

FORTHCOMING MEETINGS

**Fast Track Analysis
Dissemination Conference,
IMechE, London,
24 Jan 2012**

The Fast Track Analysis scopes possible futures for infrastructure in the UK, the drivers for change and the sources of uncertainty. It also examines the evolution of governance arrangements for infrastructure provision, and how they may need to be modified.

Further information can be found on the [ITRC website](#). To register to attend this event please email: benjamin.kidd@ouce.ox.ac.uk

ITRC PROVIDE INPUT TO INFRASTRUCTURE UK

ITRC continues its engagement with Infrastructure UK with expert input on:

- Development of infrastructure definitions and performance measures.
- Development and manipulation of national infrastructure datasets.

Two papers were presented to Infrastructure UK to assist in their ongoing work to implement the National Infrastructure Plan.

To subscribe to the newsletter, please email the ITRC programme manager: benjamin.kidd@ouce.ox.ac.uk

Welcome to the first edition of the Infrastructure Transitions Research Consortium (ITRC) newsletter.

Over the next 4 years, ITRC will deliver theoretical research, and develop models and practical decision support tools to enable strategic analysis and planning of a national infrastructure system fit for the 21st Century. In its first year, the ITRC has begun the development of a new generation of simulation models for national infrastructure assessment. In parallel, the ITRC has undertaken a Fast Track Analysis (FTA) which has involved a review of infrastructure provision in the UK, development of a framework for analysis of future uncertainties in infrastructure provision and preliminary analysis of the energy, transport, water, waste and ICT sectors, and their interdependencies.

This first newsletter contains details about plans for dissemination of the FTA in January 2012 and subsequent activities in the ITRC.

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ARUP & HALCROW-SPONSORED DPHILS BEGIN

Two EPSRC-funded DPhil projects are affiliated with the ITRC and ITRC Partners.

Reducing the risk of failure in interdependent national infrastructure network systems – Scott Thacker, supervised by Prof. Jim Hall at Oxford University and Matt Douglas, Associate Director at Arup.

Long term planning of options for sustainable national infrastructure provision – Kate Hall, supervised by Prof. Jim Hall at Oxford University and Prof. Tim Broyd, Group Sustainability, Technology & Innovation Director at Halcrow, and Chair of the ITRC EAG.

OTHER AFFILIATED PhD PROJECTS:

Roberta Velykiene has begun a research project on ICT and cascading failure as part of WS2, while Craig Robson has commenced a project to develop spatial analytical tools for modelling and analysing hierarchical spatially interdependent networks. Ed Byers is working on Sustainable transition strategies for interdependent infrastructure futures. All are based at Newcastle University.

Cambridge University are currently recruiting a PhD student to study the economic implications of long-term changes in infrastructure supply and demand. The post will be co-supervised by Prof. Ron Martin.

FAST TRACK ANALYSIS DISSEMINATION, JANUARY 2012

Workstream 5 (WS5) of the ITRC project programme involves co-production with stakeholders of integrated transition strategies, and consists of three cycles across the 5 year programme. The first of these cycles is the Fast Track Analysis which is being undertaken during the first year of the programme. Working with early activities in WS1, it involves scoping possible futures for infrastructure in the UK, the drivers for change and the sources of uncertainty. It also includes examination of the evolution of governance (policy, regulatory, funding) arrangements for infrastructure provision in the UK, and how they may need to be modified to enable infrastructure transitions.

The final report from the FTA will be disseminated at an ITRC conference taking place at the Institution of Mechanical Engineers in London on Wednesday 24 January. Further details can be found here on the [ITRC website](#). To register to attend this event please email the ITRC Programme Manager: benjamin.kidd@ouce.ox.ac.uk

