MICROGRID KNOWLEDGE SPECIAL REPORT

Why Energy-as-a-Service Microgrids are the Logical Next Step for California… and the Rest of the U.S.

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Contents

California: A Postcard from the Future?

California often serves as a bellwether and now it's ringing an alarm about a new electric grid vulnerability. While hurricanes, earthquakes, floods and tornadoes have been chief perpetrators of widespread US power outages in the past, an even more devastating foe has emerged in California: wildfires.

As a result, California has become the first state where utilities shut off power preemptively for safety reasons. The concern? Sparks from utility wires have started some of the fires. The shutdowns left millions of Californians in the dark in October and November 2019, some for several days.

*The outages crippled business activity, dealing a **$2.5 billion blow** to the state's economy during just one, two-day shut-off. Most troubling, Pacific Gas & Electric (PG&E), the state's largest utility, has warned it may enact the outages repeatedly over the next decade—which would multiply the costs.*

As other states brace for the impact of climate change, they watch California and wonder: Are they next? And if so, what will power outages cost their economies? Meanwhile, the cost of electricity from the grid is increasing and the need to reduce greenhouse gas emissions grows ever more urgent

But there is a cost-effective solution—the energy-as-a-service microgrid. Read on to learn about how this increasingly popular model works and what benefits it offers your business.

Chapter 1
The Cost of Power Outages in an Era of Climate Change

When Superstorm Sandy knocked out power to eight million electric customers on the eastern seaboard in 2012, it underscored the vulnerability of the traditional electric grid. And since then, a series of additional natural disasters and equipment failures have driven home the lesson.

Some examples of the largest power outages include:

- A **derecho** in June 2012 left 4.4 million customers in the Mid-Atlantic and Ohio Valley without power, some for nine days
- **Hurricane Irma** cut power to two-thirds of Florida, 6.7 million electricity customers, in September 2017
- Equipment failure knocked out power to the world's busiest airport, Hartsfield-Jackson Atlanta, for 11 hours on December 17, 2017, costing Delta Airlines as much as **$50 million**
- Hurricane Maria caused the longest blackout in US history, starting in September 2017 and extending for nearly a year for some areas of Puerto Rico
- Earthquakes in Puerto Rico again plunged the island into darkness in January 2020

These incidents are the headline grabbers. But every day somewhere in the US power fails because of weather, accidents, equipment malfunctions or other causes. The costs of these outages vary based on their length and who they affect. But to get a sense of their impact, Esource looked at eight major industries and found that outages as short as four hours cost on average $10,000 to $20,000 per business.

But the wildfires of 2019 turned conventional power outage scenarios on their head. With utility wires and equipment sparking deadly and destructive **wildfires**, this time the utility was not tasked with bringing the power back, but with shutting it down.

To avert fires, California utilities conducted what they call public safety power shutoffs. Power lines were de-energized and millions of customers in October and November 2019 had no electric service, sometimes for days. The power outages disrupted business, closed schools and endangered those reliant on medical equipment. The lack of traffic lights led to car accidents. Without refrigeration food perished in homes, stores and restaurants. Retail operations that could not operate cash registers closed their doors. Telecommunications became spotty. A society deeply dependent on the Internet found chaos in navigating its daily business.

The power shutoffs dealt a considerable blow to California's economy. The Stanford Woods Institute for the Environment estimated that the economic cost associated with just one power shutdown affecting 800,000 customers for 48 hours could reach $2.5 billion.

In response to the shutoffs, some in California turned to backup diesel generators. However, this isn't a viable solution. With some of the most ambitious climate change legislation in the world, California is seeking to phase out fossil fuels. The state faces these pressures as it also grapples with electricity costs that are among the highest in the nation.

And while California is the current region of concern about wildfires, it is not the only vulnerable state. Others face their own accelerating climate pressures, sustainability mandates, declining reliability and increasing costs.

Why we published this paper

Microgrids offer a way to keep the electricity flowing to all elements of society. But they are not being installed quickly enough to avert broad economic hardship from major power outages. Why the delay? Many electric customers remain unaware of the technology. Others mistakenly believe microgrid costs put them out of reach.

