

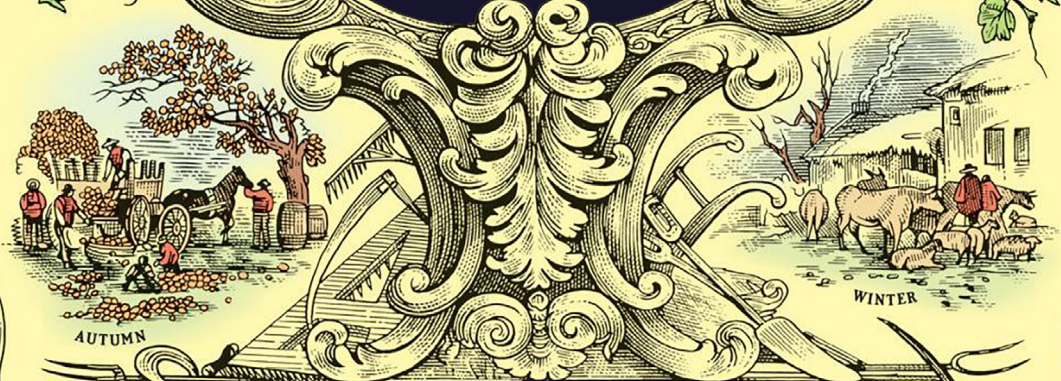
AI-Powered Insights into Winter
Business Disruptions

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The Operator's Winter Almanac

 tomorrow.io

A Next-Generation
Guide for Cutting-Edge
Operational Leaders



The Winter Weather Intelligence
& Business Impact Report

For centuries, the annual Farmer’s Almanac has provided observers with insight into the coming winter’s fiercest storms, harshest cold, and more. Now, as the climate evolves, organizations require predictive AI-backed intelligence to navigate intensifying winter extremes.

Introducing the Operator’s Winter Almanac—your data-driven guide to the season ahead. By analyzing over 15,000 alerts from winter of 2022/23, this almanac uncovers key weather impact patterns across industries, including proven strategies used by today's leaders to boost resilience in the face of snow, cold, wind and ice.

Use these AI-powered insights to stay ahead of threats, optimize operations, and ensure safety as the climate shifts.

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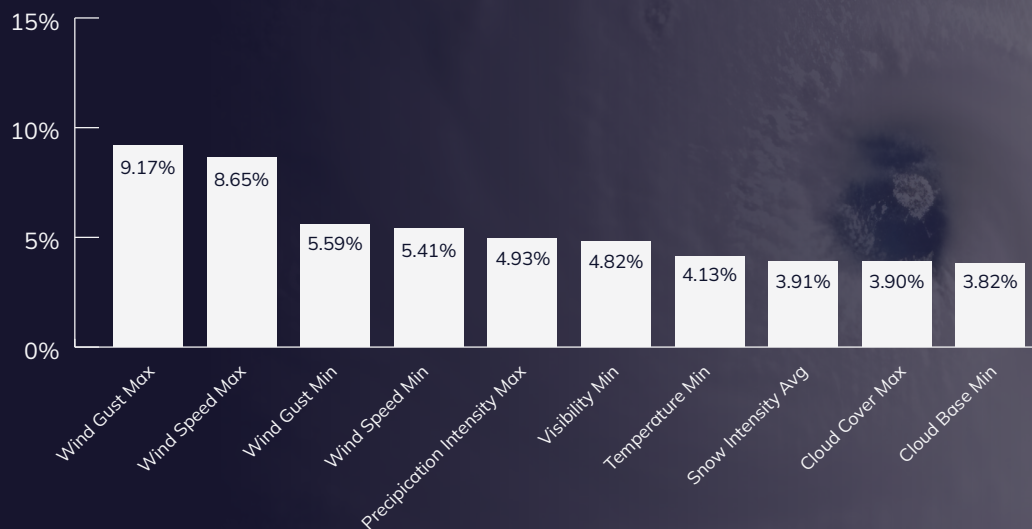
Winter's Top Operational Disruptions

Snow and wind-related parameters accounted for over 50% of alerts, with heavy snow (13%) and high winds (11%) the top threats. Extreme cold (9%), reduced visibility (7%), and ice accumulation (6%) rounded out the top five parameters, showing the diverse dangers winter weather poses.

As a result, the top winter-related operational impacts across sectors were:

- **Workforce Safety Risks:** Exposure to cold, wind, snow, and ice jeopardizes personnel health and availability.
- **Supply Chain Delays:** Hazardous conditions disrupt distribution and delivery of materials and products.
- **Facility Accessibility:** Snow, slush, and ice accumulation impedes site entrance and navigation.

