



How Weather Data Helps European Utility Companies Mitigate the Impact of Climate Change

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Introduction

Many utility companies across Europe already rely on accurate and reliable weather forecasts to help overcome daily planning and operational challenges. But as a result of climate change, the sector faces new and emerging challenges, meaning the pressure is growing on industry leaders to mitigate the impact severe weather events have on the business.

According to Accenture, 86% of utility executives in Europe have seen extreme weather events increase in frequency, severity, or duration in their networks over the last 10 years. And a further 92% expect this trend to continue over the next decade. Yet only 24% feel well prepared to deal with the impact of severe weather.

Historically, the sector has mainly focused on grid reliability. However, the gap between awareness around severe weather events and industry preparedness highlights the need for utility companies to invest in how they manage, monitor and analyze weather conditions.

This guide explores the challenges utility companies face due to climate change, evaluate how these changes are playing out in different parts of Europe, and review the benefits of advanced weather insights for utility companies. Let's get started.



Why the time for action is now

Whether you work in transmission, distribution or power generation, it's no surprise that the weather impacts your work; this has always been the case for utility companies. So, the question is, why now?

As a result of climate change, the severity and frequency of weather events that impact the sector are increasing. We've identified five challenges facing the industry due to this trend.

Challenge 1: Increased number of severe weather events

Increased extreme weather frequency, including heavy rainfall, extreme temperatures, and high winds, demonstrates that [our climate is changing](#). Environmental awareness has increased among the general public, which, in turn, puts pressure on businesses to reduce atmospheric emissions and adopt a greener approach.

Studies show that heavy rain events have become more frequent. Global floods and extreme rainfall have surged by more than 50% this decade and are now occurring at a rate four times higher than in 1980, according to a report by the European Academies' Science Advisory Council.

According to the Intergovernmental Panel on Climate Change (IPCC), [observed seasonal and regional patterns](#) indicate increased winter precipitation in Northern Europe and extreme precipitation and pluvial flooding at global warning levels exceeding 1.5 degrees Celsius in all regions except the Mediterranean.

The impact: More extreme weather conditions demand utility companies become more sustainable. In the future, weather is more — not less — likely to impact operations.

Challenge 2: Customer expectations

Modern utility companies rely on their reputation with customers to maintain and grow revenues. Word of mouth, reviews and positive customer feedback are essential for utility companies to grow and thrive year-on-year.

Consumers expect utility companies to keep the power on — at a reasonable price. In Europe, [15% of consumers](#) change energy companies each year, and the ease of switching means that companies who fail to meet customer expectations are at risk of losing customers.

Blackouts and disruption of services are likely to impact customer perceptions negatively. Based on this, investing in network resilience makes sense, however, this work comes at a high cost and can result in price increases for consumers. Utility companies must educate both consumer and business customers that these costs are worth the prices and can be measured in a minimal period of interrupted services.

In addition to consumers, utility companies must also navigate the challenges of maintaining supply to critical customers like hospitals, police and fire services.

The impact: Critical customers, who have a negative experience, can lead to reputation damage for events. The public expects utilities to prioritize safety and cost. Failing to engage and educate customers about the investments needed can result in them choosing alternative providers.

Challenge 3: Mitigating the cost of inaction

A priority for utility companies is to understand how weather conditions could impact assets and infrastructure so that maintenance teams can be deployed, and preventative measures taken as soon as possible. Planning for maintenance work helps ensure maximum efficiency and minimal disruption. Failure to plan can result in higher overall repair and maintenance costs following severe weather events. Analyses of [wind farm maintenance costs](#), for example, show that up to 40% of maintenance costs are related to unexpected failures, which result in costly ad hoc work.

The impact: Without checks in place to map the likely effect of weather conditions and alert operations teams to potential damages, repairs can become more serious, resulting in expensive replacements.

Challenge 4: Safety for employees and the general public

Severe weather can develop quickly, bringing dangerous conditions such as high winds and life-threatening storms. Early awareness provides valuable time to enact safety protocols, ensure crew safety and prevent harm to the public.

Importantly, the danger can persist even when it appears the storm has passed. With lightning, for example, further strikes can arrive in the area. As a result, crews should only receive an "all-clear" when, at minimum, lightning has not occurred for the last 15 minutes within 45-50 kilometers.

The impact: Utility companies are responsible for ensuring crews can work in a safe environment, and the general public isn't put at risk. Weather warnings ensure that teams can move to safety as weather conditions deteriorate before the weather becomes an immediate threat. Failing to put these measures in place places lives at risk.

Challenge 5: Reducing environmental impact

Utility companies are committed to providing a cleaner, reliable and affordable energy, with [nearly all major electric utilities](#) pledging to go carbon-neutral or zero out emissions by 2045 or 2050. But, hitting the right balance between decarbonization, infrastructure investment and cost control is a major challenge. [A report from Deloitte](#) indicates that the major drivers for transitioning to zero emissions are new business models and value-creation opportunities and consumer support.

