ADVANCED IoT ANALYTICS BRINGS BRIGHT FUTURE FOR SMART UTILITIES

The utility and energy industries are facing unprecedented disruption, thanks to the rise of the internet of things (IoT) and the advent of distributed energy resources (DERs). When you add the rapidly rising number of consumers who own smart devices, you're looking at a confluence of challenges for utilities. In this article, we look at some of the challenges utilities are facing today and the opportunities to embrace advanced IoT analytics to transform their business models. Altair's analytics and IoT Platforms are used by numerous utilities and embedded in many leading utility software applications, many of those experiences we refer to throughout this piece.

RISING ADOPTION OF DERS

One of the most significant challenges for utilities is the rising adoption of DERs. The number of energy providers producing energy from alternative and renewable sources such as wind and solar is rising around the world. Most individual energy producers and microgrids do not generate enough power to be completely self-sufficient. However, many produce more electricity than needed or can be stored at any one time. Utilities must be able to locate and monitor the energy DERs produce and then supply energy as needed to the grid to effectively meet customer demand.

With advanced analytics such as Carriots Analytics, utilities can discover unusual usage trends, identify peak energy demands, rationalize excess power from DERs, and predict generation and distribution requirements. Carriots Analytics connects to, ingests and aggregates data from multiple sources including DERs, SCADA, smart grid elements and enterprise applications. The platform then enables users to monitor and measure energy generation, demand, and capacity both within and beyond the utility grid.

INFRASTRUCTURE AND ASSET MAINTENANCE

Upgrading and maintaining grid assets is a costly and complex challenge for utilities. With reliability requirements ever increasing, more and more grid assets must be continuously monitored to predict failure and maintained to prevent outages. Threats from alternative energy providers have forced managing boards, regulators and legislators to mandate that utilities modernize the grid and implement smart technologies to adapt to new business models that embrace DERs management.

Analytics helps utilities manage infrastructure and assets effectively by integrating and visualizing data from multiple sources and building models for predictive maintenance. Altair's Carriots Analytics platform extends beyond data visualization to machine Learning for predicting failure patterns and determining the remaining useful life of assets. For example, grid and off-grid systems could be remotely monitored,

maintained, and alerts sent when potential failures are detected; predictive analytics can use demand forecasts to determine the best times for production or equipment outages for scheduled maintenance.

MONITORING AND QUALITY OF SERVICE

Power generation and distribution are crucial services that impact nearly every aspect of our lives. Utilities need effective monitoring and alerting capabilities to ensure that the power services provided to consumers are stable and reliable. The ability for utilities to monitor nearly every aspect of the energy production and distribution process is crucial- from grid and off-grid system elements and assets to energy distribution and consumption.

Utilities must be able to monitor power usage to avoid brownouts, blackouts, and ensure the reliability of the grid. Utilities must be able to monitor DERs, generators, and other energy producers not connected to the grid. Utilities must also deal with occasional weather events such as thunderstorms, hurricanes, and tornadoes which can cause massive power outages. When these events occur, effective situational and flexible monitoring capabilities help ensure that power is restored for all consumers in a reasonable amount of time.

In the event of widespread power outages, utilities need to be able to quickly access the most critical data associated with grid outage, response times, and communications to customers. Carriots Analytics provides the ability to generate and visualize dashboards on the fly to show outage locations, the customers impacted, the crews that have been dispatched, and other relevant information in real time. Historical data can also be analyzed along with real-time data to predict when power will be restored to specific areas and to optimize how resources are deployed during outages.

“More and more, utilities are requiring advanced BI functionality as part of their overall CIS deployment. We found that Carriots Analytics’ technology and scalability address both our short and long-term BI strategy and we are thrilled with what this partnership will offer CIS Infinity customers.” - Peter Fanous, Executive Vice President, Advanced Utility Systems.

