BIZCOMMUNITY

The intelligent utility of the future

By Cathy Pickering

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For years, technology has promised to revolutionise the power sector. While smart grids have been implemented in many countries, the internet of things (IoT) devices and digital control solutions promise to be the enabler of the intelligent utility.

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The intelligent utility of the future makes power generation, distribution, and management more responsive to the needs of the communities it serves. It will also allow for more power to be generated from smaller, more agile renewable energy sources.

This utility will be made up of centralised, regional, community and home power plants. The addition and integration of a multitude of smaller plants will not only ensure that capacity grows alongside the development of the communities that need to be serviced, but that those communities will get more consistent and reliable power. The cost saving potential for utilities is huge, from both a distribution and a generation perspective.

This type of utility will comprise two interconnected systems:

- Intelligent dynamic power generation and distribution systems, and
- a distributed cloud-based grid management system—both enabled by IoT. The IoT devices continually feed data into the cloud-based grid management system.

This information can be analysed in real-time to provide automated control of the system. For example, predictive algorithms could be used to increase or decrease the power generated based on predicted demand.

In development

While this vision might seem some time away from becoming a reality, the intelligent utility is already in development. One of the research projects we are involved in has already established the effectiveness of the conceptual model, and is showing good results in dynamic control.

Working with academic institutions in Canada, FuseForward has set up the Intelligent Systems Research Network. The network comprises professionals with an interest in the application of big data in various areas, and is actively working to develop intelligent IoT and big data solutions that bridge the gap between academia, industry and technology.

The network's current research activities cover all aspects of analytics for industrial campuses and building portfolios, including streaming data management, real-time facility analytics, and automated control. A current research project focuses on applying artificial intelligence (AI) and machine learning (ML) to energy management on a university campus in Canada, as well as the development of algorithms and AI integration for deep learning and integrating user behaviour.

The research and predictive models developed so far have resulted in the decrease in the use of energy by the HVAC systems and 30% power savings on the university campus. The research involves calculating dynamic set points and providing dynamic control of the HVAC systems using machine learning methods.

The smart campus research and the conceptual model being developed informs intelligent utility research and development. The outcome of this research will allow power companies to get started with the intelligent utility model, which requires that a distribution management system is overlaid on the power distribution grid. Further research is underway regarding methods to deal with the dynamic power supply, how to govern the distribution of power and optimise its usage.

Regulatory and financial considerations

Over and above the technology there are a number of other that need to be taken into consideration in the implementation of the intelligent utility, including regulatory and financial considerations.

As new technologies become more mainstream, and as an increasing percentage of power is generated from renewable sources, the benefits of the intelligent utility will far outweigh any potential challenges. The intelligence to predict demand and provision as required is a capability that utilities currently don't have, and that alone is enough to start the to the utility of the future.

ABOUT THE AUTHOR

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