

WHITE PAPER

# Managing Distributed Energy Resources: Utilities Can't Do It Without Customers

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## Abstract

As distributed energy resources (DER) like rooftop solar proliferate, utilities will increasingly deal with business and grid impacts of co-generation and two-way power flows. Flat or declining load growth, voltage excursions, duck-curve load profiles and more are making the need for demand management programs increasingly crucial.

In other words, utilities will need customers to help keep the grid strong. That means customer relationships have become more important than ever.

Counterintuitively, self-service options are one way utilities can strengthen those relationships by raising customer satisfaction. This white paper explains why DER are making demand management a priority and how self-service options have helped utilities save money while bolstering customer ties.



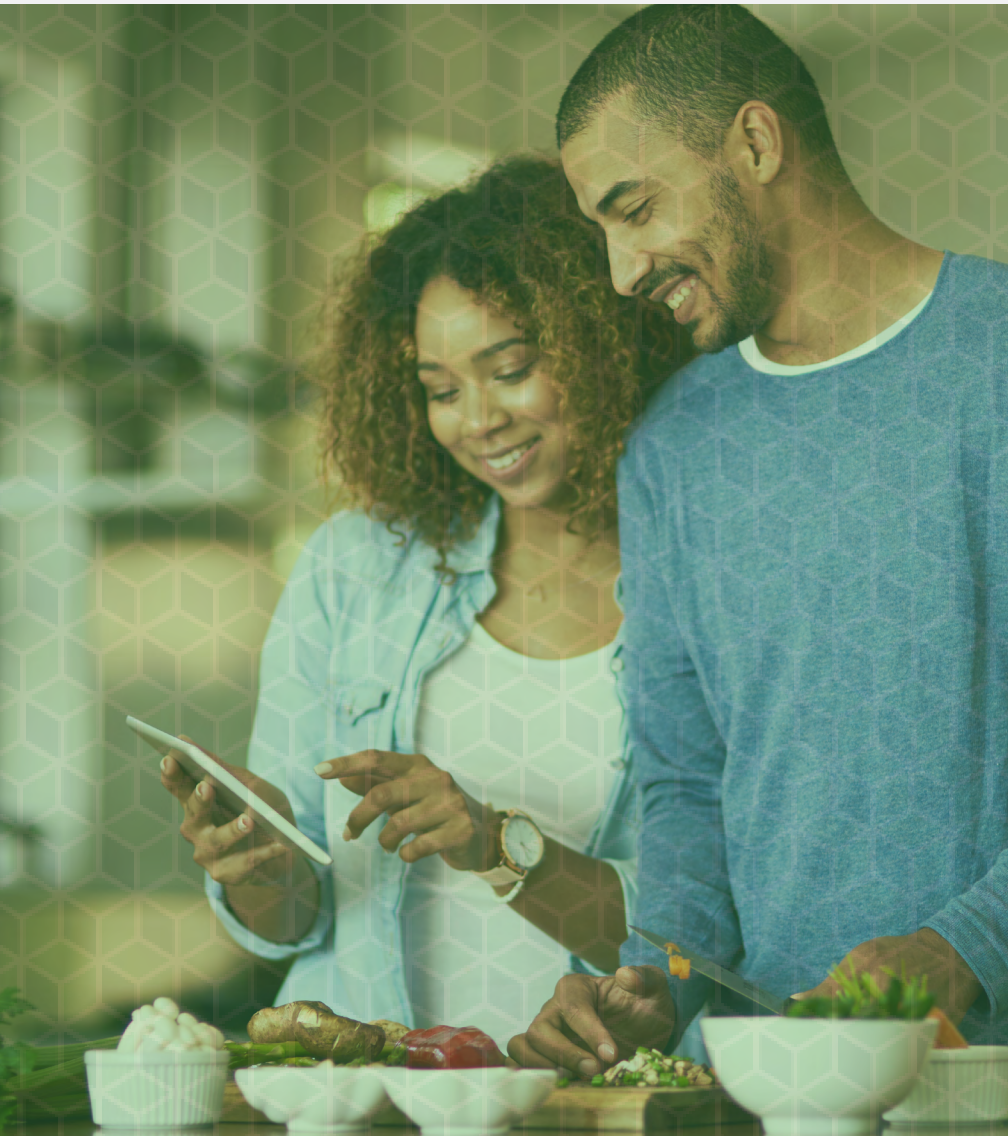
# The new utility-customer relationship

Open any utility trade publication these days, and you'll likely see an article that begins by referencing this now well-known fact: The electric grid was designed for centralized generation and one-way power flows, but the proliferation of (DER) is making co-generation and two-way power flows commonplace.

Because customers and their onsite generation are impacting grid power factor, stability and resiliency, customers are increasingly becoming part of the solution for overloaded and outdated grid assets.

A case in point is Consolidated Edison's Brooklyn-Queens Demand Management (BQDM) project, a non-wires alternative (NWA) for what would have been a \$1.2 billion solution to overloading on transmission lines serving two vital substations. Rather than go with traditional utility investments in power lines and substation equipment, the utility chose a \$200-million investment to slash load by 52 megawatts as soon as summer 2018.

The solution includes small- and utility-scale photovoltaics, energy storage, back-up generation as well as demand response and customer-sited energy efficiency. A third party aggregates and dispatches these resources within five minutes of receiving the signal from the utility to reduce 41 megawatts of load and ease congestion on the power lines. Only 11 megawatts of capacity come from utility-scale projects. The solution costs less than one-fifth of what the utility would have spent without going the non-wires route.<sup>1</sup>