The graph below displays the top winter weather parameters by percentage of alert volume, indicating which conditions drove these widespread business disruptions:



By leveraging predictive weather intelligence, organizations can proactively mitigate these common winter business impacts to maintain workforce safety, supply chain continuity, and site accessibility.

Read on for a breakdown of specific disruption risks and responsive strategies by industry.

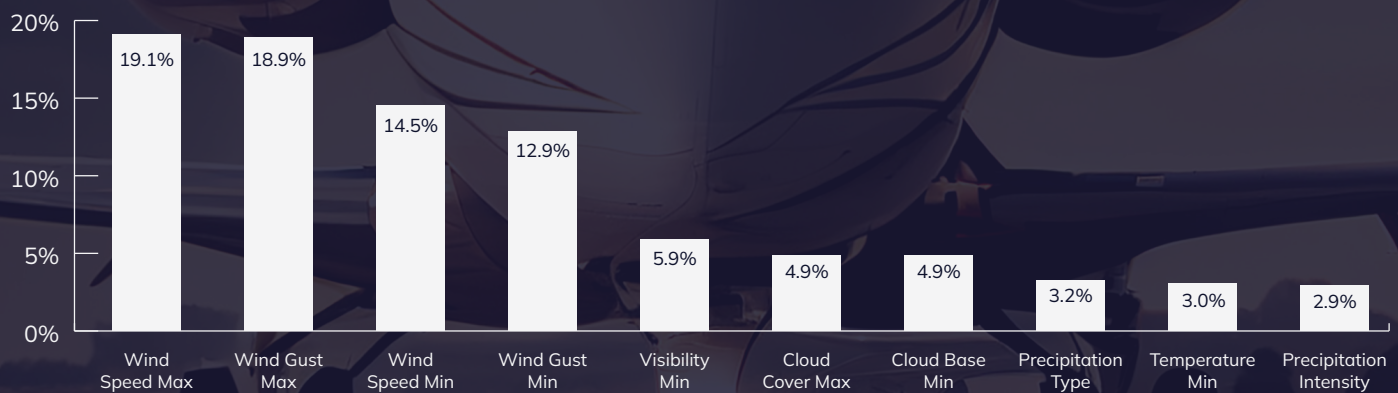
Aviation Industry Winter Impact Spotlight

Extreme winter weather events like blizzards, ice storms, and arctic cold fronts severely disrupt airline operations and flight schedules. Managing these impacts smoothly is essential for airlines to deliver safe, reliable air travel as conditions rapidly evolve.

Key Business Impact Insights:

- **Flight Delays & Cancellations:** Heavy snow accumulation and high winds frequently halt airport operations, forcing airlines to preemptively cancel flights. This strains scheduling and revenue.
- **Decreased Airport Capacity:** Low visibility requires greater spacing between aircraft, reducing the number of flights air traffic control can safely manage per hour.
- **Icing Damage:** Colder temperatures raise the risk of structural ice accumulation on wings/engines that can damage aircraft and force temporary groundings.

The following graph showcases the top winter weather parameters by percentage of alert volume, emphasizing which conditions most often disrupt flight schedules and airline operations.



How Tomorrow.io Can Help:

Tomorrow.io provides airlines with predictive weather intelligence to maximize efficiency, safety, and revenue:

- Hyperlocal forecasts enable airlines to proactively cancel flights based on expected airport closures
- Optimized deicing insights reduce unnecessary fluid usage and minimize costly Ground Delay Programs resulting from snow and ice
- En route optimization identifies tailwinds to conserve fuel on long-haul flights avoiding regions with ice accumulation risk

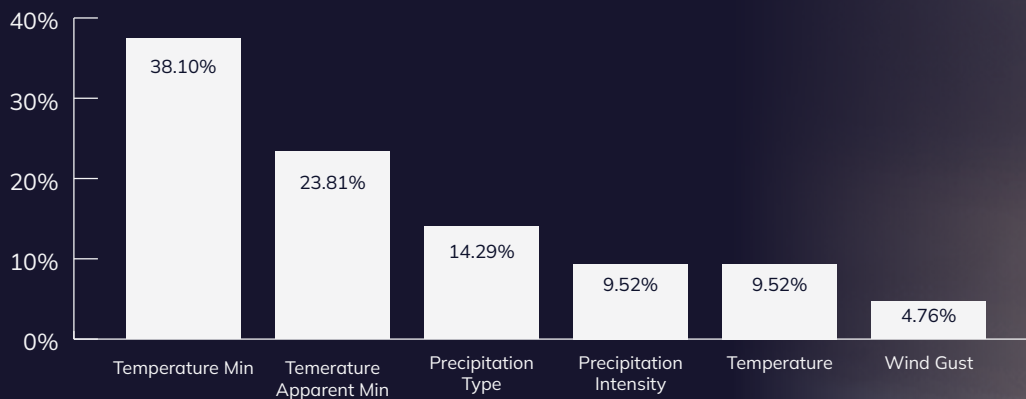
Energy Industry Winter Impact Spotlight

Extreme winter weather threatens reliable energy delivery by disrupting infrastructure and supply chains. Tracking winter climate threats helps energy companies harden infrastructure, manage demand, and deploy responsive grid strategies.

