Utility of the Future – the beginning of transformation

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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 last article set the stage for the kinds of changes that are being seen in the utility industry. In this article, I continue to expand on those changes by using a hypothetical case study.

"I just returned from Houston and my friend got a message on her cell phone that the power was out at their house, but that it would be back on in 2 hours, so we kept playing tennis. When she checked the app, she also showed me her car was only charged 80% but it was ok, because she was using her solar cells to charge it and it would be complete in 3 hours. She smiled and said she sold $75 worth of power last month back to her retailer and it paid for lunch today. She said her electricity bill now only includes a connection charge unless she does her clothes washing and baking on the same day. I am calling PSE to see what they can provide."

Case credit to Charles Filewych, CEO, Smart Grid Interconnect. Used here with permission

A slightly deeper analysis of the situation provides the following context into what really needed to be in place for the conversation on the right to be real. Let us follow the conversation:

- *Direct communication from the utility: Through an app on her smartphone, this friend in Houston was able to get the exact status of the outage in her home, an update on the charging status of her electric car, and other specific billing information.*
  - *The key – is that all the information was in one place and the customer had easy access to it.*
- *Command of severe weather implications: Whether the outage was planned or unplanned, the utility was able to take full advantage of the automation and sensors in the field to derive specific outage times which is always based on the severity of the outage, availability of crews, and availability of spare parts and so on.*
- *Reducing outage times and reliable partner to restore on time: Her confidence in the outage period leading to her playing tennis for a little while more is an important observation because she trusted that at the end of that time period, power would be back in her house and she could go back.*
- *The key – is that the customer is now a part of the equation and can plan their schedule around utility plans.*
- *Monitor and control energy usage: The utility had a full-featured AMI system in place with the net metering capability and was able to determine exactly how much energy this person was consuming and how much energy she had delivered back into the grid.*
  - *The key - The customer could take advantage of the energy tools available.*
- *Personal acquisition of renewable energy: This person had installed solar cells and possibly other (storage) on her own in her home and the utility was able to take advantage of it.*
  - *The key – The customer and the utility worked together to take advantage of other non-utility options.*

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- *Customer choice: Net metering, and unbundling of the retail rate were all tariffs already in place so that she was able to then purchase her power from a third-party retailer.*
  - *The key – the utility is the intermediary in providing other options to the customer.*
- *Rewards for reducing consumption: The fact that she was able to reduce her energy consumption so much and almost completely depend on the renewables and other equipment installed in her house was significant to her – leading to the $75 rebate from the utility and paying for her lunch.*
  - *The key – The customer and utility are now working together to resolve potential utility issues.*
- *Regulatory directive for energy effi changes.*

For automation to deliver value both the utility's front, mid, and back offices need to be transformed.

Let us look at some examples:

- *Outage Management:*
  - *through the use of automation, the utility can, not just know where the problems are but also what the problem is, what is exactly broken, the specific parts required, how long the crew with the right capabilities and parts will take to get to the fault location and fix the problem. All of this results in a more accurate ETOR (Estimated Time of Restoration) leading to better customer satisfaction at lower costs to the utility.*

It is important to note that the expectations of the typical customer in other industries is much higher than they expect from a utility but it will get there in time – which means that in the next ten years, utilities need to get their automation (and other) systems in place to deliver on this expectation. In addition, as New York (REV) and California (Better than Smart) initiatives go operational, other states will start looking at their initiatives and push their utilities to change in the same direction.

Conclusions and Closing Thoughts:

The utility front-office, back-office, and mid-office systems are all integrated and most importantly around the customer. All of that is not the focus of this report but much of the fundamentals come from the automation and the supported business architecture that is being defined here and need to be in place prior to delivering on the customer mandate. If the architecture is not in place, then the utility will need to implement them on a piecemeal basis leading to increased cost to the customer and inefficient operations at the utility.

Author's note:This is a part of series of articles written by this author for Intel. This is the second article and the next set of articles will focus on expanding on the concepts introduced in this article.