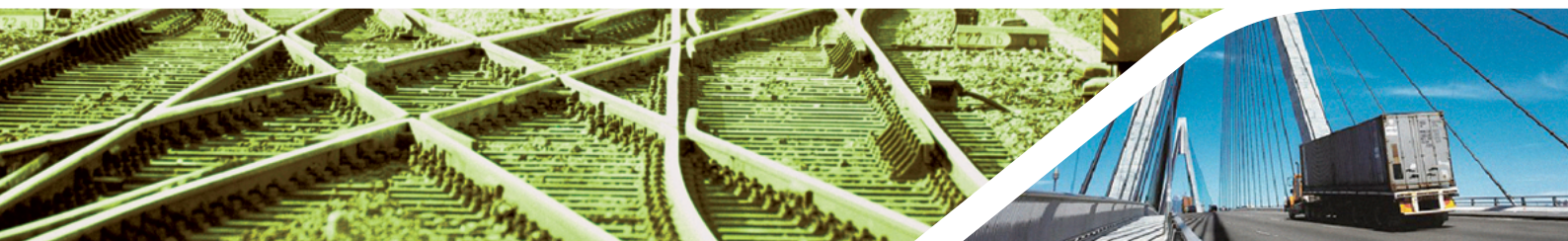




Australian Government

Department of Infrastructure and Regional Development



# Trends

## Infrastructure and Transport to 2030

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ISBN: 978-1-922205-65-0

February 2014/INFRA1996

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## Trends





## PURPOSE

Drawing on research by the Bureau of Infrastructure, Transport and Regional Economics (BITRE) and other government and industry sources, this report distils analysis and forecasting to outline the most significant impacts on the infrastructure and transport sector through to 2030 including:

- economic conditions, trends in the global economy and the outlook for the Australian economy;
- infrastructure investment trends;
- Australia's transition, including industry, demographic, and spatial changes;
- modal trends in the movement of goods and people;
- regulatory trends for the portfolio; and
- other significant challenges and opportunities including energy efficiency, climate change and technological innovation.

The Australian infrastructure and transport sector has been through a period of transition with infrastructure investments and regulatory reforms, but the sector will face significant challenges in the future. The role that governments play in the long-term responses to these challenges will have a clear impact on national prosperity.

(This report does not set out policy issues, priorities or Government commitments.)

*Despite strong economic growth, the Australian economy faces challenges and opportunities.*



## ECONOMIC CONDITIONS

### Global Economy

International economies are slowly recovering from the Global Financial Crisis (GFC), although moderated by regional uncertainties. International financial conditions have stabilised and equity prices have risen globally. Capital flows to emerging markets have also remained strong. However, the International Monetary Fund (IMF) considers that this upturn will be more gradual than those following past downturns.

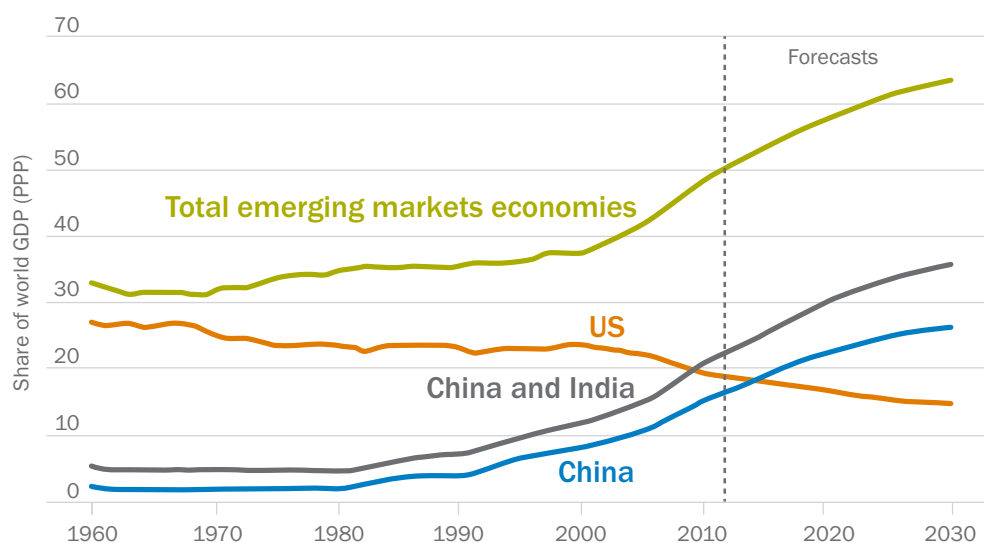
In the past 20 years, there has been a transformative shift in the global economy. By 2025, the Asia-Pacific region will account for almost half the world's economic output. In the last 20 years China and India have almost tripled their share of the global economy. China is Australia's largest merchandise trading partner and some predict that it could overtake the United States (US) as the world's largest economy as soon as 2016,<sup>1</sup> although other assessments have put this transition some further years away.

*In the last 20 years China and India almost tripled their share of the global economy.*

Many of the risks to Australia's economic outlook are external, particularly volatility in the world economy and its potential negative impacts on emerging economies like China and India. Economic resilience in the Asia-Pacific region has improved over the last decade, although economic interdependence remains a risk.

