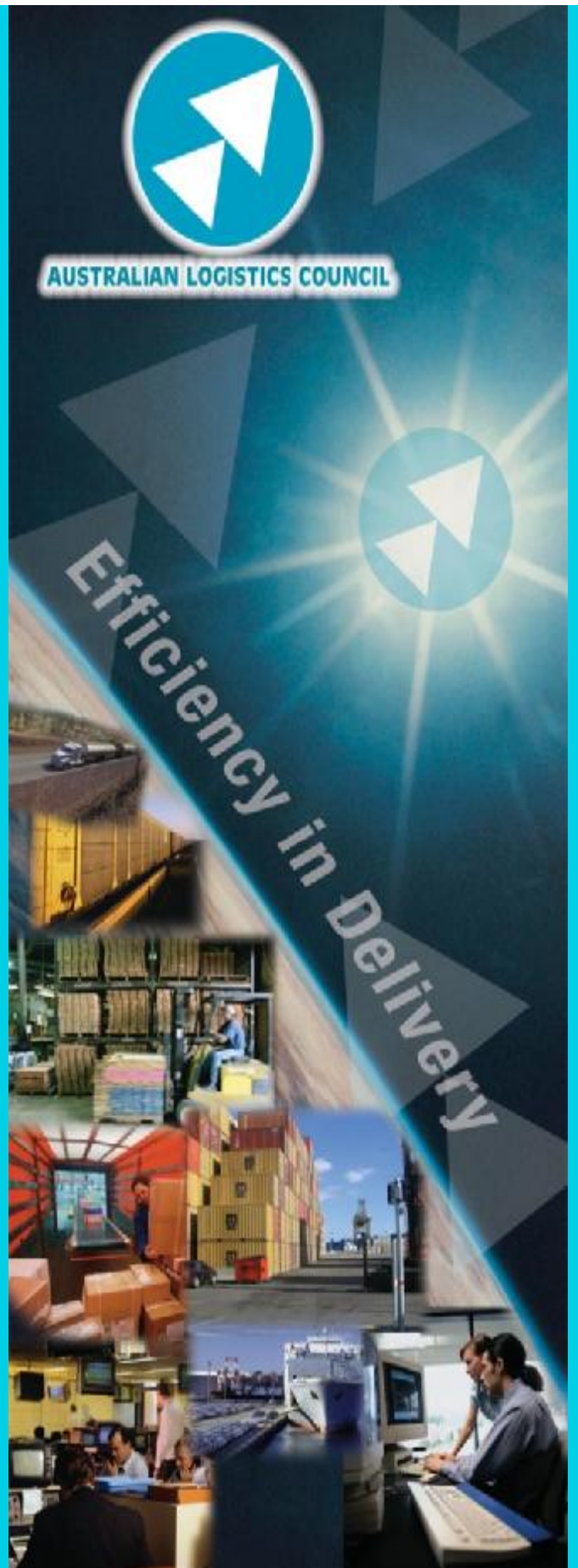


Contribution of Transport & Logistics to The Economy

Dispelling The Myths

2007





Acknowledgements to:

This report was prepared for the Australian Logistics Council by John Apelbaum of the Apelbaum Consulting Group and was made possible by the provision of funds from the Tradegate Development Fund.



AUSTRALIAN LOGISTICS COUNCIL

PREFACE

The collection of National Industry Data was the number one recommendation from the Australian Logistics Industry Strategy (ALIS) in 2002 and has been an area of strong and consistent focus in the work of the Australian Logistics Council (ALC). Our industry is flying blind with a critical shortage of reliable information on which to base decisions. We see the process of providing this information and data as a major initiative that will need commitment over a number of years and that will have many stages as models are refined and data is collected, analysed and reported. It is also work in which many groups and governments with an interest in Transport and Logistics (T&L) are sure to be involved.

The ALC National Data Working Group has made good progress and has achieved

- Definition of Freight logistics confirmed and signed off
- Details of required data established in a report from Sd+D and confirmed in the 'Data Pyramid'
- Audit of available data completed with help from Sd+D and Macquarie University
- Therefore data gap established
- Strategies to fill the gap developed to include short and medium term actions
 - Short term – make best use of available data
 - Medium term – Work with ABS to establish a satellite set of accounts as part of the National accounts (similar to the arrangements for tourism)

This current report has been completed by John Apelbaum for ALC and is an outcome of our commitment to make best use of available data. We have asked John to use his expertise to pull together the best available data and to refine the work that was previously reported by the Bureau of Regional and Transport Economics (BTRE) in paper 49 in 2002. John's work has been completed in close consultation with both the BTRE and the Australian Bureau of Statistics (ABS) and is a major step forward for Transport and Logistics (T&L).

