

2.0 Infrastructure challenges

Key points

Over the next two decades:

- Some two million more people will live in NSW, of whom three quarters will settle in Sydney needing jobs, housing, transport and services
- NSW is the largest and most diversified economy in Australia and is predicted to grow by 70 percent
- The links between NSW and the global economy will be even closer
- Businesses, people and communities will need to connect efficiently and safely
- NSW and Sydney must remain liveable and productive places that attract talented people and businesses given the ongoing role of services in the economy
- The Mining sector's role in regional employment and development will increase
- The unpredictable rates of change and potential disruption from technology will only increase
- Competition for public capital will continue to be strong.

As a result, well-connected and resilient infrastructure networks will be even more important over the coming decades in delivering a better life for NSW citizens. The economic success of NSW will rely on the ease with which ideas, people and goods can connect.

Infrastructure NSW's assessment of existing infrastructure capability and forecast demand highlights that what matters most is to fix are:

- the constraints in regional road and rail freight networks
- land-side access to the State's rapidly growing ports and airports
- congestion on the metropolitan road networks
- public transport services, by improving speed, reliability and frequency
- infrastructure for housing to help address the supply backlog
- quality of regional water systems and dams
- flood mitigation to protect people, communities and economies
- healthcare facilities, supported by service delivery reform
- education and cultural venues.

2.1 Introduction

Having established the importance of the context in prioritising which infrastructure investments should occur, it is important to examine the State's economic strengths and weaknesses and to consider future growth opportunities and trends. It is also important to understand the weaknesses and strengths in the current infrastructure asset mix in light of future demand.

2.2 NSW now and in the future

The NSW economy is the largest and most diversified in Australia. NSW is primarily a service based economy, with a number of particular strengths including:

- NSW GSP was \$420 billion¹ in 2010/11, which accounted for 32 percent of national GDP (the next largest state is Victoria which had a GSP of \$317 billion, or 23 percent of the national total²).
- Regional centres and the NSW economy have benefitted from the unprecedented improvement in the national terms of trade and the rise of Asian demand for minerals and agricultural products.
- NSW has significant black coal reserves (accounting for 40 percent of the country's total³), minerals and gas reserves.

¹ Deloitte Access Economics 2012, The NSW Economy in 2031-32, Report to Infrastructure NSW.

² Australian Bureau of Statistics.

³ Deloitte Access Economics 2012, The NSW Economy in 2031-32, Report to Infrastructure NSW.

- Sydney is Australia's only global city. Its economy is the sixteenth largest city economy in the world, ahead of major cities like Singapore and Hong Kong⁴ and is a key driver of national economic performance.
- Sydney is critically important to NSW and to Australia, contributing 75 percent of NSW's GSP and 24 percent of Australia's GDP. Within Sydney, Global Sydney accounts for 41 percent of NSW's output.
- NSW has experienced large growth of the financial services sector where NSW has a historic strength (accounting 16 percent of GSP in 2009)⁵.
- Key economic centres include:
 - The largest coal export port in the world at the Port of Newcastle⁶.
 - Sydney's CBD - 330,000 people work in the city centre⁷.
 - Parramatta is Australia's second fastest growing city (second to Perth) with 8,000 new jobs created in Parramatta in 2011⁸.
 - Sydney Airport is the primary gateway in the country accounting for 46 percent of Australia's international passenger journeys, 23 percent of domestic air passenger journeys and 50 percent of international air freight⁹.

- Global connectivity - 65 percent of international companies represented in Australia, half of Australia and New Zealand's top 500 companies and 30 percent of Australia's employment in finance and business are in Sydney¹⁰.
- Demographic advantages – NSW has a low dependency rate compared to the OECD average which means that the State's workforce does not have as large a burden of supporting the non-working population compared to other states. NSW has a low unemployment rate of 4.8 percent, which is below the national average (5.2 percent)¹¹.

Despite these advantages, NSW has experienced lower population growth, productivity and economic growth than the rest of Australia (as outlined in Section 1). NSW's economic weaknesses, (including low population growth), are driven by the under-supply of housing and high cost of living and traffic congestion.

Lower population growth between 2000 and 2010 has caused lower economic growth in NSW than in the rest of Australia. Since 2000, Australia's population increased by 3.1 million, averaging around 1.8 percent a year, the highest level of growth in Australia's history. In the same period, NSW's population increased by only 700,000, around one percent a year. This means that NSW became home for only 22 percent of Australia's newest residents, compared to around a third (32 percent) of all Australians. Each year over the past decade, NSW has had an average net interstate migration loss of 24,000 people. (However, since 2010 the level of interstate

migration from NSW has fallen and the level of natural growth (fertility rates) has increased).

- Under-supply of housing has contributed to lower population growth. Building enough of the right housing is not only important for individual needs but also for the structure of our cities¹². Housing construction in Sydney declined from 2000 to 2010 and is at historical low levels as shown in Figure 2.1.
- Under-supply of housing in established areas is reportedly due to planning complexity and delays and higher construction costs¹³. Sydney's high cost of land (the highest in Australia) and lack of land supply in greenfield areas, combined with the under-supply in established areas, contributes to households in Sydney facing the greatest housing affordability pressures¹⁴ and, in turn, contributes to the high level of interstate migration.
- Road and traffic congestion impact on the economies of both NSW and Australia has been variously estimated between \$5 billion and \$8 billion per annum. In the Property Council's 'My City' survey, 87 percent of surveyed Sydney residents were dissatisfied with the road network and traffic congestion, leading to Sydney ranking lowest in the liveability index of all cities in Australia.