The US, United Kingdom and Japan remain Australia's largest foreign direct investors – investing \$271.9 billion in Australia to December 2012.<sup>2</sup>

### Global economic transformative shift



Source: The Conference Board Total Economy Database, Maddison (2010), IMF World Economic Outlook Database and Treasury



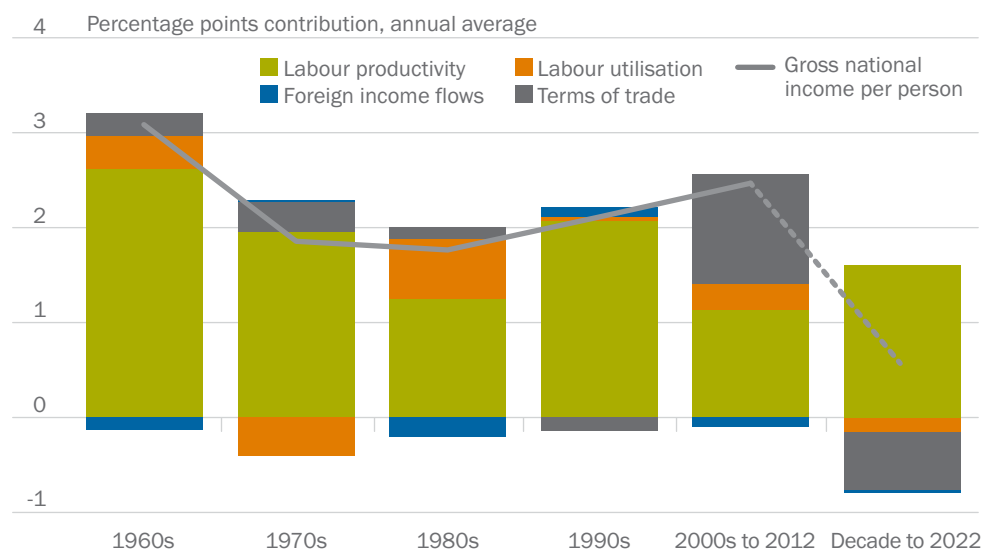
## Australian Economy

The Australian economy is continuing to transition from resources investment-led growth to broader sources of growth. Exports remain a key economic strength – around 20 per cent of Gross Domestic Product (GDP) in 2012. However, national terms of trade are expected to decline over coming years, reducing nominal GDP growth and impacting the budget bottom line.<sup>3</sup>

Although Australian GDP is currently expected to continue to be one of the fastest growing in the global economy, the changing structure of the Australian workforce will see real economic growth slow to 2.7 per cent per year over the next forty years as the population ages.<sup>4</sup>

With terms of trade projected to decline, average annual growth in income may be less than what Australians are used to.<sup>5</sup>

### Contributions to growth in average incomes



Source: Harris, P (2013), based on ABS cat. no. 5204.0, unpublished ABS data, Productivity Commission Calculations

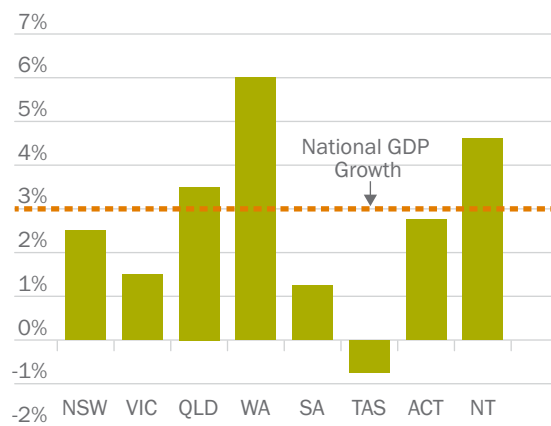
Over the past decade, multifactor productivity growth has slowed to an annual average of 1.4 per cent, compared with 2.1 per cent in the 1990s. Productivity growth has historically been the primary driver of income growth. Domestic investments in infrastructure can help enable productivity benefits within the sector and more broadly, but these investments will have minimal impact as stand-alone policies.<sup>6</sup>

States and territories are projected to face funding difficulties and have pared back budgets, making public funding of large infrastructure projects more difficult — particularly in light of increasing health, education and welfare costs.

Between 1989–90 and 2011–12, transport sector total factor productivity growth averaged 1.3 per cent per annum, compared to 0.9 per cent per annum for the national market sector. However, over the last decade, transport sector productivity growth has been slowing in line with the broader economy.<sup>7</sup>

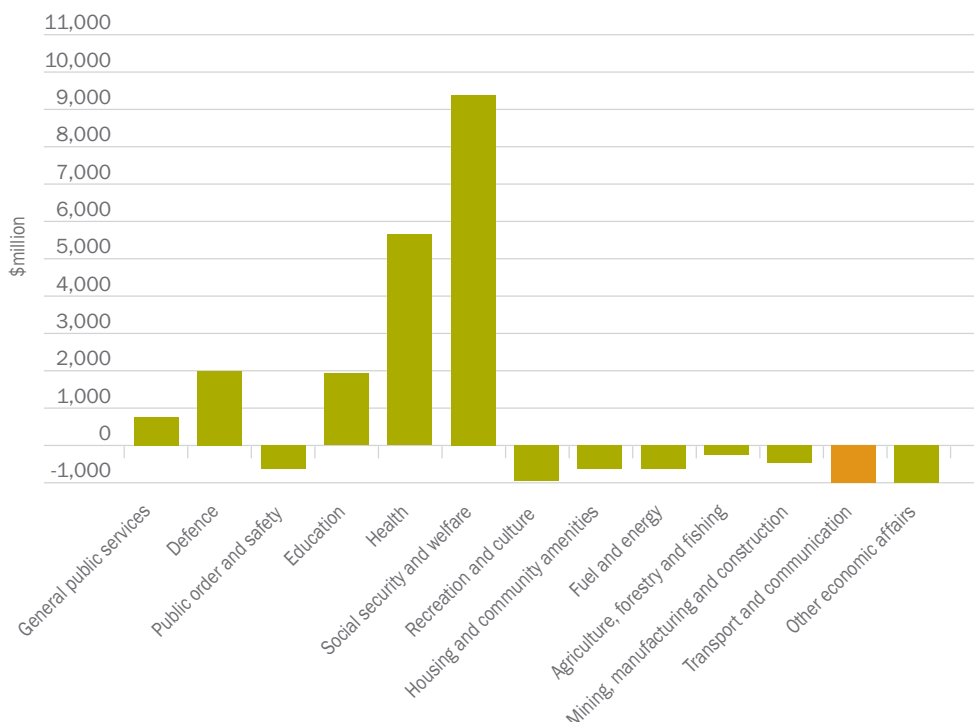
*Productivity growth has slowed to an annual average of 1.4 per cent, compared with 2.1 per cent in the 1990s.*