Microgrid Knowledge has partnered with AlphaStruxure, a joint venture of

A microgrid is a self-sufficient energy system that serves a discrete geographic footprint, such as business complex, campus or community. During a power outage, the microgrid islands from the utility grid and its onsite resources provide power to its host buildings.

Schneider Electric and The Carlyle Group, to publish this report in hopes of bridging the education gap. We focus, in particular, on the energy-as-a-service microgrid, a no-money down model that allows electric customers to reap the reliability, economic and environmental benefits of microgrids without capital outlay or operational risk.

This report also will explore:

- Why microgrids are at an inflection point
- What businesses and institutions need to consider as they make decisions about energy costs, reliability and sustainability
- How energy-as-a-service contracts work and real-world examples

We invite you to download, "Why Energy-as-a-Service Microgrids are the Logical Next Step for California...and the Rest of the U.S," free of charge courtesy of AlphaStruxure. And we encourage you to share this link widely to help educate California—and the rest of the US—about energy-as-a-service microgrids.

Chapter 2
Why Microgrids are at an Inflection Point

Before Superstorm Sandy microgrids were relatively rare in the US, largely found at universities, hospitals and large industrial facilities. At the time, those with microgrids, such as Princeton University, captured public attention because they had electric power while others nearby went dark. The term microgrid then came into circulation.

While the term's meaning is somewhat fluid—because microgrids vary widely in size and type—in essence a microgrid is an on-site energy system that serves a defined geographic footprint, possibly one building or many. It is not mere backup generation, but operates 24/7, serving its host buildings as well as the broader electric grid.

A microgrid is characterized by its software and control systems, which can be highly sophisticated and allow for advanced energy management.

Most US microgrids are connected to the local utility grid. However, they seamlessly 'island' or separate themselves from the grid when a power outage occurs. The microgrid's onsite generators then provide power for the host buildings. When the power outage ends, the microgrid reconnects to the grid. The disconnection and reconnection happen seamlessly in advanced microgrids — those in the buildings served by the microgrid are unaware of any change.

Microgrids can use any kind of generators along with energy storage. Solar, batteries, combined heat and power (CHP) and natural gas-fired generators are the most common resources found in microgrids.

A microgrid is characterized by its software and control systems, which can be highly sophisticated and allow for advanced energy management. For example, a microgrid may leverage its relationship with the central grid to achieve goals that are set by its host. If the building owner wants to achieve lowest cost energy, the microgrid determines at any given time the lowest cost source of energy. When energy prices rise on the grid, the microgrid may use its on-site generators; when grid prices fall, it may switch back to utility power. Similarly, microgrids can manage their internal resources, switching generators on and off and managing load to achieve certain goals, including lowest price, low carbon emissions or maximum reliability.

Because of their many capabilities, microgrids began capturing the attention of policymakers in states that lead on technology innovation, among them California, Connecticut, Illinois, Massachusetts, New Jersey and New York. Many of these lead states offered incentives to encourage microgrid development. Now North America is on track to see the microgrid market grow to **$10 billion** in the next seven years, according to Navigant Research, a Guidehouse company. Worldwide the market is expected to grow from roughly $3 billion to $30 billion over that time frame.

Microgrid installations are accelerating in a range of settings, including communities, industrial operations, ports and airports, business parks, fire and police stations, schools, data centers, water treatment facilities, military bases and other operations.

As aggressive as that forecast sounds, it may underestimate microgrid penetration, given recent events. Since Navigant published its forecast in 2018, activity has picked up dramatically, with California appearing to bring the microgrid market to an inflection point.

For example, Pacific Gas & Electric intends to rely on microgrids to power a significant number of its customers during future public power safety shutoffs. The utility is planning to add 522 MW of microgrids in 2020. To put that in perspective, that's nearly as much microgrid capacity as the entire US added in 2019, according to a **Wood Mackenzie report**. On top of that, businesses, cities, schools, additional utilities, and others in California have been issuing plans to build microgrid projects of their own since the wildfire shutoffs, making the state an epicenter of development.