4 McKinsey Global Institute 2010, City Scope Database.

5 Deloitte Access Economics 2012, The NSW Economy in 2031-32, Report to Infrastructure NSW.

6 Newcastle Ports Corporation.

7 NSW Bureau of Transport Statistics, 2011.

8 Parramatta City Council.

9 Sydney Airport Corporation 2009, Sydney Airport Master Plan.

10 NSW Government, Metropolitan Strategy: Economy and Employment Strategy for Sydney.

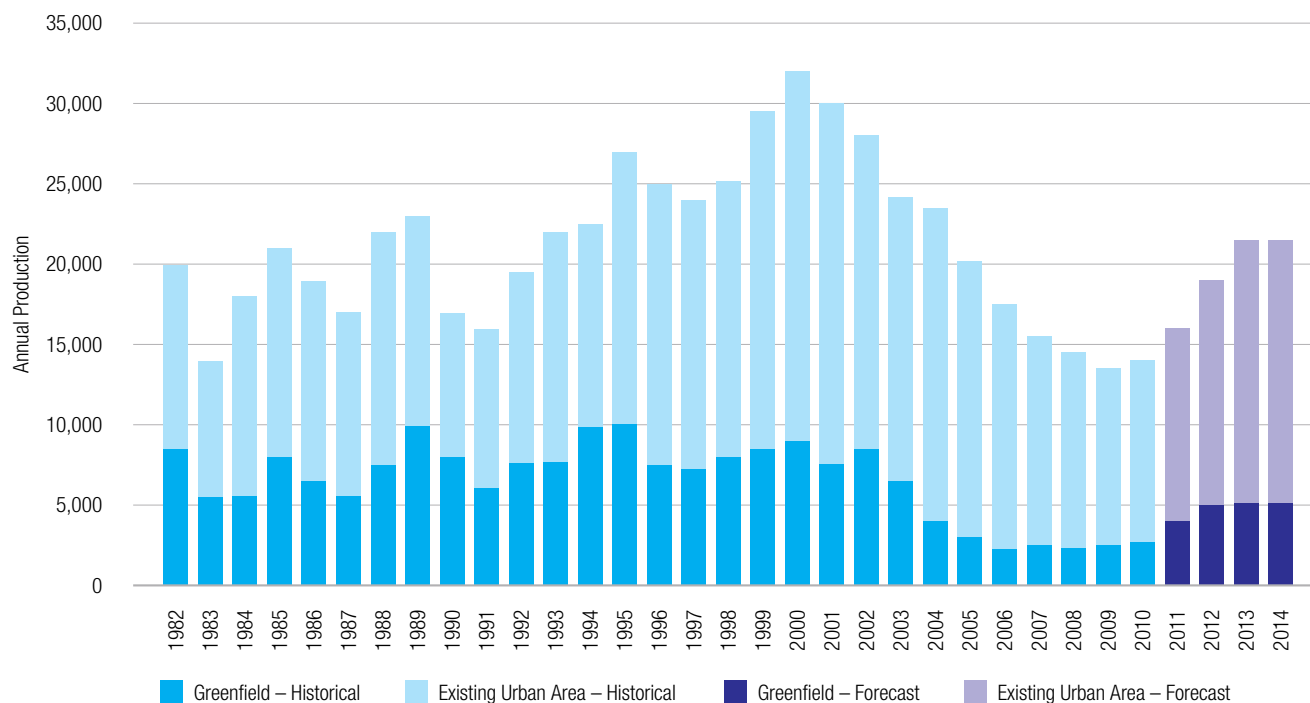
11 Australian Bureau of Statistics 2012.

12 Grattan Institute 2011, The Housing We'd Choose.

13 Grattan Institute 2011, The Housing We'd Choose.

14 NSW Government 2012, Sydney over the next 20 years: A Discussion Paper.

Figure 2.1 Sydney Regional Dwelling Production – Existing Urban & Greenfield Areas (1982-2014)



Source: Department of Planning and Infrastructure.

2.2.1 Global Trends and Driving Forces

Infrastructure NSW has considered two potentially disruptive trends which will influence the State's infrastructure investment priorities and needs. These are global competition and technological change. As a result of these trends, the infrastructure networks needed in 20 years will not be designed and used as they are now.

Globalisation

NSW must compete against the other States and other international centres. To be globally competitive, organisations in business, Government and civil society are searching for clever ideas to either incrementally improve or dramatically change their products, services and capabilities. Economic success will rely increasingly on the ease with which ideas and people can connect around the corner or across the world.

NSW's two speed economy is fundamentally caused by global demand for resources driven by economic development in emerging Asian markets. Mineral exports and agricultural products have benefited while other trade exposed industries have suffered as a result of a high Australian dollar and a greater competition for labour and capital resources.

The negative and positive side of the two-speed economy are felt across NSW regions, as described in Section 5.

As NSW's wealth is ever more closely connected to the world economy, trade in goods and services and demand for travel will continue to increase. This implies that investment supporting NSW air and sea gateways is a priority.

In terms of direct infrastructure effects, the continued demand from emerging markets means a continued increase in the sheer volume of resources and goods that must be moved through NSW's ports, the need to distribute products efficiently within our cities and a potential shift in the mix of bulk and containerised freight.

Over the longer term, the economy's expected sectoral adjustments mean that the demand for high-value skills and innovation is expected to intensify.

To win the war for talent, NSW needs to be a liveable and productive place. Therefore the Strategy has been guided by the principles of connecting people, building resilience and improving amenity to be globally competitive.

Technology and Infrastructure

Advances in technology have always driven human success and prosperity. Understanding the impact of new technologies is central to making sure infrastructure investment supports people and businesses in the coming decades.