Gross state product growth, 2012–13



Source: State Budget Papers 2013–14

Total real Government spending growth by function, 2013–14 to 2016–17



Source: The Australian Government, 2013, Budget Strategy and Outlook Budget Paper No. 1, Australian Government, Canberra



## INFRASTRUCTURE INVESTMENT TRENDS

Australia's private and public infrastructure expenditure, as a percentage of GDP, compares favourably to other OECD countries. While slipping during the GFC, the private sector is now contributing about 50 per cent of Australia's infrastructure investment.<sup>8</sup>

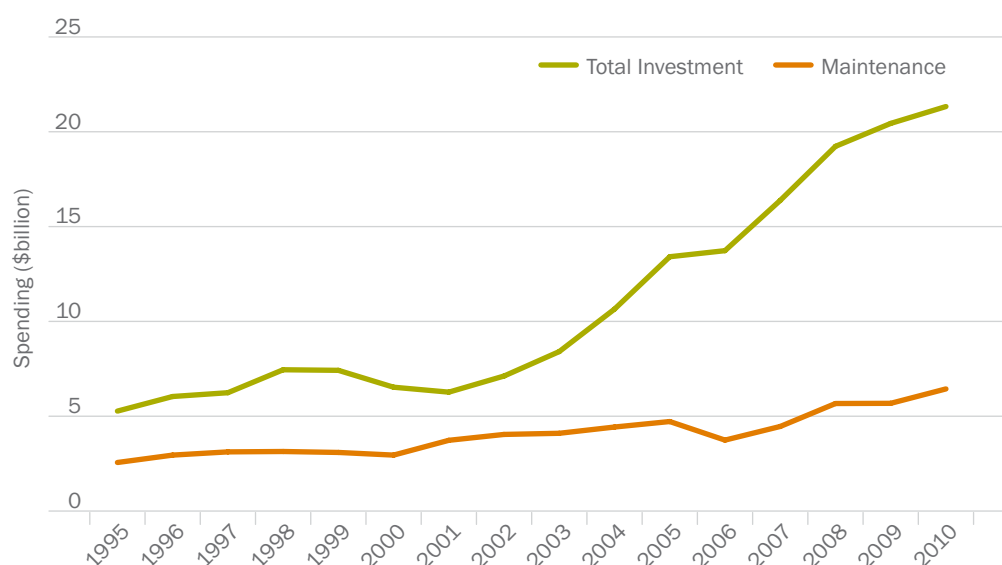
The ratio of maintenance to investment expenditure has been shifting. In part, this is due to construction costs in major cities being higher due to increasing urbanisation. For example, almost 90 per cent of New South Wales population growth over the last ten years has been in the Sydney Greater Metropolitan Area — creating pressures for infrastructure. There is also evidence that state and local government investment in maintenance is not currently optimised.

As Australia's economy transitions to a broader industry base, with less dependence on the resources sector, infrastructure construction employment is forecast to decline. The level of public infrastructure investment, particularly in a tightening fiscal environment, may directly affect employment rates.

Historically, Australian governments have been responsible for funding much of the infrastructure and transport task. Reforms in the 1980s and 1990s drove productivity improvements and price benefits for service users.

Privatisation of government (predominantly state) assets has raised significant revenue — for example, in April 2013 the 99-year lease of Port Botany and Port Kembla raised \$5.07 billion.

### Australian public spending on transport infrastructure maintenance and investment



Source: OECD Dataset: Transport infrastructure investment and maintenance spending

## AUSTRALIA IN TRANSITION

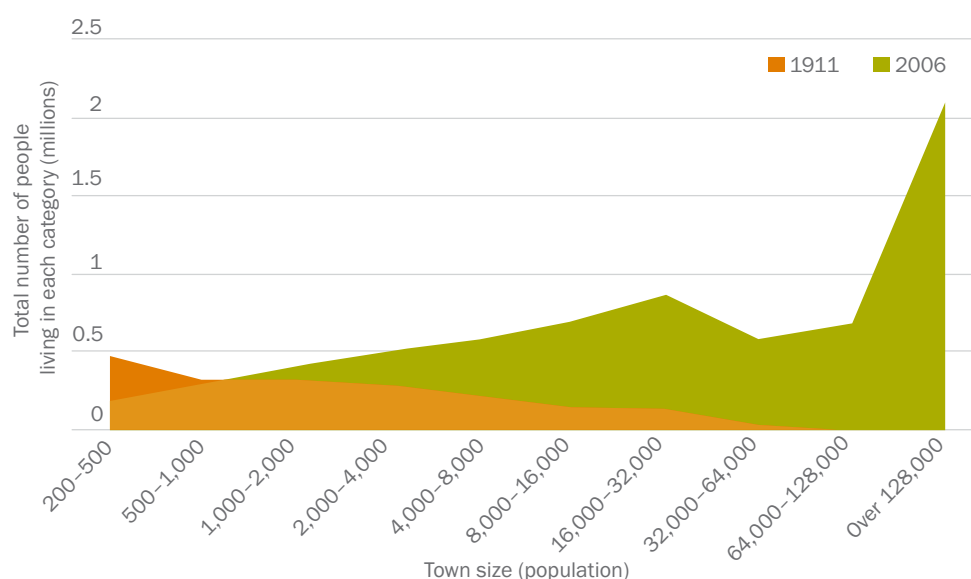
With the Australian economy in a period of transition, there has been considerable structural adjustment across the economy.