Key Business Impact Insights:

- **Grid Reliability:** High winds and heavy snow down power lines and poles, while ice buildup on infrastructure causes disruptions.
- **Supply Imbalances:** Plunging temperatures drive up energy demand for heating, straining supply as generation efficiency drops at low temps.
- **Crew Safety:** Exposure risks from extreme cold introduces dangers of frostbite and hypothermia for workers completing outdoor repairs.

The following graph depicts the top winter weather parameters by percentage of alert volume, displaying which conditions most commonly impact energy operations.



How Tomorrow.io Can Help:

Tomorrow.io provides energy companies with predictive intelligence to harden infrastructure, restore outages faster, and balance supply:

- Hyperlocal forecasts pinpoint infrastructure at risk from heavy snow, ice, and winds for proactive hardening
- Outage predictions identify most impacted areas to optimally preposition repair crews
- Load forecasts incorporate weather impacts on demand to anticipate and balance supply needs

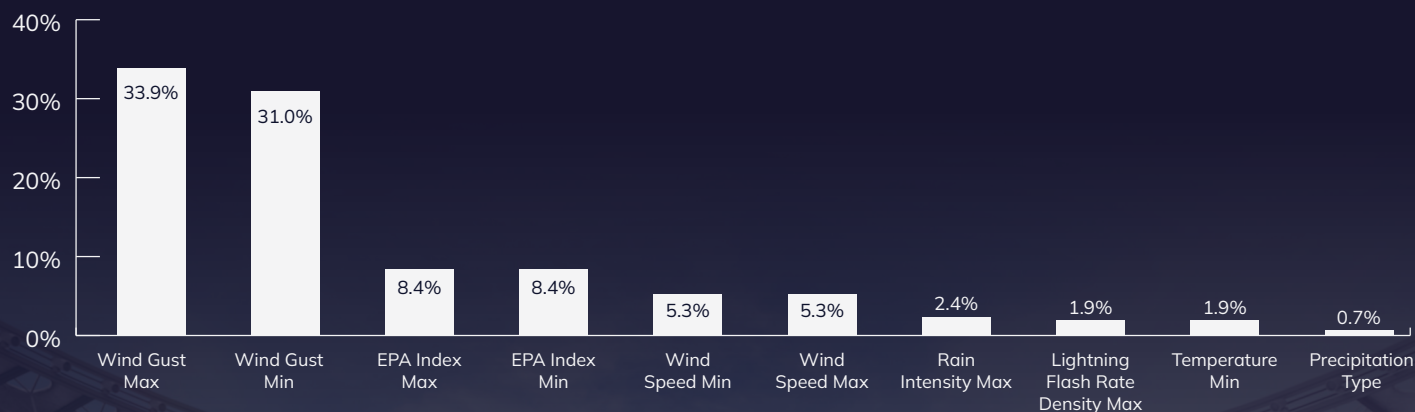
Sports/Outdoors Industry Winter Impact Spotlight

From event delays to unsafe conditions, winter weather can significantly disrupt sports events and outdoor activities. Identifying and preparing for these threats is key to maintaining schedules and fan/participant safety.

Key Business Impact Insights:

- **Event Cancellations:** Heavy snow accumulation and blizzard conditions frequently require full event cancellations when venues become inaccessible or unsafe. This strains scheduling and revenue.
- **Field Accessibility:** Heavy snow makes clearing playing surfaces extremely labor intensive, while snow-covered roads hinder team/staff access to venues. This disrupts prep and operations.
- **Hypothermia/Frostbite Risk:** Bitter cold and strong winds create dangerously icy wind chill conditions for spectators. Prolonged exposure risks fan health and safety.

The following graph depicts the top winter weather parameters by percentage of alert volume, displaying which conditions most commonly delay games and jeopardize participant safety.