Deloitte Access Economics advise that the Australian economy is at a tipping point in the shift towards a digital economy. Australia's digital economy is worth as much as the nation's iron ore exports and is forecast to grow by up to \$70 billion over the next four years.¹⁵

New and emerging technologies will be a powerful and often disruptive source of innovation and renewal. In particular, the digital age is disrupting patterns of mobility and engagement (how we work, shop, meet friends, etc).

Failure to embrace these changes risks creating an infrastructure investment strategy that "hits the mark but misses the point"¹⁶, in other words, a plan for the wrong infrastructure.

A broad range of hard and soft infrastructure is needed to support a growing innovative economy, such as world class broadband communications, investment in vocational and skills education, improved connectivity for export and import of skills. Automating "hard" infrastructure - roads, bridges, railways, electricity networks, hospitals and schools - can achieve significant productivity gains through the use of Information and Communications Technology (ICT) in infrastructure design, operation and optimisation¹⁷. A major study has found that this could improve existing infrastructure performance (lowering operation costs and increasing capital utilisation) by 15 percent¹⁸.

The NSW Government has put in place some of the 'building blocks' for ensuring that NSW industries and the Government sector are well placed to embrace these changes, (including ICT and Telecommunications Boards), and supporting the growth of the digital economy through industry action plans and the establishment of a Digital Precinct in Sydney.

It is hard to predict how these new and emerging technologies (and reactions to them) will change infrastructure demand. Therefore the Strategy has prioritised those 'no-regret' options that will be required in all likely demand scenarios. The strategy takes an incremental approach and prefers the high value, small projects over mega projects which would be exposed to higher technology risks.

¹⁵ Deloitte Access Economics, quoted by Australian Associated Press 31 August 2012.

¹⁶ Cisco Systems 2012, Report to Infrastructure NSW.

¹⁷ Digital Economy Industry Taskforce 2012, NSW Digital Economy Draft Industry Action Plan.

¹⁸ The Climate group 2008, SMART 2020: Enabling the low carbon economy in the information age.

Technology-driven transformation¹⁹

New digital technologies have already changed patterns of mobility and work, retailing, leisure and learning. For example, soft infrastructure such as health services and justice services (vital for a better life) are increasingly provided remotely via ICT. The pace of change will only continue to rapidly accelerate.

The new capabilities of ‘cloud’ computing and the massive volume of distributed information seems to have changed the collective and cumulative impact of technology and communication. This is disrupting patterns of mobility and engagement in cities and regions and is driving major behavioural change.

More and more, work is something you do, not necessarily somewhere you go. New patterns of productivity and creativity are emerging as people find ways to work at home or, increasingly, in ‘third spaces’ that sit between the home and the traditional office.

The city of Amsterdam undertook a survey recently to look at the impact of a decision by every employee in the city to work one day a week either from home or from a ‘third place’ location like a smart work centre or a shared workspace ‘hub’. The study calculated that cost savings, in terms of time, commuting expenses and work travel, would be about €15 million every year.

As far back as 2006, some 30 million Americans, or about a fifth of the workforce, was estimated to be

regularly spending significant work time not at home or in the office but in these third or intermediate spaces. The development of smart work stations means new infrastructure systems and innovations that integrate land use planning with different business models for infrastructure provision.

But an enduring human need is for connection and collaboration. Workers still need an ‘office’, but less and less of the sort that has been used for the last 50 years or more. This is likely to lead to a different mix of cleverly designed places and spaces where people, workers and citizens can congregate and connect for all sorts of work-related reasons.

This focuses Infrastructure NSW’s attention on the importance of amenity of towns and suburbs - appeal and design, facilities, risks and opportunities, all become a powerful element in the equation. Evidence from leading cities and regions, including Amsterdam, Seoul, London, Paris, and the innovation hubs springing up in East London and Birmingham for example, suggests a powerful collision of design, economics, property development, science and technology is fuelling exciting experiments in new ‘office’ or collaborative work environments.

Enabling these innovation hubs requires a planning system that supports flexible development and transport infrastructure that accommodates new journey patterns.

2.3 Forecast of the NSW economy in 2031

Infrastructure NSW engaged Deloitte Access Economics to prepare a baseline economic forecast to 2031-32 for use by the Strategy, the Metropolitan Plan for Sydney and the Long Term Transport Master Plan.

Key forecasts are provided in Table 2.1.

Table 2.1 Key forecasts

	2011	2031	Growth
Gross State Product (\$ billions, 2010 prices)	420	731	+70%
Population (millions)	7.2	9.2	+27%
GSP per capita (\$,000)	58	80	+40%
Employment (jobs millions)	3.6	4.4	+22%

Source: Deloitte Access Economics.

2.3.1 NSW Demographic Forecasts

Infrastructure investment supports the daily movement of people, the freight of goods they consume, and the economic and social services that they rely on. To a large extent, demographic patterns determine the allocation of investment.

More than 75 percent of population growth is expected to occur in Sydney, which will grow to become a city of more than six million people by 2031 (growing by 33 percent). Regional population will grow to 3.1 million people (growing by 17 percent) with most growth expected to be along the coast.

¹⁹ CISCO Systems 2012, Report to Infrastructure NSW.

Table 2.2 Population Growth by Region (millions)

	2010-11	2031-32	Growth	Average annual growth
NSW	7.2	9.2	27%	1.1 %
Global Sydney	1.3	1.7	31%	1.3%
Greater Sydney	3.3	4.4	33%	1.3%
Regional NSW	2.6	3.1	17%	0.7%

Source: Deloitte Access Economics

Most of the forecast growth comes from immigration, with 56,000 new migrants expected per annum.

This growth and region breakdown is shown in Table 2.2.

