Imagine a day when electrical supply will meet demand — on demand — with minimal need for peaking plants. A day when utilities can surgically modify load curves, no matter how volatile energy needs are, any time, anywhere, in any weather. When customers become active energy partners, selling the energy they conserve back into the grid at wholesale market rates. Imagine a day when “negawatts” are as important as megawatts, and are critical for balancing volatility from intermittent resources.

That day will soon be a reality. The future of demand response is on its way. The only question is: will utilities be part of this energy future — or get left behind?
extra peaking capacity. With the cost of constructing a new combined cycle gas power plant topping about US$500m, it’s easy to see why demand response has been such a valuable tool for utilities, bringing down overall wholesale costs and creating savings for the entire value chain.

But the world of energy supply and demand has changed, in large part due to the rapid proliferation of distributed generation, putting great onus on maintaining system reliability. Introducing electricity sourced from solar and wind has brought a layer of localized geographic complexity to the supply of energy, while the intermittent nature of these resources adds new volatility to the grid. A patch of cloud over a few neighborhood streets can lead to voltage spikes and wreak havoc on the network. Meanwhile, more electric vehicles on our roads – and charging in our garages – are creating highly localized and volatile demand surges.

Germany is a powerful example of how this volatility can impact the grid. The country’s ambitious plan to increase the share of renewables in the energy mix (to 80% by 2050) is adding an influx of intermittent resources to supply. Currently, Germany can experience positive and negative supply fluctuations of up to 3GW in 15 minutes. This figure is expected to rise to 12GW in the near future.

This kind of dangerous instability on our electricity grid cannot be effectively managed using existing demand response and grid balancing strategies. Without different solutions, we are likely to face power price hikes, outages and damage to customers’ appliances.

Three obstacles to overcome on the path to new demand response

Can demand response be a solution to balancing today’s localized and volatile electricity supply and demand? Perhaps, though not in its current form. But if demand response can evolve it could allow – and encourage – utilities to control the distributed grid in real time and with a high degree of geographical precision. Three major things must occur first – and none will be easy to achieve:

1. Establishing demand-side energy markets to value the negawatt

The world’s existing energy markets offer a variety of ways to value supply-side energy, including day-ahead, hourly or ancillary services markets. But the industry largely lacks the ability to value demand-side resources, apart from a few notable exceptions – the PJM Interconnection in the US, where demand-side resources currently make up between 6%-9% of total capacity procured, and, subject to current regulatory changes, the UK electricity market.

Creating new market structures which value the negawatt is an effective way to incentivize utilities to efficiently manage distributed energy peaks through real-time demand response.

But this represents a fundamental change to how energy markets currently function and the significant regulatory changes required will meet tough opposition from the utilities sector. Generators are likely to lobby hard against any reforms that would introduce competition, fearing a lowering of both wholesale market price points and overall energy consumption.

2. Installing enabling technology to control demand in real time

Current demand response mechanisms typically rely on customers to react to pricing tariffs. But these tactics are not dynamic enough to solve the new challenges of highly localized, volatile supply and demand. Instead, utilities must rely on technology that can quickly and reliably curtail consumption – often without any customer involvement.

The cost and logistics of installing such technology are considerable, requiring an installer to visit each home and service individual appliances. But the challenge is not insurmountable, and the industry offers examples of how creative solutions have solved similarly difficult problems.

Let’s recall the early days of residential solar PV: many said the cost would prohibit large-scale adoption of the technology until financing initiatives such as US energy services provider SolarCity helped put solar panels on roofs around the country.

Similar developments could be the way forward for the implementation of demand response enabling technology. For example, utilities deploying smart meters have a golden opportunity to install demand response technology, such as load control devices, at the same time. This would provide considerable additional value at just an incremental cost. Similar opportunities exist with the bundling of other home energy technologies, such as solar and battery storage.
3. Attracting customer participation in balancing the grid

These first two actions make localized demand response technically possible. But the final piece of the puzzle is encouraging customer participation. Unless utilities can entice customers to give them control of their load, reliably and where and when they need it, demand response will not be an effective tool in managing localized and volatile demand peaks.

Creating an effective value proposition for customers will require a rethink of how utilities and regulators incentivize, reward and engage with them. One possible scenario could provide variable incentives for customers that adjust according to real-time need. For example, if utilities must shut down load now, they could offer a reward of $10 – if the issue is less urgent, the offer could be just $1. Customers could be asked to participate via SMS messages or mobile applications, with the price increasing auction-style until there is sufficient engagement (aggregated load).

Or customers could nominate automatic price points – for example, if the price hits $7 to curtail load for one hour, then consent is given.

Offering financial rewards to customers through interactive methods is likely to appeal to today’s Uber-riding, video-streaming customer. And engaging customers to play a real-time role in balancing the grid could create a truly dynamic, flexible supply-and-demand system.

Time for utilities to choose their position

It’s true this vision of demand response is still one that exists in the future – but this future is coming fast, and it will transform the energy grid and the way our sector operates. Already utilities are feeling the impact of competition from nontraditional players such as Alphabet and Tesla offering energy-related products and services, such as Nest or PowerWall. And it’s these companies that are positioning now to compete in the energy management space, using their superior expertise in customer engagement, product development and analytics to potentially beat utilities at their own game. If power and utilities companies lose their monopoly on the energy supply and demand markets, the impact on their business models and their ability to deliver value to customers could be devastating.

The message to utilities is – don’t wait. Now is the time to choose your position in the demand response evolution. For some, the decision may be to stay out of this space, focusing instead on core energy distribution services. But for those utilities that do want in, a proactive approach is needed.

Power and utility companies have only a small window of opportunity to leverage their pole position in the energy sector. Their customers still see them as the first port-of-call for all energy services – however that won’t last. Demand response is evolving, with or without the utilities. Will they lead the way, or let others take charge?
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