How Tomorrow.io Can Help:

Tomorrow.io provides sports teams and event organizers predictive intelligence to maximize safety, visibility, and playability:

- Hyperlocal forecasts pinpoint which venues will be impacted by winter weather for proactive planning
- Predictive wind chill alerts, for example, help prevent spectator hypothermia and frostbite during frigid conditions
- Snow accumulation insights optimize labor and resources for keeping playing surfaces clear

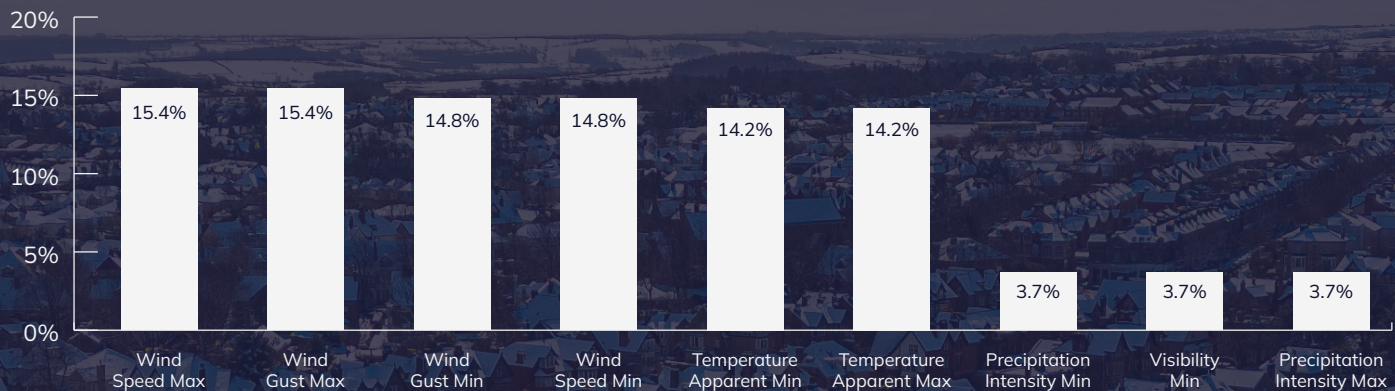
Cities/Municipalities Winter Impact Spotlight

It's not just businesses that are impacted by winter—keeping cities and communities running through extreme winter weather is crucial. By analyzing alerts data from cities and municipalities, we identified the top winter weather impacts they prepare for.

Key Insights:

- **Power Outages:** Heavy snow and ice accumulation as well as high winds bring down trees and power lines, causing widespread outages.
- **Transportation Disruptions:** Snow and ice make roads extremely hazardous to drive on, necessitating intense plowing operations while risking accidents and delays.
- **Infrastructure Damage:** Extreme and fluctuating cold severely damages critical infrastructure like water pipes and roadways.

The following graph depicts the top winter weather parameters by percentage of alert volume for cities and municipalities:



How Tomorrow.io Can Help:

Tomorrow.io provides city officials with predictive intelligence to keep communities connected and safe during winter weather:

- Hyperlocal forecasts pinpoint which neighborhoods will be most impacted by snow, ice, and wind to optimize plow routes
- Real-time precipitation type alerts help crews prepare the right equipment and materials to treat roads
- Wind gust forecasts provide advance notice to stage repair crews near vulnerable power infrastructure

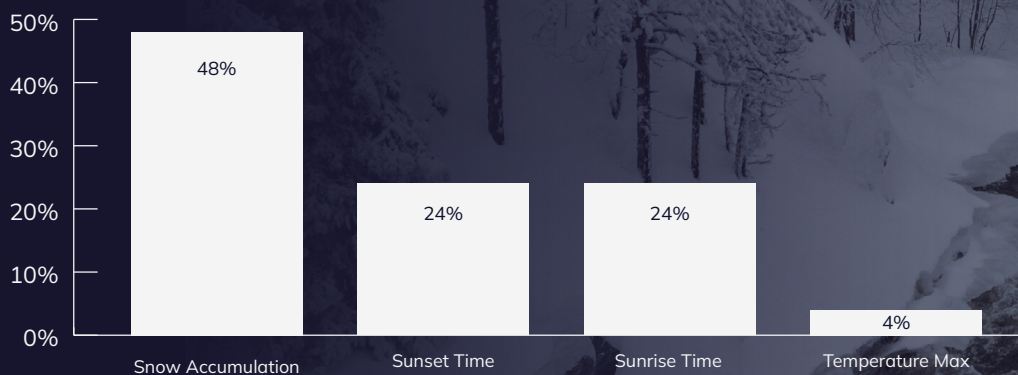
Insurance Industry Winter Impact Spotlight

Extreme winter weather events pose major risks for insurers, driving spikes in claims that strain underwriting strategies. Managing these impacts is crucial as climate change increases the frequency and severity of storms, freezing rain, and other events.

Key Business Impact Insights:

- **Policyholder Damage:** Heavy snow on roofs and ice damming lead to extensive home and property damage claims.
- **Staffing Shortages:** Inbound claim volume spikes during storms strain personnel bandwidth and overwhelm systems.
- **Resource Allocation:** Large claim influxes require rapid deployment of claims adjusters to impacted regions.