Population ageing is expected to continue – the median age for NSW was 36 in 2011 and is expected to be 40 in 2031, driven primarily by increasing life expectancy. However, the proportion of children in NSW is forecast to increase over the next 20 years, as the long-term decline in fertility rates appears to be changing.

These trends are expected to lower the ratio of workers to non-workers during this period, which will impact our ability to afford the infrastructure investment needed. Overall, NSW’s demographic position is more favourable than in much of the developed world.

The growing population will require investment in additional basic services: local roads, utilities, healthcare and education. It will also require investment in transport infrastructure to connect new housing centres with the greatest range of employment opportunities.

An ageing population will change the types of infrastructure that NSW requires. This will particularly be the case for social infrastructure – for example, an increase in the proportion of older people in an area will be likely to increase demand for shared accommodation and healthcare services.

Changes in population distribution across regional NSW will present various challenges. Service delivery models will need to change to support growing areas and to ensure delivery is cost-effective where population levels decline.

2.3.2 Industry and Job Forecasts

The State economy is expected to grow by an average annual rate of 2.6 percent per annum to 2031, from \$420 billion to \$731 billion, over 70 percent total growth.

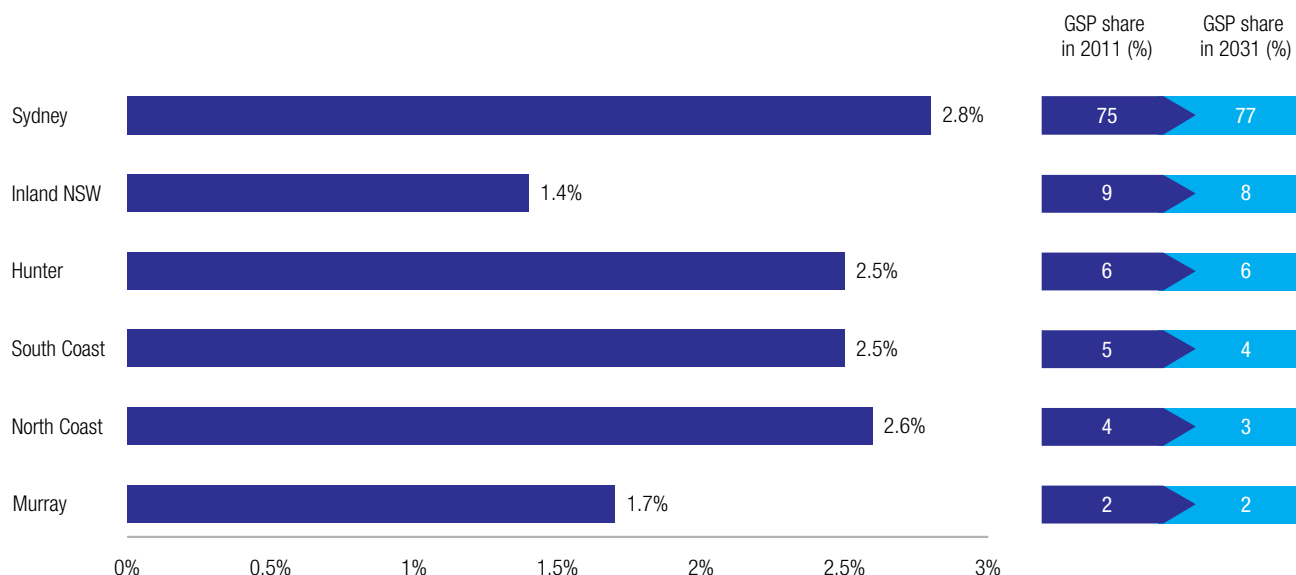
Employment is expected to grow from 3.6 million jobs to 4.4 million.

Sydney is forecast to grow faster than regional NSW and coastal regions faster than inland areas. Sydney's share of GSP is expected to increase from 75 percent to 77 percent.

The growth in regional production and shares is shown in Figure 2.2.

The ongoing decline of the manufacturing sector and the impact of lower water irrigation allocations accounts for the lower growth forecast in the South Coast, Murray and Inland NSW.

Figure 2.2 Forecast Economic structure of NSW GSP growth by region



Source: Deloitte Access Economics.

Economic Structure

NSW is primarily a service economy, with this sector comprising 73 percent of GSP in 2011 and expected to make up nearly 76 percent in 2031. The manufacturing sector is expected to decline from 10 percent of GSP to seven percent over this period.