Key to NWA solutions is consumer engagement. Last year, e-Source, an energy-related consultancy and research firm, queried 28 U.S. and Canadian utilities. A write-up of the study noted,

“

The majority of utilities stated that 'improving customer satisfaction' is an extremely important driver of their DER-related strategy efforts, but less than half are currently including customer experience analysis and planning in their DER strategies.





## Driving the change

Several factors contribute to the need for increased management of DER. Among them are green-thinking consumers, falling technology costs and aging utility infrastructure. Here's a closer look.

## Consumers want clean energy

Consumer sentiment was the number one reason utilities are investing in clean energy, according to the 2017 Utility Dive State of the Electric Utility Survey. Twenty percent of respondents named it as the main driver behind their business cases, and 19 percent named sustainability as their top reason for investing. Among electric cooperatives 38 percent cited consumer sentiment as their number-one motivator.<sup>2</sup>

How is that playing out in the industry? Utilities that install community solar gardens find them selling out quickly. Last summer, Fremont, Nebraska offered citizens the chance to buy into a 500-kilowatt (kW) system. Demand was so strong, the utility expanded the solar array to 1.55 megawatts – 4,928 panels – and citizens subscribed for all of them within six weeks. The town now is planning a second site, and there's already a long waiting list of people hoping to subscribe.<sup>3</sup> No wonder GTM Research predicts community solar systems will become a 500-megawatt annual market by 2019.<sup>4</sup>

<sup>1</sup> <https://insideclimatenews.org/news/04042016/coned-brooklyn-queens-energy-demand-management-project-solar-fuel-cells-climate-change>

<sup>2</sup> <https://www.utilitydive.com/library/2017-state-of-the-electric-utility-survey-report/>

<sup>3</sup> <https://sepapower.org/knowledge/nebraska-community-solar/>

<sup>4</sup> <https://www.greentechmedia.com/articles/read/us-community-solar-market-to-surpass-400-mw-in-2017#gs. H2=BV8>

