

Energy Storage Changes How a Building Consumes Power

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Just a fraction of a second ago, the electricity that's powering your device, allowing you to read this very article, was produced and propelled through a complex path from power plants, through transmission lines and substations, and finally to you. As intricate as it is, our transmission-and-distribution system is over a hundred years old, when only a fraction of buildings consumed electricity. Over the past century that power grids have existed, grid managers have had control over the supply of power, but not the demand for it.

The growth in electricity consumption and the switch to renewables is shaping a seismic multi-decade upheaval in global power systems. As a result, the electrical grid is becoming increasingly stressed, causing wholesale prices to rise and power disruptions to occur.

There is a growing demand for more flexible energy usage, and one of the best ways to do this is by storing energy. A number of storage options exist for power plants, but over the past few years the prospect of storing energy at the source of consumption is gaining traction. Battery storage has grown in popularity as a result of major technological advancements, notably in lithium ion systems. Putting batteries in buildings can help save money, reduce carbon footprint, and make our energy grids more resilient.

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More Than a Backup

When it comes to energy storage in relation to buildings, the reality is that a battery system is less of an emergency backup power source and more of a way to reduce the load that a building is using at a specific time. Valerie Kitchell, the Director of Energy Markets at Peak Power, a Canadian energy storage services provider, asserts that batteries do more than provide back-up power as well. “A common misconception with batteries is that buildings use them only for backup power, but that doesn’t tell the full story.” While a building’s Battery Energy Storage System (BESS) certainly allots for emergency backup power, battery storage allows a building’s load to be managed for strategic consumption of energy.

Most utilities charge more for power during peak times. This creates an opportunity for “energy arbitrage” by buying and storing power at off-peak times and using it when energy is more expensive. This energy arbitrage can greatly reduce a property’s utility bill. The advantages go even further if the property generates electricity, like with rooftop solar, because energy created

on-site can even be sold back to the grid when prices are highest. “These batteries make sense because of the savings they can create and the energy services they can provide, which generally are far more valuable than a backup for a single site,” Kitchell said.

Many utilities base energy prices on each property’s peak demand, sometimes for intervals as small as fifteen minutes. So even though a battery might not have enough energy to run a building on, if it can be used strategically during peak times it can still help bring down a building’s overall power costs. Doing this is easier said than done, of course. Buildings need to be able to predict outside air temperature on the hottest or coldest days of the year as well as the occupancy on those days. Luckily, analytical software has been developed that can help building managers and engineers with this incredibly complicated calculation.

Buy clean, be green

In the same way that batteries can help buildings consume power when it is the cheapest, they can also do the same when it is the cleanest. One of the downsides of renewable energy sources is that they produce power intermittently. This means that clean power is not always available, no matter the cost. So for properties to lower their carbon footprint they have to use batteries to store clean energy when it is abundant so they can use it later. Much like lowering peak power usage, increasing clean energy consumption requires a lot of advanced software.

Some interactive grids can work directly with buildings by telling them when energy is cleanest. But for less sophisticated networks the software can still look for signs of cleaner energy like strong overhead sun near solar plants and

sustained winds around windmills. All of this has to be weighed with the power consumption of both a building and its neighbors. Steady power has been one of few remaining pros of high carbon power generation like coal but as buildings are able to react to the fluctuations of renewable power, that argument could eventually fade away.

As more and more property companies and tenants create sustainability mandates, there will be a greater need to consume renewable energy. Some of the largest office occupiers, like Facebook, Apple, and Google, have already built their own renewable energy plants to offset the power usage of their offices and data centers. These companies see this commitment to sustainability as core to their mission and as an important retention and recruitment tool. Since large corporate occupiers tend to follow the lead of trailblazing tech companies, it is likely that we will see more and more industries demand more clean energy from their grids and their buildings.

Collective consumption

Even though batteries are so much more than a backup for power outages, they can play an important role in preventing them. A battery can help a building reduce its energy consumption during peak demand times. With the right infrastructure, it can also help reduce the consumption of other buildings around it. Micro-grids are starting to be developed that allow buildings to buy and sell energy from each other, making it easier to avoid costly brown and blackouts. There have even been experiments with using electric cars as an additional energy source when the energy grid is straining under the weight of our buildings' demand.

The sad truth about our energy systems is that a lot of the energy that is produced goes unused. Since grids need to produce enough power to supply our needs during its peak, we often end up creating more power than we can use. There is an obvious need for a better way to consume the power that we already produce. Supply side power storage is one solution but financing and building batteries large enough to help power entire cities is often not feasible. A better alternative might be to equip our buildings with energy storage capabilities. For individual properties, upfront costs can be offset by long-term savings, and clean energy consumption can be optimized. It is time for our buildings to be more self-sufficient because, as the saying goes, if we don't use it, we lose it.

Interactive Grids Help Buildings and Cities Prepare for Peak Demand Days

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The way we power our world is changing. While electricity is one of the greatest wonders of science, as we've relied more heavily on it to power our lives over the years, it's coming at the cost of the health of our planet. Although electricity is a relatively clean form of energy on its own, the generation, and transmission of electricity wheezes the second-largest share of greenhouse gas emissions into the atmosphere. What's worse, nearly 61 percent of utility-scale electricity in the US was generated from fossil fuels in 2021. Fortunately, there are alternatives to using fossil fuels to generate electrical energy.

Renewable energy sources used to be fairly inaccessible to the average property manager, and extremely expensive to acquire. "10 years ago, it was much cheaper to build a new power plant that burns fossil fuels than to build a new

solar photovoltaic (PV) or wind plant,” said Max Roser, founder and director of the publication *Our World Data*, “but in the last few years this has changed entirely.” Wind and solar have reached all-time low prices in the last decade,

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As our cities grew over the years, so has our reliance on energy in order to provide the comfortable and well-lit buildings inside them. The building sector’s energy consumption has risen dramatically in recent years, owing mostly to population growth and the need for increased residential and commercial space. Just a few years ago, the U.S. Department of Energy found that the buildings sector accounted for about 76 percent of electricity use, 40 percent of all U. S. primary energy use, and all the greenhouse gas emissions that go with it. Suffice to say, reducing energy consumption in buildings is vital in order to meet decarbonization goals, not to mention lowering energy costs for building and energy managers and tenants.

As 2030 inches closer and we race to hit emission reduction targets, there are tremendous opportunities to improve energy efficiencies. When it comes to buildings, the topic of energy performance is a huge concern of property owners and managers because it equates to cost. Since such a huge chunk of the

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