But the shutoffs are not the only impetus. A confluence of market and societal shifts are heightening interest in microgrids, especially among corporate C-suite executives who seek not only electric reliability, but also stable energy costs and a sustainable power supply.

These shifts include four main stimuli:

1. **Microgrid economics are now compelling**

Navigant identified a 30% drop in microgrid costs from 2014 to 2018. A microgrid's generation and storage assets contribute the most to its costs, so not surprisingly, the cost decline is linked to a corresponding drop in the price tag for solar and batteries.

Batteries have experienced an 87% drop in price since 2010 according to Bloomberg New Energy Finance. Meanwhile, the **Solar Energy Industries Association** has documented a 70% decline in the cost of solar photovoltaic systems over the last decade. Tax incentives and grants can further improve a microgrid's economics, where they are available.

With any discussion of microgrid economics, it's important to consider not only cost, but also the savings and revenue a microgrid can offer. Large energy customers often grapple with utility demand charges, which their microgrid

can help them manage. Microgrids also are often used to leverage grid pricing, or they may earn revenue for their owners by selling services to the grid or participating in utility demand response programs.

To create greater economies of scale, microgrids from multiple locations may be aggregated contractually into "virtual power plants" that offer grid services of a greater magnitude.

2. **Increased need for reliable electricity**

Power is the lifeblood of a digital economy. In a world where almost all business is web-enabled, a power outage virtually shuts down society. Consider that:

- The **Berkeley Lab** estimates annual power outage costs at $44 billion, up 25% since 2006
- Eight key U.S. market segments studied by energy consultant E Source lose about **$27 billion** per year due to power outages.
- Power outages are the primary cause of data center downtime at a cost that can exceed $1 million per incident—and in one case reached $50 million, according to a survey by the **Uptime Institute**.

These studies were done prior to the California power shutoffs of 2019, which are likely to recast some of the numbers dramatically.

While it's a relatively straightforward calculation to determine economic losses for most businesses—perished goods, lost sales, diminished worker hours—the calculation becomes more complex when considering societal impacts. When the value of life is considered, whether in medically vulnerable populations or power outage-induced accidents, the figure becomes incalculable.

3. **Sustainability as a core C-Level goal**

Sustainability has become increasingly important to the corporate world. While in 2011 only 20% of Fortune 500 companies engaged in sustainability reporting, by 2018 the number had reached 86%, according to the Governance & Accountability Institute (G&A). With this trend the C-Suite has become increasingly involved in making energy decisions.

Still, 80% of CEOs believe corporate efforts on the environment fall short, according to a survey of 1,000 chief executives by Accenture and the United Nations Global Compact.

By installing microgrids, executives take control of their organization's energy supply, which can help them fulfil a range of environmental, societal and economic responsibilities.

By better integrating clean sources of energy and improving energy efficiency, a microgrid can also help the corporation improve its Environmental, Social and Governance (ESG) scores, a metric increasingly used by analysts and investors in evaluating a company's performance.

For example, a company that installs a clean energy microgrid shows itself to be a good corporate citizen. Green energy used by the microgrid may even help the company's city or state reach clean energy or climate goals. Some companies take their societal contribution a step further by opening their doors to the community to charge phones and get a hot meal during an extended power outage.

By better integrating clean sources of energy and improving energy efficiency, a microgrid can also help the corporation improve its Environmental, Social and Governance (ESG) scores, a metric increasingly used by analysts and investors in evaluating a company's performance. It's also important to remember that a large swath of consumers—particularly **Millennials and GenXers**—support clean energy and gravitate toward companies that show climate stewardship. Showing support for sustainable energy, particularly technology geared for an era of climate change, can help differentiate your company from those yet to catch on.

4. **Desire for local control of energy**

Communities, too, are seeking more control over their energy production and use. In seven states, including California, this trend has led to a rise in community choice aggregators (CCAs), entities formed to secure power on behalf of the residents, businesses and public accounts in a municipality or county. California's first CCAs appeared in 2011 and the state now has nearly 30 operating or in planning.