Commodities continue to be important to the economy, generating export earnings of around \$38 billion<sup>9</sup> from agricultural sector exports, and \$176 billion<sup>10</sup> for minerals and energy in 2012–13. Primary industries, concentrated in regional Australia, make up almost two-thirds of our merchandise exports. Global food demand is expected to rise by around 77 per cent to 2050 from 2007 levels, with most demand coming from Asia. Such growth will place Australia's freight network under increasing pressure to meet demand.<sup>11</sup>

*Today there are around four and a half working age people for every person aged over 65 years, by 2050 there will be only three.*

By 2030, Australia's population will grow from 23 million to 30 million<sup>12</sup> — with a very different demographic profile and spatial distribution to today. The trend towards urban living will continue, even in regional Australia. Today there are four and a half working age people for every person aged over 65 years, by 2050 there will be only three. This will put pressure on budgets as government revenues fall relative to expenditure. Immigration programs will have only a marginal impact on the ageing population profile.

### Distribution of regional\* population by town size, 1911 and 2006



Source: BITRE Analysis of ABS Census Results

\* Mainland state capitals and rural population not included.

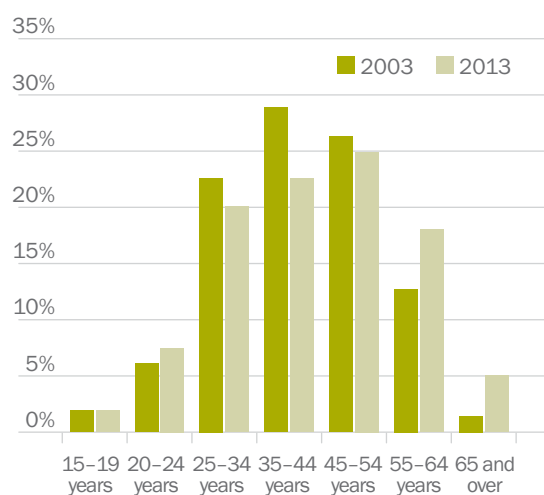


Spending on health, age-related pensions and aged care will rise from a quarter to almost half of government spending by 2049–50, further constraining governments' capacity to fund other more discretionary areas, including infrastructure.<sup>13</sup>

Transport currently has the second oldest industry workforce profile (behind agriculture, forestry and fishing) with the consequential risk of skills shortages constraining productivity — sometimes offset by technologies that reduce the number of staff required (for example aircraft maintenance).

In 2010–11, transport and storage recorded the highest serious workplace health and safety incidence rate, nearly twice the average across all industries.

#### Transport, postal and warehousing — employed persons by age group, 2003 and 2013



Source: Based on ABS Labour Force, Australia, Cat no: 6291.0.55.003



## MODAL TRENDS

### Road

Over 70 per cent of all domestic passenger movements within Australia occur on roads. Driving remains by far the preferred means of transport within cities and for trips up to 400 kilometres. This is resulting in suboptimal energy efficiency and a congestion cost to the economy of \$15 billion per year.<sup>14</sup> Based on current trends, congestion will increase, imposing burdens on those living in Australian cities, those seeking to move goods through Australian cities and to the national economy. Particular constraints on freeways and highways will emerge, constraining productivity within cities and regions.

Over 75 per cent of non-bulk domestic freight is carried on roads, dominating freight movements between Sydney, Melbourne, Brisbane and Adelaide.

Truck traffic is predicted to increase by around 50 per cent to 2030. Governments face challenges gaining community acceptance of larger heavy vehicles and funding road infrastructure improvements to service both a larger freight task and a growing light commercial vehicle task. The volatility of oil prices will continue to impact sector competitiveness.

### Rail

Rail dominates freight movements between Perth and the eastern states. Rail freight, mainly supporting commodity exports, is expected to jump by two-thirds by 2030, increasing pressure on the rail system.<sup>15</sup>

Rail traffic on the Brisbane, Sydney and Melbourne route faces capacity constraints around Sydney with a dedicated rail freight line to the north required to deliver a larger modal share to rail. Deloitte Access Economics estimates that a modest increase in rail's modal share of the freight task would result in the current \$92 million in benefits derived from the north-south corridor growing to \$227 million by 2030.<sup>16</sup>

At present the only route between Melbourne and Brisbane is through Sydney. An inland route has the potential to provide a rail freight option up to 7 hours faster and 170 kilometres shorter, making rail a more competitive transport option relative to road.<sup>17</sup>

The freight task and volume of container traffic is increasing substantially proportional to the overall growth rate of the economy. Passenger rail is generally given priority over freight services in cities. Rail makes up a very small portion of passenger kilometres, but it has been growing faster than either passenger car or bus transport.<sup>18</sup>





## Aviation

Aviation contributes over \$32 billion to Australia's GDP. It directly employs 149,000 people and over 160,000 people indirectly.<sup>19</sup>

While carrying only 0.1 per cent of Australia's international freight by weight, aviation freight makes up nearly 21 per cent of freight by value — over 750,000 tonnes of high-value and time sensitive freight, worth over \$110 billion during 2011–12. Over the last twenty years the volume of freight flown into and out of Australia has more than doubled and is expected to increase by a further 120 per cent by 2030.<sup>20</sup>

Continued passenger growth at major airports is already testing the capacity of airport infrastructure, particularly during peak periods. International air travel will grow strongly to 2030, with both domestic and international passenger movements through capital cities almost doubling. Substantial investments by airport operators will be required to meet this demand.

Increasing demands from the resources sector has also put significant pressure on some regional airports and their infrastructure. Conversely, some regional airport usage is declining as population changes take place.

