Fortunately, we do. Werner has the industry expertise and connections to help our partners navigate the complex energy business.

SIZE OPTIMIZATION

From sizing and quoting your project, our specialists will help determine the right custom solution for your solar and storage needs. We will work by your side to help integrate storage into your facility by determining where it will go, how it will be powered, and what load it will help offset.

Size optimization is vital to the ROI of the system. One size definitely does not fit all. There's a sweet spot between not big enough and too big that is unique to every business and its energy usage profile. Our specialists use modeling and simulation software to help determine the exact optimal size for each project.

NABCEP CERTIFIED

Werner's team of NABCEP certified energy specialists continue to partner with top solar and storage industry technology providers. The specialists bring technical and installation expertise, often conducting and facilitating training. Werner's specialists scope, design and perform financial evaluations of complete energy systems. Werner identifies, recommends and provides full solutions.

We understand our customers' drive for profitable growth in a labor-constrained market, and we bring solutions that can differentiate their business, like energy storage, while reducing labor requirements with agile construction management and staging, products engineered for labor-saving installation, and more.

Solar+storage is a relatively new player in the clean energy marketplace, but its time has come. Solar+storage is growing fast, fueled by fluctuating energy costs, the decreasing reliability of the grid, falling prices of both solar installations and lithium batteries for storage, heightened awareness of reducing one's carbon footprint, and increased demands to align businesses with shared values (like environmental sustainability). Plus, it just makes good sense to combine solar with storage, so businesses are not dependent on cloudless days to power their facilities with solar energy.

If you're interested in learning more about how we can help you meet your clients' solar+storage energy needs, **contact us** today. We'll be happy to sit down with you and help you navigate this complex new market.

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