CCAs attempt to use their collective buying power to drive down energy costs for the community. They also work to reflect community values. So in green-leaning California., the CCAs offer customers the choice of using power that comes at least partially from renewable sources. California's CCAs also focus on electric reliability, so several are exploring microgrids. Redwood Coast Energy Authority in Humboldt County already has a microgrid under development. Monterey Bay Community Power has released an application seeking customers to host microgrid projects.

CCAs and microgrids are a natural fit: both champion local energy that can reduce costs, accelerate sustainability, and improve reliability. As a result, adoption of CCAs is likely to foster more microgrid installations.

Microgrids are clearly on the rise with several factors responsible: technology advancements, reliability needs, C-suite leadership and the local energy movement. But one of the biggest drivers came with the introduction of an innovative financing model, energy-as-a-service, which makes microgrids easy and affordable for the customer. We'll explain how it works in the next chapter.

Chapter 3
Energy-as-a-Service: Making Microgrids Easy and Affordable

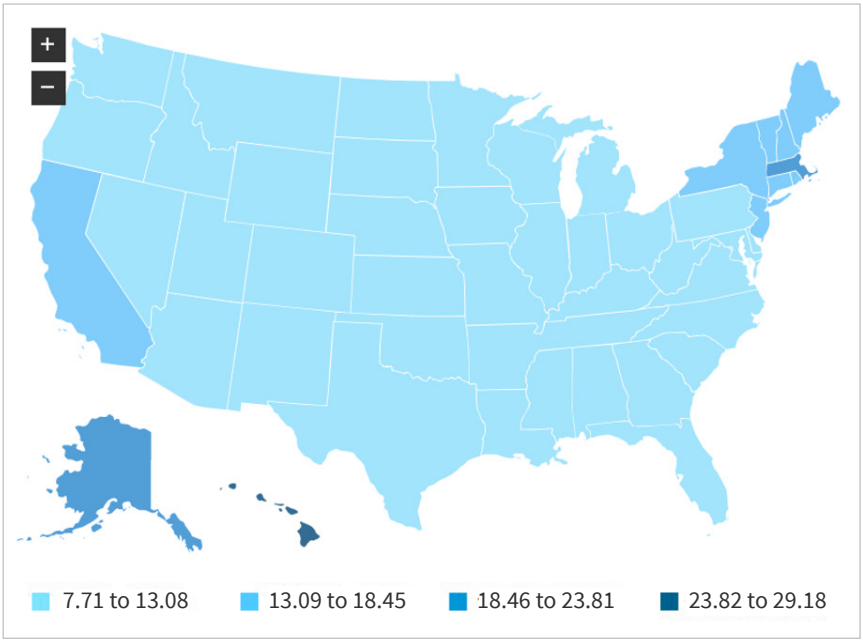
Business executives, community leaders and others often quickly see the value of having the 24/7 energy reliability of a microgrid. But three questions keep them up at night as they consider microgrid adoption.

1. Can we afford it?
2. How will we build and manage it?
3. Will it help us meet our sustainability goals?

In California, the question 'Can we afford a microgrid?' might be more aptly phrased: 'Can we afford not to have a microgrid?' The state already has among the highest electricity retail rates in the nation, 16.58 cents/kWh compared with the national average of 10.48 cents/kWh, according to the **US Energy Information Administration** (EIA). (Figures release 12/2019)