## Maritime

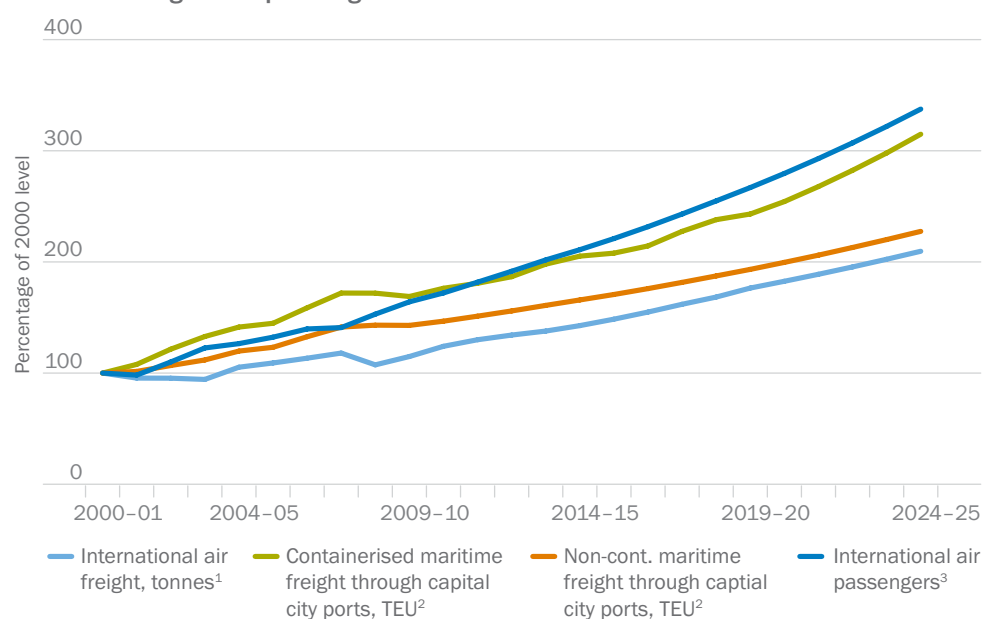
Maritime activity grew strongly in the decade to 2011–12. Bulk port throughput grew by more than 75 per cent and container trade by two thirds. Concurrent with, and facilitating, this growth has been the trend to much larger bulk and container vessels.

To 2030, the bulk freight task will increase by half and national container throughput is projected to double. Australia's containerised international exports will almost double by 2030 due to strong demand from China and South East Asia. At the same time Australia's strong demand for consumer goods imports will grow broadly in line with the economy, increasing freight imports.<sup>21</sup>

Total coastal freight has slightly declined in the same period to 2011–12 — from 53 million tonnes in 2002–03 compared to 49.5 million tonnes in 2011–12 (an approximate decline of 0.7 per cent per annum).<sup>22</sup>

The number of cruise vessels operating in Australia continues to increase. In the four years to 2012, Australian cruise passenger numbers more than doubled, with New South Wales and Queensland accounting for two thirds of Australian cruise passengers.<sup>23</sup>

### Growth in freight and passenger tasks



Sources: 1 Hamal, K 2011, International air freight movements through Australian airports to 2030, 2011 Australasian Transport Research Forum  
 2 BITRE 2010, Australian Maritime Activity to 2029–30  
 3 BITRE 2012, Report 133, Air Passenger movements through capital and non-capital city airports to 2030–31

## Public Transport

Public transport use has been increasing in all capital cities since 2004. Currently, one in six people in the capital cities uses mass transit for daily commuting.<sup>24</sup> To 2030, the public transport task will grow by 30 per cent — primarily through population growth rather than a significant shift in the proportion of people using public transport.<sup>25</sup>

Public transport is not only confined to capital cities. A lack of reliable, efficient and affordable public transport options and limited services are issues for regional communities and economies. Poor or non-existent public transport within and between cities can exacerbate social isolation and limit access to health care, education and services in rural and remote communities.<sup>26</sup>

Fare recovery in Australian urban mass transit systems is around 25–30 per cent, well below the level recovered in a number of transport systems internationally, with outer suburban services less than ten per cent.<sup>27</sup> This raises questions about accessibility versus cost recovery, the sustainability of current financial structures and the scope for further public investment in mass transport infrastructure and services.

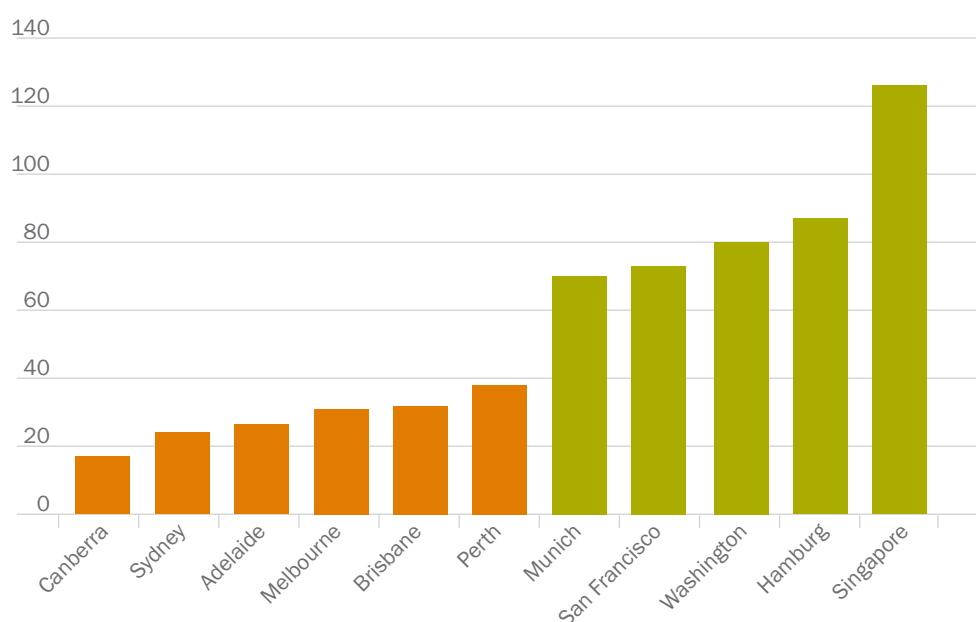
*Private road vehicles currently account for about 90 per cent of the motorised passenger task in Australian cities.*

## Active Travel

While Australian cities have been planned predominantly for private motor vehicle travel, economic analysis of infrastructure projects relating to walking or cycling infrastructure has shown benefits via decongestion, health, reduced vehicle operating costs, infrastructure savings, and environmental benefits.