The following graph depicts the top winter weather parameters by percentage of alert volume for the insurance industry:



How Tomorrow.io Can Help:

Tomorrow.io provides insurers predictive intelligence to inform underwriting strategies and better support customers through winter events:

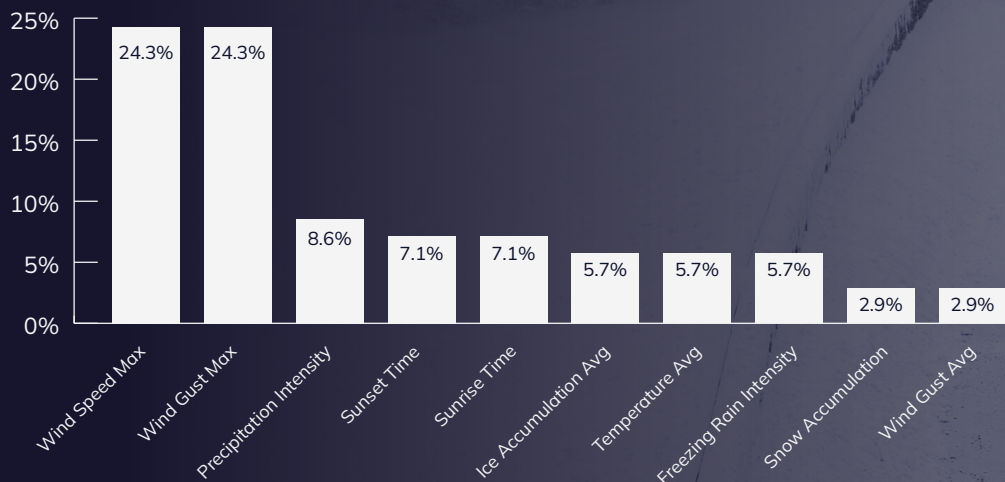
- Hyperlocal forecasts enable targeted policyholder alerts ahead of incoming snow, ice, and wind threats
- Historical weather analytics validate claims and inform pricing for new policies
- Real-time storm tracking helps claims adjusters schedule damage assessments

Manufacturing Industry Winter Impact Spotlight

With extensive operations and equipment, manufacturing is vulnerable to winter disruption. By analyzing alerts data, we identified key winter risks manufacturing operations prepare for.

Key Insights:

- **Equipment Damage:** Extreme cold exceeds safe operating thresholds and causes equipment freezing while snow/ice accumulation damages exterior assets.
- **Productivity Losses:** Heavy snow reduces employee attendance while cold lowers motivation and performance as well as slowing processes.
- **Supply Chain Delays:** Winter storms make transportation hazardous, delaying inbound parts shipments and outbound product deliveries.



How Tomorrow.io Can Help:

Tomorrow.io provides manufacturers predictive intelligence to safeguard operations, productivity, and supply chains:

- Hyperlocal forecasts pinpoint which facilities will be impacted by snow, ice, cold, and wind to proactively adjust staffing and scheduling
- Real-time lightning alerts provide advance notice to protect equipment and inventory vulnerable to power surges
- Flood index modeling helps preemptively stage pumps and materials to prevent water damage at flood-prone sites

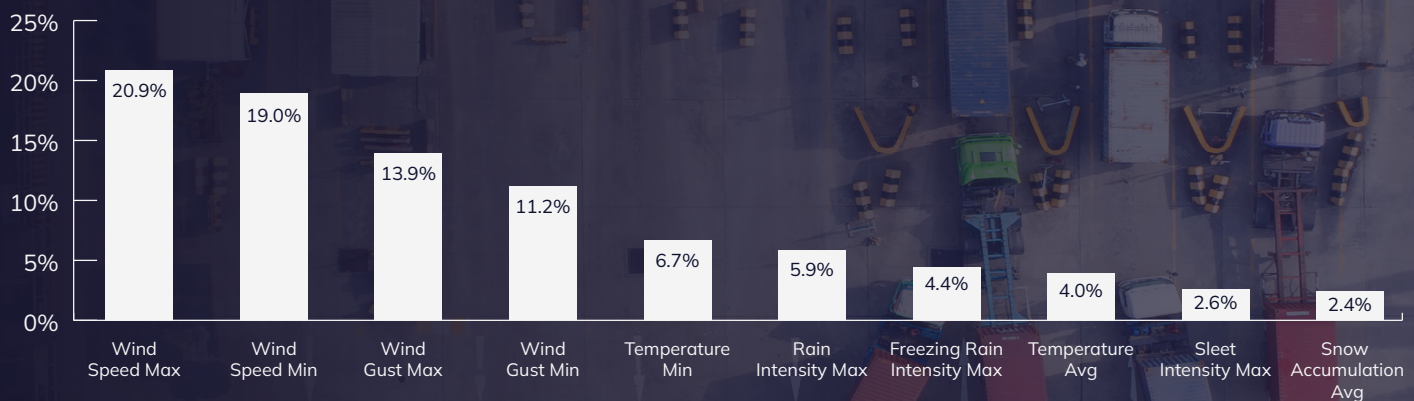
Logistics Industry Winter Impact Spotlight

Logistics operations involve extensive driving and reliance on transportation infrastructure. By analyzing internal alerts data, we identified the top winter impacts logistics companies prepare for to safeguard delivery commitments.