ALC is committed to continuing with this important process and to working with others in our industry to finish the job.

Finally, the great work of the volunteers who make up the National Data Working Group must be recognised. In particular the leadership of Margaret Milne and Len Harper has been tremendous and is very much appreciated.

Hal Morris
Chief Executive
Australian Logistics Council

September 2007



AUSTRALIAN LOGISTICS COUNCIL

The Contribution of Transport
and Logistics To The Economy -
Dispelling The Myths



Apelbaum Consulting Group Pty Ltd

2007

Table of Contents

HEADLINES

	<i>CONTRIBUTION TO GROSS DOMESTIC AND GROSS STATE PRODUCT.....</i>	<i>1</i>
	<i>INTERNATIONAL EARNINGS AND THE CURRENT ACCOUNT ..</i>	<i>2</i>
	<i>THE FREIGHT TRANSPORT TASK.....</i>	<i>2</i>
	<i>ENERGY CONSUMED BY FREIGHT TRANSPORT.....</i>	<i>3</i>
	<i>EMISSIONS GENERATED BY FREIGHT TRANSPORT.....</i>	<i>4</i>
1.0	INTRODUCTION	5
1.1	Background	5
1.2	Study Objectives And Scope	5
1.3	Reconciling Transport And Logistics To Australian National Accounts.....	6
1.4	Data Limitations.....	7
1.5	Report Outline.....	7
2.0	The Significance of T&L to Gross Domestic Product	11
2.1	The Hire And Reward Sector.....	11
2.2	Total Transport And Logistics	12
2.3	The Equivalence Of T&L To GDP.....	13

Table of Contents cont...

3.0	THE CONTRIBUTION OF FREIGHT TRANSPORT TO AUSTRALIA'S CURRENT ACCOUNT	15
3.1	Australian Transport And The Current Account – A Short Primer.....	15
3.2	International Freight Earnings	16
3.3	Impact Of Freight Services On Net Services.....	17
4.0	THE AUSTRALIAN FREIGHT TRANSPORT TASK – A MODAL PERSPECTIVE.....	19
4.1	The Domestic Freight Task.....	19
4.1.1	Road	21
4.1.2	Rail.....	22
4.1.3	Air	23
4.1.4	Sea	23
4.1.5	Non-Urban Pipelines.....	24
4.2	International Freight Task.....	24
4.2.1	Sea	24
4.2.2	Air	25
5.0	THE CONTRIBUTION OF FREIGHT TRANSPORT TO FUEL CONSUMED.....	26
5.1	Direct Energy Projections	27
5.2	Energy Intensity.....	28
6.0	THE IMPACT OF FREIGHT TRANSPORT ON EMISSIONS.....	29

Table of Contents cont...

BIBLIOGRAPHY	31
GLOSSARY	33
APPENDIX A: METHODOLOGY AND ASSUMPTIONS	34
A-1 GDP/GSP Analysis	34
A-1-1 The Freight Component Of Gross Value Added By Hire And Reward Transport By Mode.....	34
A-1-1-1 Road Transport.....	34
A-1-1-2 Rail Transport.....	34
A-1-1-3 Air Transport.....	34
A-1-1-4 Sea Transport.....	34
A-1-1-5 Transport Services And Storage	35
A-1-2 Apportioning The Freight Transport – Hire And Reward GVA By State/Territory	35
A-1-3 Ascertaining The Contribution Of Ancillary Transport To GVA..	35
A-1-3-1 Road Transport	36
A-1-3-2 Air Transport	36
A-1-3-3 Water Transport	36
A-1-3-4 Rail Transport.....	36
A-1-3-5 Transport Services And Storage.....	37
A-2 CURRENT ACCOUNT ANALYSIS	38
A-2-1 Resident Transport Operators	38
A-2-1-1 Freight On Exports.....	38
A-2-1-2 Passenger Services - Earnings	38
A-2-1-3 Other Earnings Abroad	38
A-2-1-4 Shipping Component Of Passenger Services.....	38
A-2-1-5 Insurances.....	38
A-2-1-6 Foreign Operators – Expenditure In Australia.....	38

Table of Contents cont...

