# Weather Means Business™

*Enabling transformative decision-making with precise weather data for energy and utilities, insurance, retailing and the public sector*

## The value of integrating weather into decision-making

Weather has a profound and widespread influence on business. We are all vulnerable to unforeseen weather events, and the inability to manage weather-related risk can limit business success, thwart economic development and threaten public safety. It is estimated that weather causes businesses to lose half a trillion dollars every year.[1] In 2014, the US economy alone lost nearly USD50 billion in sales and 76,000 jobs because of weather.[2]

Until now, most businesses have treated weather as a force to which they can only react. Leading-edge companies today are taking a different approach, moving from a "cope and avoid" mindset to "anticipate and execute." They can now respond to disruptive weather events, taking early action to mitigate the impact and return to normal operations more quickly. Even the calmest weather days present an opportunity for business optimization—for example, sunny skies and higher temperatures can affect everything from wildfire danger and energy demand for air conditioning, to sales of cold beverages.

This paradigm shift in how companies actively use weather as a differential advantage is an opportunity to take the first steps toward becoming a cognitive business. A cognitive business uses every opportunity to interact with data to reason, adapt and continuously learn. Essentially, a cognitive business places a premium on making fact-based decisions using data rather than reacting after the fact. Core to this shift is the capability to tap into and synthesize myriad diverse data sets, including weather data, and combining it with business and external data to add context, depth and confidence to every business decision.

IBM and The Weather Company have partnered to bring actionable weather insight to businesses across industries. Combining weather data with traditional business data and rich data from an unprecedented number of Internet of Things (IoT)-enabled systems and devices has the potential to significantly impact enterprise decision-making.

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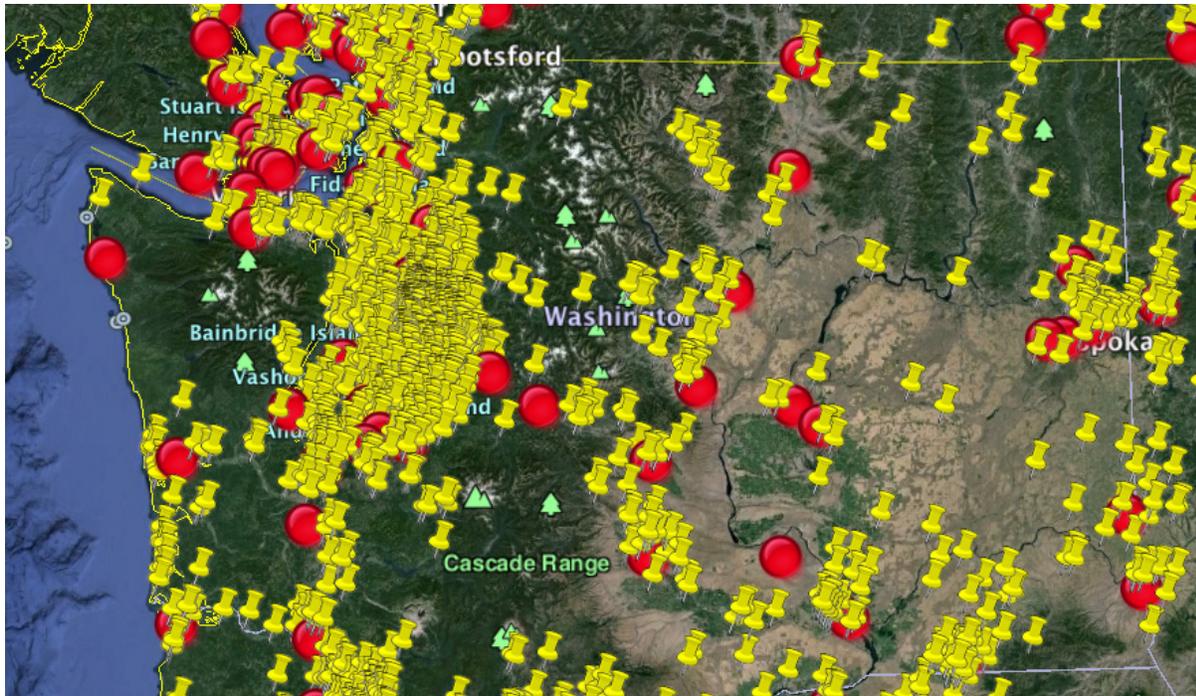
*Figure 1*. Public sources (in red) versus The Weather Company sensors (in yellow).