In 2011, 5.4 per cent of workers used ‘active’ travel as their only method of journey to work.<sup>28</sup>

Percentage of public transport costs recovered through user payments



Sources: Hale, C, 2011, Evolving Futures for Australian and International Passenger Rail  
Information from the Department of Planning, Transport and Infrastructure South Australia





## REGULATORY TRENDS



As the movement of people and goods increases in a dynamic international environment and national transport system, so too does the need for effective regulation. The Minister for Infrastructure and Regional Development currently administers around 90 Acts, most aimed at contributing to the safety and security of individuals, communities and assets. Additionally, the sector is subject to a range of broader economic regulatory settings.

### Economic Reform

Significant regulatory reforms dating back to the 1970s have helped drive widespread changes in the transport industry. For example, road train mass limits varied significantly across the different jurisdictions prior to the adoption of uniform national mass limits. Since 1971, general mass limits for road trains in Western Australia and the Northern Territory have increased by around nine per cent, compared with sixty per cent in Queensland and South Australia. These regulatory changes enabled the growing freight task to be catered for with half the number of vehicles that would have otherwise been required.<sup>29</sup>



*2012 was the safest year in aviation since 1945.*

## Safety

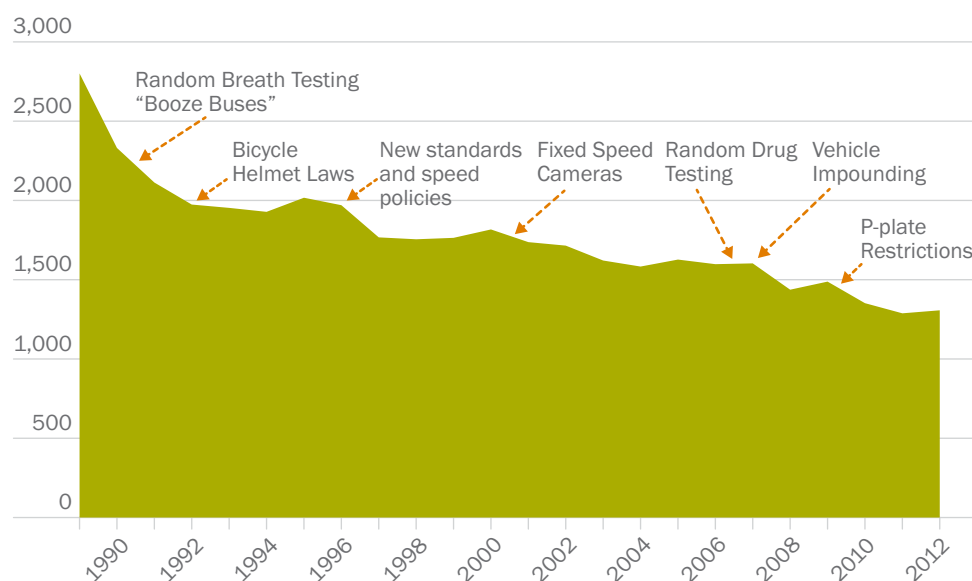
Transport fatality rates have significantly improved and are expected to continue to do so as government interventions, technology, and industry practices target improvements.

2012 was the safest year in international aviation since 1945. However, the regulatory task is increasingly complex across all modes as business models and technology change more rapidly. Balancing public expectations of safety with the increasing demand for efficiency is a growing challenge for the design and implementation of regulation.

The annual cost to the Australian economy of road traffic crashes is estimated to be \$27 billion.<sup>30</sup> Currently, Australia is ranked the thirteenth safest country internationally for the number of road deaths per 10,000 vehicles and tenth per billion vehicles-kilometres.<sup>31</sup>

Rail has the lowest fatality rate per hundred thousand people (0.15), followed by aviation (0.17), maritime (0.24). Road fatalities are 5.70 per hundred thousand people. Similarly, the serious injury rate per hundred thousand people varies, with aviation (0.09), rail (0.41) and maritime (0.45) being substantially lower than road (155.43).<sup>32</sup>

### Australian road fatalities by year 1989–2012



Source: Australian Road Deaths Database and Department of Infrastructure and Regional Development analysis

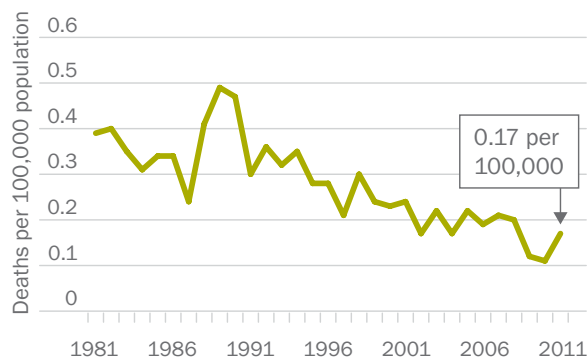
## Trends

The incidence of fatal road crashes on a population basis is substantially higher in outer regional and remote areas. Heavy vehicle risk exposure and incidence varies across different parts of the network.

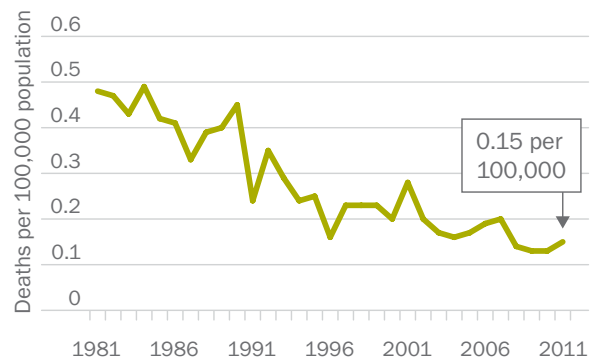
Over the last decade, the emergence of new in-car technologies has been a growing factor in road safety incidents (due to driver distraction).<sup>33</sup> There is increasing evidence of distraction from new technologies for both pedestrians and drivers. Dealing with such factors will be critical in government and industry efforts to maintain the overall improvement in road safety in the decades ahead.<sup>34</sup>