A-2-2	Foreign Operators.....	39
A-2-2-1	Freight On Imports.....	39
A-2-2-2	Insurance On Exports	39
A-2-2-3	Port Services	39
A-2-2-4	Resident Operators – Expenditure Abroad	39
A-2-3	Freight Earnings	39
A-2-3-1	Australian Resident Operators – Freight On Imports	39
A-2-3-2	Australian Air Transport Operators – Freight On Exports	39
A-2-3-3	Foreign Operators – Freight On Exports.....	40
A-2-3-4	Earnings By Foreign Air Operators.....	40
A-2-3-5	Resident Operators – Expenditure Abroad	40
A-2-3-6	Net Income – Australian Shipping	40
APPENDIX B: ADDITIONAL TABLES.....		41

List of Tables and Figures

Table 1	ANZSIC Reconciliation	8
Table 2	League Ladder Of Australian Industries	14
Table A-1	Tonnes Carried By Australian Shipping By Service Type And Trade	36
Table A-2	Rail Freight Transport Task By Jurisdiction	37
Table B-1	The Equivalence Of Hire And Reward Transport And Logistics To GDP/GSP, 2004/05	41
Table B-2	The Equivalence Of All Transport And Logistics To GDP/GSP, 2004/05	43
Table B-3	Freight Transport Earnings From Australia's External Trade, 2004/05	45
Table B-4	Impact Of International Transport On Net Services On the Current Account, 2004/05	46
Table B-5	Tonnes Carried By Australian Transport By Mode, 2004/05	47
Table B-6	Australian Freight Task By Mode, 2004/05	48
Table B-7	Australian Freight Task By State/Territory, 2004/05	49
Table B-8	Energy (FFC) Consumed By Freight Transport	50
Table B-9	Projections Of Direct Energy Consumed By Major Freight Mode	51
Table B-10	Energy Intensity In Undertaking The Freight Task, 2004/05	52
Table B-11	CO ₂ -e Emissions From Domestic And International Freight Transport	53
Table B-12	CO ₂ -e Emissions From Domestic And International Freight Transport By State/Territory, 2004/05	54
Figure 1	The Equivalence Of Hire And Reward Transport And Logistics To GSP By State/Territory, 2004/05	12
Figure 2	The Equivalence Of Transport And Logistics To GSP By State/Territory, 2004/05	13
Figure 3	Freight Transport Earnings From Australia's External Trade, 2004/05	16
Figure 4	Impact Of All Transport On Net Services, 2004/05	17
Figure 5	Impact Of Freight Transport On Net Services, 2004/05	18
Figure 6	Tonnes Carried By Australian Domestic Transport By Mode, 2004/05	19
Figure 7	Australian Domestic Freight Task By Mode, 2004/05	20
Figure 8	Share Of The Domestic And International Freight Task By State/Territory, 2004/05	21
Figure 9	Outlook For The Road Freight Task	22
Figure 10	Outlook For The Rail Freight Task	23
Figure 11	Outlook For The Domestic Shipping Freight Task	24
Figure 12	Outlook For Tonnes Carried By International Shipping	25
Figure 13	Share Of FFC Energy Consumed By Domestic Freight Transport	26
Figure 14	Direct Energy Consumed By Freight Transport By State/Territory, 2004/05	27
Figure 15	Projections Of Direct Energy Consumed By Major Freight Modes	28
Figure 16	Energy Intensity In Undertaking The Freight Task, 2004/05	28
Figure 17	CO ₂ -e Emissions From Domestic Freight Transport	29
Figure 18	CO ₂ -e Emissions From Domestic And International Freight Transport By State/Territory, 2004/05	30

HEADLINES

This report dispels some of the myths associated with the significance of Transport and Logistics (T&L) to the Australian economy and demonstrates that not only is the sector a dominant contributor to Australia's economic prosperity but its role in servicing the Australian economy is likely to continue for the foreseeable future. The major headlines from the review are summarised below.

CONTRIBUTION TO GROSS DOMESTIC AND GROSS STATE PRODUCT

The value added by Australian T&L is equivalent to approximately 14.5 per cent of Australia's GDP.

