The retail energy revolution

A digitized, distributed and decarbonizing residential energy market will see the competitive landscape redrawn. Can incumbent utilities survive?

The energy supply business is in flux. In most industrialized countries, power demand is flatlining or shrinking. Margins are under pressure, as new and agile competitors erode the market share of incumbents. Digitization and new technologies are transforming the relationship between generators and consumers and upending market dynamics, while decarbonization adds costs and complexity.

Consumers in developed countries are using less energy. In July, the U.S. Energy Information Administration released data showing that, after sustained growth for two decades, residential demand fell between 2010 and 2016 – by 3% in absolute volume and 7% on a per-person basis.

Households are also starting to abandon their traditional suppliers. From 2013 to 2016, the market share of the UK’s top six energy companies fell from 99% to 85%. This competition, combined with the effect of renewable energy generation on wholesale prices, has hit utilities hard in some markets.

Underpinning these forces is the digitization of the energy system. Smart meters, digital networks and big data are enabling a distributed, democratized energy system, potentially putting control – and economic power – in the hands of the consumer.

How should utilities and their investors respond? The precise contours of the future utility business model are unclear.

But Matt Rennie, EY Global Transaction Advisory Services (TAS) Power & Utilities Leader, suggests it will combine a range of technological, financing and customer-engagement innovations that save the consumer money. It will do so by bringing together increasingly low-cost distributed renewable energy and storage systems, managing away the demand peaks that account for a large part of power system capital expenditure. “These innovations will give us a peakless network, where we are no longer building for those 8 to 10 hours a year of peak demand,” says Rennie.

But that also implies a complex, multidirectional and flexible power system, or costs will be much higher. And that raises questions about the role of the consumer. Should utilities prepare for the rise of engaged “prosumers,” who both generate and consume power, and who take an active interest in optimizing their energy use? Or should utilities instead assume the vast majority of householders will remain passive consumers, for whom reliability and cost remain the overwhelming concerns?

“Consumers traditionally haven’t had to have an opinion about energy – it’s been something almost invisible,” says James Mandel, a Principal in the Rocky Mountain Institute’s electricity practice, based in Colorado. “Many aspects of the energy future that we’re excited about involve consumers doing things – making decisions about where they source energy, pricing plans, how they fit smart devices into their lifestyles, do they participate in demand-side management programs, do they buy electric cars.”

Vermont-based utility Green Mountain Power (GMP) is positioning itself in the vanguard of the energy transition, offering energy service products that range from help with energy efficiency all the way to enabling customers to go off-grid (while continuing to pay GMP for their energy).

“The majority of our customers want reliable, affordable and clean energy … that delivers increased comfort,” says Josh Castonguay, GMP’s Chief Innovation Executive. “But they don’t want to have to think more about their energy consumption or what time of day they’re consuming it. It’s on us to deliver products and services that don’t put any more burden on the customer, that don’t complicate their lives, and hopefully improve it.”

He adds: “Our view is that the energy delivery model needs to change. We’re shifting to one that is distributed; home, business, community-based. To get there, we need a whole new set of tools we’ve never had before.

We’re going from thousands of power plants in New England to what could be millions of discrete points all over the distribution system, and they need to be choreographed and managed. If it’s done well, it’s going to reduce the cost of operating the system, and really improve the customers’ energy life, comfort and reliability.”

So, how do we get from here to there? Where should incumbent margin retailers be directing their investment, and where should investors make their bets?

“It’s much easier to make investment decisions if you know where you’re heading,” says Steve Hellman, a Managing Partner at Energy Impact Partners (EIP), a US-based private equity firm backed mostly by strategic utility investors. “If you can say, ‘this is where we think we’re going to be in 10 years,’ let’s work backwards and find the components of that road map.”

He spells out two broad scenarios. The energy service model sees the utility becoming “a partner in the customer’s energy decisions,” helping the customer to reduce their costs while, at the same time, optimizing the structure of the grid to deliver power.
The other scenario is where the utility becomes what Hellman calls “a ‘smart integrator,’ where the utility becomes a platform to facilitate interaction among a proliferation of customers and actors on the grid – where the utility is the manager of that interface among service providers, customers, generators and other third parties, and manages that complex interaction.”

Stewart Reid, Head of Asset Management and Innovation at Scottish and Southern Electricity Networks (SSEN) in the UK, offers the analogy of distribution utilities transforming from traditional brick-and-mortar supermarkets, where consumers simply buy energy, similar to an eBay model, “where consumers might buy energy from local community projects or a neighbor’s solar panels, or sell it to someone charging an electric vehicle.”

“The role of the DSO [distribution system operator] then would be like the Post Office,” he says, providing the platform “to tell customers, on a real-time basis, that they can transfer power from A to B, when you can do it, and how much it’s going to cost. Utilities become a platform for facilitating the trade of energy across the network.”