More than 60% of the public believes that climate change is an emergency and want businesses to reduce atmospheric emissions and adopt a greener approach. Legislation under the [European Commission for climate action and green deal](#) further enforces the fact that utility companies must take action to increase energy efficiency and renewable energy

The impact: Legislative action and public interest in climate change put pressure on utility companies to provide clean, reliable, and affordable energy. The transition to zero emissions in the set timeframe are challenging and require new business models.

What do these factors tell us? If we summarize all of the above in one sentence, you get:

Utility companies must deal with more frequent extreme weather events and meet demanding customer expectations while ensuring safety, managing maintenance costs and lowering their carbon footprint.



How these challenges are playing out across the continent

Across the continent, the challenges are playing out in different ways. By 2080, [it's expected](#) that extremely high temperatures will have a negative impact across the whole EU-region. When extremely high temperatures occur, it results in decreased transport capacity across the network. But this isn't the only effect of climate change. For northwestern Europe, the effects of snow, ice and storms are predicted to increase damage to networks (and, consequently, the likelihood of blackouts), with an anticipated medium-negative impact by 2025. And increased heavy precipitation in mountainous regions across the continent will cause more landslides, mudslides and debris flows, resulting in damage to network infrastructure.

The challenge for utility companies is visibility on when severe weather events will occur. This insight enables the industry to prepare infrastructure and build resilience in the network ahead of extreme weather events.

At the same time, the shift to renewables also increases the challenges facing the sector output from renewable sources can be difficult to predict, which is a challenge for grid reliability and profitability — [one offshore wind farm developer](#) overestimated the power generation at its sites by up to 2%, which consequently knocked 10% from the value of the company's stock. If weather conditions aren't favorable, it can require reverting to gas or coal for electricity production.

Germany

[A recent report](#) highlighted that Germany is among the top three countries worldwide affected by extreme weather. The number of hot days experienced in the country is up 170% since 1951, and winter precipitation has increased by 26% since 1881.

Snow, ice, and cold

On February 8, 2021, [Germany experienced a significant snowstorm](#) with strong winds and sub-freezing temperatures, leading to icy roads and large snowdrifts. The event halted transportation, including ambulance services, leaving many stranded, awaiting rescue.

Floods

In July 2021, several European countries experienced severe floods, including the United Kingdom, Germany, Austria, Belgium, Croatia, Italy, Luxembourg, the Netherlands, and Switzerland. [In Germany](#), the flooding killed 196 people and caused widespread power outages. On July 15, the country's largest power distribution grid stated 200,000 properties were without power — and restoration couldn't occur until the roads were cleared.

Thunderstorms

February 2022, violent storms wreaked havoc across Great Britain, Germany, and the Netherlands. [Tens of thousands of Europeans were without power](#), including 54,000 households in North Rhine-Westphalia and 10,000 households in Bavaria. Most of these outages were from trees falling on power lines.

The [push to increase renewable electricity production](#) in the country is also an area of concern for supply stability. While the ambition to end coal production will help the country meet CO2 reduction targets, renewables are typically much more susceptible to severe weather conditions. Long periods of unfavorable weather could hamper electricity production when storage facilities remain limited and coincide with peak demand from cooling or heating systems.

France

[Air temperature](#) increases recorded in France during the 20th Century is approximately 30% higher than the global average. This trend is particularly concerning for the country's nuclear power sector, as increased temperatures could impact equipment safety at nuclear power facilities.

France has long relied on nuclear power as a critical electricity source — almost three-quarters of electricity is generated via nuclear power. However, the utility is [under pressure](#) to improve resilience to rising temperatures and an increased likelihood of natural disasters occurring due to climate change.

The UK

In the United Kingdom, experts have warned the country must prepare for [more storms](#). Recent severe weather incidents, like [Storm Christoph](#), saw the worst affected areas experiencing up to 7 cm of rainfall within 48 hours and thousands of homes affected by flooding.

In February 2022, [Storms Dudley, Eunice, and Franklin](#) left several thousands of homes without power, and the Isle of White recorded a 122-mile-per-hour wind gust — a new record for England.

While the UK has [reduced emissions](#) faster than any other G7 country, the growing reliance on renewable sources for power generation leaves it vulnerable to unfavorable weather conditions. Additionally, distribution in the UK remains sensitive to damage caused by storms.



How weather insights improve utility operations

Unfortunately, utility companies can't control the weather, but they can control their responses to weather changes, storms, and other severe events. Robust, predictive data and analysis help maximize efficiency and minimize risk before, during, and after severe weather events.

Field crew and personnel planning

Improved insight and understanding about when and where severe weather will affect the service territory helps utilities plan an efficient outage response, keep crews safe and improve restoration times. Accurate and reliable data helps with confident crew planning decisions to improve storm preparedness and ensure the right amount of resources is available to restore all weather-induced outages. Real-time storm visualization provides dispatchers with the information they need to keep field crews and personnel safe.

Load balancing

Know for a fact when to produce or purchase more power, avoids costly over-purchasing and gives companies the ability to increase profits on trading activities. Effective temperature forecasts – which consider the impact of parameters like wind speed, radiation and humidity alongside temperature – help utility companies have advanced notice about anticipated periods of increased load. With better load forecasts, utilities can reach out to larger businesses, such as warehouses or factories, and ask them to reduce their load by moving peak manufacturing times or cutting back on lighting. Those businesses that agree can receive financial rewards, while the utility lowers the risk of an energy shortage.