The significance of T&L to State/Territory economies varies substantially by State/Territory with the value added by T&L being equivalent to 24.1 per cent of Western Australia's gross state product (GSP), 18.6 per cent of Queensland's GSP, 17.1 per cent of South Australia's GSP, 14.1 per cent of Tasmania's GSP, 13.0 per cent of the Northern Territory's GSP, 12.0 per cent of Victoria's GSP, 11.2 per cent of New South Wales' GSP and 3.6 per cent of the ACT's GSP.

The value added equivalence to GDP of T&L is the largest of any sector in the Australian economy.

INTERNATIONAL EARNINGS AND THE CURRENT ACCOUNT

Transport earnings arising from Australia's external trade totaled A\$13.1 billion in 2004/05. Freight on exports equated to A\$5.0 billion (or 38.3 per cent of total freight earnings) with the remainder (A\$8.1 billion or 61.7 per cent) arising from imports.

The contribution of freight transport to the net services deficit equated to A\$5.0 billion which is equivalent to 8.7 per cent of the current account deficit.

The vast majority of the freight transport deficit (A\$4.2 billion) arose from the use of foreign shipping while a further A\$1.4 billion emanated from foreign airlines.

Australian freight transport contributed to a A\$0.6 billion reduction in the deficit on net services.

THE FREIGHT TRANSPORT TASK

Cargo handled by the domestic freight transport sector (excluding pipelines) totaled 2.7 billion tonnes in 2004/05, an increase of 54.5 per cent or 1.0 billion tonnes relative to 1994/95.

The domestic freight task has grown by 43.3 per cent since 1994/95 to 517.2 billion tonne-kilometres in 2004/05.

Road and rail transport increased their share of the domestic freight task to 37.5 per cent and 35.9 per cent respectively, at the expense of domestic shipping, whose market share declined to 22.1 per cent. Pipelines increased their share of the national non-urban freight task to 4.5 per cent in 2004/05.

Almost 74.0 per cent of the Australian freight task (domestic and international) was undertaken by activity in Western Australia and Queensland, followed by New South Wales (16.3 per cent), Victoria (5.8 per cent) and South Australia (2.2 per cent). Tasmania and the Northern Territory both generated 1.1 per cent of the national freight task.

For the major freight modes, growth in economic activity is projected to increase the annual:

- road tonne-kilometre task by 56.2 per cent to 303.1 billion tonne-kilometres, by 2014/15;
- rail freight task by 98.2 billion tonne-kilometres, or 52.9 per cent, to 283.8 billion tonne-kilometres by 2014/15;
- domestic shipping task by 24.3 billion tonne-kilometres or 21.3 per cent to 138.3 billion tonne-kilometres in 2014/15;
- tonnes carried by international shipping by 448.0 million tonnes or 65.8 per cent by 2014/15.

ENERGY CONSUMED BY FREIGHT TRANSPORT

Energy consumed in servicing Australia's major domestic and international transport freight modes¹ totaled 981.6 PJ (on a full fuel cycle basis) in 2004/05, an increase of 52.6 PJ or 5.7 per cent relative to that evidenced a decade ago.

Of the energy (FFC) consumed by domestic freight transport in 2004/05, 84.2 per cent arose from the use of road vehicles (LCVs and trucks), 7.9 per cent from rail transport, 4.0 per cent from non-urban pipelines and 3.8 per cent from domestic sea transport.

NSW transport activity consumed 35.7 per cent of the direct energy required by freight transport (excluding air transport) followed by Queensland (22.7 per cent), WA and Victoria (16.9 per cent each), South Australia (4.8 per cent), NT (1.4 per cent), Tasmania (1.3 per cent) and the ACT (0.3 per cent).

Projections suggest that direct energy consumed by major Australian domestic and international freight transport modes (excluding pipelines) may increase by 350.2 PJ or 41.3 per cent by 2014/15. Much of this growth (62.1 per cent) may be incurred by international shipping.

In the movement of Australian freight, international shipping is the most energy efficient mode (on a FFC basis) followed by ancillary rail, coastal shipping, hire and reward rail, pipelines, articulated trucks, rigid trucks and light commercial vehicles.

¹ Road, rail, sea and pipelines.

EMISSIONS GENERATED BY FREIGHT TRANSPORT

Domestic and international freight transport services² in, to or from Australia generated 71,992.6 Gg of CO₂ equivalent greenhouse gas emissions in 2004/05.

