

BC Hydro Drives the Future of Smart Energy Performance with Bit Stew

EXECUTIVE SUMMARY

BC Hydro is the primary electric provider in British Columbia, Canada, with more than 18,000 km of transmission lines, 260 substations, 41 dam sites and 30 hydro facilities spread across an area of nearly one million square kilometers. Headquartered in Vancouver, BC Hydro has a large and diverse service area consisting of dense urban, suburban, rural and extremely remote areas, each with their own unique set of operational challenges.

“Grid operators cannot possibly manage this volume of data without help from the proper tools and technology, We needed a way to aggregate and intelligently display all of the data so operations teams could easily identify issues and make remediations.”

- David De Yagher, Senior Manager, Field Device Operations at BC Hydro

THE CHALLENGE

Integrating Data from 2 Million Smart Meters and 30 Network Systems

In 2011, BC Hydro began an ambitious smart grid project that included replacing old electromechanical meters with nearly two million state-of-the-art smart meters. The company undertook its industry-leading smart grid rollout with the goals of improving energy efficiency and reliability in the region while reducing losses and more quickly identifying power outages.

As electric utilities become more connected to the Industrial Internet of Things (IIoT), they often experience challenges managing the massive volumes and variety of data generated by connected devices, sensors, smart meters and other networked systems throughout their operations. Without the ability to integrate all of this siloed data into a common model and application, it is difficult for utilities to gain a holistic view of their smart grid operations or identify potential risks in real-time.

As BC Hydro began its smart meter roll-out, the leadership quickly recognized that without the right technology, it would face significant challenges integrating and analyzing such a large volume of data from so many different sources.

Before deploying smart meters, BC Hydro manually read meters once every two months, managing approximately 30,000 data values per day. Upon implementing nearly two million smart meters, BC Hydro immediately began gathering approximately 237 million data values per day, including registers, intervals and events. Planned enhancements to the smart grid will bring the total to approximately 678 million data values per day. Additionally, because many of BC Hydro's systems hold six months of data for analysis purposes, the utility is tasked with managing, analyzing and identifying trends among 122 billion data values.

THE SOLUTION

Enter Bit Stew Systems

BC Hydro partnered with Bit Stew Systems to help design a data architecture that would quickly and easily integrate data from nearly 2 million smart meters, more than 5,000 relays, 2,000 routers and 30 different operational and IT systems including homegrown and legacy systems.

By implementing Bit Stew's Mlx™ product portfolio, including Mlx Core™ and Mlx Director™ Suite, BC Hydro has been able to integrate AMI data from the smart grid along with data from grid-asset health tracking systems, distribution grid management systems, field dispatch systems, work management systems such as SAP, customer information systems, Itron's AMI system, meter data management systems, geospatial information systems (GIS) and more. Using adaptive stream computing and a semantic data modeling, Mlx Core quickly integrates complex operational and IT data into a common data model. It applies machine learning and predictive analytics to recognize patterns automatically, detect anomalies and automate responses to help operators triage situations.

BC Hydro also implemented Bit Stew's Mlx Director Suite, which can apply real-time analytics to the data, generating rich visualizations and providing a "single pane of glass" view that enables operators to see important activity happening across the smart grid. It provides a dashboard interface that enables operators to more easily assess situations, triage alerts and alarms, and gain the actionable intelligence they need in order to make informed decisions more quickly.

For BC Hydro, the Mlx Director Suite covers the following use cases, purpose-built for

Electric utilities:

- Network and Sensor Deployment
- Advanced Network Communications Management
- Network Planning and Optimization
- Networked Distribution Asset Management
- Network and Asset Security
- Energy Visualization Portal
- Deployment Management

- In Home Display (IHD) Unit Registration and Management

RESULTS

Fast Data Integration and Operational Insights that Improve Grid Performance

Bit Stew's Mlx Core and Mlx Director Suite enable operators at BC Hydro to effectively and efficiently triage hundreds of millions of data elements every day.

Using Bit Stew's Mlx technology, BC Hydro's operators now have a contextual view of the entire operations. They can easily access geo-spatial views of all grid assets and generate real-time visualizations of meter outages, communications performance issues, distribution grid load and voltage issues, as well as other critical events.