Line rating

The capacity of the overhead power line network is highly dependent on the cooling capacity of the weather. Line rating enables utility companies to optimize available grid capacity by understanding weather forecasts and making better predictions for early congestion detection. It allows dispatchers to improve insights on the grid capacity and avoid re-dispatching or grid breakdowns.

Asset inspection

Intense lightning and thunderstorms pose a considerable risk to utility operations. By identifying and proactively inspecting substations and other infrastructure that may have been struck by lightning, utility companies can find and repair issues before a failure takes place. Proactive inspection means less downtime for customers and fewer emergency repairs than need to occur outside of standard working hours.



Three benefits of using weather insights

Forward-thinking utility companies are already using advanced weather tools to help manage the impact of climate change. They're doing this because they understand the impact accurate weather data has on managing risks, reducing outages, improving reliability and maintaining safety.

1. Improve risk management and planning for severe weather events

The number one benefit is improving risk management. Severe weather poses a risk to people and assets — it's not an exaggeration to say it can cause injury or even death. But without accurate weather data, one of two things will happen. Either, the weather's impact is overestimated, resulting in an overzealous response that costs time and money. Or, conditions are underestimated, and the company is caught reacting to a situation as it unfolds.

If a utility company is using a basic weather product, then deciding on the next course of action is more challenging because of the lack of confidence in the forecast accuracy. As a result, it allows for higher weather tolerance to maintain safety, leading to more inaccurate calls.

How weather data helps: Identify historical events similar to those forecast to evaluate other possible storm impacts. Reduce the risk of under- or overestimating the effects of a severe weather event.

2. Reduce outages, reduces SAIDI and improve restoration time

Storms, lightning strikes, and high winds delay maintenance programs and disrupt schedules. But if planners know, from the accurate weather data, that a storm will hit the area at a set time, they can plan around the weather.

Maintenance work can be scheduled well before the precise weather conditions are known. As the day draws nearer, operators and meteorologists will begin to have a clearer idea of the likely forecast. But they need the confidence to make their "go or no go" call to start or continue work on site.

If the forecast shows they should go ahead, they need to be confident that conditions will not change and subsequently impact safety. However, if the weather data show conditions will now be unsafe, they need to trust that a "no go" call is the right decision.

Knowing when downtime due to the weather could occur helps planners put steps to improve restoration time and reduces SAIDI, or system disruption.

How weather data helps: Accurate weather data ensures operators can be confident in their decisions to continue or postpone maintenance work. In situations where the weather conditions are marginal, accurate data can be the difference between going ahead or canceling maintenance work. The impact here is potentially huge. Not only can unnecessary scheduling changes mean losing the weather window to complete the job, but it can also be weeks before rescheduling.

3. Improve reliability, resilience and customer relationships

The utility sector is having to plan for both the short and long term. There are upcoming weather events that need immediate resource focus to prevent or minimize outages. But to adapt to the challenges posed by climate change, companies increasingly need to look at longer-term infrastructure investments, like system hardening and flexibility improvements.

Improving reliability by being prepared to make informed decisions to mobilize resources ahead of large weather events will remain important. A strong understanding of the weather type, forecast confidence, meteorologist discussions, and probabilistic outage prediction forecasts, will aid in planning restoration resources, source contractors and mobilize crews in regions that will face the largest impacts.

But increasingly understanding how the weather will impact infrastructure in the years ahead will be essential to make the right infrastructure investments to maintain reliability. Working with a weather partner can help utility companies understand the longer-term trends that will inform these decisions and support a predictive maintenance program. Analyzing the impact of past weather events on asset lifespans means improving maintenance scheduling and plan work to preempt this impact and reduce asset failures.

How weather data helps: Weather risk forecasts help improve communication of environmental threats. Proactively communicate with customers about the likely impact of severe weather events and keep them informed when supply is affected to strengthen customer relationships. Plus, post-storm reports document an event's forecast and outcome to justify decisions to management and regulators.



Conclusion

The challenges caused by climate changes may be daunting, but ignoring these changes isn't an option for the utility sector in Europe. Organizations that fail to adapt to the growing threats put their business and customers at risk.

Incorporating accurate weather data in planning will also help utility companies face other challenges, not just those posed by climate change. The technology now available means utility companies can access more insight than ever before to help plan, prepare and mitigate against severe weather events. This capability means it's easier to make informed decisions and enables earlier communication to both crew and customers about the likely impact of weather events. And for utility companies working towards predictive maintenance, it can streamline maintenance planning. By combining pre-emptive maintenance and parts replacement, with the existing maintenance schedule, it reduces the burden on planning.

Timely, accurate weather information designed for the utility sector can significantly improve productivity, reliability, safety and efficiency. Access to briefings prepared by meteorologists, tailored to a specific region or area, with the option to receive a personal response to submitted questions means operators can be confident in the expected outlook.

[Contact DTN](#) today for a free trial and discover how we can help.