Annual greenhouse gas emissions (CO₂ equivalent) arising from Australian domestic freight transport increased by 6,481.1 Gg or 21.5 per cent during the past decade.

Freight movements in NSW generated 35.6 per cent of freight CO₂-e transport emissions, followed by Queensland (23.2 per cent) Victoria (17.2 per cent), WA (16.2 per cent), South Australia (4.9 per cent), NT (1.4 per cent), Tasmania (1.2 per cent) and the ACT (0.3 per cent).

² Excludes air transport.

1.0 INTRODUCTION

1.1 Background

The performance of transport and logistics (T&L) is critical to the competitiveness of Australian business and the national economy on a global scale. While there exists data and analysis pertaining to the size of the Australian freight transport task, there is no coherent body of accurate and relevant data which defines the industry's contribution to the national economy nor has there been any assessment to reflect the differing contribution of T&L to the economies of Australia's States and Territories.

The most widely referenced assessment of the economic significance of T&L to the Australian economy was that undertaken by the Bureau of Transport Economics (BTE)³. The analysis concluded that the gross value added by T&L equated to \$57 billion which was equivalent to 9.2 per cent of GDP in 1999-2000 dollars. However, the BTE noted that the estimates are "probably conservative"⁴ as the analysis "does not include some transport activities that are undertaken in-house by firms primarily involved in other activities". In briefly examining the significance of this exclusion, the BTE noted that the contribution of in-house transport services to transport value added in the United States was almost forty (40) per cent. By applying the in-house estimate to the Australian hire and reward (H&R) contribution, the BTE concluded that value added by T&L may have contributed to 15.0 per cent of GDP⁵. Nevertheless, the 9.2 per cent equivalence has become the accepted understanding of the role of T&L within the Australian economy.

In 2002, the Apelbaum Consulting Group (ACG)⁶ examined the issue of the contribution of T&L to the national and Victorian economies as part of the Victorian Government's development of the Victorian Freight and Logistics Strategy. The analysis involved both the H&R and in-house or ancillary components of the T&L sector and concluded that the value added by T&L was equivalent to approximately 14.8 per cent and 13.0 per cent of the Australian and Victorian economies, respectively.

The Australian Logistics Council (ALC) has, for some time, been concerned about the paucity of data and analysis pertaining to the contribution of T&L to the Australian economy. Within this context, the ALC National Industry Data Working Group commissioned Strategic Design and Development⁷ to prepare a strategic data audit for the Australian logistics sector. Overall, while there was some evidence of data that could define some components of the T&L sector there was little empirical data (or an analytical framework) that allowed a holistic quantification of the significance of T&L to the national and State/Territory economies. Accordingly, the ALC sought the assistance of the ACG to estimate the contribution of Australian T&L to the domestic economy and international earnings.

1.2 Study Objectives And Scope

The principal objective of the assignment is to estimate the contribution of T&L and logistics to the Australian economy at both the State/Territory and Federal level in a manner conducive to policy development and informed debate. In so doing, the scope encompasses quantification of:

³ Bureau of Transport Economics (2001).

⁴ Ibid, pg 32.

⁵ Ibid, pg 33.

⁶ Apelbaum Consulting Group Pty Ltd (2002).

⁷ Strategic Design and Development (2006).

- the equivalence of T&L to GDP/GSP;
- the role of T&L to international earnings and the current account;
- the tonnes carried and the tonne-kilometre task by Australian freight transport;
- energy consumed by Australian freight transport;
- CO₂-e emissions generated by Australian freight transport.

Data pertaining to the number of businesses, industry turnover, employment and investment arising from T&L activities is grossly incomplete. Any attempt to undertake such an assessment on the basis of existing data would be misleading and, in all likelihood, underestimate the role of the industry within the Australian economy.

1.3 Reconciling Transport And Logistics To Australian National Accounts

As the analysis was totally reliant on publicly available data in general and data provided by the Australian Bureau of Statistics in particular, the first phase of the work program involved reconciliation of a definition of T&L to the national accounts.