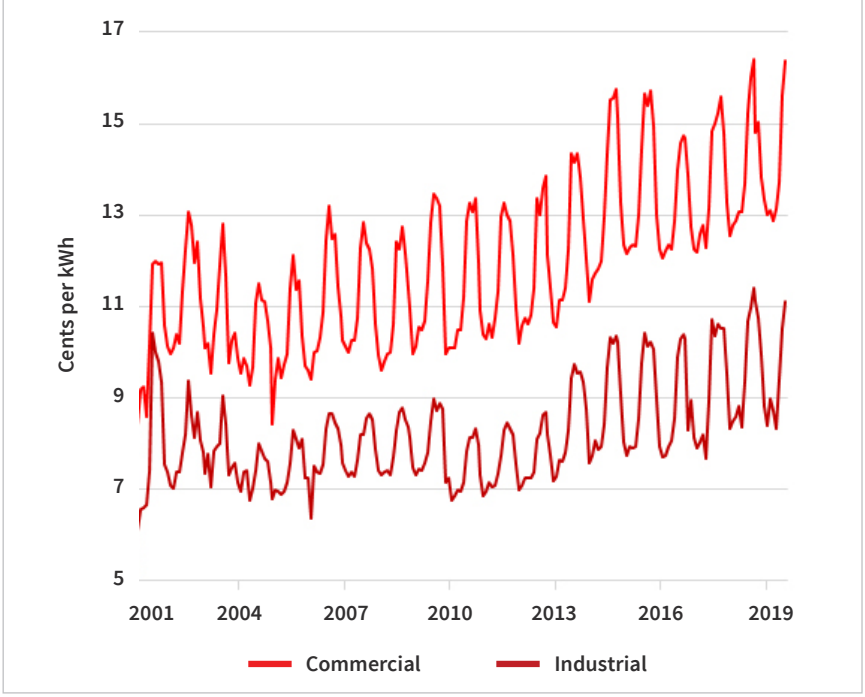
And electricity costs aren't likely to go down. In fact, a confluence of factors are putting upward pressure on utility rates in California, including more than $24 billion in utility costs for wildfire-related funds and settlements related to property destruction. As of this writing, the state's largest utility, PG&E, was seeking permission from state regulators to raise its retail rates by more than $1 billion in 2020.

U.S. average retail price per kilowatthour is 10.48 cents



Source: EIA

Average C&I retail price of electricity – Pacific contiguous



Source: EIA

The second worry of decision-makers—building and managing onsite energy—also is justified. Having control over one's energy brings many benefits but navigating power technologies and wholesale markets is the sphere of experts. If you're not in the energy business, it may be difficult for your company to secure and install the equipment, operate and maintain the plant, and capture cost savings opportunities and revenue streams from the market.

The same problems arise in navigating sustainability goals. Achieving emissions reductions from your facility, securing state or federal incentives for doing so, and then verifying and documenting performance, become a substantial effort for those not steeped in the process.

When a business tries to manage a microgrid on its own, it may draw resources away from its core activities. Recognizing this, the energy-as-a-service model was designed to provide customers with the benefits of microgrids without the operational and capital burden.

How does it work? What do you as a microgrid customer need to do?

Under energy-as-a-service, the customer takes on none of the burden associated with the microgrid's capital investment nor its operations. That's handled by third-party energy operators and investors who guarantee the performance of the microgrid system. So the customer is spared the work of developing, operating and maintaining the microgrid, and the financial burden of a capital outlay—which is why energy-as-a-service microgrids also are called no-money down projects.

In your financial accounting, the microgrid is recorded as an operational—not capital—expenditure, freeing up capital for other non-energy investments. As the microgrid customer, you simply pay a regular charge for receiving the microgrid benefits—affordability, reliability, resilience and sustainability.

But what will that operational expenditure be? An experienced energy provider, with strong financial backing, will structure your contract to fit your budget goals. In California (and other states where electricity prices are high) your energy-as-a-service contract should result in energy costs that are no higher than what you would otherwise pay—and likely less.

> Energy-as-a-service is a business model that provides a customer with the benefits of a microgrid for no money down, avoiding the risk and complexity of construction, ownership and operation. An energy-as-a-service provider builds, owns and operates the system and the customer pays only for the ongoing services it uses from the microgrid.

There are other benefits as well. Your energy-as-a-service contract may assume costs for energy efficiency upgrades, off-site renewables, and load optimization, which can further improve project economics.

What are the mechanics behind an energy-as-a-service contract? How does it lead to an affordable microgrid?

Your microgrid is owned and operated by a knowledgeable third party with robust engineering expertise and financial capabilities. A qualified energy-as-a-service provider must be steeped in understanding about energy contracts, financing, incentives, power outage costs, load management, demand response, demand charges, demand response programs, ancillary services and wholesale market pricing.

