



The impact of extreme weather on the power supply to GB railways

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PhD Civil Engineering

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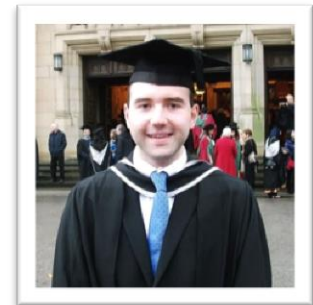
Despite being regarded as robust (Eddowes et al, 2003) railway infrastructure in GB remains vulnerable to weather induced failure, with Thornes & Davis (2002) estimating that up to 20% of unplanned delays may be due to adverse weather conditions. It is the 'extreme' weather events, such as flooding, that present the greatest risks to the railway network (Thornes et al, 2012) where the failure thresholds of assets are exceeded.

In order to appreciate the full spectrum of threats posed to the railway network by extreme weather, a 'systems-of-systems' (Hall et al, 2013) approach is required. Critical infrastructures are interdependent, with a high degree of interconnectivity presenting a risk of failure cascading between networks (Rinaldi, 2001).

There is a particular dependence of the railway network on the energy system for a supply of electrical power, both for traction and several safety-critical elements such as signalling and train control.

It is therefore proposed that the GB railway network may be vulnerable to failures of the external power supply in extreme weather conditions, highlighted as a particular threat in the recent 'Brown Review' (DfT, 2014).

This EPSRC-funded PhD aims to establish the extent to which the railway network is impacted by a loss of electricity supply during extreme weather events and whether anticipated changes in climate and infrastructure technology will alter the relationship in the future.



About

Simon Hodgkinson graduated from the University of Birmingham with a BSc Geography degree in 2012. In his third year, he completed an undergraduate dissertation on the topic of spring precipitation variability in East Anglia. After graduating, he then moved on to a Master of Science programme in Applied Meteorology and Climatology, also at Birmingham, graduating in 2013. His MSc dissertation focused on the impact of precipitation on the local Cross City railway line.

Aim & Objectives

Aim:

To assess and quantify the impact of extreme weather on the power supply to GB railways.

Objectives:

- 1) Determine the organisation and structure of the power supply system for GB railways.
- 2) Quantify the problem of extreme weather related disruption to the GB railway power supply.
- 3) Identify the most vulnerable connections of the railway system to the electricity network.
- 4) Assess how infrastructure vulnerabilities will change in future climates.
- 5) Provide recommendations to enhance resilience management of the railway system.



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