## Advances in weather analytics for better business outcomes

Enterprises now can use weather-driven insights to improve business results, largely because advances in weather science, analytics, geolocation, cloud computing and the harnessing of data through the IoT have fundamentally changed the paradigm.

IBM technology and analytical capabilities, paired with very precise and accurate weather data from The Weather Company, unlock new insights. The Weather Company delivers billions of forecast requests each day in real time using its own proprietary model. The IoT enables the company to map the atmosphere, collecting weather and related information from a worldwide network of more than 140,000 private weather stations, aircraft, smartphones, buildings and homes, and even moving vehicles (Figure 1).

Through this big data approach to forecasting, The Weather Company and IBM provide precise, accurate and timely weather data unavailable from public weather data sources:

- **Precision:** Enabled by its worldwide network of weather stations, The Weather Company's coverage is 100 times greater than publicly available sources down to a 500-square-meter resolution.
- **Accuracy:** The Weather Company forecast data is rated number one in accuracy for one- to three-day forecasts.
- **Speed:** Using a cloud-based delivery platform provides the speed to deliver the most frequent forecast updates—every 15 minutes for up to 2.2 billion locations worldwide.

## A Powerful Cloud Platform

By migrating its data platform to the IBM® Cloud, the business-to-business division of The Weather Company can deliver at scale and speed up to provide 26 billion individual forecasts per day—through the fourth most-used mobile app in the US. The solution ingests and leverages:

- Data from 40 million smartphones
- Atmospheric information from 50,000 flights per day
- A network of over 140,000 weather stations

Through The Weather Company and IBM Cloud platform, clients can integrate real-time weather data into enterprise processes more easily and combine it with data from supply chains, customer buying patterns and other sources to take time-sensitive weather-informed business actions at the point of impact:

- Through the Insights for Weather IBM Bluemix® service, businesses can easily create weather-aware mobile and web apps.
- Insights for Weather for Industries is an IBM Cloud offering that provides access to Weather Company application programming interfaces (APIs) and data curated from 43 data sources into industry-specific bundles for insurance, government, and energy and utilities, as well as cross-industry solutions.

*The Weather Company can deliver at scale up to 26 billion individual forecasts per day.*

## Mapping the atmosphere: A big data and IoT approach to weather

In the past few years, the rise of mobile phones and the Internet of Things has significantly increased the amount of weather data available. Now The Weather Company and IBM are using the cloud and analytics to crunch more than a terabyte of data every hour to provide billions of highly accurate forecasts every day:

- Mobile phones have the ability to both measure and report localized atmospheric pressure data, which is used to improve forecasts for everyone.
- IoT-connected, environment-sensing devices and technologies, including personal weather stations and aircraft, share important weather data.
- Satellite systems and radar stations operated by various government meteorological authorities provide global data on clouds and precipitation.
- Current condition and observation data from around the globe are combined and processed by computers and more than 200 meteorologists at The Weather Company to create weather forecasts.

## Weather and data driven industry-specific solutions

IBM's new portfolio of Insight Cloud Services apply powerful descriptive, predictive and prescriptive analytics techniques to The Weather Company data, a company's own internal data and more than 150 other data sources to provide targeted insights to help business leaders make better decisions and take confident action. These advanced industry-specific solutions include:

- Alerting insurance policyholders to impending weather perils, helping to reduce claims and create customer loyalty
- Accelerating energy and utilities companies' responses to outages and planning power distribution for peak demands
- Helping governments better protect citizens and infrastructure by increasing their lead time to prepare for weather events and responding faster after storms
- Optimizing retail inventory and staffing levels with accurate seasonal and hyperlocal forecasts

## Industry uses cases in depth

Insurance companies, energy and utility companies, government agencies and retail organizations may have different use cases for weather data, but optimum decision-making is essential to success in all of them. The following scenarios provide a detailed look at how precise data and analytics from The Weather Company and IBM fosters better, more informed decisions and improved outcomes in these four key industries.