By integrating hundreds of millions of data points, alerts and events from multiple systems, filtering out the "noise" and displaying only the most important events on a visual dashboard, Mlx Director Suite enables operators to more quickly identify and prioritize critical issues. This real-time, situational intelligence enables operators to manage the grid more effectively and rapidly enact decisions that improve operational performance – such as more quickly identifying outages and mobilizing field crews to restore power faster.

With Bit Stew's Mlx product portfolio, BC Hydro is able to:

- Efficiently triage hundreds of millions of data elements every day
- Quickly integrate data from nearly 2 million smart meters, more than 30 network systems and thousands of network assets
- See real-time displays of meter outages and geo-spatial views of grid assets
- Better identify and prioritize issues and alerts
- Better manage meter-to-grid performance such as voltage issues, system restoration and more
- Identify and reconcile any data discrepancies across separate systems to ensure data accuracy in all systems

Complex Event Processing that Enabled BC Hydro to Weather the Storm

One example of the benefits provided by the complex event processing and operational insights made possible by Bit Stew's technology occurred in August 2015, when Vancouver Island was hit with an unexpected and intense wind storm. More than 700,000 customers – representing nearly half of all BC Hydro customers in the area – were suddenly without electricity. Using Mlx Director Suite, BC Hydro's operators were able to quickly gather power outage notifications sent by each smart meter, view them graphically according to each meter's loss of power, and even use meter pings to look for nested outages within the larger outage. As a result, BC Hydro was able to mobilize crews faster. Over the course of just three days, crews replaced approximately 200 power poles, 500 broken cross-arms on pole tops, fixed 25 damaged transmission circuits and replaced 10,000 meters of wire and more than 1,200 pieces of electrical equipment. Customers



A view of the 700,000 customers who lost power during the storm.

would have been without power much longer if BC Hydro did not have the ability to prioritize alerts and quickly gain operational insights from the smart grid data.

Customizable, Data-Enabled Applications

Another benefit that Bit Stew's MIx solutions have provided BC Hydro is the ability to customize data visualizations and reports, and easily purpose-build custom applications to meet their needs.

"With its easy-to-use dashboard interface, MIx Director Suite gives me instant access to the operational analytics I need. I don't have to wait for someone to run a report, create a cube or load a data warehouse," explains De Yagher. "Bit Stew's technology contributes to our bottom line by providing quicker response time to information that's presented to us, such as identifying choke points in order to better understand where situations are occurring that are disruptive to our business. It allows me to make the most intelligent use of the data without having to employ additional data scientists and analysts."

ABOUT BIT STEW SYSTEMS

Bit Stew Systems has built the premier platform for handling complex data integration, data analysis, and predictive automation for connected devices on the Industrial Internet. Through data-driven automation, Bit Stew removes the complexity of industrial operations and connected machines to give clarity and control back to operations. Purpose-built for the Industrial Internet, Bit Stew's MIx™ product portfolio automates data ingestion, applies machine intelligence to learn patterns in the data, allowing industrial companies to discover actionable insights that optimize operational performance.

In 2015, Bit Stew was named to Greentech Media's Grid Edge 20 list, as one of the top 20 innovators architecting the future of the electric power industry, and was ranked as one of the Top 100 Analytics Companies and Top 100 IoT Startups by Forbes Magazine.

Incorporated in 2009, Bit Stew is a venture-backed private company that is headquartered in Canada with offices in the USA, Australia and Europe.

ABOUT THE INDUSTRIAL INTERNET CONSORTIUM

Bit Stew Systems has been a member of the Industrial Internet Consortium since June, 2015. The Industrial Internet Consortium is a global public-private organization of over 250 members, formed to accelerate the development, adoption and wide-spread use of interconnected machines and devices, intelligent analytics, and people at work. Founded by AT&T, Cisco, General Electric, IBM and Intel in March 2014, the Industrial Internet Consortium catalyzes and coordinates the priorities and enabling technologies of the Industrial Internet. Visit www.iiconsortium.org.

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