# UK power network components found vulnerable as heatwaves threaten rising failure risks



Recent research led by the energy consultancy Ricardo has highlighted the vulnerability of various components within the UK's power network to extreme heat, a concern that becomes increasingly pressing as global temperatures rise. The study, commissioned by the UK Department for Energy Security and Net Zero, indicates that while no power network components were classified as ‘extremely vulnerable’, four critical categories were identified as ‘vulnerable’. These include transmission and distribution transformers, service lines, switchgears, and underground distribution cables. Each of these components faces significant challenges as temperatures escalate beyond current operational thresholds.

In the UK, transformers, for instance, are typically designed to handle ambient temperatures up to 40°C. However, projections indicate that regions in the south could experience temperatures soaring to 42°C under a 2.5°C global warming scenario. Such conditions can compromise the electrical current capacity, hastening the degradation of insulators and other materials. Similarly, excessive heat can lead to the sagging and loss of strength in service lines, while protection devices like switchgears risk malfunction due to accelerated wear. The study posits that, under the most extreme heat scenarios, the effects on these vulnerable components could be classified as medium to medium-high in severity.

Amidst these rising temperatures, historical evidence underscores the extent of the threat. For example, a heatwave in 2022 resulted in nearly 15,000 properties in regions such as Yorkshire losing power due to equipment overheating. Northern Powergrid reported delays in power restoration, citing an unusual spike in faults across its network. This incident serves as a sobering reminder of the potential chaos that extreme weather can unleash, with cascading failures capable of disrupting power supplies for hundreds of thousands.

To mitigate these vulnerabilities, the UK's National Grid has been proactive in implementing robust strategies. They engage in frequent maintenance checks, adjust asset ratings according to varying temperatures, and continuously monitor for signs of overheating. These measures are designed to secure the stability of power distribution amidst heatwaves, ensuring that any failures can be quickly addressed.

However, with more households adopting air conditioning as a response to rising temperatures—currently around 5% of UK homes are equipped with this technology—electricity demand is expected to spike during heatwaves. This further complicates the landscape, increasing the likelihood of supply disruptions. The Ricardo report emphasises that the life expectancy of energy components often spans decades, necessitating a forward-thinking approach to infrastructure design that accommodates anticipated climate conditions rather than just historical data.

To enhance resilience, the consultancy advocates for a range of adaptive measures, including improving cooling systems, updating insulation, and utilising materials better suited to handle elevated temperatures. Automated monitoring systems that can preemptively adjust currents and initiate cooling mechanisms are also recommended to bolster the power network's response capabilities.

As climate change continues to escalate the frequency and intensity of heat events, the findings of this study serve as a crucial reminder: the UK must prioritise the resilience of its energy infrastructure. A proactive and adaptive approach will be essential in ensuring that critical power components remain functional and reliable in an increasingly unpredictable climate.

## Reference Map:

* Paragraph 1 – [[1]](https://industrialnews.co.uk/power-network-components-in-uk-found-vulnerable-to-extreme-heat/?utm_source=rss&utm_medium=rss&utm_campaign=power-network-components-in-uk-found-vulnerable-to-extreme-heat), [[2]](https://www.gov.uk/government/publications/impacts-on-energy-assets-from-extreme-heat-and-heatwaves)
* Paragraph 2 – [[1]](https://industrialnews.co.uk/power-network-components-in-uk-found-vulnerable-to-extreme-heat/?utm_source=rss&utm_medium=rss&utm_campaign=power-network-components-in-uk-found-vulnerable-to-extreme-heat), [[4]](https://www.bbc.com/news/uk-england-south-yorkshire-62222195), [[5]](https://www.itv.com/news/meridian/2022-07-15/how-does-the-heatwave-affect-power-supplies)
* Paragraph 3 – [[3]](https://www.nationalgrid.com/stories/grid-work-stories/how-we-protect-electricity-network-extreme-heat), [[6]](https://www.newcivilengineer.com/latest/how-did-uk-infrastructure-cope-with-record-temperatures-21-07-2022/)
* Paragraph 4 – [[5]](https://www.itv.com/news/meridian/2022-07-15/how-does-the-heatwave-affect-power-supplies), [[7]](https://www.weforum.org/agenda/2023/04/how-extreme-weather-threatens-to-bring-down-uk-s-power-lines-and-halt-supply-to-homes/)
* Paragraph 5 – [[1]](https://industrialnews.co.uk/power-network-components-in-uk-found-vulnerable-to-extreme-heat/?utm_source=rss&utm_medium=rss&utm_campaign=power-network-components-in-uk-found-vulnerable-to-extreme-heat), [[2]](https://www.gov.uk/government/publications/impacts-on-energy-assets-from-extreme-heat-and-heatwaves)

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## Bibliography

1. <https://industrialnews.co.uk/power-network-components-in-uk-found-vulnerable-to-extreme-heat/?utm_source=rss&utm_medium=rss&utm_campaign=power-network-components-in-uk-found-vulnerable-to-extreme-heat> - Please view link - unable to able to access data
2. <https://www.gov.uk/government/publications/impacts-on-energy-assets-from-extreme-heat-and-heatwaves> - The UK Department for Energy Security and Net Zero published a report detailing the vulnerabilities of energy assets to extreme heat and heatwaves. The study assesses the relationship between energy infrastructure and climate-related hazards, focusing on the impacts of high temperatures on various components of the energy system. It highlights the need for adaptation measures to ensure the resilience of energy assets in the face of increasing heat events.
3. <https://www.nationalgrid.com/stories/grid-work-stories/how-we-protect-electricity-network-extreme-heat> - National Grid outlines the strategies employed to safeguard the electricity network during extreme heat events. Measures include proactive maintenance checks, asset rating adjustments for varying temperatures, continuous monitoring for signs of overheating, and fire prevention protocols near overhead lines. The company emphasizes the importance of these actions to maintain a reliable power supply during periods of high temperatures.
4. <https://www.bbc.com/news/uk-england-south-yorkshire-62222195> - BBC News reports on power outages in the UK caused by extreme temperatures leading to equipment overheating. Northern Powergrid, responsible for supplying power to 3.9 million homes and businesses, reported that nearly 8,000 properties were without electricity due to overheated conductors and sagging overhead lines. The company worked diligently to restore power and address the challenges posed by the heatwave.
5. <https://www.itv.com/news/meridian/2022-07-15/how-does-the-heatwave-affect-power-supplies> - ITV News Meridian discusses the impact of heatwaves on the UK's power supply. The article explains how elevated temperatures can reduce the capacity of power lines, leading to potential failures and the need for rerouting electricity. It also highlights the measures taken by National Grid and other power distributors to mitigate issues arising from extreme heat, ensuring a stable power supply during heatwaves.
6. <https://www.newcivilengineer.com/latest/how-did-uk-infrastructure-cope-with-record-temperatures-21-07-2022/> - New Civil Engineer examines the resilience of UK infrastructure during record-breaking temperatures. The article highlights challenges faced by various sectors, including energy, where power cuts were reported due to overheated equipment. Northern Powergrid's response to these challenges is detailed, showcasing the efforts made to maintain service continuity despite the extreme heat conditions.
7. <https://www.weforum.org/agenda/2023/04/how-extreme-weather-threatens-to-bring-down-uk-s-power-lines-and-halt-supply-to-homes/> - The World Economic Forum article explores how extreme weather events, including heatwaves, pose threats to the UK's power supply. It discusses the vulnerabilities of power lines and substations to high temperatures and the cascading effects of multiple extreme weather events. The piece emphasizes the need for the UK's energy system to adapt to these challenges to ensure a reliable power supply.