Your partner starts by carefully evaluating your operation, energy needs and the true cost you pay for energy. Many organizations do not realize that there are embedded costs for energy beyond the kilowatt-hour charge from the utility. These might be:

- The loss of business due to power outages
- Penalties related to environmental non-compliance
- Missed opportunities for energy efficiency
- Inability to capture revenue streams from the sale of energy or services to the grid from a microgrid
- Missed opportunities to reduce demand charges or participate in demand response or load management programs

The third-party owner can design an energy-as-a-service contract that takes all these costs and savings opportunities into account. The length of the contract can be adjusted to meet the budgeting needs of your operation.

In some cases, companies have multiple facilities in various locations and the energy-as-a-service provider can link them 'virtually' or contractually to achieve even greater savings and sustainability.

With an energy-as-a-service microgrid, a company can achieve optimal energy economics while at the same time gaining the benefit of reliable and resilient power.

Because energy-as-a-service model makes microgrid adoption easy, it is expected to speed development of the technology worldwide. Already 31% of total microgrid capacity operates under this business model, according to Navigant Research.

With energy-as-a-service microgrids become the next logical step in securing reliable energy, an important step for California—and the world, as we'll discuss in the next chapter.

Chapter 4
Why microgrids are the next logical step

Microgrids are the next logical step in the evolution of energy management for businesses. Many businesses are already working to be energy efficient and green. Microgrids enhance these efforts and add a third layer: resilience.

As a result, microgrids serve as both a short- and long-term solution for businesses...and the world.

Short-term microgrids keep the lights on and businesses open while helping them meet their sustainability goals while keeping energy affordable.

Long-term they help reduce greenhouse gases through their use of clean and renewable energy, contributing to efforts by states to meet clean energy mandates. California has set a goal for 50% of its electricity to be powered by renewables by 2025 and 60% by 2030. By 2045 the state intends to get 100% of its power from zero-carbon sources. Several other states have similar—and sometimes more ambitious—goals. Seven states, plus Puerto Rico have adopted clean energy transition laws, according to the **UCLA Luskin Center report**. Washington DC seeks 100% renewable electricity by 2032. New York has set a target of 100% carbon-free electricity by 2040, and Massachusetts is seeking net-zero emissions by 2050.

And it's not sustainability and reliability alone that microgrids bring to the table; they offer an opportunity to reduce energy costs for everyone by way of their relationship with the central grid. They contribute new and efficient resources that help moderate the cost of operating the grid to the benefit of all who use it.

In addition, microgrids tap into a growing, grassroots movement for local control of energy.

By making microgrids simple and affordable, the energy-as-a-service contracting model helps accelerate all of these trends. While once microgrids were the domain of only those ready to make a large capital expenditure, today they are available to a wide swath of businesses and institutions thanks to the energy-as-as-service approach.

As their numbers increase, microgrids will begin to interact with each other, communicating, sharing resources, and coordinating activities to achieve levels of efficiency and electric reliability not possible with today's centralized grid. This concept is sometimes described as a 'grid of microgrids.' Should this vision bear out—and it appears inevitable—an interconnected web of microgrids and distributed energy could act as the primary power supplier for advanced economies. The centralized grid we rely on today would become secondary, serving as a backup system.

But that's the vision for the future. How about right now? Here are a few examples of microgrids now in operation and the benefits they offer.

Blue Lake Rancheria Microgrid

When PG&E shut off power to more than 30 California counties in October 2019, Humboldt County was not left completely in the dark, thanks to the microgrid at the Blue Lake Rancheria tribal reservation.

NPR reported: "As one of the only gas stations in the county with power, the reservation provided diesel to United Indian Health Services to refrigerate their medications and to the Mad River Fish Hatchery to keep their fish alive. The local newspaper used a hotel conference room to put out the next day's paper. Area residents stopped by to charge their cell phones. Ganion estimates that on that day more than 10,000 nearby residents came to the reservation for gas and supplies."

Continue reading here.

Schneider Electric has partnered to develop a microgrid at a public safety facility in Montgomery County, Maryland.

Stone Edge Farm Microgrid

During the same power shut off, a winery in Sonoma County, California, kept its operations up and running—and assisted neighbors thanks to its microgrid:

Troy Wooster, who operates the The Stone Edge Farm microgrid reported at the time: "We are currently running three households, one spa, one woodworking shop, two car storage barns and two trailers and as a part of our community outreach, we are powering a refrigeration van that stores food from a couple of restaurants from Downtown Sonoma." At the time the microgrid had been operating islanded from the utility grid for 33 hours.