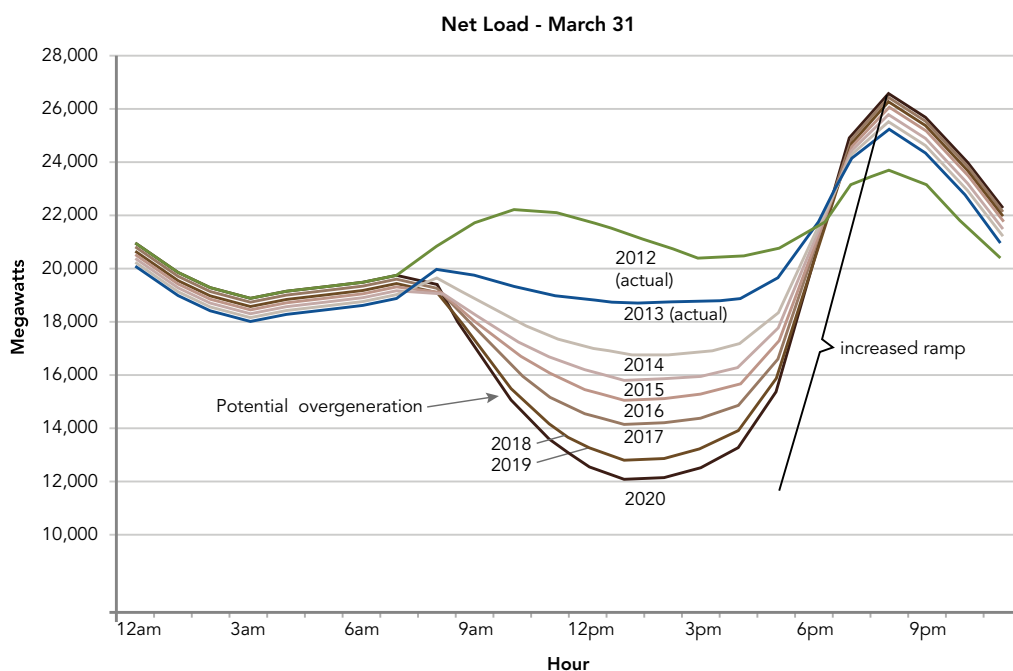
# Solar and storage growth continues

GTM Research predicts prices for photovoltaics will continue to drop some 4.4 percent annually or 27 percent by 2022. As for installed capacity, GTM's team calculates PV will more than double over the next five years and, by 2022, nearly 15 GW of PV capacity will be installed annually.<sup>5</sup>

Worldwide, solar is now the leading type of new capacity. According to GlobalData researchers, 2016 saw 72 gigawatts of new PV, while wind energy added 53 gigawatts – one more than coal – gas ended the year with 41 new gigawatts of generation and hydro added 31 gigawatts.<sup>6</sup>

This is great news for the environment, but bad news for utility load profiles. Consider the California Independent System Operator's now famous "duck curve," so named because the mismatch in variable generation and load makes the curve look like an outline of a duck.

The belly of the duck shows how variable generation from renewables creates oversupply of electricity during daytime hours. The neck of the duck shows the steep ramping that must occur when utility scramble to meet demand as solar production winds down and people go home to switch on the air conditioner, make supper and, perhaps, wash a load or two of laundry.



Source: U.S. Dept. of Energy, Energy.gov

Storage – particularly customer-sited storage – may help and, fortunately, it too is on the rise. Since 2012, Lithium-ion prices have dropped some 70 percent, according to IHS Markit. This, the IHS analysts say, will drive global uptake of energy storage over the next few years. They maintain that installed storage capacity will reach 52 gigawatts – up from around 4 GW today – by 2025.<sup>7</sup>

<sup>5</sup> <https://www.seia.org/news/us-solar-market-notches-another-quarter-2-gw-growth-uncertainty-holds-back-installations>

<sup>6</sup> <https://www.solarpowerworldonline.com/2017/09/solar-installed-new-electricity-generator-worldwide-2016/>

<sup>7</sup> <https://pv-magazine-usa.com/2017/08/03/falling-lithium-ion-battery-prices-to-drive-rapid-storage-uptake/>







# EVs rise

Electric vehicles (EVs) are another form of potential grid-connected storage. “One properly designed electric-drive vehicle can put out over 10kW, the average draw of 10 houses,” notes a website on vehicle-to-grid (V2G) technology research at University of Delaware, which is one of the nation’s top V2G research sites.