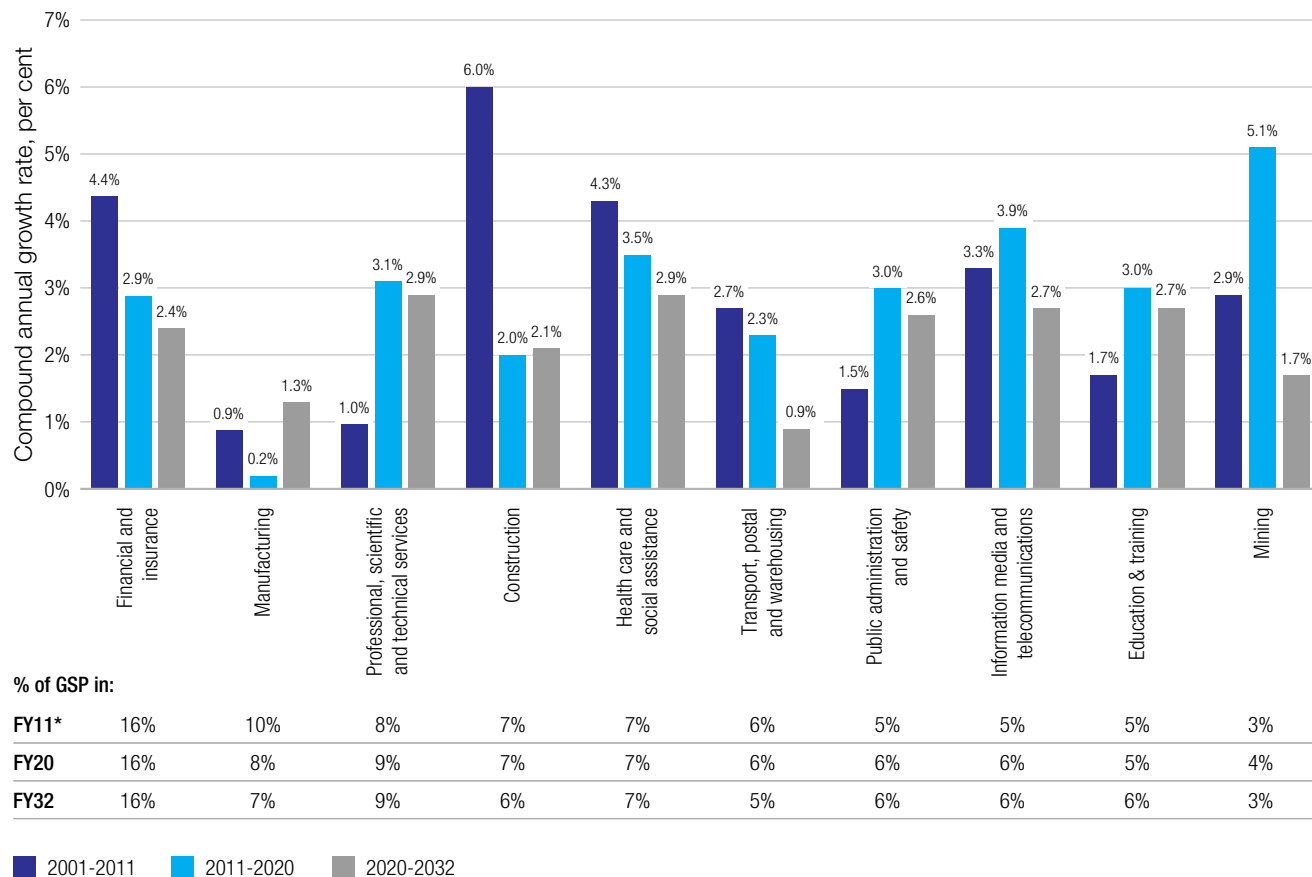
Important changes in the rates of growth between different sectors are shown in Figure 2.3 for the past decade, 2001 – 2011, and for the next two decades.

Key points are:

- The highest growth in the next decade, (2011 – 2021) is expected in mining, with information media and telecommunications sector experiencing the second highest levels of growth.
- The finance sector retains its share of the economy but does not grow as fast in the next two decades.
- The healthcare and social services sector and the professional, scientific and technical sector is expected to grow by 3.5 percent and 3.1 percent respectively. These sectors are growing due to international demand in emerging economies as well as growth in the digital economy in Australia.

Figure 2.3 NSW economic structure and growth 2001-2031

Compound annual growth rate of gross value added to Gross State Product (real, 2009/10)



% of GSP in:

FY11*	16%	10%	8%	7%	7%	6%	5%	5%	5%	3%
FY20	16%	8%	9%	7%	7%	6%	6%	6%	5%	4%
FY32	16%	7%	9%	6%	7%	5%	6%	6%	6%	3%

Source: Port Jackson Partners.

* Per cent of FY11 GSP excluding value added by ownership of dwellings, taxes less subsidies and statistical discrepancies.

These growth industries depend on NSW attracting and retaining people with high skills in knowledge intensive industries. Also these businesses tend to thrive where there is strong connection enabling interaction between many people and businesses. NSW's strengths are in industries where there will be strong continued global competition. It follows that NSW needs to protect its competitive edge by prioritising infrastructure investments that improve productivity, build global connections and improve amenity. Losing the war for talent would have considerable negative consequences for Sydney and NSW.

Therefore, it is essential for infrastructure investment to make Sydney a more attractive place for the knowledge workers whose skill and expertise is at the heart of a successful services based economy.

2.4 The state of NSW's infrastructure

2.4.1 Infrastructure Demand Forecasts

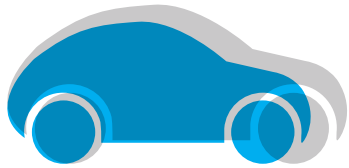
Based on the economic and demographic forecasts and the global infrastructure trends set out above, Infrastructure NSW has collected sectoral demand forecasts summarised in Figure 2.4 and daily travel summarised in Figure 2.5.

The key points are:

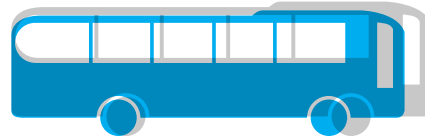
- While population is expected to grow by 27 percent and economic output (GSP) is expected to grow by 70 percent, the demand for some infrastructure is expected to grow many times faster.
- Private car trips are expected to grow by 27 per cent. Cars will remain the mode of choice for most journeys.
- Demand for roads and rail for freight will continue to grow at a multiple of 1.5 to two times GDP growth. Freight demands over the next 20 years will more than triple for port container freight in Sydney and double for bulk freight.
- The continuation of the shift away from a manufacturing base to a service based economy will see a greater demand for imported goods which drives the significant growth in port container traffic. This will result in increased land transport needs particularly around the Port Botany precinct in major regional arterial routes.

