Utility of the Future – An Intel Blog Series

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Meet the Author:

An IEEE Fellow, electricity industry visionary, and leader, Dr. Mani Vadari delivers strategic services to a global set of utilities, vendors, and service providers seeking deep subject matter expertise in setting the business and technical direction to develop the next-generation electric/energy system. As a Business Architect, Dr. Vadari has been delivering solutions focusing on Transmission/ Distribution/ generation operations, Energy markets, and Smart Grid for over 35 years. In addition, he is an Adjunct Professor at Washington State University and an Affiliate Professor at the University of Washington. He has published two popular books, "Smart Grid Redefined: Transformation of the Electric Utility" and "Electric System Operations – Evolving to the Modern Grid, 2nd Edition", in addition to over a hundred industry papers, articles, and blogs. His books are serving as textbooks at several universities in the US and around the world

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The utility industry in the US has been changing for several tens of years but most often, this change is slow and somewhat predictable. It started with PUHCA in the 1930s. The more noteworthy ones after that were PURPA in 1970s, FERC order 888/889 in the 1990s and the Energy Policy Act of 2000s. In parallel, numerous sets of technologies also appeared on the horizon and where applicable, utilities incorporated them into their roadmaps and implemented them. Some of the more noteworthy technologies incorporated into the utility technical landscape include SCADA, EMS, wireless communication, PMUs (also known as Synchro-phasors), CIS systems, mobile field force enablement and so on.

Through all of this, the core utility customer – the consumer of their product was not impacted for the most part with exceptions in some states like Texas and Pennsylvania. The consumer's expectation of where their energy was coming from did not change.

Now that is changing and with it, new challenges to the utility business model - Enter the DER (Distributed Energy Resource)
The definition of the DER is varied but the one from the New York Reforming the Energy Vision (REV) is the most comprehensive and has defined them as a series of technologies that include PV, Battery storage, Fuel cell, Wind, Thermal, Hydro, Biogas, Cogeneration, Compressed air, Flywheel, Combustion generators, DR and Energy efficiency.

Key characteristics of DERs are:

- *They are very often small, distributed and can be installed almost anywhere with very little or simple permitting process.*
- *Many generate energy from renewable sources meaning that they are intermittent in nature and generally cannot be dispatched.*
- *Some, like storage can also store and deliver energy when needed.*

Newer mechanisms such as microgrids are coming into play which can almost be defined as smaller grids within the existing distribution grid. These grids have the ability to be somewhat self-sufficient in energy supply-demand under some circumstances.

These changes are empowering the customer and paving the way for reducing their dependence on the electric utility.

Conclusions and closing thoughts:

The bottom line is that business-as-usual does not work in any industry. Every industry has felt the need to evolve and this is no different for the utility industry. The telecom industry saw it with the "almost" demise of the landline service which brought the venerable company AT&T down and came back as a media, content, and wireless company. Utilities, even if they are regulated need to change, and for this, they may need the help of the smart regulator as well.
It is time for them to evolve and transform – otherwise, change will be thrust on them.

Author's note: This is the first in a series of articles written by this author for Intel. This is the kickoff article and the next set of articles will focus on expanding on the concepts introduced in this article – one concept at a time.