# Transport and climate change

## ARRB Group capability




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## Overview

The ARRB Group Ltd is a public company whose members are federal, state and local government authorities in Australia, Australian Local Government Association and the national authority of New Zealand. Originally established as the Australian Road Research Board in 1960, ARRB operates as an independent entity, providing research and consultancy services via funding grants and contracts to Commonwealth, state and local government agencies, international agencies and private industry.

ARRB Group has established a strong reputation and significant experience in many aspects of roads and transport infrastructure in Australia. Additionally, the organisation has an international reputation for innovation, independence, scientific integrity and professional excellence. ARRB has successfully delivered aid-funded international projects for the World Bank, the Asian Development Bank (ADB), Global Road Safety Partnership and AusAID; and has also undertaken projects through gTKP, IRF, HDM Global, iRAP, OECD, and TRB. Additionally privately-funded projects have been successfully conducted in Asia, Europe, Africa, North America, South America and the Middle East.

## Our organisation

ARRB employs 230 staff and has its headquarters in Melbourne, Australia, with offices in Sydney, Perth, Brisbane and Adelaide. ARRB Group is represented internationally by an office in Dubai, Jakarta, Indonesia, an agent in China and has an joint venture in India. ARRB has an international reputation for innovation, independence, scientific integrity and professional excellence, and takes pride in the quality of our staff. Approximately 20% of all staff hold a Master's degree or PhD, and nearly 50% of staff hold a bachelor's degree.

Our staff complement is multidisciplinary, with engineers (civil, geotechnical, mechanical, chemical, and computer systems), scientists (physicists, chemists, behavioural), and economists. Our research and consulting operations focus on four national priority areas:

- Sustainable Infrastructure Science - materials, pavements and concrete technology
- Sustainable Infrastructure Management - asset management, bridge asset management
- Safe Systems — safety and traffic engineering, road user behaviour
- Congestion, Freight and Productivity - heavy vehicles, transport operations, transport economics.

ARRB has conducted extensive research into the impacts of vehicles and transport infrastructure on the environment, and climate change implications for road transport infrastructure and operations. ARRB has experience in the areas of environmental externalities and impacts, as well as detailed knowledge in the areas of economics, policy analysis, engineering research; data systems and analysis addressing the issues of sustainability. This includes:

- external costs of transport and valuing environmental and other externalities e.g. provision of unit values for a broad range of externality costs (for example, noise, air pollution and climate change) and for different vehicle types (cars, light commercial vehicles and heavy vehicles)
- provision of services in modelling emissions and impacts on road pavements
- evaluation of greenhouse gas emissions arising from road materials used in roadworks and the relative impacts of various road construction and maintenance methods
- development of a climate change framework for the needs of road agencies
- investigation of the impacts of incentives and disincentive programs on passenger transport and efficient vehicle use: improvements to the environmental performance of the transport sector
- participation in low carbon transport initiatives across government.

## Examples of ARRB research work related to sustainability and transport

Environmental and Cultural Heritage Audit Framework (2009) - ARRB was engaged by Queensland Department of Transport and Main Roads (TMR) to develop an ECHAF. It required a desktop review of the current status of auditing processes across TMR regions. It also developed a proforma and minimum standards for audits.


Strategic Review of Future Asset Management Issues (2009): Impact of Reducing Greenhouse Gas Emissions; Impact of 'Peak Oil'; and, Impact of Climate Change on Agriculture, Industry, the Community and Road Use - This Austroads project is aimed at identifying issues that will impact on road agency asset management in the next 10 to 20 years. Three separate discussion papers on the above impacts are currently being finalised so that those issues impacting on asset management practice are clearly identified to be the potential subject of future research.

Climate Change Framework (2008) - ARRB was commissioned by the Queensland Department of Transport and Main Roads (TMR) to develop a Climate Change Framework. The purpose of the project was to examine the possible short- and long-term impacts of climate change on road transport with specific reference to the Queensland, Australia context.

Austroads Guide to Project Evaluation, Part 4 (2008) - This document draws on Austroads Valuing Environmental and Other Externalities (2003) (see page 4), which developed a set of 'calibrated' unit values for a broad range of externality costs (including accident costs, noise, air pollution, climate change, nature and landscape, congestion and additional costs from upstream and downstream processes). Within this update a review of the externality methodologies for Austroads and Australian Transport Council (ATC) was undertaken and adjusted to provide values for passenger cars, buses, and light and heavy trucks.

Greenhouse Gas Emissions and Pavement Types (2005) - This project was commissioned by the RTA NSW, and provided a review of available knowledge and published studies on the life cycle greenhouse gas (GHG) emissions arising from road materials used in roadworks and the relative impacts of various road construction and maintenance methods.

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Austroads – Impact of Climate Change on Road Infrastructure (2004) - This report:

- assesses the likely local effects of climate change for Australia during the next 100 years, based on the best scientific assessment currently available
- assesses the likely impacts on patterns of demography and industry, and hence on the demand for road infrastructure
- identifies the likely effects on existing road infrastructure and potential adaptation measures in road construction and maintenance
- reports on policy implications arising from the findings of the project.

National Performance Indicators - Greenhouse, Fuel Consumption and Consumption of Road Transport (2004) - The objective of this project, commissioned by Austroads, was to provide a critical review of the Austroads Greenhouse Gas National Performance Indicators for publication as part of the set of Austroads 'National Performance Indicators'. The review investigated current data availability and developed an improved methodology for the Austroads Greenhouse Gas Emissions (GGE) indicators. This involving the reporting of key indicators of GGE in terms of carbon dioxide equivalent, and the calculation of the GGE by vehicle type e.g. emissions for passenger cars, light commercial vehicles, and freight vehicles.

Valuing Environmental and Other Externalities (2003) - ARRB was commissioned by Austroads to investigate and report values for environmental and other externalities in order to extend the traditional economic evaluation of project proposals to include a wider range of costs and benefits. The report demonstrates that externality cost estimates depend on assumptions relating to discount rate, methodology (e.g. damage cost or avoidance cost approach) and the treatment of equity issues. A set of 'calibrated' unit values that includes a broad range of externality costs (including accident costs, noise, air pollution, climate change, nature and landscape, congestion and additional costs from upstream and downstream processes) for road transport are provided in this report.

Triple Bottom Line Evaluation of Transport Proposals (2003) - This report, commissioned by Austroads, undertakes background and preparatory work on Triple Bottom Line (TBL) evaluation prior to developing relevant material for the Guide to Project Evaluation series which deals with the equity (distributional) effects of projects, detailing underlying reasoning, guidelines, tools and worked examples. It provides a complete review of the best practice in TBL valuation and the difference between TBL and other evaluation techniques.

Impact of Climate Change on Road Performance (forthcoming) - This Austroads project produced software that provides climate information from 1960 up to 2099. The climate information includes mean, minimum and maximum daily temperatures, rainfall and estimates of the Thornthwaite Moisture Index which influences pavement deterioration to some extent and is an input variable for the predictions of pavement performance. The climate data from 2007 onwards was based on prediction made from climate modelling by CSIRO, while the pre-2007 climate data was based on historical meteorological measures. The climate information is accessible by mean of GPS coordinates throughout Australia.

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