## Insurance: Weathering the extremes

Insurance organizations have long incorporated historical weather patterns into their underwriting and pricing models. Now they are taking advantage of improved weather science, the IoT and advanced analytics to work more effectively with customers. By combining The Weather Company data and IBM Analytics, insurers can lessen the impact of weather-related claims and use internal resources more effectively to help customers after an event.

### Customer engagement

Insurers can use weather data to spot the likelihood of significant weather-related events, alert customers to take precautions and counsel them to mitigate their personal damage. Hyperlocal weather data from The Weather Company enables organizations to proactively contact individuals in areas affected by an event to determine their needs, speeding the claims process and strengthening the customer relationship. Insights gained from customer interactions during and after weather events are also valuable in improving product development.

The IBM Weather Alerts for Insurance solution uses the 500-square-meter resolution and nearly three billion forecast points to pinpoint adverse weather and alert policyholders in an affected area to take precautionary action. Not only can insurance companies save up to $25 per policyholder through proactive outreach, but these highly useful customer touchpoints help increase customer loyalty.

### Claims

During weather events, insurance organizations experience much-higher volumes of calls and claims, and these increases can result in backlogs that delay customer response. Predicting call-center workforce requirements, positioning claim adjusters in the field, and optimizing use of company vehicles and equipment can be difficult. By incorporating weather data into their operational decision-making, organizations can meet these challenges more efficiently. Insurers can move resources into place ahead of major events and be in a much better position to adjust resources as necessary.

### Risk management

Insurance organizations are in the business of managing risk. That means balancing two competing imperatives: the need to invest their money and the need to set aside cash for paying claims. They must avoid significantly reducing investment income and at the same time not over-rely on short-term financing to cover claims costs. Advanced weather data can help insurance organizations better gauge risk and successfully balance these needs.

**Telematics**

Used in conjunction with the telematics available in many of today's cars, weather data can potentially play an important role in evaluating driver behavior and providing a record of driving conditions for claims investigations. For example, was the customer driving 65 miles per hour in clear weather or in a blizzard? Telematics can also be a tool to alert drivers that they are approaching poor weather conditions.

## Energy and utilities: Keeping the lights on

The link between weather events—both storms and day-to-day temperature fluctuations—is perhaps clearest in the energy and utilities sector. According to a study of US Department of Energy data from an 18-year period, approximately 78 percent of the reported electric grid disruptions were weather-related, caused by temperature extremes, thunderstorms, tornadoes, hurricanes and other severe storms. Those grid disruptions affected 178 million metered customers.[3] Data also suggests the trend of outages from weather-related events is increasing.[4]