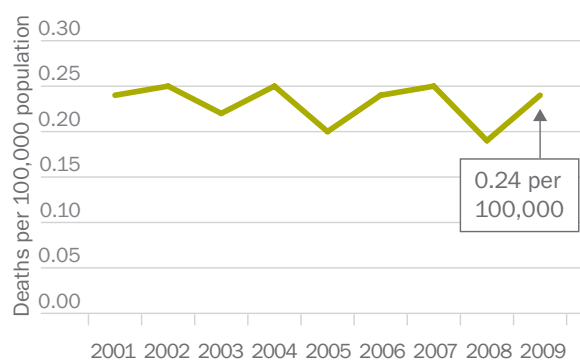
Fatality rates – aviation



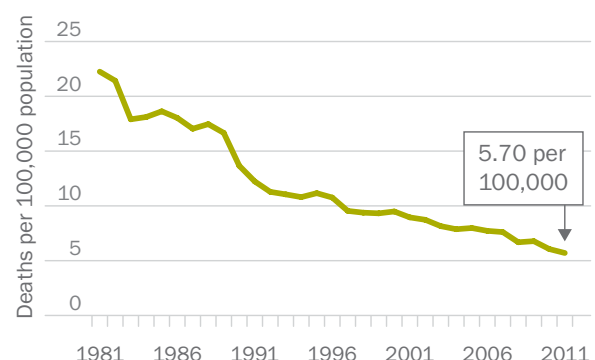
Fatality rates – rail



Fatality rates – maritime



Fatality rates – road



Source: Australian Infrastructure Statistics Yearbook, BITRE (2012)

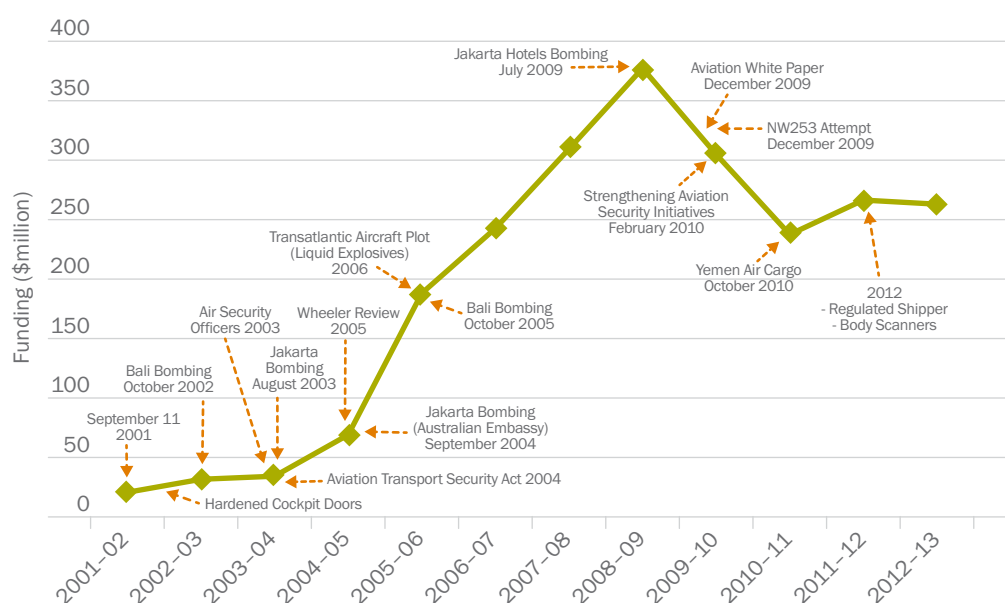


## Security

The transport sector, internationally and nationally, remains a target of terrorism. Policy responses have been incident-based, intended to ensure known risks within the system are managed.

Security threats will remain for the foreseeable future. Like safety, the range of compliance activities and the tools required to ensure the system remains protected has grown. This is expected to rise as new cargo security regimes are introduced. As volumes and variances increase, maintaining a risk-based regime which focuses on higher risks becomes increasingly challenging.

### Total Australian Government aviation security funding commitments



Source: Department of Infrastructure and Regional Development research and analysis  
 Note: Estimate based on total Government aviation security funding commitments obtained from Budget papers. It includes funding commitments for programs of the Office of Transport Security within the Department of Infrastructure and Regional Development, as well as aviation policing and law enforcement, and intelligence arrangements.



## OTHER CHALLENGES AND OPPORTUNITIES

### Energy and Emissions

Australian transport fuel demand is rising, increasing almost 20 per cent over the past 11 years with a further 15 per cent predicted by 2020. Australia is highly dependent on crude oil-based energy and is likely to be increasingly reliant on importing oil.

Internationally, oil prices are less predictable with volatility caused by geopolitical instability and changes in the international economy. Estimates for the long-term average oil price vary considerably, ranging from \$100 to \$250 a barrel by 2030 (in 2009 prices).<sup>35</sup> Growing demand from China and India is likely to drive prices higher.

Transport activity accounts for over 38 per cent of the nation's energy end-use and 73 per cent of liquid fuels. Domestic transport emissions are projected to continue to grow by an average of 1.3 per cent per annum through to 2030. Civil aviation, commercial road vehicles and rail will have particularly strong growth, although passenger cars will continue to be the single largest contributor (around 47 per cent of all domestic transport emissions) to 2020 – despite reduction in emissions per kilometre travelled through technological advances.

Achieving improved energy efficiency in transport will help mitigate costs to industry and consumers, reduce pollution and decrease oil import demand.





