



## ACRI Rail Knowledge Bank update

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#### Design

##### Station design idiom

This UK design Idiom has been put together to recognise, conserve and sympathetically nurture the design heritage that already exists and to inspire great design in all new projects, regardless of scale. At its core is a belief that good design and its implementation require a holistic approach and cannot be achieved in a piecemeal fashion. It can only be successful when there is excellent guidance and strong communication between everyone involved. The scope of the Idiom is wide-ranging, from small interventions like repainting, to full station refurbishments, modernisations, and new builds. It complements existing Underground standards and guidance and is the first port of call for all station design decision-making on the network.

## **Efficiency**

### **[Efficiency in railway operations and infrastructure management](#)**

Efficiency entails maximizing the outputs from a set of inputs (technical efficiency) or creating an optimal mix of inputs to maximize output (allocative efficiency). When we consider efficiency, we are inclined to think in terms of a single dimension, a single number or percentage. The railway business is not that simple and the provision of railway services is multidimensional. In most contexts and on most continents, a competitive railway market is not a straightforward concept.

### **[Rail efficiency cost research and its implications for policy](#)**

In this paper we consider alternative measures of efficiency, explain why simple partial productivity measures are inadequate as the basis of overall measures of efficiency, and outline two alternative approaches. The first is technical efficiency – the degree to which output is maximised for a given level of inputs (or conversely inputs are minimised for a given output) – and the second is cost efficiency, the degree to which costs are minimised for a given level of output.

### **[The results and efficiency of railway infrastructure financing within the EU](#)**

This study analyses the results, efficiency and effectiveness of the EU investment in rail infrastructure with a special focus on cross border rail projects. Beginning with a discussion of the reasons for the moderate success of EU railway policy it investigates four case studies with a focus on effectiveness of funding schemes and success of removing bottlenecks, particularly at border crossings, to improve attractiveness of the railway mode.

### **[What is rail efficiency and how can it be changed?](#)**

Assessing railway efficiency is complex for a number of reasons. This paper assembles a wide database of railway data relating to operating scale and various indices of performance over the period of 1970 to 2011. We show, as expected, that railways differ widely in scale and mix of services, which may partly explain differences in ranking by performance indices. We show also that railway performance has changed greatly over time and that, in some cases, changes in performance can at least partly be attributed to reforms in structure, ownership and management incentives.

## **Environment**

### **[Adapting transport infrastructure to climate change: how to protect assets against increased risks from extreme weather](#)**

The International Transport Forum's Working Group on "Infrastructure Adaptation to Extreme Weather and Climate Change" reviewed the range of threats to transport system performance that are posed by climate change. Its work provides evidence-based guidance to transport asset owners and network managers that can help them ensure continued network performance under growing uncertainty regarding network resilience in a changing climate.

### **[The carbon footprint of global trade: tackling emissions from international freight transport](#)**

The International Transport Forum (ITF) estimates that international trade-related freight transport currently accounts for around 30% of all transport-related CO<sub>2</sub> emissions from fuel combustion, and more than 7% of global emissions. Assessing how changing trade patterns will affect future CO<sub>2</sub> emissions is important in establishing whether policies are aligned across the supply chain to achieve climate change mitigation objectives.

### [Carbon valuation for transport policy: towards a more coherent international approach](#)

The issues underlying the valuation of CO<sub>2</sub> emissions were explored in two recent studies by the International Transport Forum (ITF) and the OECD. These studies also examine the valuation approaches adopted in selected countries and looked at the actual values used. The OECD surveyed a sample of member countries on their approaches for valuing CO<sub>2</sub> emissions in transport appraisals. Drawing on this survey and the available literature, an ITF Working Group examined the practical and theoretical issues associated with valuing CO<sub>2</sub> emissions (the “carbon value” for short).

### [Greenhouse gas emission reductions from Canberra's light rail project](#)

Australia has one of the highest per capita rates of greenhouse gas (GHG) emissions in the world as well as one of the highest percentages of urban dwellers, focusing attention on the need for our cities to reduce emissions. This study estimates the GHG emission reductions that will be achieved by the first stage of Canberra's light rail network, which will commence operation in 2019. Compared to a business-as-usual case (no light rail), emissions will be reduced by 18–30% along the first stage corridor, depending on the size of the modal shift from private passenger vehicles to the light rail.