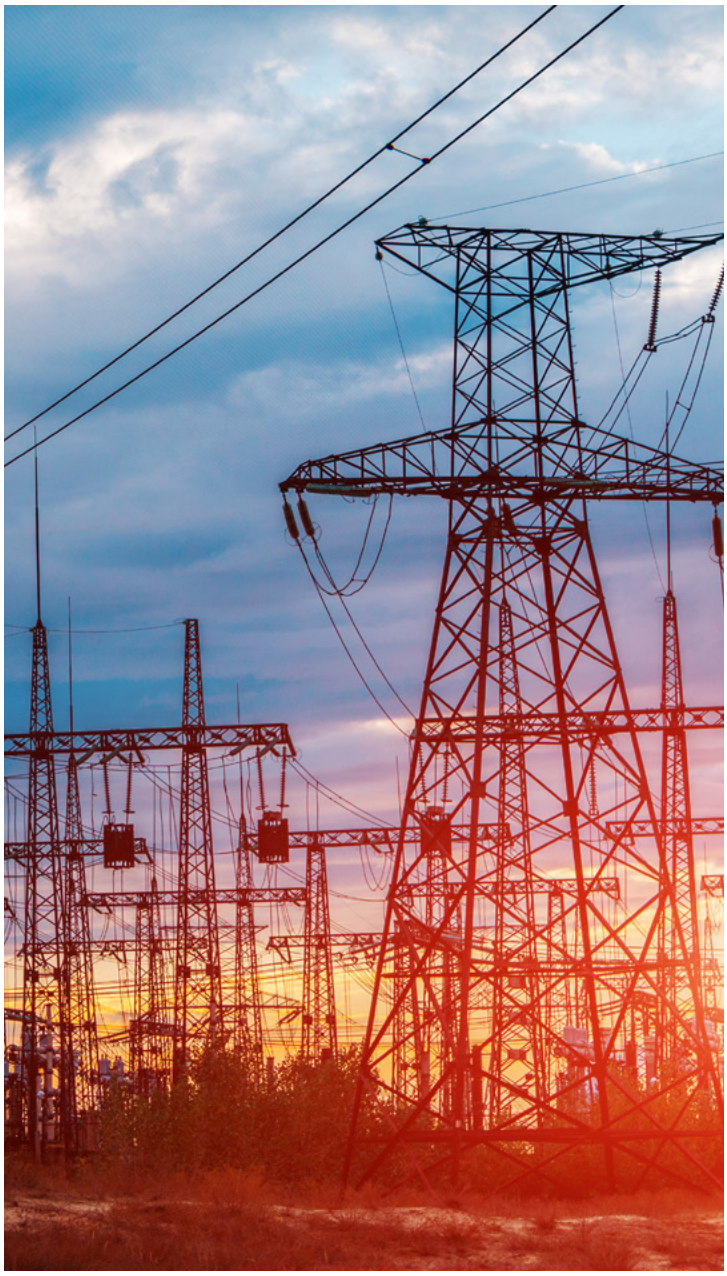
MASSIVE VOLUMES OF DATA

Utilities are finding that massive volumes of data are being generated from many different sources- smart homes, smart buildings, smartphones, sensors, DERs and grids, to name a few. Most utilities are using systems that are not designed to ingest and analyze massive volumes of data from numerous connected things. Utilities often run into problems such as duplicate data and timestamp data conflicts when ingesting data from multiple sources. Another challenge for utilities when it comes to data is that systems use different formats so the data must be cleaned and restructured before it can be analyzed.

Carriots Analytics solves the problems of collecting massive volumes of data from numerous and often nonstandard sources. It integrates directly with popular data sources and big data engines and relates data between multiple data sources. Utilities can then plot data from multiple sources into a single chart, column types are detected automatically, data sources are synced in real time via push notifications and dashboards are also refreshed in real time. Utilities can also define hierarchical relationships and create new hierarchies on the fly.

