

Renewable Energy - Managing Assets During Extreme Heat Events

Extreme or prolonged hot weather events can result in unforeseen damage and losses. This document discusses these risks in more detail and provides practical guidance to help reduce the potential for such loss events.

Renewable Energy – Managing Assets During Extreme Heat Events

Introduction

Climate change and global warming are increasingly influencing the operating environment for renewable energy assets including wind generation, solar photovoltaic power, battery energy storage (BESS), hydro generation and green hydrogen. Rising average temperatures, and the increasing frequency of heatwaves or prolonged hot weather events, is placing pressure on energy supplies and infrastructure, creating challenges for asset owners and operators.



Elevated temperatures can adversely affect equipment performance, increase cooling demands, reduce operational efficiency, heighten the risk of equipment failure, and place additional strain on critical utilities and supporting infrastructure. These conditions can contribute to operational disruption, increased maintenance requirements, increase the potential for damage and loss events as well as create health and welfare risks for employees and operatives.

This Loss Prevention Standard provides guidance on the key risk factors that should be considered when assessing the resilience of energy-related assets to increasing temperatures and associated climate-related hazards. By adopting a proactive and systematic approach to climate resilience, organisations can improve their preparedness for future environmental conditions.

Note: This Loss Prevention Standard relates to managing operations during extreme heat events and is focussed on asset loss prevention and related risk management guidance. It is not intended to address liability/general liability exposures. The presumption is that all local regulatory territory requirements, and compliance with national/local building regulations, codes, or standards take precedence and have, or will be, met. In territories where local authorities have jurisdiction, compliance with applicable laws and regulations is assumed as a minimum requirement. The recommendations in this document are intended to supplement, not replace, local requirements.

Understanding the Risks

The following are some of the common risks and exposures, associated with extreme hot weather events, that cause frequent loss events:

Equipment Failure. High temperatures can lead to overheating and failure of equipment, potentially resulting in expensive repairs and prolonged downtime.

Cable Insulation. Prolonged or repeated exposure to sunlight and heat can cause cable insulation or cable connectors to degrade, especially if the original installation used incorrectly specified cables.

Fire. Equipment and lubricating oils, etc, can ignite and fire may spread to other equipment, materials, buildings and surrounding grounds and vegetation. It can also cause wildfire events that expose Renewable Energy assets.

Local Grid Constraints. Failures within local power networks can result in the export capacity reducing, being suspended or insufficient power being available.

Pressure Systems. Pressure systems can fail, potentially with catastrophic consequences.

Firefighting Response. Natural or manmade water stores (e.g. ponds, lakes, reservoirs) and/or piped supplies can reduce significantly during sustained extreme weather, creating challenges for firefighters and emergency response.

Flooding. Following periods of sustained dry weather, any sudden or prolonged rainfall can create excessive run-off from hard land, so increasing the risk of surface water run-off and other flooding events.

Business Continuity. Equipment downtime can result in business interruption losses.

Health and Welfare. Working in extreme temperatures can create health, safety and welfare risks for employees and other operatives.

Managing the Risks

The following guidance outlines practical measures that asset owners and operators can implement to reduce the likelihood and consequences of loss events associated with extreme hot weather. The measures should be considered as part of the organisation's asset management, maintenance, emergency planning, and business continuity arrangements.

Equipment Failure

High ambient temperatures can adversely affect the performance and reliability of electrical, mechanical, hydraulic, and electronic equipment. Ensure:

- The suitability of equipment operating temperature limits against anticipated local climatic conditions has been thoroughly risk assessed.
- Cooling, ventilation, and heat-rejection systems do not require setting changes or calibration to operate as designed.
- Temporary cooling systems are provided where necessary and arrange for this equipment to be included within self-inspection and maintenance programmes.
- Ventilation openings, air intakes, and other cooling systems or components are free from obstruction and contamination.
 - ✓ Review equipment de-rating requirements where manufacturers specify reduced operating capacities at elevated temperatures.
- Inspection and maintenance frequencies are increased in line with installer or Original Equipment Manufacturer (OEM) recommendations during periods of extreme heat.
 - ✓ Use thermal imaging cameras to help identify unusual heat patterns.
- Critical equipment temperatures are closely monitored and alarm thresholds are appropriate and regularly tested.
- Maintain an inventory of critical spare parts for equipment vulnerable to overheating.

Refer to the Aviva Loss Prevention Standards **Self-Inspections, Maintenance Regimes** and **Use of Thermographic Cameras – General Considerations** and **Checklist** for further guidance.

Fire

Prolonged hot and dry conditions can increase the likelihood of fires involving equipment, vegetation, combustible materials, and lubricating oils. Once established, fires can spread rapidly.