- Continued growth is expected in the bulk commodities export of coal and minerals, and in agricultural products, driving the need for efficient transport connection to get product to market efficiently.
- A shift in the demographic profile of our society (with an ageing population) will provide challenges for the health sector.
- NSW is a desirable tourist, business and immigration destination in the region, reflected in the growth in visitor and air passenger travel numbers. This will place greater demands on our key transport hubs such as Sydney Airport and the associated land transport connections.
- Public transport is expected to experience strong growth particularly supporting Global Sydney and other business centres.

Figure 2.4 Future Infrastructure Demands (percentage growth)



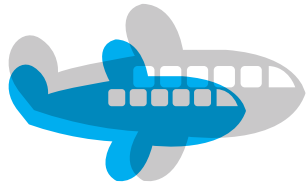
Road – Car Trips
 2011 – 8.6m
 2031 – 10.9m
27%
 2.3 million more daily car trips need to be accommodated on our roads in 2031-32.



Road – Bus trips
 2011 – 0.7m
 2031 – 0.9m
16%
 An extra 121,000 more bus trips each day need to be accommodated on our roads.



Train trips
 2011 – 0.8m
 2031 – 1.1m
37%
 An extra 326,000 train trips each day are expected in 2031-32, including the new South West and North West Services.



Sydney Airport
 2010 – 40m
 2029 – 79m
98%
 An extra 39 million Passenger trips are expected to and from Sydney airport by 2029.



Port Botany – Container trade
 2011 – 2m TEU
 2031 – 7m TEU
272%
 Freight demand grows at a multiple of 1.5 to 2 times GSP and an extra 5 million TEUs are expected in 2031-32.



Coal Freight
 2011 – 170mt
 2031 – 370mt
117%
 Export of coal is expected to more than double in the next twenty years.



Hospital Beds
 2011 – 20,000
 2031 – 25,500
28%
 An extra 5,500 hospital beds may be needed by 2031-32.



Housing Stock
 2011 – 2.9m
 2031 – 3.6m
26%
 More than 700,000 additional houses will be needed by 2031-32; this means around 35,000 each year.



Electricity
 2011 – 71.5 Twh
 2031 – 81.1 Twh
14%
 Electricity consumption has fallen since 2009 and is only expected to increase by 14% in 20 years.

TEU Twenty-foot equivalent unit
Twh Terawatt hour
mt Million Tonnes

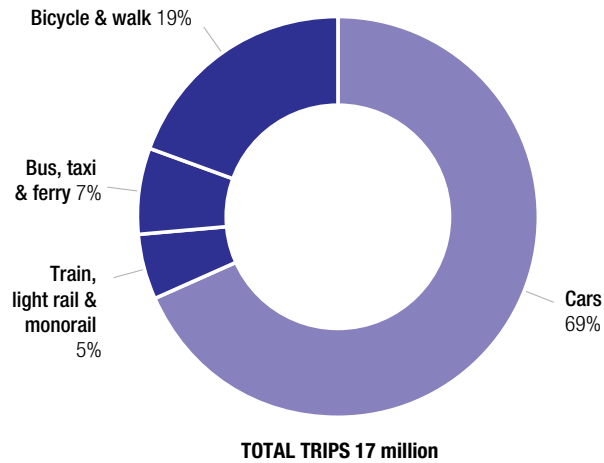
Figure 2.5 Moving around Sydney

Each weekday there are over 17 million passenger journey across Sydney. If walking and cycling are excluded, there are nearly 14 million journeys.

What is important to note is that:

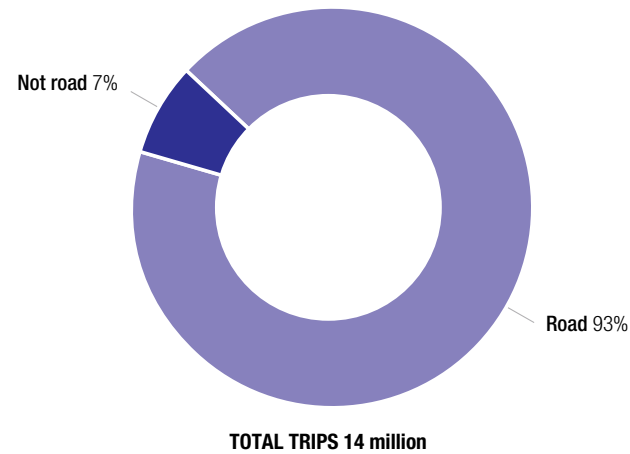
- 69% of trips are by car
- 93% of travel is on roads
- only 48% of transport budget is for roads

Mode share (average weekday trips, 2010)



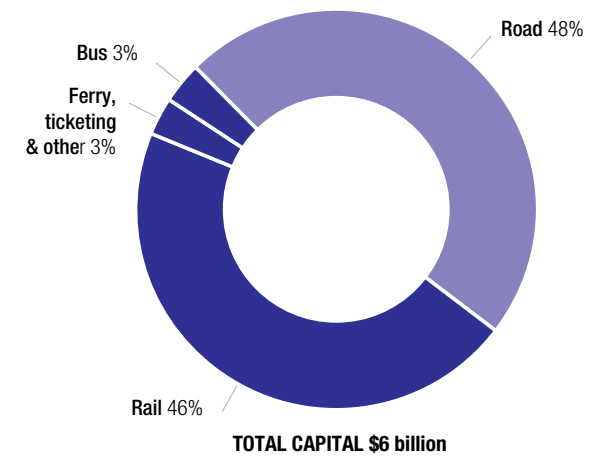
Source: NSW Bureau of Transport Statistics.

