



Five global megatrends are forcing electric utilities to rethink the way they do business

Electric utilities around the world are expected to be greatly transformed by deregulation, climate change, the rise of renewable energy, new technologies, declining populations, and changing user needs.

The transformation will eventually see the power grid's integration with industries such as water, gas, transportation, among others, which ultimately could mean better service.

A factor driving the changes is the need to reduce greenhouse gas emissions. Electricity and heat production is among the biggest sources of emissions, which is why energy producers have been adding more renewable sources such as solar, wind, geothermal, hydropower, and biomass into their power mix.

Technology and changing demographics and user needs will also change utilities. Now that technologies can better track customers' energy consumption, utilities will be able to predict when it is highest and ensure supply during those times.

Utilities' transformation will come in three waves.

The first wave of transformation will come as regulators introduce more competition into the industry to ensure better and more affordable service.

The second wave will involve unbundling utilities' transmission and distribution to increase competition. The industry will reduce its greenhouse gas emissions, introduce more renewable energy sources, and set up mini power grids closer to users—as against big power plants powered by fossil fuels—giving consumers more choices in sourcing power. Digitalization of energy systems will allow utilities to install smart meters to track consumers' energy use.

The third wave, or Utility 3.0, will allow electric utilities to better manage energy sources and use integrated data from other network operators such as gas, water, telecoms, and transportation, to better serve customers.

Hiroshi Okamoto, executive vice president of Japan's Tokyo Electric Power Company Holdings—or Tepco—Power Grid, told an audience at the Asian Development Bank Institute:

Deregulation, decarbonization, decentralization, digitalization, and depopulation, which are global megatrends, will be triggers for the

transformation to Utility 3.0, and the future power systems will play a key role in realizing Utility 3.0 as an integrated platform with other network infrastructures, energy and market management, and integrated data management.

Japan went through the first wave when regulators started to liberalize the power market in 2000.

Now, utility giant Tepco is transforming its business to prepare for the next two waves. Tepco has about 30 million customers, with annual sales of about 250 terawatt-hours and installed generation capacity of about 66 gigawatts. It controls about a third of Japan's electricity market.

Tepco expects the second wave to start by 2020 when utility companies are required to unbundle their transmission and distribution businesses. It also has to reduce carbon emissions, add renewable energy sources, and install smart meters.

Now, we see the next or the second wave of the big global trends, like decarbonization and decentralization and the digitalization of the industry and the user experience. Especially in Japan, we are facing a decreasing population. Even in developing countries, you will see the aging demography and a decrease in the working population. In Japan, we are already facing that issue, which is a very, very big issue.

Many developed and developing countries are now going through the second wave of electrification, driven by the need to reduce greenhouse gas emissions and decentralize generation. This coincides with the setup of renewable sources of energy and mini grids that give households alternative ways of sourcing electricity that don't depend on big fossil fuel-powered grids. As a result, the electricity industry's carbon dioxide emissions have gone down, but the ultimate goal is for utilities to move away from all energy sources that emit greenhouse gases.

By 2050, Japan could reduce carbon dioxide emissions in the utility industry by 70% as it produces more renewable energy and becomes more efficient, as the population declines, and as the use of distributed energy resources and energy storage rises. Distributed energy resources refer to smaller power generation systems, many of which rely on renewable energy and on energy storage systems that pave the way for electric vehicles.

The second wave of electrification will be driven by distributed energy resources and distributed energy storage. For example, if you have very cheap, affordable, and high-quality distributed energy storage, namely, battery, it will drive the electrification of transport. Such new technologies will accelerate electrification of every process in industry and social life.

But Japan is also bracing for the third wave, which promises to be a game changer for consumers. Power distribution could be integrated with other networked infrastructure such as water, gas, transportation, and even telecommunications. Using digital

technologies to amass and track data along all networks is key to improving consumers' lives.

For instance, an interconnected transport network and power grid would allow service providers to see when electric vehicles in the network need to charge or discharge their batteries, where the network is congested, the general status of the network—information needed to make sure the grid is running smoothly and power supply is uninterrupted.

Of course, more electric vehicles on roads will depend on demand from the end-user, but the move is constrained by the two networks: transportation network and the power grid. So now maybe we can optimize these technologies.

Integrating other networks such as water and gas and using all the data from an integrated network would give service providers a wealth of information and allow them to better serve consumers.

Now Tepco is launching smart meters for all customers. By the end of 2020, we will have installed them for about 30 million customers and, by that time, we would have collected a lot of data from our customers. By utilizing and combining this data and the data from the other providers, we can produce new value for the customer. Such kind of data integration will be needed to transform to Utility 3.0.

Hiroshi Okamoto is executive vice president of Japan's Tepco Power Grid. He made these remarks at Developing Clean and Effective Energy Systems in the 21st Century, a forum organized by the Asian Development Bank and ADBI in Tokyo.

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