- Manage all potential ignition sources closely and assume a 'what if'/challenge mentality and approach for every task completed using or generating heat, sparks or flame. If safe to do so, defer or delay any such tasks to cooler and wetter periods.
- Implement a formal inspection programme to identify signs of overheating, fluid leaks, damaged electrical equipment, and accumulated combustible materials.
- Maintain effective housekeeping standards and promptly removing combustible waste.
- Control vegetation growth around buildings, equipment, cabling and connectors, plant, transformers, substations, fuel storage areas, and other critical assets.
 - ✓ Establish and maintain suitable vegetation-free zones around high-risk equipment.
 - ✓ Installing fire breaks within large areas of vegetation can help prevent or slow the spread of fire.
 - ✓ The use of drones with thermal imaging capability can help identify developing hot spots and heating issues and therefore support early intervention.
- Ensure hot work activities are strictly controlled.
 - ✓ Refer to the Aviva Loss Prevention Standard **Hot Work Operations** for further guidance.
- Verify that telemetry and equipment control systems, including interlocks, remain fully operational and are appropriately maintained.
- Verify that detection, fire protection and associated alarm systems are suitable, remain fully operational and are appropriately maintained.

Local Grid Constraints

Periods of extreme heat can place significant demand on electrical infrastructure, resulting in supply interruptions, export restrictions, or network instability.

- Review the site's dependency on external utility services and identify critical power requirements.
- Review contingency arrangements for grid outages, supply reductions, and export limitations.
- Engage with the local power operator to understand how best to collaborate during such periods.
- Test emergency generators and standby power systems regularly and maintain adequate fuel supplies.
- Where hired-in power generators may be necessary, formalise supply arrangements with a trusted provider.
 - ✓ Ensure suitable hard standing is available and ensure there are no local restrictions, e.g., noise, fuel storage, etc.
- Review the resilience of communications, monitoring, and control systems during utility interruptions.
- Establish procedures for the safe shutdown and restart of critical processes following power disturbances.

Pressure Systems

Elevated temperatures can result in increased pressures within process systems, vessels, tanks, and associated equipment.

- Ensure pressure systems are designed, operated, inspected, and maintained in accordance with applicable regulations and recognised standards.
- Verify that pressure relief devices are correctly installed, maintained, and tested.
- Ensure pressure relief discharge points do not create additional exposures.
- Monitor operating temperatures and pressures during periods of extreme heat.
- Review alarm, trip, and shutdown settings to ensure they remain suitable for anticipated operating conditions.
- Check the condition of insulation, cooling systems, and protective devices.

Solar Photovoltaic Systems

Solar photovoltaic (PV) systems are increasingly deployed across a wide range of commercial and utility-scale applications, providing a reliable source of renewable energy. However, ageing infrastructure, environmental exposure and electrical faults can increase the risk of system failures and fire events. Regular inspection, maintenance and condition monitoring are therefore essential to ensure safe and reliable operation throughout the life of the installation.

- Ensure there are no loose strings and that all low-voltage (LV) cables are adequately secured to the mounting framework to prevent mechanical damage, cable sagging and electrical faults.
- Where practical, undertake thermographic drone inspections of arrays, MC4 connectors to identify high-resistance connections, hot spots and potential points of failure before they result in equipment damage or fire.
- In locations subject to high ambient temperatures, elevated UV exposure or significant temperature fluctuations, UV-rated polymer cable ties may degrade prematurely. These should be replaced as part of a maintenance programme with insulated metal cable ties, which typically provide a service life comparable to that of the solar PV installation.
- Inspect and maintain combiner boxes, connectors and associated electrical equipment to identify signs of overheating, arcing, smoking or other developing faults.
- Control ignition sources during maintenance and construction activities, particularly hot works, as sparks and other ignition sources can ignite combustible materials and lead to fires that may extend well beyond the originating component and result in significant losses.

Firefighting Response

Drought conditions and increased demand on public water supplies may affect the availability of water for firefighting purposes.

- Review arrangements for responding to vegetation and wildland fire threats where applicable.
- Review the adequacy and resilience of firefighting water supplies.
 - ✓ Additional storage tanks and reservoirs should be considered where feasible.
- Ensure suitable firefighting equipment is available, accessible, and maintained.
- Inspect water storage tanks, reservoirs, pumps, hydrants, and associated infrastructure regularly.
- Identify alternative water supplies that could be utilised during an emergency.

- Liaise with local fire services to understand any limitations affecting firefighting capabilities and seek appropriate advice.
- Ensure access routes remain suitable for emergency vehicles throughout periods of extreme weather.

Refer to the Aviva Loss Prevention Standard **Emergency Response Planning with Fire and Rescue Services** for further guidance.

Flooding

Prolonged dry weather can harden ground conditions, reducing infiltration and increasing surface water runoff when rainfall occurs. This can result in flash flooding and damage to buildings, infrastructure, and equipment.

- Review existing, or where necessary undertake a flood risk assessment.
- Maintain drainage and attenuation systems, and other drainage infrastructure.
- Keep drainage routes free from debris, vegetation, and obstructions.
- Assess whether critical equipment, electrical systems, and control panels are vulnerable to floodwater or surface water run-off.
 - ✓ Where necessary, provide suitable flood protection measures.