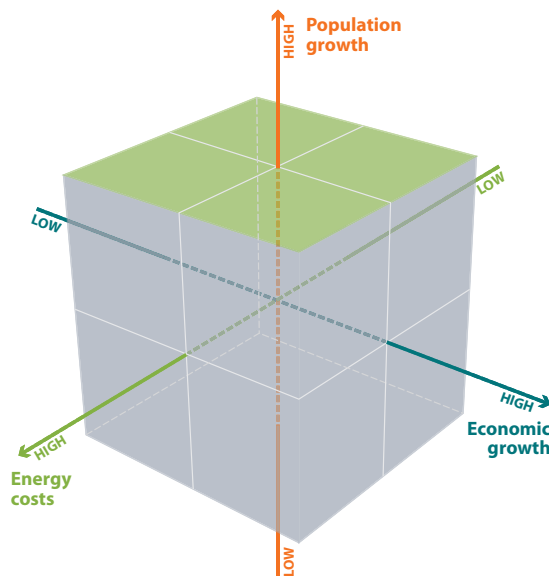
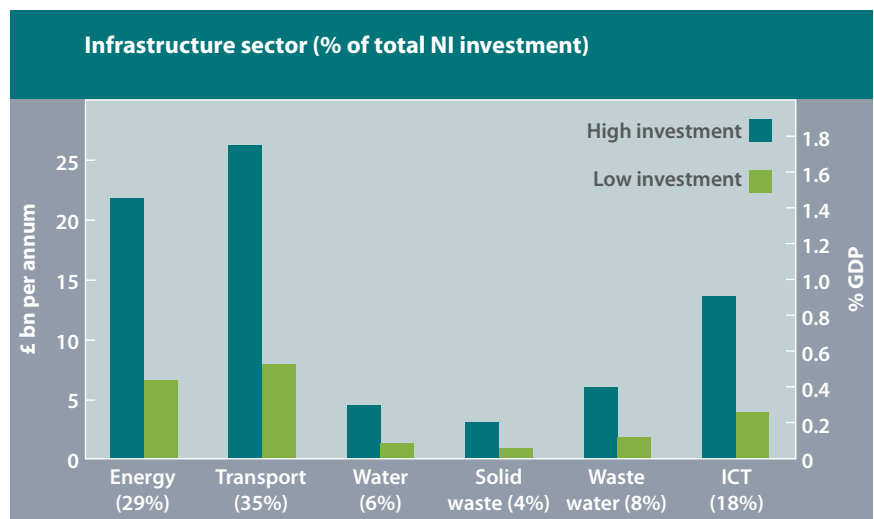


Figure 1: Drivers of change.

Figure 2 (below): Absolute investment (£bn) by sector per annum for high and low investment over the next 5 years.



OUTPUTS

Now available as downloads from the ITRC website at www.itrc.org.uk:

- Presentations and reports from the first ITRC Assembly, held in Oxford in June 2011.
- Presentations and reports from the Fast Track Analysis stakeholder review workshop held on 31 October 2011 in London.

JIM HALL GIVES PRESENTATION TO PARLIAMENTARY & SCIENTIFIC COMMITTEE

Professor Jim Hall, PI of the ITRC and Director of the Environmental Change Institute at Oxford University, gave a presentation at a meeting of the Parliamentary and Science Committee in London on 18 October entitled "*What are the likely impacts of climate change on infrastructure?*"

Other speakers included Prof. Will Stewart, Chair of the Communications Policy Panel of the IET, and Prof. Brian Collins, Professor of Engineering Policy at UCL, Chairman of the Engineering and Interdependency Expert Group (Infrastructure UK) and former Chief Scientific Advisor to BIS and DfT.

The UK Parliamentary and Science Committee provides a liaison between Parliamentarians and scientific bodies, science-based industry and the academic world, and focuses on those issues where science and politics meet.

Further information can be found at the [UK Parliamentary and Science Committee website](#).

PROGRAMME UPDATES

ENABLING TOOLS TAKING SHAPE (WS4)

Workstreams 1, 2 and 3 are underpinned by shared databases and tools for uncertainty and sensitivity analysis, currently being developed in WS4.

A spatial database is under development to house infrastructure, hazard and socio-economic (including demand and vulnerability) data.

Use will be made of innovative cloud computing facilities to overcome the computational complexity and run-time of the various modelling software packages being used.