- “ The EV revolution is going to hit the car market even harder and faster than Bloomberg New Energy Finance (BNEF) predicted a year ago, notes a BNEF report.
- “ EVs are on track to accelerate to 54 percent of new car sales by 2040. Tumbling battery prices mean that EVs will have lower lifetime costs, and will be cheaper to buy, than internal combustion engine (ICE) cars in most countries by 2025-29.<sup>8</sup>

Batteries – whether installed for pure energy storage or installed to power the drive train of an EV – can respond to grid operator signals “almost instantly,” notes researcher Darlene Steward in a report<sup>9</sup> titled Critical Elements of Vehicle-to-Grid Economics published by the National Renewable Energy Lab. That means these fast-ramping resources can be used to compensate for fluctuations in variable generation from renewables, support load shifting and provide grid services like operating reserves or even regulation service to keep the North American grid frequency at 60 hertz.

But, such uses of these DER are only possible when utilities get customers to participate in demand response programs.





# The digital bridge

Last June, Utility Dive ran an article noting that, successful customer engagement “helps utilities meet energy efficiency mandates, smooth peak loads, and implement new rate designs.”

The same article quoted Navigant Principal Analyst Neil Strother, who called digital access via smart phones and tables a “mobile front door” and websites an “online front door”<sup>10</sup> for customers.

Once you invite consumers into those front doors, you can make them feel welcome by giving them something they want: The ability to answer their questions and resolve issues without waiting for your call center to open up or a representative to help out.

A 2016 survey by Aspect, makers of call-center software, found that 65 percent of survey respondents agreed with the statement,

“ I feel really good about both the company and myself when I am able to answer a question or solve a problem related to that company without having to talk with a customer service agent.

This figure was 70 percent for Millennial respondents.

The same survey found that 71 percent of respondents

“ Want the ability to solve most customer issues on their own. This was up from 64 percent in 2015.

In fact, 42 percent said they’d “rather clean a toilet” than contact customer service.<sup>11</sup>

Along with pleasing customers, self-service capabilities save utilities money. Here’s an example:

## Self-service reduces calls

Working with Datavail, formerly Navantis, a large Canadian utility launched a highly functional customer self-service portal that provides 24/7 access to information and services customers need, such as payment history, bills and account details. It is highly targeted to this utility’s specific customer needs and experiences because Datavail used call center data to prioritize functionality.

### Results



- Leading drivers of call center traffic are now things customers can handled themselves via the portal.
- Incoming calls to the utility call center dropped from 614,000 to 214,900 calls annually.
- Call volume overall is down by 65 percent.

<sup>8</sup> <https://about.bnef.com/electric-vehicle-outlook/>

<sup>9</sup> <https://www.nrel.gov/docs/fy17osti/69017.pdf>

<sup>10</sup> <https://www.utilitydive.com/news/utility-customer-engagement-goes-digital/444149/>

<sup>11</sup> [https://www.aspect.com/globalassets/2016-aspect-consumer-experience-index-survey\\_index-results-final.pdf](https://www.aspect.com/globalassets/2016-aspect-consumer-experience-index-survey_index-results-final.pdf)



Another utility – a North American T&D provider serving 1.3 million business and residential customers – had only 8 percent of its customers signed up for e-billing. Since each paper bill cost the company an average of \$5 in processing and mailing costs, the company was able to save big with a 20-percent increase in e-billing sign-ups.

For both utilities, customer satisfaction went up and costs went down. Each of these firms is now in a better position to ask customers to help them defer infrastructure investments with participation in demand response programs.

According to a 2017 survey conducted by the Smart Electric Power Alliance,

“Utilities are increasingly looking to target demand response in specific distribution-level areas with high load growth or infrastructure constraints.”