Road vs non-road travel (average weekday trips, 2010)



Note: Road does not include bicycle or walk trips.

Funding share to mode (2012-13, \$ million)



Source: NSW Government.

2.4.2 Asset Condition and Capacity

Infrastructure NSW has undertaken a capability assessment of the public infrastructure sectors in order to identify deficiencies that have the most serious impact on the NSW economy and achievement of the Government's objectives.

Section 1 described issues identified with the planning and procurement of infrastructure. This capability assessment covers asset condition and capacity to meet demand by sector.

Independent reviews of each sector have been carried out by GHD (transport, energy and water) and PwC (health, education, culture and justice).

Infrastructure NSW has adapted the Engineers Australia Rating Scale for this assessment, which considers present state condition and ability to meet demand. The assessment is summarised in Table 2.3.

Rating Scale adapted from Engineers Australia Rating Scale contained in Infrastructure Report Card NSW 2010.

Grade	Designation	Definition – condition	Definition – capacity
A	Very good	Infrastructure is fit for its current and future purpose	Infrastructure is capable of meeting its current and future demand
B	Good	Minor changes required to enable infrastructure to be fit for its current and future purpose	Minor changes required to enable the infrastructure to meet its current and future demand
C	Adequate	Major changes required to enable infrastructure to be fit for its current and future purpose	Major changes required to enable the infrastructure to meet its current and future demand
D	Poor	Critical changes required to enable infrastructure to be fit for its current and future purpose	Critical changes required to enable the infrastructure to meet its current and future demand

Table 2.3 Assessment of the Current State of Infrastructure

Sector	Asset Class	Condition	Capacity	Issues
Transport	Urban Roads (Section 6)	B	D	<ul style="list-style-type: none"> Overall physical condition of State roads in urban areas recently improved 92 percent of all state roads are performing adequately in terms of ride quality and 98 percent performing in terms of pavement durability. Although the overall physical condition of roads is good, about 35 percent of road pavements are greater than 35 years old. Ensuring effective ongoing maintenance will be an important issue. Capacity of urban roads is deteriorating with rising congestion where average speeds are approximately 30 kilometres per hour (kph) in the morning peak and 42 kph in the afternoon peak. Congestion along Sydney motorways varies from 2.9 hours on the F3 Motorway at the Wahroonga to Somersby Interchange to up to 13 hours a day on the Eastern Distributor. Average AM peak travelling speeds for the M4 and the M5 range between 17 kph and 35 kph and 17 kph and 24 kph, respectively.
	Buses (Section 7)	B	C	<ul style="list-style-type: none"> Bus services into the CBD are constrained by available road space.
	Rail (Section 8)	A	C	<ul style="list-style-type: none"> The Track Condition Index (TCI) for RailCorp has improved over the years with a TCI of about 40.30, which reflects good condition²⁰. Peak services operate well above capacity in terms of passenger loadings²¹. Increasing rail passenger flows into and out of the Sydney CBD during the peaks appears to be capped by available train paths.

²⁰ A score of below 40.00 indicates very good track condition.

²¹ The Loading factor is used as an indicator of the capacity of CityRail network with respect to meeting demand.

Table 2.3 Assessment of the Current State of Infrastructure (continued)

Sector	Asset Class	Condition	Capacity	Issues
Transport	Ports (Section 9)	Botany A	A	<ul style="list-style-type: none"> – Capacity at NSW major ports ie Port Botany is adequate due to recent infrastructure upgrades and is planned to grow in line with need. There is a lack of integration between ports, road and rail that has led to congestion problems²². – While the current capacity is adequate, Port of Newcastle has development approval to double coal exports to 211 million tons per annum with a potential for a further 90 mtpa for Terminal 4 at Port Waratah Coal Services but this is contingent on take-or-pay contracts with coal producers. – Likewise with Port Kembla, studies are progressing to expand its capacity to 25 mtpa in two phases with Phase 1 (by 2012) to 21 mtpa via operational improvements and Phase 2 (by 2015) to 25 mtpa via new infrastructure.
		Newcastle B		
		Kembla B		
Transport	Regional Roads (Section 10)	B	B	<ul style="list-style-type: none"> – Majority of regional roads are performing adequately in terms of ride quality. – Journey speeds remain stable which indicates that capacity is adequate to meet existing needs. – RMS has a continuous program of upgrading and modifying existing road assets to improve the connectivity and safety of major routes. – 10 to 20% road network not suitable for high productivity/high mass limit vehicles.
	Regional Rail (Section 10)	C	C	<ul style="list-style-type: none"> – The condition of the Country Rail network is significantly worse than the metropolitan network with severe operating speed limits and axle load limits. About 55% of the grain rail network is Class 5 track which is limited to 40 kph speeds and operates to 19 tonne axle load limits. Many of these lines are further restricted to 20 kph operations because limitations with the track formation. Much of the network is characterised by timber sleepers on the branch lines and numerous timber bridges. – Rail freight operations are constrained when the network is shared or interfaces with metropolitan passenger services. This is particularly apparent during the peak commute hours where curfews prevent freight train access on the metropolitan network.
Electricity Section 11	Transmission & Distribution	A	A	<ul style="list-style-type: none"> – TransGrid's network asset design lives vary between 20 and 50 years. – Planned increase in interstate transmission capacity will allow wholesale trading across the national market to share spare capacity.
Water Section 12	Metropolitan Water	A	A	<ul style="list-style-type: none"> – The condition of water supply infrastructure is good with water main breaks and the leakage index both exhibiting a downward trend. At the same time unplanned disruption and water quality complaints remain stable. – The unprecedented increases in capital expenditure due to asset renewal for wastewater and augmentation of existing water supply to include desalination and recycled water over the past few years has introduced diversity into the supply sources to deliver a more reliable water supply system.