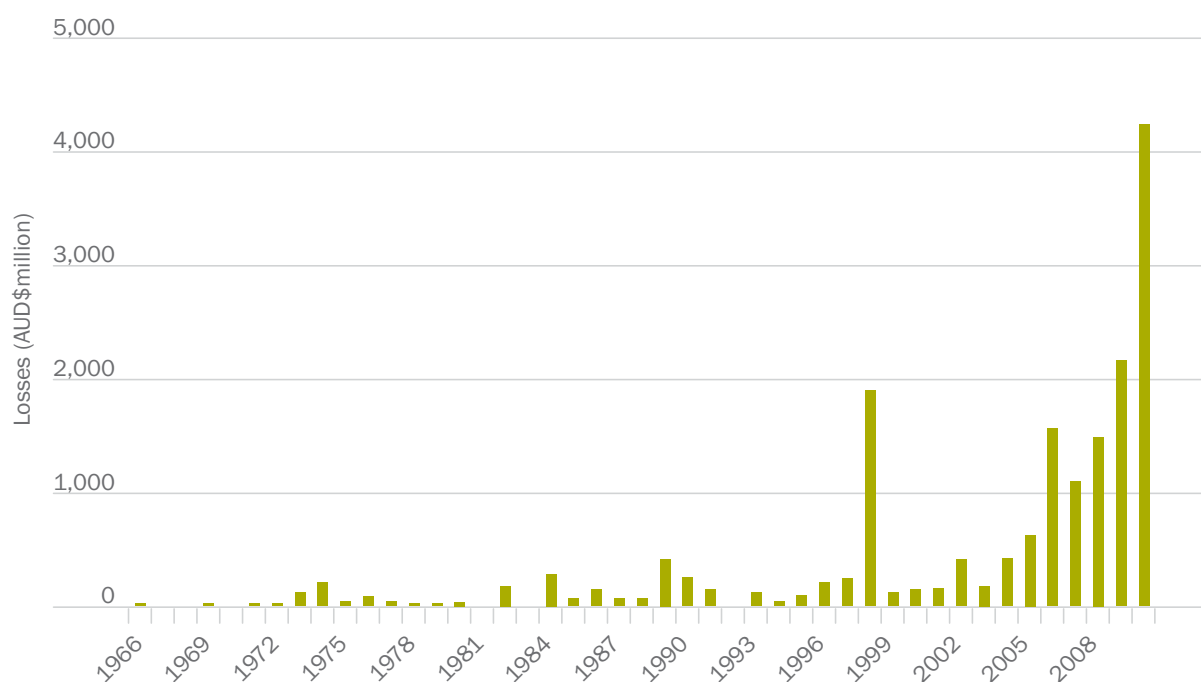
*Australian transport fuel demand is rising.*

## Climate Impacts

Changing weather patterns have the potential to negatively impact infrastructure assets.<sup>36</sup>

Changes in climate and extreme weather events not only bring direct damage to infrastructure assets, but can also cause operational shortfalls and a loss of profits and revenue.

Annual aggregate insured losses for weather-related events in the disaster list



Source: Crompton, R 2011 Normalising the Insurance Council of Australia Natural Disaster Event List: 1967–2011, A report prepared by Risk Frontiers for the Insurance Council of Australia, Risk Frontiers, Sydney

### Technology

Technological innovation can improve efficiency, productivity, safety, security, and environmental outcomes in transport – but can also have unpredictable, disruptive consequences. Increased access to data is already allowing for more complex analysis and collaboration within both government and the private sector. On-board systems are emerging as a source of significant safety and productivity benefits. In rail, the introduction of automatic train management systems can improve the efficiency of existing rail infrastructure. Google's driverless cars have already clocked up tens of thousands of kilometres worldwide, while Rio Tinto's driverless trucks have now moved more than 100 million tonnes of earth in the Pilbara.

Smart infrastructure in the form of digital technologies will provide opportunities to improve productivity and contribute to sustainability. For example, road-mounted camera and sensor systems enable better infrastructure management by detecting congestion, collisions and road works, providing motorists with alerts and re-routing

*Driverless trucks have now moved more than 100 million tonnes of earth in the Pilbara.*

suggestions, reducing travel times, reducing fuel consumption and energy demand, and enabling better use of existing infrastructure. Environmental benefits can be derived from dynamic coordinated freeway ramp signals. For example, coordinated signals on Melbourne's Monash Freeway have saved 16,500 litres of petrol and led to a 40 tonne reduction in greenhouse gas emissions a day, as well as rerouting traffic, at a relatively low cost.

The OECD estimates that an average household with two adults and two teenage children had around ten internet-connected devices in their home during 2012. The OECD projects this figure will rise to around 25 devices in the home by 2017 and up to 50 devices by 2022.<sup>37</sup>



Photo courtesy of VicRoads.



The internet has changed the way we engage with transport: consumers now buy, book and choose seating preferences online. Information from Radio Frequency tags, remote sensors, barcodes, 2D scans and 'just in time' production, have all increased the pressure for the transport sector to respond to rich data regarding the movement of people and goods.

Research has shown that if 10 per cent of Australian employees were to telework 50 per cent of the time, the total annual gains to the Australian economy would be around \$1.4–\$1.9 billion. By 2020–21 the workplace participation impacts of telework enabled through new high speed broadband infrastructure could grow the annual GDP by \$3.2 billion, and create an additional 25,000 full-time jobs.<sup>38</sup>

Social shifts due to the increased use of the internet may also reduce some transport use, easing congestion and associated environmental impacts in urban areas.



## Trends



## CONCLUSION

As a critical enabler of economic growth, the efficiency and effectiveness of infrastructure and transport directly impacts Australia's future economic and individual prosperity. Our standard of living, international competitiveness, transport safety and security, and capacity to invest in infrastructure that meets future demands will be at risk without timely action.

Quality investment decision-making has become an even greater imperative. Equally, there are opportunities for further reform and productivity improvement across the infrastructure and transport sector. The evidence is clear that Australians are already reaping the considerable benefits of the reforms from previous decades — including safer and cheaper travel, greater diversity of transport options, a more efficient and productive freight sector (with lower prices for consumers) and better quality infrastructure than ever before.

Continued monitoring and analysis of trends impacting the portfolio is vital in helping governments ensure that the right policy settings, initiatives and programs are in place to manage demand, capitalise on opportunities and strengthen Australia's international competitiveness.

*The efficiency and effectiveness of infrastructure and transport directly impacts Australia's future economic and individual prosperity.*





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