Key Business Impact Insights:

- **Delivery Delays:** High winds, heavy snow, and whiteout conditions frequently halt trucking operations altogether when driving becomes unsafe. This strains customer service.
- **Increased Maintenance:** Fluctuating temperatures contribute to more mechanical problems and tire blowouts that take trucks temporarily out of service for repair.
- **Warehouse Congestion:** Snow and ice make staging areas and loading docks inaccessible, leading to bottlenecks and congestion at distribution centers.

The following graph displays the top winter weather parameters by percentage of alert volume, underscoring which threats most frequently delay shipments and endanger drivers.



How Tomorrow.io Can Help:

Tomorrow.io provides logistics companies predictive intelligence to optimize routing, inform drivers, and meet service commitments:

- Hyperlocal forecasts enable targeted pre-planning based on snow depth, winds, and icing forecasts along routes
- Real-time alerts notify drivers of deteriorating conditions and suggest precautions to improve safety
- Automated messaging ensures protocols are followed in hazardous conditions to avoid accidents

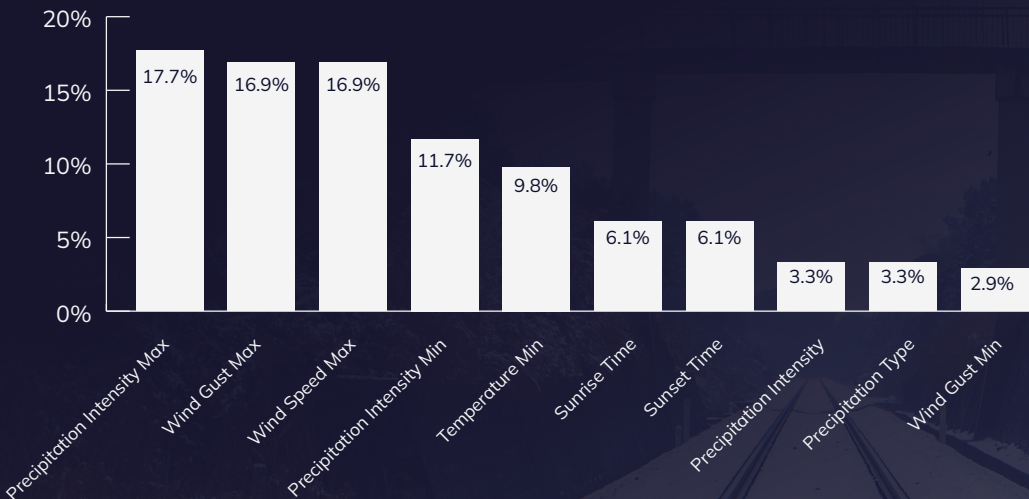
Rail Industry Winter Impact Spotlight

With hundreds of thousands of miles of track exposed to the elements, winter events like blizzards and polar vortexes pose constant business disruption threats to railways. By analyzing internal winter alerts data from rail companies, we identified the top impacts on operations and infrastructure they prepare for.

Key Business Impact Insights:

- **Crew Safety:** Bitter cold introduces dangers of frostbite and hypothermia for crews carrying out inspection, maintenance, and repair work outdoors.
- **Reduced Traction:** Heavy snow accumulation and ice on tracks lowers locomotive traction, forcing slower speeds that impact efficiency.
- **Visibility Issues:** Blowing snow during blizzards reduces conductor visibility, raising the risk of accidents and derailments.

The following graph highlights the top winter weather parameters by percentage of alert volume, indicating which threats most disrupt railway operations:



How Tomorrow.io Can Help:

Tomorrow.io provides rail operators with predictive intelligence to maximize safety, reliability, and efficiency through winter extremes:

- Hyperlocal forecasts enable targeted treatment of switches prone to freezing before temperatures drop
- Real-time wind alerts inform operators when gusts may impact locomotive stability and cause derailments
- Snow depth insights optimize scheduling of plows and treatment to maintain visibility