More about the Stone Edge Farm microgrid here.

Gordon Bubolz Nature Preserve in Appleton, Wisconsin

Nature decided to upstage the rest of the presenters during a microgrid tour at the Gordon Bubolz Nature Preserve in Appleton, Wisconsin.

A massive thunderstorm hit on September 17, 2018 as about 75 members of the International Association of Electrical Inspectors (IAEI) toured the new 18,000 square-foot green building, served by the microgrid.

"You couldn't even open the door to the building, the winds were blowing so hard. Torrential rains," said Don Wingate, vice president of sales, utility solutions for Schneider Electric which worked with Faith Technologies to build the microgrid.

The electrical inspectors had come to learn about how the advanced microgrid offers electric reliability when the power goes out.

And then—defying probability—the power did just that.

Continue reading here.

As we've discussed in this report, and as these projects show, microgrids are both a short- and long-term solution for businesses...and the world.

Short term, microgrids keep the lights on and businesses open while helping enterprises meet their sustainability goals.

Long term, microgrids help reduce greenhouse gases through their use of clean energy, assisting states like California achieve their climate and renewable energy goals.

In addition to producing clean energy internally, microgrids can assist the larger grid in integrating renewable energy. Because renewable energy is intermittent, grid operators need quick acting resources they can call upon to balance supply and demand when the wind suddenly stops blowing or clouds cover solar panels. Microgrids can play this role.

The ability to manage intermittency is becoming ever more important as states step up their renewable energy goals. About three-fifths of US states have renewable portfolio standards, requirements that a percentage of their power come from renewables by a specified date. California in 2018 pushed the envelope by increasing its standard. By 2045 100% of its electricity must be carbon free. California is often an energy leader, so not surprisingly other states are following suit.

Today, more than a dozen US states, districts, and territories and more than 200 cities and counties have 100% clean electricity goals—or have already achieved the marker. A **report** by the UCLA Luskin Center for Innovation says that that one out of every three Americans (about 111 million Americans and 34% of the population) lives in one of these areas.

This is a world made for microgrids—and a world microgrids help make. So how do you take the next step and secure an energy-as-a-service microgrid for your operation?

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Chapter 5
The AlphaStruxure Energy Vision: From Coast to Coast

To be successful, an energy-as-a service microgrid requires a developer and operator with extensive financial and engineering capabilities. So the first step for your business or organization is to find an able partner.

It's best to seek a company that offers capital/structuring and design, build, own, operate and maintenance capabilities. Your partner should also have expertise in energy efficiency, power purchase agreements, managing and optimizing a microgrid digital platform and collecting and analyzing the platform's data. The partner must be more than a consultant; you'll need a developer/operator who takes on risk and guarantees performance of the microgrid, likely to be two or more decades.

Because energy-as-a-service microgrid development requires multiple levels of expertise, joint ventures are forming between major energy technology companies and capital providers to accomplish the task.

One example is **AlphaStruxure**, a joint venture of The Carlyle Group and Schneider Electric. The Carlyle Group, one of the world's largest investment firms, manages over $220 billion in assets with 33 offices across 19 countries. Schneider Electric, a global energy management and automation company, and an early leader in microgrids, is credited with installation of 300 microgrids and related control equipment in North America alone. AlphaStruxure's energy-as-a-service offer is backed by the staying power and credibility of two industry leaders in energy and finance.

Ready for *a microgrid? Take the first step by contacting AlphaStruxure to learn how the energy-as-a-service model can help you control energy costs, improve reliability and achieve sustainability goals. AlphaStruxure@se.com*

Next we profile two microgrid projects that demonstrate Schneider Electric and AlphaStruxure's track record and capabilities.

The Montgomery County, Maryland Microgrids

After a derecho caused massive power outages in Montgomery County, Maryland, government officials began exploring resilience for essential facilities. Out of their efforts came two industry-leading microgrids: one for the county's public safety headquarters in Gaithersburg and another at a correctional facility in Boyds.

