

Understanding infrastructure interdependencies: challenges and progress

Even beginning a conversation about infrastructure interdependencies can be a challenge: what are we talking about?

In terms of adaptation, we mean the linkages within and across different infrastructure sectors (transport, energy, water, ICT or waste) and the implications for the provided services. In particular, failure or compromises to infrastructure and the services it provides can propagate within the system and even move into other infrastructure sectors. Interdependencies also come into play when actions to address failures or compromises need to take account of the implications of those actions across one or more infrastructure sectors.

As an example, consider the infrastructure and service impacts that came to light across large parts of England during December 2013 – February 2014, when the UK experienced a succession of storms. The weather tested and, in some cases, led to failures in existing infrastructure strategies and systems. The impacts included: thousands of flooded properties, power cuts and transport difficulties – including the cutting off south-west England from the national rail network; and tragically, some deaths.

These impacts revealed a [number of interdependencies](#) across the different infrastructure sectors (pdf, 60 KB).

- Flights were cancelled because of power failures when a substation within the Gatwick complex was flooded. Even the high-tech toilets couldn't be flushed.
- Energy providers struggled to repair wind-damaged power lines as the road network was flooded or blocked with trees, and gales made it difficult to use 'cherry pickers'.
- Debris and floods made transport corridors impassable, making it difficult to monitor and inspect road and rail networks.

There are plenty of other stories about the wide range of impacts of the severe winter weather. But how are we using these stories to generate the more detailed evidence we need to help unpick the role of interdependencies? Is this evidence helping us to understand and address the problems that interdependencies can create and identify potentially more effective options?

Working with the challenges associated with infrastructure interdependencies is not always easy. It can be difficult to work across sectors when there are different legal and regulatory frameworks, and where the focus is primarily on the individual sector.

Fortunately, the need for action is being recognised in research, government and industry.

Research projects funded by EPSRC such as the [Infrastructure Transitions Research Consortium](#) (ITRC), [Infrastructure Business Models, Valuation and Innovation for Local Delivery](#) (iBuild) and the [International Centre for Infrastructure Futures](#) (ICIF) are all exploring infrastructure interdependencies and potential solutions. All of these projects are working with policy and industry stakeholders, with some valuable outputs starting to emerge.

The government, through its National Infrastructure Plan, and its deliberations and activities within the UK Regulators Network has begun to recognise the role of understanding and addressing interdependencies.

Here at the Adaptation and Resilience in the Context of Change (ARCC) network, we support the development and application of evidence. By engaging research, policy and business communities, we aim to enhance the quality and relevance of the research being conducted. Working with these communities, together we are helping to provide the evidence needed to secure robust infrastructure and services in the UK. We are working

with those involved with operating the UK's infrastructure (e.g. the Infrastructure Operators Adaptation Forum) to [share knowledge and information on embedding resilience and adaptation](#), and on interdependencies.

Together we are looking for ways to make our evidence more accessible to the communities of decision-makers that will need to be involved in providing sustainable infrastructure services needed now and in the future.

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