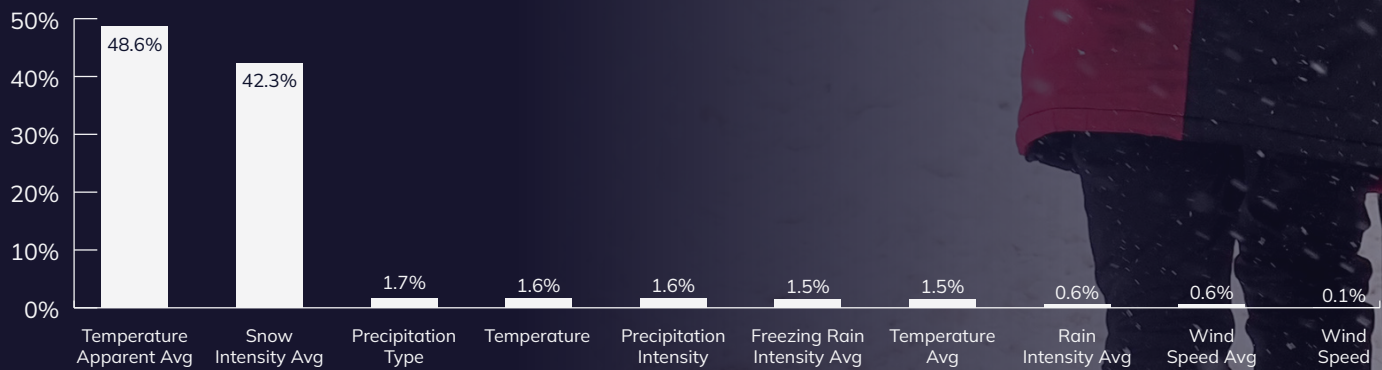
On-Demand Industry Winter Impact Spotlight

While tech and on-demand companies operate indoors, their contractor networks still face substantial winter weather risks. Identifying and mitigating these threats is crucial as the contractor workforce scales globally.

Key Business Impact Insights:

- **Delivery Delays:** High winds and blowing snow force delivery drivers to slow or stop altogether when road conditions become too hazardous, delaying deliveries.
- **Driver Safety:** Extreme cold introduces dangers of frostbite and hypothermia for delivery drivers regularly exiting vehicles. This strains workforce availability.
- **Network Disruptions:** Heavy snow can down power lines and disrupt connectivity of contractor devices, preventing job assignment and tracking.

The following graph highlights the top winter weather parameters by percentage of alert volume, indicating which threats most disrupt on-demand operations:



How Tomorrow.io Can Help:

Tomorrow.io provides on-demand companies predictive intelligence to keep contractor networks safe and deliveries on time through winter extremes:

- Real-time precipitation type alerts inform which equipment and vehicles are needed for current conditions
- Hyperlocal visibility insights enable route optimization to avoid dangerous whiteout driving segments
- Automated messaging prompts early shutdown of operations if conditions deteriorate

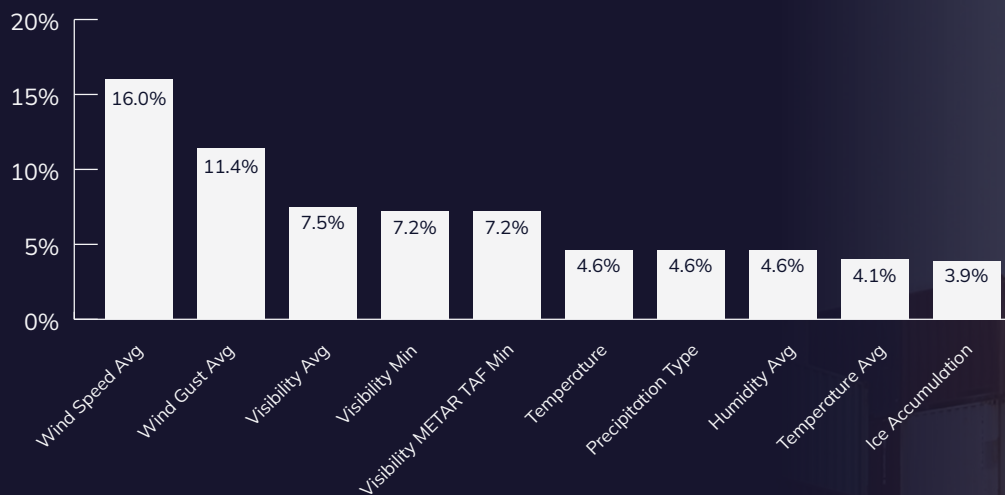
Air Freight Industry Winter Impact Spotlight

Winter storms like blizzards frequently disrupt air freight operations and delay time-sensitive deliveries. Managing these impacts smoothly is essential as air cargo volume expands globally.