Developed by Schneider Electric and a financial partner, the microgrids serve as a model for effective public/private partnerships that use the energy-as-a-service model. Montgomery County gained the reliability, economic and environmental benefits of a microgrid at a locked-in rate without making a capital outlay. In addition to gaining long-term price certainty, the county facilities retain electric power when the central grid goes down.

The project had another bonus for the county. They incorporated into the 25-year agreement the costs of electrical infrastructure upgrades that the county needed to make to its 50-year-old public safety headquarters. The county was able to pay for the upgrades from energy savings the microgrid generates.

"Our partnership with Schneider has enabled us to do over $5 million in capital improvements—major electrical switchgear and things like—because of the savings generated from energy reductions. Five million in capital improvements is significant," said David Dise, director of the county's department of general services, in a **Facebook interview** with Kevin Self, Schneider's vice president strategy, business development & government relations.

Fast facts: Montgomery County microgrids

- Produce 11 million kWh/year
- Reduce greenhouse gas emissions by 5,900 metric tons annually, the equivalent of taking more than 1,200 cars off the road
- Two megawatts of solar photovoltaic canopies mounted over the existing parking lot
- An 800 KW combined heat and power (CHP) system
- Electric vehicle charging stations and a cyber security system
- Receives state clean energy credits and benefits from the state's aggregate net energy metering policy
- First facility of its kind to achieve Platinum certification from the Green Business Certification Inc.'s (GBCI) PEER rating system recognizing sustainable infrastructure.

Watch video and read details about the microgrids here.

Port of Long Beach Microgrid and Electrification

The second busiest container port in the United States, the 3,200-acre Port of Long Beach handles $194 billion in cargo per year. It has 140 shipping lines with connections to 217 seaports.

Known as 'The Green Port," it is living up to its name with microgrid and electrification projects.

The Port is home to a $5.2 million microgrid development commissioned with Schneider Electric.

"Ensuring a stable supply of energy is crucial to the zero-emissions future the Harbor Commission envisions for the Port of Long Beach," said Tracy Egoscue, president of the Long Beach Board of Harbor Commissioners.

Because of their ability to island, microgrids offer a way for ports to secure electricity supply even if a power outage occurs on the central grid. Reliable electricity is crucial to major ports given the volume of business they do.

The microgrid bolsters energy resilience for the port's critical response facility, the Joint Command and Control Center (JCCC), which functions as its security hub.

"Across all industries and public entities, there is increasing demand to bolster energy resilience to support business continuity at critical facilities. The plans of the Port of Long Beach illustrate the foresight required to augment ongoing electrification efforts with resilience," said Mark Feasel, vice president, smart grid & microgrid, **Schneider Electric**.

As part of the project, Schneider helps compile and analyze 12 months of performance data to ensure the microgrid moves the port towards its energy resilience goals.

Port of Long Beach

The project integrates distributed energy resources and microgrid controls, including:

- A 300-kW solar array
- 250-kW microgrid-extending mobile battery energy
- A 500-kW diesel generator
- Schneider's pre-configured hardware solution, Energy Control Center DC coupled and merged with technologies from partner EnSync Energy, mobile storage solution and microgrid controls. Energy Control Center will also leverage 330 kW/670 kWh of stationary battery energy storage
- Schneider's EcoStruxure Microgrid Advisor, the cloud-connected, demand-side energy management software platform that simplifies the port's DER integration and allows microgrid operators to collect, forecast and automatically optimize operations
- Schneider's EcoStruxure Power solutions including Power Monitoring and Power SCADA Operation.
- Additional microgrid controls to allow demand response, peak shaving, and microgrid islanding

The port will serve as a site for federal, state, and local response agencies to visit and learn about microgrids. Schneider Electric is developing a "lessons learned" guidebook about the project to support replicability and commercialization of microgrids—part of the goal of the CEC grant program. As part of the project, Schneider also will undertake local workforce development with Long Beach City College and the International Brotherhood of Electrical Workers.

To learn more, contact
AlphaStruxure@se.com

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