ANALYSIS OF FUTURE RISKS OF INFRASTRUCTURE FAILURE GETS UNDERWAY (WS2)

A start-up workshop was held in Newcastle on 2 and 3 November 2011 for researchers involved in Workstream 2, which will aim to provide improved understanding of the future risks of infrastructure failure.

Given the severe long term threats posed by climate change, WS2 will begin by focussing upon climate-related hazards, though opportunities to extend to other natural hazards and man-made hazards will be explored later in the research programme.

The ITRC will be developing new spatially coherent probabilistic scenarios of extreme climate related hazards and their associated uncertainties. Central to WS2 will be the development and testing of network models for analysis of interdependent national infrastructure failure and risk. Quantification of the direct consequences of infrastructure failure will use the economic and demographic scenarios developed in WS1. The indirect economic consequences of failure and recovery will be analysed at regional and national scales using an input-output modelling approach, extending beyond previous work by considering long term change in the economy.

MODELLING FRAMEWORK BRIDGES CROSS-SECTOR DIVIDES (WS1)

Workstream 1 is developing a generic modelling framework for analysis of long term change in capacity and demand, under uncertainty, which is applicable to interdependent national infrastructure systems.

The main dimensions of future uncertainty relating to capacity and demand (e.g. economy, technology, demography, climate, governance, finance) are being identified, and a list of definitions and common performance metrics relating to infrastructure are being developed.

WS1 is making use of existing sector models, where available, to develop reduced complexity but geographically explicit national-scale models of energy, transport, water, wastewater and solid waste systems. The ITRC refer to this new generation of conceptually consistent high level capacity/demand assessment models as CDAMs.

DEMOGRAPHICS AND ECONOMICS MODELLING ASSIST FUTURE PROJECTIONS IN FAST TRACK ANALYSIS AND ONGOING SECTOR MODELLING

Internally consistent projections of changes in demand have been generated through multi-sectoral regional economic modelling and national household-based micro-simulations of demographic change.

The Office of National Statistics provides annual principal, low and high growth projections to 2033, and 5-year projections up to 2083 for population numbers in England, Scotland and Wales. For the ITRC FTA, the expected growth level in 2083 has been extended to 2100, and further work is feeding into the development of a microsimulation model in WS4 of the British population from 2008 to 2083, using the sub-national age/gender projections previously calculated for WS1. Additional demographic data on ethnicity and household size will also be fed into this process.

The three GDP scenarios used in the FTA are growth from 2008 as follows:

- Low economic growth: 1.6% per annum
- Principal economic growth: 2.3% per annum
- High economic growth: 3.0% per annum

Economic projections based on these growth scenarios have been made with an enhanced version of the Cambridge Econometrics MDM-E3 econometric model (Multi-sectoral Dynamic Model – Energy-Environment-Economy). These results are not direct inputs to the sector scenarios that are developed and the analysis that follows, but they provide a useful commentary on factors influencing one of the key drivers. Interesting discussions are taking place within the consortium on whether these GDP scenarios are realistic given the current economic crisis.

ITRC COLLABORATE WITH FELLOW ARCC PROJECTS AND OTHER INFRASTRUCTURE FUTURES PROJECTS

Researchers involved in other Adaptation and Resilience to a Changing Climate (ARCC) projects, RESNET and FUTURENET, as well as the parallel EPSRC-funded Resilient Futures project, joined ITRC researchers at the start-up meeting for WS2 on future risks of infrastructure failure. Researchers across the various projects shared approaches and agreed on a forward programme of future collaboration.

The benefit of this coordinated approach, in addition to the those gained by the various researchers involved, will be to avoid 'stakeholder fatigue' given that many of the same infrastructure stakeholders are involved in each of the projects.

Further information on the ARCC projects mentioned and the associated ARCC Coordination Network (ACN), which the ITRC is a member of, is available from the [ARCC website](#).

A number of other affiliated projects (also funded by EPSRC) have recently got underway, including *Undermining Infrastructure* based at University of Leeds, and *Transforming Utility Conversion Points*, based at Cranfield University. Information on these projects can be found on the [ITRC website](#).