Key Business Impact Insights:

- **Canceled Flights:** Blizzards and polar vortices frequently ground aircraft and halt air freight operations altogether when conditions get too hazardous.
- **Runway Accessibility:** Heavy snow accumulation makes airport runways unusable until extensive plowing takes place, preventing takeoffs and landings.
- **Aircraft Deicing:** Freezing precipitation and temperatures require extensive application of aircraft deicing fluid, causing gate congestion and delays.

The following graph highlights the top winter weather parameters by percentage of alert volume, indicating which threats most disrupt air freight operations:



How Tomorrow.io Can Help:

Tomorrow.io provides air freight companies predictive intelligence to efficiently navigate winter extremes and meet customer commitments:

- Hyperlocal forecasts of snow depth and accumulation inform proactive flight cancellations based on expected airport closures
- Real-time precipitation type alerts enable airport crews to prepare the right snow clearing and deicing equipment
- Predictive visibility insights facilitate safe aircraft ground handling during low visibility events

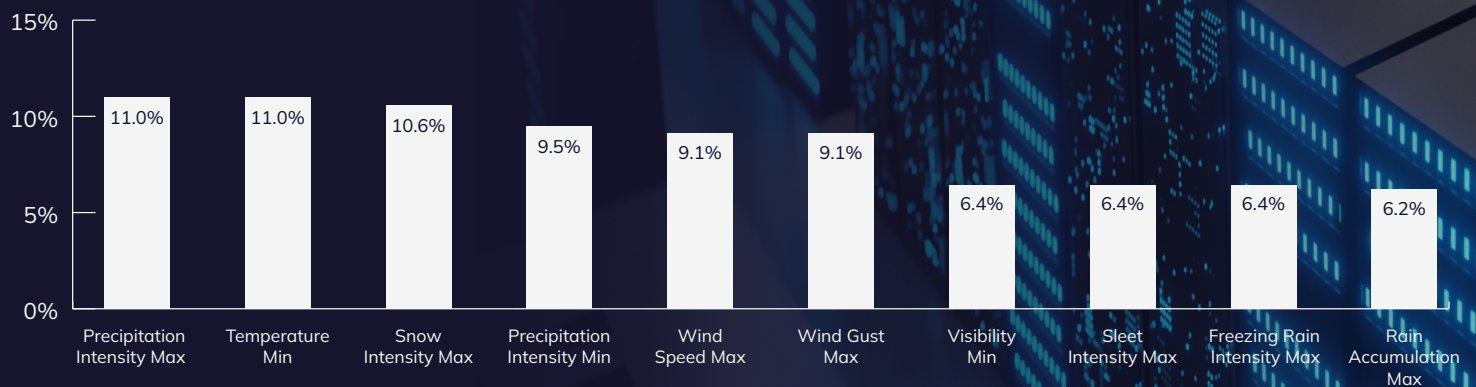
Technology Industry Winter Impact Spotlight

While tech companies operate indoors, their field networks still face substantial winter weather risks. Identifying and mitigating these threats is crucial as contractor workforces scale globally.

Key Business Impact Insights:

- **Network Outages:** Heavy snow and ice can down power lines and disrupt connectivity of contractor devices, preventing remote management.
- **Technician Safety:** Extreme cold introduces dangers of hypothermia and frostbite for technicians working outside installing hardware.
- **Missed SLAs:** High winds force bucket truck operations to cease, delaying installations and repairs past service deadlines.

The following graph highlights the top winter weather parameters by percentage of alert volume, indicating which threats most disrupt technology operations:



How Tomorrow.io Can Help:

Tomorrow.io provides technology companies predictive intelligence to keep field networks running and meet customer commitments through winter extremes:

- Hyperlocal forecasts enable targeted scheduling of technicians based on expected snow depth and road impacts
- Real-time precipitation type alerts help crews prepare vehicles and equipment for current conditions
- Wind chill alerts prevent technician hypothermia and frostbite during cold weather jobs

A satellite view of Earth showing the Western Hemisphere, with a satellite in orbit on the right side. The satellite has several rectangular panels and a central structure.

Proactive Winter Readiness is Crucial

As extreme winter weather intensifies worldwide, these mounting impacts increasingly disrupt business operations and supply chains across industries. Proactive readiness and agile responsiveness will only grow more crucial.

Ongoing weather intelligence and automated alerts enable organizations to stay ahead of winter threats and build resilience. Sound interesting? See for yourself at www.tomorrow.io/lp/get-demo-v/

About Tomorrow.io

Tomorrow.io is the world's leading weather intelligence and climate adaptation platform. Supercharged by proprietary modeling capabilities, global leaders rely on Tomorrow.io to solve their weather and climate-related challenges. From early warning systems to actionable insights, organizations can predict impact, mitigate risk, and ensure operational resilience with Tomorrow.io. Join the weather intelligence revolution at www.tomorrow.io.