### **Network**

#### [Bus bridging disruption in rail services with frustrated and impatient passengers](#)

When a disruption in a rail network occurs, it is crucial to provide quick and efficient substitution of services via alternative transportation modes, including bridging disconnected railway stations using bus services. The amount of disruptions, surprisingly, is high; for example, there are more than 15 000 disruptions in six months in Melbourne, Australia. The provision of bus bridging services calls for proper planning and designing of a temporary bus bridging network considering limited bus and driver resources, and prevailing urban traffic conditions.

#### [Modelling travellers' choice between park-and-ride and other modes of travel to work in the context of risk and uncertainty](#)

This paper focuses on the choice in Perth, Western Australia, to commute by park-and-ride (PnR), and the trade-off between departure time and the uncertainty of securing a parking bay. The paper also explores other sources of uncertainty in the mode choice setting: day-to-day travel time variations when travelling by car and crowding on public transport.

#### [Optimal allocation of protective resources in urban rail transit networks against intentional attacks](#)

This paper advances the field of network interdiction analysis by introducing an application to the urban rail transit network, deploying protective resources against intentional attacks. The resource allocation problem for urban rail transit systems is considered as a game between two players, the attacker interdicting certain rail stations to generate greatest disruption impact and the system defender fortifying the network to maximize the system's robustness to external interdictions. This paper introduces a game-theoretic approach for enhancing urban transit networks' robustness to intentional disruptions via optimally allocating protection resources.

### [Planning for pedestrian flows in rail rapid transit stations: lessons from the state of current knowledge and practice](#)

Decades of research have contributed to the development of standards and models to guide pedestrian-friendly transit station designs, although it is not at all clear from the literature how these tools are collectively used in practice. To address this, we interviewed 15 experts in transit station design. Based on the themes identified in these interviews, we conducted an online census of all 16 transit agencies in North America with rapid rail transit systems with below-grade stations.

### **Rail Level Crossings**

#### [Extension and application of cognitive work analysis to improve pedestrian safety at rail level crossings](#)

The aim of this thesis was the development and evaluation of a cognitive work analysis (CWA)-based approach to support the design of complex sociotechnical systems, and the application of this approach to provide recommendations for railway level crossing (RLX) design to improve pedestrian safety. A secondary aim of the research was to investigate pedestrian behaviour within the RLX system using CWA.

#### [Measures for managing safety of heavy vehicles at passive and active railway level crossings](#)

This report aims to identify and develop measures to manage the risks associated with the passage of restricted access vehicles (RAV) and multicomination vehicles (MCV) across active and passive railway level crossings. The report reviews heavy vehicle crash history at level crossings in Australia and New Zealand. It also reviews a variety of risk mitigation measures including measures for passive level crossings, measures for active level crossings, traffic management measures, governance initiatives and education and enforcement. The reported benefits, current status, suitability to heavy vehicles, and comments for each of these measures are also discussed and summarised.

#### [What are the differences in driver injury outcomes at highway-rail grade crossings? Untangling the role of pre-crash behaviors](#)

Crashes at highway-rail grade crossings can result in severe injuries and fatalities to vehicle occupants. Using a crash database from the Federal Railroad Administration, this study explores differences in safety outcomes from crashes between passive controls (Crossbucks and STOP signs) and active controls (flashing lights, gates, audible warnings and highway signals).

### **Statistics**

#### [Annual safety performance report 2014-2015](#)

RSSB's Annual Safety Performance Report (ASPR) reviews safety trends for passengers, the railway workforce and members of the public. It looks in detail at specific areas of risk, such as train accidents, level crossings and stations. Also included are sections on benchmarking railway performance, data quality, and European Common Safety Indicators and Targets.

#### [Trainline 3: statistical report](#)

Trainline 3 is a collaborative compendium between the Australasian Railway Association (ARA) and BITRE, providing insights, analysis, and an understanding of the Australian freight and passenger railway industry. The publication presents an overview and data in terms of rail tasks performed; characteristics of the railways networks; train operators'

rolling stock; and aspects of railway performance, including safety, environment and reliability.

### [Yearbook 2015: Australian transport statistics](#)

The Transport Statistics Yearbook provides a single comprehensive source of annual Australian transport statistics for use by policy makers, transport analysts and the wider Australian community. The Yearbook has a focus on long-term time series for road, rail, air and sea transport, with additional data summarising transport safety, energy use and the impact of transport on the environment. Introductory tables are provided to summarise external economic factors which may influence Australian transport activity.



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### [National Interest Services supporting an informed land transport community](#)

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See the [Rail Knowledge Bank Charter](#) for more information on its objectives and resource coverage.



This email was sent by Jill Aron, ARRB Group, Vermont South, Victoria, Australia

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