SEPA researchers found that 10 percent of utilities with demand response programs have leveraged locational programs as non-wires alternatives. Another 60 percent are planning or researching such an approach.

It will be easier to engage customers in these demand management programs for utilities that already have strong customers ties. Self-service customer care technology is one way to develop them.

## Customer-centric DER management

As a case in point, consider last year’s appeal to consumers made by Tesla, makers of the Powerwall battery energy storage system, and Green Mountain Power (GMP), a Vermont utility. The utility is offering Powerwall 2 batteries to up to 2,000 customers. These units can be had for no money down and monthly payments of \$15 or a one-time \$1,500 charge. That’s less than half the usual cost of a Powerwall.

Why is GMP doing this? To access those batteries during peak consumption hours. According to the company press release, “GMP estimates a reduction of up to 10 megawatts of peak load, which is the equivalent of taking an average of 7,500 homes off the grid. When paired with solar, the program also allows customers to generate and store their own energy and power their homes during outages.”<sup>12</sup>

There’s an upside for customers who don’t get the Powerwalls, too. GMP and Tesla plan to bid into New England’s wholesale energy markets to help keep rates low for all of the utility’s customers.

Getting a project like this off the ground takes plenty of customer education. GMP also has online sign-ups for those who want to learn more about the program. That takes IT support.

There are many places where meeting customers online – or on their smartphones and tablets – makes sense with DER management. Among them are the initial phases of interconnection requests, promotion and sign-up capabilities for programs like the BMP Powerwall offering, programs for selling aggregated DER capacity into the market, as well as education and sign-ups for special rates that may soon make sense for people who have resources such as on-site solar and storage.

And, here’s another place where making it easy for customers to connect to and interact with the utility online makes sense for DER management: the Internet of Things (IoT).

<sup>12</sup> <https://www.greenmountainpower.com/press/gmp-launches-new-comprehensive-energy-home-solution-tesla-lower-costs-customers/>



By 2020, Gartner predicts that internet-connected things will outnumber humans by a ratio of four to one.<sup>13</sup> For utilities, that presents many opportunities, such as appliance monitoring, including monitoring of DER generation resources, which will help both the utility and the customers by ensuring these resources are operating optimally. Or, utilities may someday offer services such as roving charging, where the utility alerts an EV to nearby charging infrastructure and makes sure the charging event winds up on a customer's bill.

Again, these programs are ideal for online education and sign-up technology. Customers will be looking for such opportunities. Will your utility be ready to offer them?

Once you do, will your firm be able to harness and use the data that DER and IoT technology deliver? Will you be able to leverage EV charging data from infrastructure your utility implements or maintains? Will you be able to analyze current installations of customer-sited DER and analyze where more customers will probably add rooftop photovoltaics so you can plan your system accordingly? That's what they're doing at Sacramento Municipal Utility District.

If you implement programs like the one at Arizona Public Service, where utility-owned solar plus smart inverters has been installed on customer rooftops, voltage- and frequency-sensing terminals on those inverters will have all sorts of information the operations and planning engineers will want to know. Could your organization leverage it?

According to Gartner, "Through 2020, a lack of data science specialists will inhibit 75 percent of organizations from achieving the full potential of IoT."

Though that shortage exists, there is one way to make sure you have the talent on hand to build your portals, your customer sign-up sites and leverage the data that connectivity will bring you. You'll find the resources you need at Datavail. To learn more visit [www.datavail.com](http://www.datavail.com).



<sup>13</sup> [https://www.gartner.com/imagesrv/books/iot/iotEbook\\_digital.pdf](https://www.gartner.com/imagesrv/books/iot/iotEbook_digital.pdf)



# Biography



**Vikas Mukhi**

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Vikas Mukhi is an Enterprise Architect at Navantis, a Datavail company with 15+ years of successful leadership and experience in business processes, complex applications and secure enterprise-class solutions necessary for 24/7 business operations.

His responsibilities include Solution strategy and implementation for business operations and has been recognized as a customer-trusted advisor throughout the project life cycle.

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