Similarly, Markus Nitschke, a spokesman for German utility E.ON, describes his company as becoming more like a bank, using both onsite and remote battery storage to allow consumers to make deposits and withdrawals. “In the future, we won’t be dealing with our own energy only – we’ll be handling energy produced by the consumer, servicing their account.”

The speed of the changes involved poses problems for incumbents. “Fundamentally, the biggest challenge for utilities is the agility to keep up and adapt to a market that is changing rapidly,” says Brendan Lane, Senior Manager, Advisory, at EY. “How committed will they be to setting up the business of the future whilst maintaining their current margin retail businesses of today? … The risk is that at some point they will pass the inflection point where they are too late to catch up.”

Certainly, a business model that moves away from integrated generation, distribution and supply becomes one driven less by capital-intensive infrastructure and more by IT innovation – allowing more agile tech companies to erode market share.

E.ON’s Nitschke says this is changing the culture of some big utilities: “Our business is becoming mainly IT-driven.” This necessitates different relationships with its partners. In the past, E.ON tended to either develop products and services internally, or seek majority ownership of partners; “now, we’re co-operating much more” with giants such as Google, which is working with E.ON on a service that helps homeowners evaluate the attractiveness of installing solar photovoltaic (PV) panels, as well as with much smaller firms, such as online heating supply firm Thermondo.

Lane believes that some retailers will look to acquire or partner with providers of technology platforms that will, among other things, allow peer-to-peer trading of surplus renewable energy generated by households and businesses, or that will allow the aggregation of large volumes of distributed energy generation or storage: “We expect that some of the big retailers will look to snap up, or partner with, platform providers: If they can scale those platforms across their existing customer base, they can make a big jump forward in market position and establish a base into which they can plug other technologies.”

However, encouraging a culture of innovation is not necessarily easy for incumbents. “Innovation and utilities are complicated concepts to bring together, not because utilities have a bad culture – on the contrary – but because they have a very clear mandate to keep the lights on. … Innovating in that environment can be risky,” says Hellman at EIP.

His firm manages private equity investments, mostly on behalf of an international group of utilities, in a variety of new energy companies that have proven technologies and business models and are now seeking scale. “We’re trying to derisk the innovation process,” he says, observing that one of the problems for utilities seeking to invest in or partner with emerging technology providers is “asking whether the company is even going to be around in five years to support that software or product.”

Of course, IT is as much about software as it is about hardware, and the move to a digitized future is bringing with it new challenges. GMP is embarking on a large-scale program of installing and controlling Tesla Powerwall 2 batteries, partly to provide backup for consumers, and partly to provide distributed storage capacity that the utility can use to earn revenue and reduce costs. Opportunities include tapping the batteries...
The biggest challenge is getting all the kit to work together.

A big part of that pilot, Hastings says, is developing a “simplification engine” that allows for distributed resources to be aggregated and traded in wholesale markets. “This will allow householders to access revenue streams” from existing and planned electricity markets, he says.

Advances in battery technology and economics have been driven in large part by the EV industry. This offers the energy sector a bright spot in terms of demand: in the UK, National Grid estimates EVs could add GW of peak demand by 2030. But managing that demand is also a significant challenge: meeting an early-evening EV peak, with the costs involved in ensuring adequate supply and reinforcing distribution networks, could be very expensive.

SSEN has been conducting pilots looking at the effects of the “clustering” of EV purchases – a phenomenon seen, for example, in rooftop solar. “We found when we reached 40% uptake on any one street, we had constraint issues,” says Reid. SSEN tested a demand-side management system that allowed supply to be shared between the vehicles overnight, ensuring they were all charged by the morning – with an emergency button provided should a car be needed urgently. “The level of acceptance from customers was high,” Reid says. It helps that the imposition is not onerous: “We’d be unlucky if there were more than two or three hours a year we need to manage,” he adds.

Reid says that consumers can be persuaded of the need to share common services. He gives the example of traffic lights, which are accepted “because crossroads can’t be shared, and we can’t have flyovers at every junction. Road users can still do what they want to do, which is to get from A to B.

“The challenge for us is to get the message out early, and tell the story to consumers so they understand why,” he adds.

There is also a pressing need for investment in the infrastructure – both physical and, increasingly, digital – needed to pull the pieces together. “Smart, digitized infrastructure will be a key enabler to the vision of the future – balancing loads, enabling large-scale distributed generation and energy storage and growing EV demand – that piece needs to happen” says EY’s Lane.

For that, intervention by governments and regulators will be necessary. Nina Skorupska, Chief Executive of the Renewable Energy Association in the UK, praises regulatory changes announced in July by the UK Government that, among other things, will encourage battery storage, help enable smart homes and businesses – and help consumers use energy when it is cheapest.

A virtual insurgent

Ireland-based start-up Solo Energy, plans to break into the UK retail market with a low-cost, 100% renewable energy tariff built on a virtual power plant (VPP) comprising thousands of customer-hosted battery systems.

“There’s been very little disruption to the supplier part of the energy market over the last 20 years – that’s where we see the opportunity,” says CEO and co-founder Mark Hamilton. “Our approach is all about taking energy storage to the mass market, as a way to disrupt the energy supply model.”