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Aside from the tangible power disruption effects of weather on electrical service, weather has a core impact across utility company operations on areas including load forecasting, response planning, outage mitigation and predictive maintenance of generation and distribution assets.
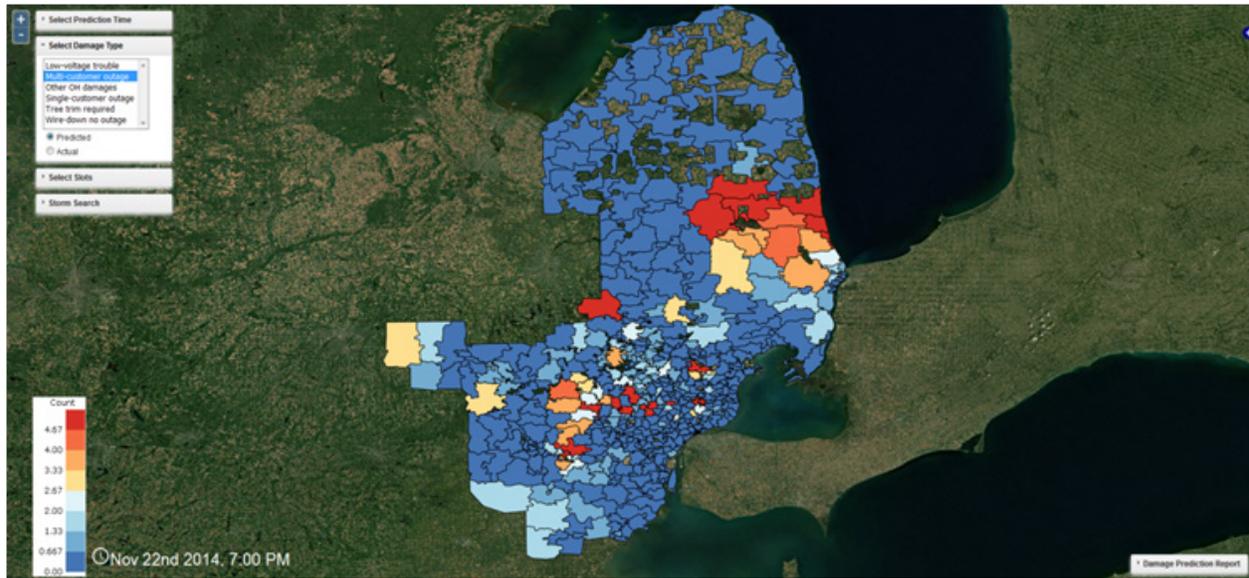
*Figure 2*. Map pinpointing where analytical models expect damages to utility assets based on hyperlocal weather forecast data at 2km resolution.

## Outage prediction and response optimization

Outages from adverse ice, wind, tornado and hurricane events can cost utilities millions for just a single event. With hyperlocal and historical weather data, vice presidents of transmission and distribution can deploy crews and materials to areas with the most anticipated need, reducing outage durations and remediation costs (Figure 2).

Lightning alone can cause a majority of outages for US power companies during the summer season and costs utilities millions in mitigation costs. The proprietary StrikeZone data service from The Weather Company can provide lightning forecasts within 30-minute windows to improve response planning. And The Weather Company's global lightning detection network generates up-to-the-second, bolt-by-bolt detection within 250 square meters of a strike to allow for pinpoint outage risk and response.

The IBM Outage Prediction service leverages proprietary The Weather Company forecast models and high-resolution data to help utilities understand where and when outages are likely to occur. Detailed predictions allow for better advance planning and faster response after inclement weather strikes.

### Predictive asset failure

Weather data combined with asset information and analytics can be used to proactively monitor assets and predict failure before it happens. Directors of maintenance can leverage hyperlocal weather information combined with asset performance information to understand the impact of weather on asset failure. Predictive maintenance analytics can be used to understand the impact of weather on asset performance and provide alerts when assets are at risk to proactively maintain assets before failures, perform condition-based maintenance instead of scheduled maintenance and more efficiently allocate capital for asset purchases.

## Emergency management: Staying ahead of the storm

With natural catastrophes in 2014 estimated to have cost USD110 billion and claimed 7,700 lives worldwide,[5] the ability to better plan for and mitigate weather emergencies can have a profound impact. For emergency management directors and city managers, highly accurate, timely and hyperlocal weather data is at the center of protecting critical infrastructure and citizens more rapidly, more thoroughly and as far ahead of severe weather events as possible.

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IBM's new Intelligent Operations Center for Emergency Management collects historical and real-time data from a variety of sources, and applies deep analytics, data visualization and real-time collaboration to help agencies plan for and manage response efforts during natural disasters, public safety emergencies and common but unexpected incidents. By integrating The Weather Company weather data into the IBM Intelligent Operations Center for Emergency Management, local governments and emergency response organizations will be able to:

- **Increase lead time:** The integration of 15-day probabilistic tropical forecast, which can deliver approximately 1.5 days additional lead time over publicly available hurricane forecast information, into the IBM Intelligent Operations Center for Emergency Management solution can help government officials around the world make far better planning, resource positioning and logistical decisions.