Refer to the Aviva Loss Prevention Standards **Flood Guidance and Mitigation (Global)**, **Flood Guidance and Mitigation (UK)** and **Flood - Emergency Response Plan** for further guidance.

Business Continuity and Emergency Planning

Extreme weather can affect multiple systems simultaneously and should therefore be considered as part of wider resilience planning.

- Ensure business continuity plans have been reviewed to include the risks associated with extreme heat events and flooding.
- Define response actions, roles, responsibilities, and escalation arrangements.
- Monitor weather forecasts and implement response measures when severe conditions are anticipated.
- Consider testing emergency and business continuity arrangements to highlight any deficiencies or areas to improve.
- Review lessons learned following extreme weather events and update plans accordingly.

Refer to the Aviva Loss Prevention Standards **Business Continuity - Seven Steps to Continuity** and **Emergency Response Teams** for further guidance.

Health and Welfare

Working in high temperatures can create health and welfare risks.

- Review planned work activities and prioritise critical tasks, deferring non-essential work where elevated temperatures may increase risk.
- Reduce external working activities during periods of excessive heat where practicable.
- Adjust shift patterns, working hours and break schedules to minimise exposure during periods of peak temperature.
- Review the site's Medical Needs Analysis to ensure it remains appropriate for anticipated heat-related health risks.
- Monitor workplace temperatures and periodically assess whether environmental conditions remain suitable for continued work activities.

- Review personal protective equipment (PPE) requirements to determine whether lighter-weight or cooler alternatives are available.
- Confirm that any specialised PPE, such as immersion suits, remain suitable for the environmental conditions and work activities.
- Ensure personnel have access to an adequate supply of chilled drinking water.
- Consider the provision of electrolyte replacement drinks or supplements for personnel undertaking prolonged physical work in high temperatures.
- Provide suitable sunscreen with appropriate UVA and UVB protection and encourage its use by personnel working outdoors.
- Implement regular buddy checks to monitor personnel for signs of heat stress, dehydration or fatigue.
- Establish clear procedures for recognising, reporting and responding to heat-related illnesses, including heat exhaustion and heat stroke.
- Provide personnel with appropriate training and awareness regarding the hazards, symptoms and controls associated with working in high-temperature environments.

Contact Information

Canada

Please visit [Aviva Risk Management Solutions | Aviva Canada](#) or email us at arms.canada@aviva.com

Ireland

Please visit [Insurance Risk Management | Business Risk Management Insurance - Aviva Ireland](#) or Email us at armsireland@aviva.com

United Kingdom

Please visit [Aviva Risk Management Solutions](#) or email us at riskadvice@aviva.com. To speak to one of our advisors, call 0345 366 6666.*

*The cost of calls to 03 prefixed numbers are charged at national call rates (charges may vary dependent on your network provider) and are usually included in inclusive minute plans from landlines and mobiles. For our joint protection telephone calls may be recorded and/or monitored.

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The following Specialist Partners provide products or services in relation to risk guidance provided, discussed or referenced in this Loss Prevention Standard.

Canada

- [Electrical Service & Solutions Toronto | IPE Canada](#)

For more information please visit: [Our Specialist Partner Network | Aviva Canada](#)

Ireland

- [Pass Thermal Imaging Cameras and PAT Testing Equipment - Aviva Ireland](#)

For more information please visit: [Insurance Risk Management | Business Risk Management Insurance - Aviva Ireland](#)

United Kingdom

- Thermal Imaging Cameras and PAT Testing Equipment - [Pass](#)
- Fire alarm systems - [Secom](#)
- Flood protection Services - [Apex Flood Solutions](#)
- Flood risk management - [Ashfield Solutions](#)
- Flood risk assessments - [JBA Consulting](#)

For more information please visit: [Aviva Risk Management Solutions - Specialist Partners](#)

Standards, Sources and Useful Links

Canada

- [Canadian Centre for Climate Services \(CCCS\)](#)
- [Environment and Climate Change Canada \(ECCC\)](#)

Ireland

- [Environmental Protection Agency \(EPA Ireland\)](#)
- [Department of Climate, Energy and the Environment](#)

United Kingdom

- [Environment Agency \(EA\) - Climate](#)
- [Met Office](#)
- [Department for Environment, Food & Rural Affairs \(DEFRA\)](#)

Loss Prevention Standards

These documents set out best practice recommendations to help reduce the likelihood and impact of losses.

Relevant Aviva Loss Prevention Standards include:

- **Hot Work Operations**
- **Self-Inspections**
- **Maintenance Regimes**
- **Use of Thermographic Cameras - General Considerations and Checklist**
- **Emergency Response Planning**
- **Emergency Response Planning with Fire and Rescue Services**
- **Flood Guidance and Mitigation (Global)**
- **Flood Guidance and Mitigation (UK)**
- **Flood - Emergency Response Plan**
- **Business Continuity - Seven Steps to Continuity**

Please visit [Loss Prevention Standards](#) to view the full library.

Aviva Risks Training Solutions (United Kingdom Only)

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Please visit [Aviva Risk Training Solutions](#) for further guidance.

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