Despite numerous definitions of transport and logistics such as those prepared by the Canadian Association of Supply Chain and Logistics Management⁸, the OECD⁹, the US Department of Transport¹⁰ and UNCTAD¹¹ there is no universally agreed definition of logistics due to the multiplicity of terms that are used to refer to what is essentially identical or, at the least, similar activities (such as supply chains, trade facilitation, freight forwarding, value chains, demand chains and services auxiliary to transport). Within the Australian context, the BTE¹² defined logistics as “the activities required for the movement and handling of goods and materials, from inputs through production to consumers and waste disposal”. It included “associated reverse flows such as product and equipment returns, and recycling”. The Industry Steering Committee of the Freight Transport Logistics Industry Action Group¹³ defined logistics as “everything to do with freight”. Further, the Committee defined logistics management as “the science of balancing the storage (stocks) and movement (flows) of inputs and outputs to meet demand and minimise total cost while delivering increased efficiencies”.

The ALC advised that the BTE definition should be adopted for the analysis. In accordance with this definition, it was concluded that the broad logistics activities are production processes (including inventory), materials and other inputs (procurement), transport, storage, product support, reverse flows and disposal. Specifically, T&L activities include warehousing, inventory management, processing, labeling, kitting, order management, planning and processing, line haul (road, rail, sea, air and pipelines), regional consolidation, distribution centre activities, courier route trade, local and regional distribution, customer service and call centre activities.

⁸ Canadian Association of Supply Chain and Logistics Management at website www.infochain.org

⁹ OECD (1992).

¹⁰ Federal Highway Administration (2005).

¹¹ UNCTAD Secretariat (2006).

¹² Bureau of Transport Economics (2001).

¹³ Industry Steering Committee of the Freight Transport Logistics Industry Action Group (2002).

The major stakeholders of T&L activities are manufacturers, import/export service providers and customers. These stakeholders reside in all sectors of the Australian economy with many of the activities being undertaken internally within entities whose primary role is other than T&L. Accordingly, there is no specific industry within the Australian economy that is largely responsible for the full suite of activities that constitute T&L though some components of T&L have been separately accounted for in the national accounts (such as transport and storage). **Table 1** outlines the reconciliation between the nominated T&L activities and the national accounts. The reconciliation between logistics activities and the national accounts, allowed the following conclusions:

- the national accounts do not readily lend themselves to delineation according to the above definition of T&L. Even if the national account classification could be fully reconciled with T&L activities, the ABS is unlikely to have data for each of the classifications;
- The national accounts do not explicitly acknowledge ancillary (or in-house) T&L activities, being confined to H&R transport and storage;

As a result, the national accounts are unable to unilaterally provide a quantitative description of T&L. Ultimately, the accounts need to be supplemented by additional “third party” data to encompass all those activities currently not identified within the ANZSIC definition and to allow for ancillary T&L activities¹⁴.

1.4 Data Limitations

The national accounts are not sufficiently detailed to provide a holistic, quantitative assessment of the Australian T&L sector, nor were there resources to independently acquire additional data. Data issues also extended to the current account analysis, as much of the (ABS) data required to delineate sea from air transport and to ascertain non-resident to non-resident transactions were unavailable due to confidentiality requirements.

Accordingly, in order to undertake the analysis, existing publicly available data was supplemented by ACG data. In addition, the analysis was predicated, in part, on assumptions, which are detailed in the text or appendices. Third party data has been assessed for consistency but has not been audited. The ACG cannot be accountable for any errors in the data provided.

1.5 Report Outline

The report consists of five (5) further sections. Section 2 details the significance of T&L to gross domestic/state product. The contribution of T&L to the current account is outlined in Section 3. Section 4 provides an outline of the Australian freight task by State/Territory. The section concludes with ten (10) year freight task projections. Section 5 details the contribution of freight transport to fuel consumed (including projections) on a State/Territory basis, while the final section examines the impact of freight transport on greenhouse gas emissions (by State/Territory).

¹⁴ For the purposes of the analysis, H&R activities are defined as those described by the ABS as transport and storage. That is production, materials and other inputs, product support and reverse flows have not been included with H&R.

TABLE 1: ANZSIC RECONCILIATION

T&L Activity	ANZSIC Code	Title	Description
Production			
<i>Production flow management</i>			
Production planning			
Materials handling			
<i>Inventory management</i>			
<i>Packaging</i>			
Packaging	7320	Packaging Services	Includes crating and packing for road freight
<i>Order processing</i>			
Order management			
Order receipt			
Labelling			
Filling orders			
Kitting			
Pre retail			
Co packing			
Despatching			
Demand forecasting			
Materials and other inputs			
<i>Procurement</i>			
<i>Materials management</i>			

