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Advanced weather technologies are changing utilities' approach to operations and long-term capital investments. Beyond short-term forecasts, long-term weather models, data, and analytic tools can provide utilities with reliability, safety, and reduced operational expenses by leveraging actionable intelligence derived from emerging technologies.

The Increasing Importance of Advanced Weather Technologies: Building Resiliency in Utility Operations and Field Services

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Introduction

Utilities have traditionally been more reactive than proactive when it comes to natural disasters and storm restoration. The use of weather data by utilities over the years has been mostly rudimentary as a guide to gauge potential short-term weather threats. As weather technologies, data, and tools evolve, utilities will be better positioned to build greater resiliency in their operations and field services by taking advantage of emerging technologies such as artificial intelligence and machine learning in combination with modern modeling techniques and rigorous predictive analytics.

Pushing past the limitation from the use of raw weather data and publicly available weather forecasts, utilities can now take a more sophisticated and proactive approach to natural disasters and storm preparedness. By utilizing hyper-local weather predictions and operational models, utilities can build greater resiliency, safety, and reliability in their operations, critical infrastructure, and field services. Up-and-coming weather models and tools can now assist utilities not only in short-term weather-related events but can also provide utilities with greater accuracies in business-cycle planning and staff and equipment planning. In addition, utilities can mitigate risk when faced with unplanned weather events by integrating advanced weather technologies with existing utility applications that support operations leading to greater system reliability, cost savings, and superior utility preparedness.

AT A GLANCE

WHAT'S IMPORTANT

As weather technologies, data, and tools evolve, utilities will be better positioned to build greater resiliency in their operations and field services by taking advantage of emerging technologies such as artificial intelligence and machine learning in combination with modern modeling techniques and rigorous predictive analytics.

Benefits

Advanced weather data and tools are becoming critical components to operations and field services in the utilities sector. Utilities traditionally have used weather data in key areas such as electric demand forecasting and storm restoration efforts. The use of raw weather data in these efforts has been fairly limited to activities such as regression molding for electric demand forecasting and weather forecasting providing situational awareness when preparing for short-term weather events.

Advanced weather models and tools can provide utilities over and above short-term demand modeling and short-term weather forecasts. The following are benefits, along with emerging technologies and use cases, that are driving the investment in evolving weather platforms, helping utilities meet their goals as they strive for operational excellence and superior field services in utilities:

- **Integrating weather data, geospatial analytics, mapping, and alerting tools to create modeled scenarios** can provide utilities confidence in future investments in staffing, equipment, and applications needed to ensure a prompt and prepared utility response to weather-related patterns and events that can be strategized well before the fact.
- **Advanced weather tools utilizing artificial intelligence and machine learning** can enhance ensemble forecasting models allowing for multiple variables and data sources to be used as input. This can provide utilities several plausible weather outcomes to prepare for.
- **Cloud-based weather platforms** are evolving, providing readily accessible data and insights to all key stakeholders. For example, stakeholders can include personnel and departments such as senior management, information technology, operational technology, field services and line crews, energy trading, finance, risk management, and third-party contactors. A cloud-based platform takes a holistic approach that can leverage weather data, analysis, and applications throughout the utility organization to provide the quickest, most cost effective, and safest response to weather-related events.
- **Advanced weather technologies and models** can positively impact long-term capital planning and asset life-cycle management. State-of-the-art weather applications can improve asset management and maintenance crew coordination, providing better overall preparedness well before weather-related incidents occur. By leveraging sophisticated longer-term weather forecasts and models in the 12- to 24-month time frame, utilities can anticipate and gain through comprehension of their assets' expected stability and potential operations implications that can occur due to extreme weather events. This type of long-term weather modeling and analysis can provide better coordination and planning — resulting in sizable cost savings and quicker restoration times on damaged assets that have come offline.
- **Advanced weather decision support platforms** can provide seamless integration with various applications that are essential in utilities operations and field services such as enterprise asset management, asset performance management, mobile workforce management, geospatial information systems, and customer information systems. Integration and compatibility with these core utility applications will increase agility, capability, and speed while eliminating redundancies and increasing efficiencies in a utility's existing technology stack.

Considering Advanced Weather Technologies and Platforms

As improvements in weather technologies and platforms emerge, utilities will be able to face greater challenges that are currently not being met by legacy weather applications and the traditional and limited use of raw weather data. By investing in modernized weather technologies and platforms, utilities will experience a host of benefits. State-of-the-art weather offerings can provide utilities with several capabilities and advantages, which include but are not limited to the following:

- » Enabling artificial intelligence and machine learning to improve and support long-term operational decision making
- » The ability to produce hyper-local operational analysis by utilizing geospatial information systems overlayed with ensemble weather forecasts providing scenarios of potential weather conditions at specific asset locations throughout multiple areas of a utility's footprint
- » Strategic approaches to proactive and preventative vegetation management enabled by AI and advanced analytics to keep ahead of vegetation overgrowth that can impair transmission and distribution lines if not addressed
- » Improved asset optimization and asset life-cycle management supported by weather, climate, and environmental impact forecast scenarios and analysis
- » The capability of supporting sustainability, decarbonization, and emission reduction efforts with CO_2 tracking, compliance, and reporting tools
- » Modernized and intuitive user interfaces and dashboard visualization tools that provide a wholistic view of a utility's operations (This can help utilities manage operations throughout their entire footprint by tracking items such as weather alerts, critical asset information, field crew locations, inventory on parts and equipment, and customer information.)
- » Customizable user input with model flexibility allowing for multiple scenarios, forecasts, and input assumptions from various data sources
- » A cloud-enabled weather platform providing remote collaboration and decision making across a utility's organization involving all key stakeholders in multiple locations
- » Seamless plug-and-play integration, compatibility, and interoperability with other core operational-related systems such as enterprise asset management, asset performance management, mobile workforce management, geospatial information systems, outage management, and customer information systems
- » Real-time weather information enabling the coordination of utility crew fleets and enhancing contractor management during major storms and natural disasters
- » Providing both short-term and long-term weather insights to increase reliability and preparedness (Timely weather forecasts will provide utilities with time to plan and analyze all necessary compliance and safety measures to protect utility crews and the customers they serve.)

- Weather analysis driven by artificial intelligence and machine learning, enabling predictive, preventative, and prescriptive maintenance measures (In addition to preventing power outages, these predicative, preventative, and prescriptive measures driven by weather insights can save a utility's time, maintenance, and labor costs.)
- Actionable insights derived from weather forecasts creating revenue growth and cost savings related to asset life-cycle optimization and capital planning on items such as new or upgraded generation, transmission, and distribution lines
- Enhanced vegetation management by applying advanced analytics, machine learning, and satellite and drone captured imagery to address vegetation that could cause risk to transmission and distribution lines

Challenges

As advanced cloud-enabled weather technologies and platforms emerge, utilities may encounter some challenges. First, in the utility sector, the adoption rate of cloud is still relatively low when compared with other asset-intensive industries. This is primarily an issue in the United States and mostly impacts investor-owned utilities. The ability to capitalize cloud is being decided on a state-by-state and utility-by-utility basis. Unfortunately, there is not a "one size fits all" template in how to go about capitalizing cloud. That said, utilities in states such as New York and Illinois have made progress and worked successfully with regulators and have been able to work through the capital expenditure/operational expenditure issues and barriers that have impeded the adoption of cloud in the industry.

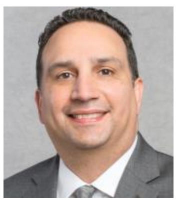
However, it is expected that, with time and backed by evidence, cloud-enabled platforms will grow and become commonplace eventually as regulators become aware of and support the efficiencies and benefits that cloud-enabled platforms can provide to both utilities and their customers. Of course, this will not happen overnight — but utilities will embrace investments in cloud technologies in due time.

Conclusion

In recent years, utilities are increasingly under extreme pressure from customers and regulators in their abilities to respond to and prevent utility power outages and asset damage caused by climate change and the increased frequency of severe weather. This pressure on utilities has recently been escalated by weather-related events such as the wildfires in the western United States and deep freezes creating ice-covered transmission and distribution lines in Texas and in the northeastern United States. There are expectations and a movement by utilities as of late to spend more on advanced weather technologies to prevent unplanned outages, asset failures, and uncoordinated responses to these types of events. In addition, vegetation overgrowth, which can exacerbate the danger to customers and damage caused to transmission and distribution lines, has become an increasing liability to utilities due to neglected or inefficient vegetation management.

Advanced cloud-enabled weather models, platforms, and applications can help prevent the challenges utilities are facing with state-of-the-art weather offerings. The use of artificial intelligence and machine learning, combined with modern weather modeling, is providing utilities with actionable intelligence that can save time and costs while increasing efficiencies in their operations and field services. Advanced weather technologies not only help utilities prepare for short-term weather events but also assist utilities in long-term planning for capital investments, line crew coordination, and overall reliability of their power systems. Investing in advanced weather technologies can enable utilities to respond quickly to short-term events and be prepared for potential longer-term disruptions caused by weather. This forward-looking strategy, driven by investing in and utilizing advanced weather technologies, can provide cohesive and coordinated preventative and prescriptive measures, which can protect utilities and their customers from unplanned power outages and asset damage due to weather-related events.

About the Analyst



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John Villali is a Research Director for IDC Energy Insights, primarily responsible for thought leadership in utility digital transformation. John provides the IDC Energy Insights group with an extensive background in wholesale and retail power and natural gas markets. John's expansive experience within the energy industry allows him to provide superior market insight by having firsthand experience understanding the needs and desired business outcomes of a wide range of energy industry customers.

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