²² Engineers Australia 2010, Infrastructure Report Card 2010: New South Wales.

Table 2.3 Assessment of the Current State of Infrastructure (continued)

Sector	Asset Class	Condition	Capacity	Issues
Water Section 12	Non-metropolitan Water	C	C	<ul style="list-style-type: none"> – Regional water supply assets across the State are managed by local authorities. There is a high variability in the condition of water supply assets in different regions. – Combined with the impacts of a prolonged drought event in many areas of the State and a low rates base and small scale operations, many local authority managed assets exhibit under investment leading to lower levels of service or environmental performance when compared with metro regions.
Water Section 12	Metropolitan Wastewater	A	B	<ul style="list-style-type: none"> – There has been improvement in the condition of wastewater system for Sydney Water and Hunter.
	Non-metropolitan Wastewater	B	C	<ul style="list-style-type: none"> – The varying ability of local authorities to fund timely and adequate investment results in high variability in the condition of wastewater assets across the regions of NSW. Some regional areas require upgrades to meet environmental licence conditions. – Similar to water supply, wastewater in regional areas suffer from lower levels of service or environmental performance due to low rates base and small scale of operation.
	Flood Mitigation and Stormwater	C	C	<ul style="list-style-type: none"> – Flood mitigation is inadequate in the Hawkesbury Nepean Valley area.
Health Section 13	Hospitals	B	C	<ul style="list-style-type: none"> – The infrastructure is diverse and much of it is aging with 40 percent of assets more than 50 years old. – Capacity: the configuration of health assets in NSW shows significant differences to other states including more public and fewer private hospitals and more large, multi-purpose and fewer specialist hospitals.
Social Section 14	Schools	B	C	<ul style="list-style-type: none"> – Maintenance around 1.5 percent of asset value needs to be supplemented by higher minor works capital. – Utilisation of primary schools above 100 percent in metropolitan areas. – Existing facilities designs do not reflect technology-driven changes to how teaching and learning occur.
	Culture venues	B	C	<ul style="list-style-type: none"> – Investment not informed by overarching policy or strategy. – Infrastructure constraints with major cultural institutions limit ability to attract major events.
	Justice	B	A	<ul style="list-style-type: none"> – Operational reforms have resulted in some asset classes, i.e. court houses having lower utilisation. – Program of upgrades (courts) and new facilities (prisons) pave the way for reconfiguration rather than expansion of facilities.

The asset capability assessment has highlighted critical (red) and major (orange) infrastructure deficiencies in:

- metropolitan road capacity
- bus capacity, (due to road congestion)
- metropolitan rail capacity in peak periods
- regional rail condition and capacity
- non-metropolitan water and wastewater capacity
- flood mitigation asset condition and capacity
- health capacity
- schools and cultural venues capacity

2.4.3 Priorities – First Things First

Based on the Capability Assessment and the analysis of demand trends, Infrastructure NSW has identified the highest priority infrastructure challenges:

- NSW's trade patterns make its international gateways critical to the State's economy. In recent years, rapid demand growth at Port Botany and Sydney Airport has impacted on NSW's transport networks, particularly around these facilities. With growth forecast to continue, investment is urgently needed in landside infrastructure to allow access to these gateways.
- The congested metropolitan road network means loss of amenity and worsening access to jobs. Sydney's road network carries 93 percent of weekday journeys, that is nearly 13 million journeys a day and major arterials such as the M4 and M5 are

now congested up to 13 hours per day²³.

- Much of the growth in transport demand will be by road over the next 20 years. Congestion will worsen without investment in road infrastructure.
- Rail public transport provides critical access to key employment centres – especially Sydney's CBD. Rail carries a six percent share of journeys in Sydney, around one million on week days. Service quality is perceived as poor, with overcrowding, speed, reliability and customer service identified as issues. Improved service quality and capacity are needed to support NSW economic growth.
- The regional road network cannot support high capacity, high productivity vehicles and 10 to 20 percent of the regional road freight task is constrained.
- The regional rail network is constrained by the condition of the network and the impact of shared use on operations. Growth in freight and growth in mining and agriculture will put more pressure on localised parts of the network.
- Infrastructure for housing is needed for the forecast growth of around 35,000 homes a year. A step change is needed in the number of houses built each year to meet demand, and supporting infrastructure investment (i.e. utilities and roads) is essential to enable this. The policies and actions proposed by the Department of Planning and Infrastructure²⁴ are

²³ Ernst & Young 2011, Port Botany – Sydney Airport Precinct Scoping Study, report to Infrastructure NSW.

²⁴ Department of Planning and Infrastructure 2012, A New Planning System for NSW – Green Paper.

important to support this step change and expected to successfully re-shape Sydney with more intense residential areas closer to jobs and more employment land release in Greater Sydney.

- High electricity network investment has increased costs to households and reduced the competitiveness of NSW businesses. With subdued demand forecast over the next two decades, capital expenditure should reduce from historically very high levels.
- While investment in metropolitan water has been high, investment is needed in some regional water systems.
- Under-investment in healthcare capital over the past decade has increased waiting times and the recurrent cost burden on the health budget. Investment in new facilities in growing areas of the state is needed.
- The quality of education, cultural and justice infrastructure affects quality of life, creativity, innovation and the competitiveness of NSW. The pattern of demand is changing across these sectors and more targeted investment and more flexibility is needed.

The infrastructure imperatives from a spatial perspective are discussed in more detail in Sections 3, 4 and 5. The sectoral options are assessed and recommendations are in Sections 6 – 14.