TABLE 1 cont: ANZSIC RECONCILIATION

T&L Activity	ANZSIC Code	Title	Description
Transport and Storage			
<i>Freight (line haul) transport</i>			
<i>Road transport</i>	4610	Road Freight Transport	Includes furniture removal services, postal services by heilage, road freight services excluding truck (with driver) and motor vehicle hire (with driver). Excludes mail, parcel and express, inter-urban.
<i>Rail Transport</i>	4710	Rail Freight Transport	Excludes mail, parcel and express, inter-urban.
<i>Sea Transport</i>	4010	Water Freight Transport	Includes blue water freight between domestic ports, freight ferry services, harbour freight transport services, international services, river freight transport, ship management services, river/canal services. Excludes oil transport, inland navigation, shipping.
<i>Air Transport</i>	4910	Air and Space Transport	Includes passenger and freight transport and time charter of aircraft. Excludes repair of aircraft, ticket sales and sight seeing services.
<i>Pipelines</i>	5021	Pipeline Transport	Includes pipeline operation for the transport of gas, oil and other material. Excludes construction and repair of pipelines.
	5811	Water Supply	
	5812	Storage and Transport Services	
<i>Other transport</i>	5029	Other Transport Services	
Warehousing and storage			
Warehousing	5321	Chain Storage Services	Includes grain elevator and grain silo operation and grain storage.
	5320	Other Warehousing and Storage Services	Includes bond store operation, bulk petroleum storage, cool room storage, controlled atmosphere storage, free atmosphere storage, bonded atmosphere storage, other storage, warehousing and stock storage. Excludes self-storage renting or leasing.
<i>Cross Deck segment consolidation</i>			

TABLE 1 cont: ANZSIC RECONCILIATION

T&L Activity	ANZSIC Code	Title	Description
Other transport services			
Postal services	5101	Postal Services	Includes mail services, mailbox rents, post office operation, postal agency operation.
Courier Services	5102	Courier Pick-up and Delivery Services	Includes postal services, customised express pick-up and delivery, grocery delivery, home delivery, messenger services, pick-up and delivery.
Maritime Stevedoring	6011	Stevedoring Services	Includes ship loading and unloading, cargo securing, unloading and re-loading services.
Harbour stevedoring	6092	Harbour Stevedoring Services	Includes unloading, re-loading and unloading.
Sea port services	6012	Port and Water Transport Terminal Operations	Includes end loader operation (water transport), port terminal operations, grain loader operation, port operations, ship mooring services, freight terminals, passenger terminals, wharf operations. Excludes construction, port planning, ship repairs.
Other sea transport services	5213	Other Water Transport Support Services	Includes ship agency, towage, lightering, navigation services, oil cargo salvage, ship repair and agency.
Airport and other air services	5220	Airport Operations and Other Air Transport Support Services	Includes air traffic control service, air navigation, aircraft support, baggage handling, airport operation, airport terminal operation. Excludes aircraft repair, terminal cleaning, airport, ticket sales, programming software, etc.
Customs clearance	6291	Customs Agency Services	Includes clearance services, import & export clearance. Excludes customs and border control.
Other transport support	6299	Other Transport Support Services n.e.c.	Includes road, rail and container terminal operations, freight brokerage, road passenger terminal, road vehicle ending service, taxi rank operation (for couriers), toll bridge operation, toll road operation and weighbridge operation. Excludes hiring and leasing of assets.
Truck and rail			
Product Support			
Ferries support			
Service support			
Reverse Flows			
<i>Handling, storage and transport of product returns</i>			
<i>Return to manufacturer</i>			
<i>Recycling and waste disposal</i>			

Source:
Australian Bureau of Statistics (2006).

2.0 The Significance Of T&L To Gross Domestic Product

In simple terms, gross domestic product (GDP) can be defined as the total value of final goods and services produced for consumption within Australia's borders for a selected time period (such as a year). Importantly, GDP does not include intermediate goods and services but final goods and services¹⁵.

In order to compare Australian T&L to GDP, it is necessary to determine the value added by T&L. In this way, we are able to quantify the extent of T&L's contribution to GDP. But because intermediate goods are not included in GDP, this is a difficult process requiring detailed national accounts¹⁶ that are capable of identifying those goods and services purchased by logistic services that are consumed in the production of goods and services by business. The difference between the gross output less intermediate purchases is T&L's contribution to GDP. There are two steps required to achieve this outcome.