- **Activate rapid response:** With weather alerts, data feeds, visualizations and algorithms that track and predict storms around the clock integrated into the IBM Intelligent Operations Center for Emergency Management solution, emergency response teams will be able to leverage its advanced analytics to activate rapid response to the worst-hit areas first.
- **Utilize scenario planning:** With access to The Weather Company's proprietary ensemble forecast system, government agencies can create multiple, realistic scenarios for how a particular weather event, like a major snowstorm, could unfold (for example, who is hit the hardest, where the rain/snow line will be). This approach shifts the paradigm from using an explicit forecast, which can lead to less-insightful decisions, to expressing the forecast in probabilities, which leads to better, more informed decision-making.

Additionally, real-time weather data from The Weather Company incorporated into the common operational picture of the Intelligent Operations Center for Emergency Management provides emergency planners and responders with the speed and pinpoint situational awareness to respond quickly to areas with the most critical needs.

Rapid 15-minute forecast updates deliver critical forecast changes up to four times faster than other weather models. Additionally, using the high-density observation abilities of

The Weather Company's IoT-powered worldwide network of weather stations, the ground truth of disaster areas can be assessed at a 500-square-meter current conditions grid.

## Retail: Reading the barometer

Retail sales are a barometer of how customers "feel" about their personal situation and what is going on around them. For example, a big drop in temperature can discourage many shoppers and significantly reduce sales. The ability to better understand and predict weather's impact lets retailers adjust staffing and supply-chain strategies and take a more proactive approach to customer service.

Weather impacts not only the demand-and-supply curve of essential commodities such as groceries, water, gas and other goods—it also affects where and how people do their shopping. In inclement weather or when a storm is predicted, customers tend to do more of their buying online from the comfort of their homes instead of visiting retail stores. Hyperlocal forecasting allows retailers to outpace competitors in promoting weather-influenced merchandise on an e-commerce site or through a mobile marketing campaign when foot traffic declines during cold weather.

### Weather marketing strategies

More retailers are developing weather marketing strategies to manage environmental factors beyond their control. Historical

and forecast weather data, integrated with industry-specific data models and analytics, can help retailers better anticipate customer behavior. The use of advanced analytics can uncover affiliation and correlation of weather data and its impact on specific merchandise, product category sales and customer foot traffic in a store. Retail organizations can use this analysis to deliver personalized communications to target customers at the right time and place—for example, designing hyperlocal marketing campaigns that send weather alerts in advance to their customers.

### Supply chain management

Retail organizations can solve thorny business challenges such as merchandise planning and inventory optimization by integrating weather forecast data with analytics. Predictive weather analytics can offer valuable insights into weather conditions months in advance. Combined with stock availability data for various store locations, this predictive capability empowers retailers to become proactive in managing their supply chain and interactions with their suppliers. Retailers can also improve pricing, promotion and markdown decisions that are weather-sensitive.

The new IBM Demand Insights for Retail and Consumer Packaged Goods solution allows retailers to respond proactively to optimize staffing, inventory and marketing decisions by combining not only The Weather Company data, but news, events and social data to create descriptive signals and predictive insights that enhance their existing demand forecast models.

## Weather Means Business

Weather plays a critical role in many industries. Advances in both weather science and cloud computing have fundamentally changed the paradigm, allowing us to harness more data, scale to meet demands, and be far more precise and accurate in forecasts. As a result, IBM and The Weather Company can transform how businesses understand the impact of weather on their operations, anticipate weather events sooner and take action to optimize those parts of their enterprise impacted by weather—allowing more businesses in all sectors to make weather actionable.

## For more information

To learn more, contact your IBM representative or IBM Business Partner, or visit: **ibm.com**/ibmandweather

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**IBM**

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