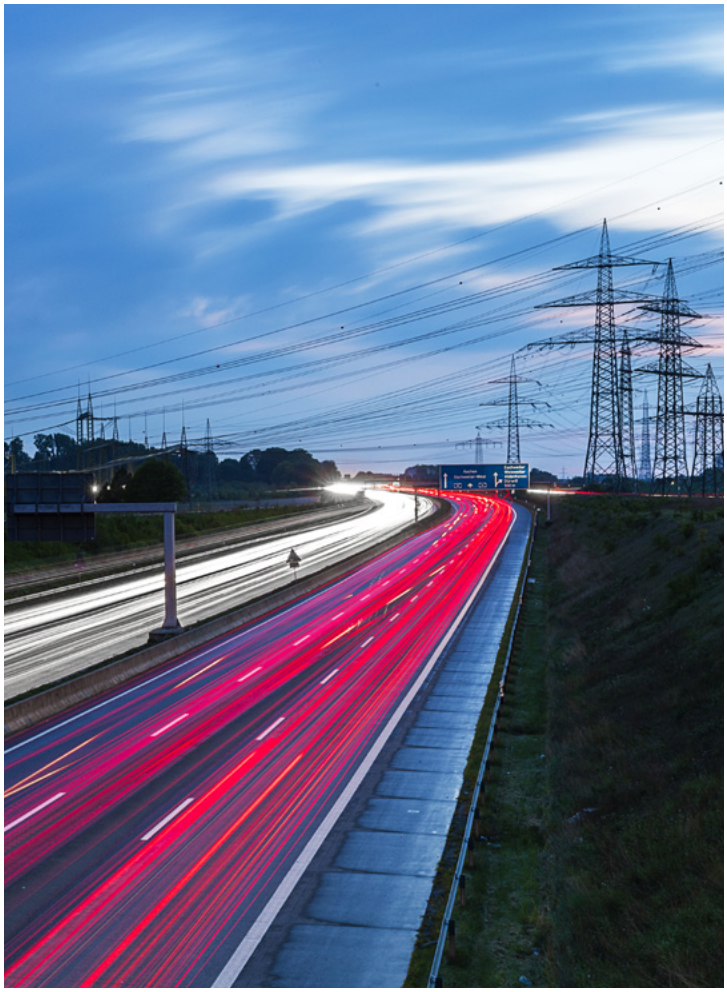
TURNING DATA INTO ACTIONABLE INSIGHTS

Many utilities are finding that advanced analytics is required to gain actionable insights from the massive volumes of data generated from connected things including DERs. Many utilities are using



traditional BI platforms that do not support advanced analytics and are difficult to scale. For many utilities, providing analytics to an expanding customer base is difficult. However, embedding scalable advanced analytics in traditional Utility CIS, EAM and ERP platforms is easy with Carriots Analytics.

Utilities can convert data into a multitude of interactive visualizations with our comprehensive charting suite. Users can enable ad-hoc reporting, dashboarding, and on-the-fly data analysis. With Carriots Analytics, utilities can enable predictive and prescriptive analytics for business processes focused on customer and asset management, creating alerts and sending critical notifications of anomalies.



ACCESSIBILITY TO ANALYTICS TOOLS

The popularity of smart homes and smart buildings is on the rise, and utilities are finding that they need to better engage with and support the tech-savvy customers who own them. Utilities are facing many challenges when it comes to customer expectations. One of those challenges is that the number of consumers who want greater control over when and how energy is consumed is increasing. According to a recent Accenture report, 72% of the consumers surveyed said it's important that utilities provide products and services that allow them to manage their energy consumption using mobile apps, smart appliances, and other digital tools.

Other challenges utilities are facing when it comes to customer expectations is that many customers want renewable energy sources, and DER owners are looking to utilities to help them optimize power generation and consumption as well as reduce energy costs. The number of customers who expect advanced and personalized analytics services from utilities is also rising.

With the right IoT platform, utilities could deliver personalized analytics and flexible demand response resources to customers. For example, utilities could manage customer energy usage in real time automatically adjusting lighting, thermostats, and other devices in smart homes and smart buildings as needed. Utilities could offer customers discounts and rebates on their smart devices and energy bill for opting in on specific demand response programs.

Altair, with Carriots Analytics and Carriots IoT platform, provides utilities and their customers access to advanced IoT analytics tools as well as enterprise BI analytics. Utilities can analyze customer service and billing data to gain valuable insights about customers. Drill down into data from an aggregated level such as monthly revenues, business units, rate schedules, and accounts; embed advanced, interactive data visualizations in customer-facing applications; and monitor energy consumption and help customers make informed decisions about their energy use.

"Altair was the perfect partner to launch Energy Smart Generation as it shortened our time to market to develop and test the product and later on proved to be a reliable partner to support the product for our key clients." - Raúl Gil García, Business Development Manager, Unatec

A BRIGHT FUTURE FOR SMART UTILITIES

When it comes to DERs, advanced analytics and the internet of things, utilities are facing many challenges. But with those challenges come many opportunities and possibilities- a future where connected smart assets are commonplace, where flexible demand response resources are available to everyone, where every utility is a smart utility.