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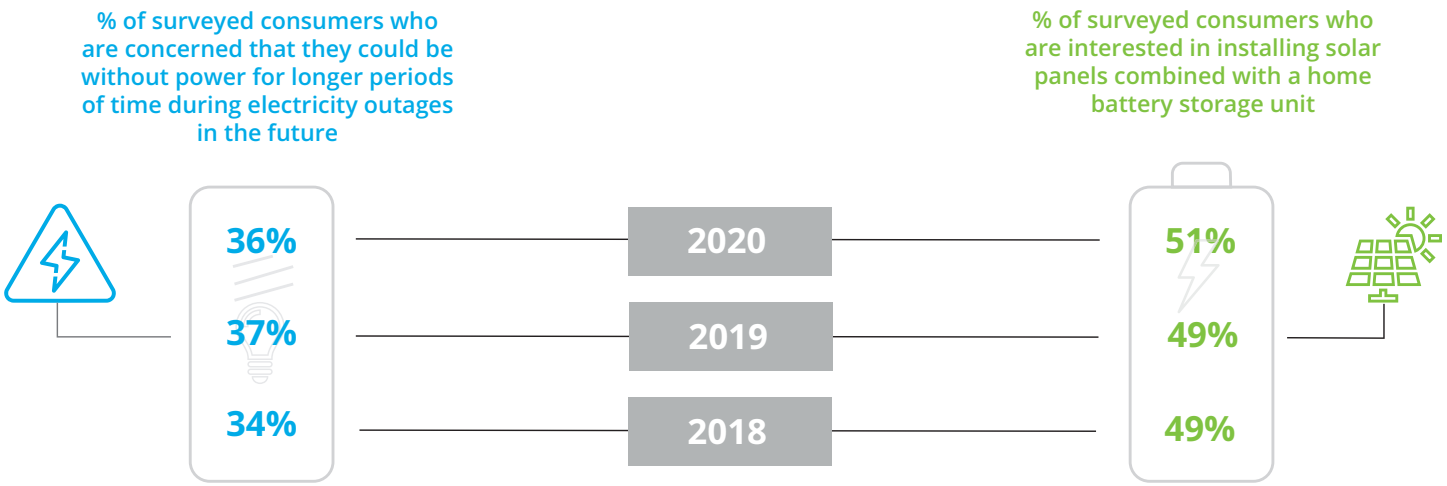
Lasting COVID-19 impact on work patterns may boost residential electricity self-sufficiency

Residential electricity consumers' increasing concern about outages, combined with falling technology costs, are driving many toward self-sufficiency, a trend that may increase as work-from-home patterns are expected to continue into the post–COVID-19 period. And this trend may accelerate residential consumer interest in rooftop solar, battery storage, and nanogrids.

Residential electricity consumers increasingly seek resilience and self-sufficiency as concerns about power outages rise



Source: Deloitte Resources Study, 2018-2020

In the past few years, residential consumers' concerns over power reliability have risen, largely due to an increase in extreme weather and climate events, such as earthquakes and wildfires, and concerns about supply security.[1] Utility customers experienced 1.33 billion outage hours in 2020, up 73% from roughly 770 million in 2019.[2] In addition, there is an increasing concern about cyber security, causing 37% of the surveyed consumers to worry about an interruption to electricity supply due to a cyber security event with their electric supplier in 2020.[3]

Furthermore, a revolution may be occurring in work patterns, as almost 42% of the American workforce worked from home full-time during 2020, in stark contrast to 12.3% before the novel coronavirus. This trend looks poised to continue even post-pandemic, with an estimated 26.7% expected to continue working from home through 2021 and about 22% through 2025—almost double the pre–COVID-19 level, highlighting that working from home seems to be here to stay.[4]

This shifting workforce dynamic increases the need for reliable electricity supply significantly for the residential segment, which already saw a surge and a shift of power demand during spring 2020 shelter-in-place orders. As a result, from April–July 2020, residential demand rose 8% compared with the same period in 2019, while commercial and industrial demand dropped 9% and 13% respectively during the same period.[5]

These changing consumption patterns may raise residential consumers' electricity bills due to increased demand for heating, cooling, and other uses. In 2019, the average annual electricity consumption for a US residential electricity customer was 10,649 kWh, and a customer working from home for a year will use an estimated additional 2,250 kWh, which translates into approximately $300 annually or $25 monthly of additional costs.[6] In addition, power outages in homes in these scenarios would no longer be just an inconvenience, since they can now carry significant costs due to business disruptions.

All of this may be honing consumers' interest in energy self-sufficiency and potentially contributing to accelerating investment in rooftop solar and battery storage systems, which was already trending upward in recent years. In fact, in the third quarter of 2020, residential storage installations grew 7% compared with the second quarter, which may partly reflect the growing quest for resilience.[7]

An 89% decline in battery storage costs in the past decade[8] and improving solar-plus-storage economics have increased adoption rates and may boost future sales of these residential energy systems or nanogrids. By 2025, more than 25% of all behind-the-meter solar systems are expected to be paired with storage, compared with less than 5% in 2019.[9]

Nanogrids are typically small, single home, locally controlled, solar and storage-based microgrids that can provide smart energy management and can be islanded to provide on-site power in case of outages.

They can create further value for customers by enabling them to participate in utility demand response programs, save money with time-varied pricing, and potentially aggregate excess output with other residential customers' systems to provide grid services as part of a "virtual power plant." These services can help utilities shave peak power demand and smooth variable output from renewable sources such as solar and wind. In fact, a California utility and rooftop developer are collaborating on one of the first residential energy storage virtual power plants in the United States, to be implemented in 2021.[10]

Looking ahead

The COVID-19 pandemic has amplified residential consumers' continuing need for a reliable and resilient power supply and renewed the interest for many in self-sufficiency.

These investments can on one hand provide consumers with some level of independence, and on the other hand provide new opportunities for utilities, which can tap nanogrids for grid services, including demand response, ancillary services, and local capacity. Utilities will likely increasingly assess nanogrid market potential and potential impact on grid operations as part of their integrated resource plans.

[1]Deloitte Resources 2020 Study, July 2020.
[2]Garett Hering, "US power outages jumped 73% in 2020 amid extreme weather events", S&P Global Market Intelligence, Jan 19,2021.
[3]Deloitte Resources 2020 Study, July 2020.
[4]Dr. Adam Ozimek, "Economist Report: Future Workforce," Upwork, December 15, 2020.
[5]US Energy Information Administration (EIA), electric power monthly data.
[6]Deloitte analysis; Daniel Crow and Ariane Millot, "Working from home can save energy and reduce emissions. But how much?", International Energy Agency (IEA), June 12, 2020; US Energy Information Administration (EIA), electric power monthly data, Feb 24, 2021.
[7]Wood Mackenzie, US energy storage monitor: Q4 2020.
[8]BloombergNEF, "Battery pack prices cited below $100/kWh for the first time in 2020, while market average sits at $137/kWh," December 16, 2020.
[9]Solar Energy Industries Association (SEIA), "Solar Industry Research Data."
[10]Sunrun Inc., "Sunrun launches one of the first home battery virtual power plants In U.S.," POWER, June 16, 2020.

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