



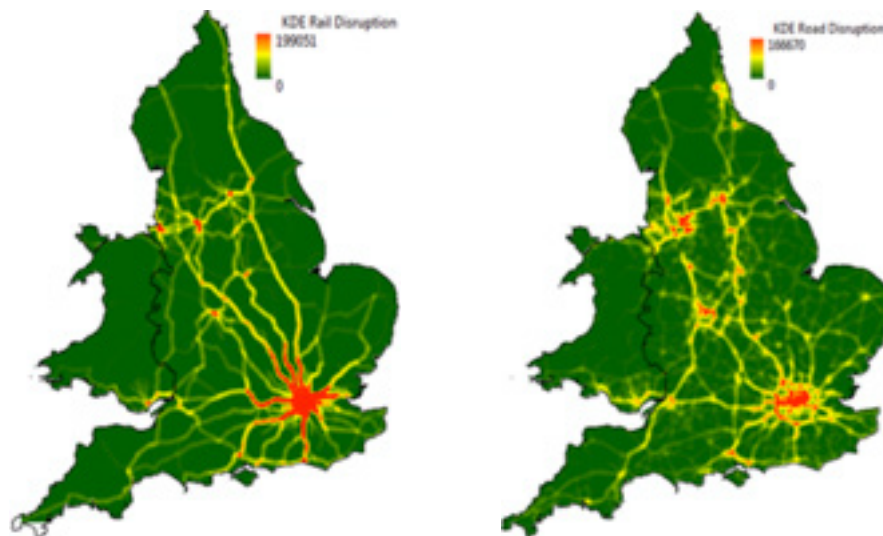
ITRC infrastructure criticality hotspot analysis

PUBLIC BRIEFING DOCUMENT

Failure of critical national infrastructure (CNI) can result in major disruption to society and the economy. CNI provides essential services to households and industries across the country. CNI also provides essential services to other infrastructure networks, so for example all infrastructure networks are dependent upon electricity infrastructure. The nature of these interdependencies and their potential consequences in the event of failure are not well understood.

The UK Infrastructure Transitions Research Consortium is developing national models to enable the long term planning and adaptation of infrastructure systems in the face of a changing climate. The ITRC has developed a national model of electricity transmission and distribution, along with gas, trunk road and rail networks. For the first time, this model seeks to represent the effect of interconnectivity between infrastructure networks, which can result in failure at a particular location having disproportionate consequences. We have mapped the telecoms, water and water treatment assets that are dependent on electricity networks. The model also uses data on customer/passenger use of infrastructure and census data on where people live, to understand where large numbers of people are dependent on critical infrastructure. This modelling capability has been used to identify ‘infrastructure criticality hotspots’, which we define as a geographical location where there is a concentration of critical infrastructure, measured according to number of customers directly or indirectly dependent on the infrastructures in that location.

Critical infrastructure hotspots for rail and road.



The ITRC analysis has involved testing 200,000 failure scenarios. For each one the consequential infrastructure impacts and the numbers of customers directly or indirectly effected has been calculated. The consequences of each infrastructure failure have been mapped using the metric of the number of customers affected. We have analysed all of England and Wales to identify locations that are particularly significant in terms of the potential consequences of infrastructure failure.

The analysis is presented as maps for electricity and dependent assets, road and rail, along with a composite map which brings all infrastructures together. The road and rail maps are rather intuitive in that hotspots are identified along the most heavily trafficked routes and stations. The analysis of electricity and dependent assets identified hotspots in large urban areas. However, the hotspots are typically located around the periphery of urban areas rather than in the centre. A large number of criticality hotspots exist outside urban areas, where there are large facilities upon which many customers depend or where several critical infrastructures are concentrated in one location.

Critical infrastructure hotspots for electricity (including dependent gas, telecoms, water and water treatment assets). The far right hand figure shows the composite map for all infrastructure assets.