The plan uses switching websites to attract customers with market-beating renewable energy tariffs, supplied by third-party generators. Solo will then offer customers even better tariffs if they agree – at no cost – to install a battery on their property.

The batteries, controlled by Solo’s cloud software, will charge when wholesale prices are low, typically at times of peak renewable generation and low demand, and discharge them to customers – and the grid – when prices are high. If customers have behind-the-meter generation, such as solar, the batteries will also be used to maximize self-consumption.

“It’s all about using energy storage to make demand flexible,” says Hamilton. “We want to change the way we use energy by enabling demand to follow the intermittency of renewable generation.”

The company is planning to begin marketing in the UK early in 2018 and is signing up customers for its launch phase. “All the elements that allow our business model to work have come together in the UK market,” he says – smart metering and half-hourly settlement in wholesale power markets.

In addition, by aggregating thousands of batteries into a VPP, Solo will be able to carry out arbitrage trading in the wholesale market, as well as offering grid balancing services, which could potentially be particularly valuable at the distribution network level, according to Hamilton.

These additional revenue streams have the potential to transform the economics of energy supply, he adds. “The standard supplier model assumes you need 30,000 plus customers to get close to breakeven. If things converge as we expect in the market, we believe we can reach breakeven somewhere between 5,000 to 10,000 customers by driving the prosumer revolution where customers generate and use more of their own energy using renewables and energy storage.”
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to avoid the risk of obsolescence,” Ozler
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For EY’s Rennie, this last element may
be the most important. He believes that
considerations around the right technology
solutions and business models are secondary
to the right pairing of incumbents and
insurgents. He says that it is likely to be
too capital intensive for new entrants to acquire
sufficient customers for the scale needed,
while incumbents will struggle to adapt their
internal cultures to embrace change at the
speed required.

The problem is that utilities have competed
for consumers almost exclusively on price, but
are now attempting to sell deeper
generation and value-added services – a
more complicated sales proposition.
“Customer acquisition for new energy
services is higher cost and, as a result, organic
growth of new energy retailers is low. When
you combine a higher cost-of-serve model
with a cash combustion engine, you’re going
to implode,” Rennie says. “We’re not going to
see new energy companies take over markets
through organic growth.

“They are quietly educating the customer
base, but they are doing it at high cost and
burning through their shareholders’ cash.
The providers of that capital are going to
get impatient.” He calculates that around
six million customers are needed to achieve
the necessary scale to compete. He cites
acquisition costs of around US$30–US$50
per customer, implying an investment
of around US$300m – a price tag most
investors are likely to consider too high.

Instead, Rennie believes these investors will
push new energy retailers toward acquiring
incumbents: “The new energy retailers get
to deploy through scale, while for the margin
retailers, it provides the transformation they
need to operate in the market of the future.”

She says that “the Government has
started taking some of the key actions
necessary,” such as removing network
charges on batteries when they are both
charged and discharged: “We always want
more, certainly, but we’re pleased that the
regulator has started to address some of the
market rules needed.”

However, Skorupska accepts there’s a
delicate balance to be struck: “Our hope is
that government and regulators don’t create
frameworks that shut down new ideas. But
we’re talking about people’s homes and
energy supplies. Regulation needs to ensure
the involvement of reliable, responsible and
responsive companies.”

Similarly, more work is required to ensure
market standardization, says Hastings. “On
the software integration side, there are a
number of protocols that have been thought
about ... [such as] open-data style protocols
that enable different layers to interact more
efficiently. That work could be accelerated.”

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Advisory Services, Power & Utilities at
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Phillipp Pausder, Founder and Managing
Director of Thermondo, believes that
utilities are not sufficiently responsive to
customer needs to effectively facilitate those
processes. His Germany-based firm is using
the supply and maintenance of residential
heating systems to develop long-term
relationships that, in future, will allow the
company to evolve into a full-service “non-
commodity utility.”

Utilities’ core competencies lie with building
and operating large-scale power plants,
trading power and lobbying governments,
Pausder says, but “the new model will be
completely different,” relying instead on
many thousands of small-scale projects and
much closer relationships with consumers.

“As a householder, you will be faced with
a lot of new models of buying electricity,
trading electricity, perhaps getting paid to
consume electricity. In this digital, distributed
and connected world, householders will need
a partner to understand and take away the
complexity, instead coming up with precise
and simple offerings,” he says. “You have to
be good at lots of things: marketing, sales,
coding, people management, process design
and customer care. It’s ultimately all about
outstanding service to customers.”

But there is no reason that incumbent utilities
can’t hold their own in a distributed, digital
marketplace, believes Yunus Ozler, Partner,
Advisory Services, Power & Utilities at
Ernst & Young LLP. Developing capabilities in
smart-home technologies can allow utilities to
extend existing consumer relationships into
value-added services such as security and
monitoring of appliances and energy systems.

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