

FREIGHT RAIL CLIMATE RESILIENCY & DISASTER RECOVERY

Key Facts

- Railroads are hardening infrastructure to withstand increasing climate threats.
 - Real-time monitoring and rapid response keep trains running during extreme weather.
 - Railroads aid disaster recovery, delivering supplies and restoring service fast.
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Railroads operate an expansive, outdoor, 24/7 nationwide network that often put trains in the path of natural disasters. Railroads have always monitored weather closely and coordinated directly with customers and emergency agencies. They take the necessary precautions to protect employees, rail infrastructure and shipments from natural disasters.

Today, the rail industry—as are many other industries—is facing an increasing frequency of climate-driven natural disasters. These include floods, wildfires, droughts, storms, and unpredictable temperature shifts. Freight railroads are building a more resilient network that can withstand climate-related hazards while continuing to deliver for America.

KEEPING THE NETWORK RUNNING

Railroads combat climate hazards by mapping vulnerable areas and implementing fire prevention programs. They also use firefighting trains and install detectors for seismic, wind, and flood threats. They upgrade wooden structures, elevate tracks to reduce flooding, and adjust maintenance to prevent heat-related buckling.

With 24/7 command centers and weather monitoring, railroads swiftly respond to disruptions. They execute detailed contingency plans and collaborating with emergency agencies for safety assessments and repairs. Coordinated efforts ensure prompt restoration of network operations while maintaining customer communication. Here are some examples of what freight railroads will do during extreme weather:

Customer Communications

- Notify customers as weather threats emerge
- Continue updates until service is restored
- Hold traffic if necessary

Operational Changes

- Reroute trains and relocate personnel
- Move equipment, locomotives, and cargo from risk zones
- Stockpile repair materials: ballast, generators, fuel
- Position engineers and maintenance crews for rapid recovery

Damage Assessment

- Inspect tracks and clear small debris
- Examine bridges; deploy divers for underwater checks
- Use drones and helicopters for hazardous areas

Infrastructure Repair

- Remove large debris with heavy equipment
- Replace track, ties, and add ballast
- Repair bridges, trains, and grade crossing signals
- Coordinate with utilities to restore power and communications

Restarting Operations

- Prioritize customer locations for traffic restart
- Resume service at reduced speeds if needed
- Fully restore network operations after repairs
- Update disaster contingency plans for future safety

Community Support

- Deliver critical supplies: food, water, shelter, fuel, lumber
- Remove debris from disaster zones
- Partner with relief organizations to aid recovery

MANAGING HIGH TEMPERATURES ON STEEL TRACKS

Steel rails expand in heat, which can cause buckling or “sun kinks.” As climate change brings higher temperatures to new regions, railroads use proven strategies to protect track integrity. From 2010 to 2021, Class I mainline track-buckling accidents dropped by 52%.

- **Continuous Welded Rail (CWR):** Rails are welded into long, uninterrupted sections. CWR provides a smoother ride and extends rail life. The FRA requires strict procedures for installing, adjusting, and inspecting CWR.
- **Rail Neutral Temperature (RNT):** Setting the correct RNT during installation is critical. Railroads monitor rail temperatures, record installation details, and recheck tracks seasonally. They use fasteners and keep the ballast—the stone foundation—firm to stabilize tracks.
- **Heat Orders and Technology:** When temperatures exceed safe limits, railroads issue heat orders. Trains slow down to reduce stress on rails. Through AAR’s Strategic Research Initiatives, MxV Rail is developing software to predict sun kink risks. This helps railroads manage heat hazards more effectively.

PREPARING FOR & RESPONDING TO STORMS

Freight rail spans 140,000 miles, making it vulnerable to hurricanes, floods, and winter storms. Water can weaken bridges, wash away ballast, and damage signals. Snow and ice add more challenges.

- **Proactive Measures:** Railroads monitor weather 24/7 through traffic control centers and work with FEMA, DOT, and FRA. They maintain drainage year-round and stage winter resources like plows and heaters in high-risk areas. Employees receive cold-weather gear, training, and transportation support. Extra track capacity helps prevent congestion.
- **Disaster Response Plans:** Before major storms, railroads relocate staff, stage critical resources, and reroute shipments. They move locomotives and railcars from high-risk zones. During floods, bridges are weighed down with loaded railcars. In winter, heating systems keep switches from freezing.
- **After the Storm:** Civil engineers, dispatchers, and maintenance crews assess damage, clear debris, and restore service. Drones and ground-penetrating radar inspect flooded yards and bridges safely.
- **Winter Operations:** Command centers monitor conditions and adjust operations in real time. Crews rework schedules and deploy rapid-response teams for track and signal repairs. Specialized equipment keeps trains moving: bulldozers for heavy snow, Jordan Spreader cars for large drifts, and rotary plows for deep snow. Heated switches prevent ice buildup.