The first involves delineation of T&L from Australian business activities. Having done so, the second requires disaggregation of H&R T&L activities from in-house (or ancillary) activities¹⁷. The Australian national accounts provide some measure of the value added from H&R T&L (incorporating line haul transport, transport services and storage). However, there is no means of determining the value added by in-house T&L services nor other logistic activities within the hire and reward sector.

Given the above, and in describing the role of T&L to GDP, it is critical to emphasise that the analysis presented below should not be interpreted as T&L accounting for some percentage of GDP or that the value of T&L contributes some per cent of GDP, but rather that the contribution of T&L is equivalent to some per cent of GDP¹². Appendix A details the assumptions and secondary analysis required to address existing data limitations.

2.1 The Hire And Reward Sector

The analysis indicates that the value of Australian H&R line haul freight transport sector is equivalent to 2.7 per cent of GDP. Adding logistics and storage to freight transport increases the H&R T&L value equivalence to 6.2 per cent of GDP, in 2004/05.

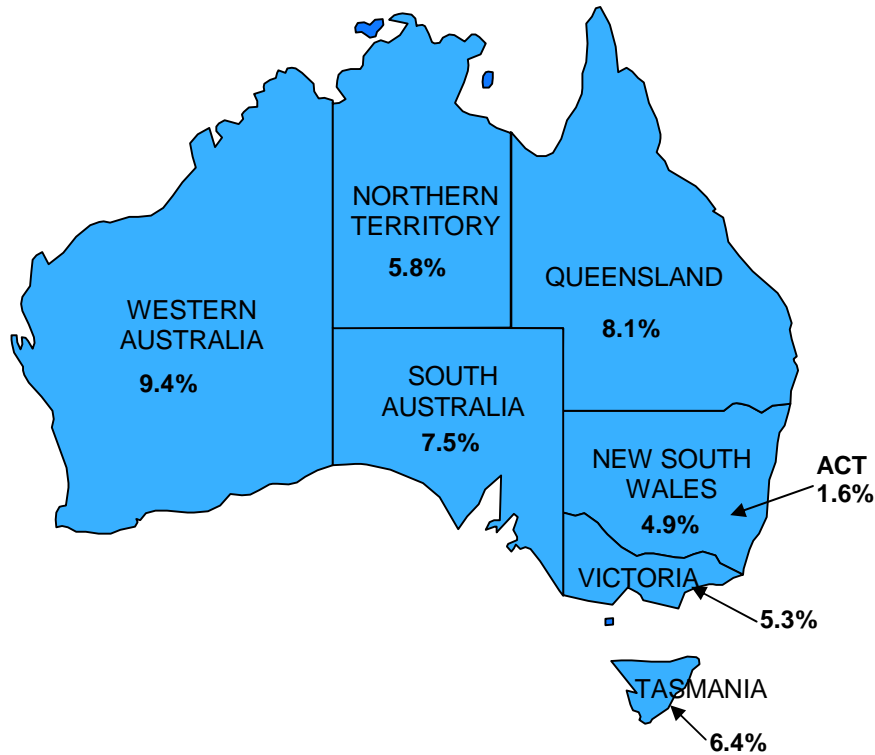
Further, the value equivalence of H&R T&L differs by State/Territory. **Figure 1** illustrates that the value of H&R T&L may be equivalent to between 1.6 per cent (ACT) and 9.4 per cent (WA) of gross state product (GSP) with the equivalence of H&R T&L to GSP in Western Australia, Queensland (8.1 per cent), South Australia (7.5 per cent) and Tasmania (6.4 per cent) exceeding the national value.

¹⁵ For a fuller description of GDP and the role of logistics refer to FHA DOT (2005), "Logistic Costs and the US Gross Domestic Product", Prepared by MacroSys Research and Technology.

¹⁶ With far greater detail than that evidenced from the ABS statistics.

¹⁷ Within this context, consideration should also be given to excluding non-T&L activities from entities predominantly involved in T&L. There is no empirical evidence to suggest that T&L entities undertake significant activities associated with other sectors of the Australian economy such as agriculture, mining, retail etc. Accordingly, it is assumed that such involvement is negligible.

FIGURE 1: THE EQUIVALENCE OF HIRE AND REWARD TRANSPORT AND LOGISTICS TO GSP BY STATE/TERRITORY, 2004/05



Source:
Table B-1.

2.2 Total Transport And Logistics

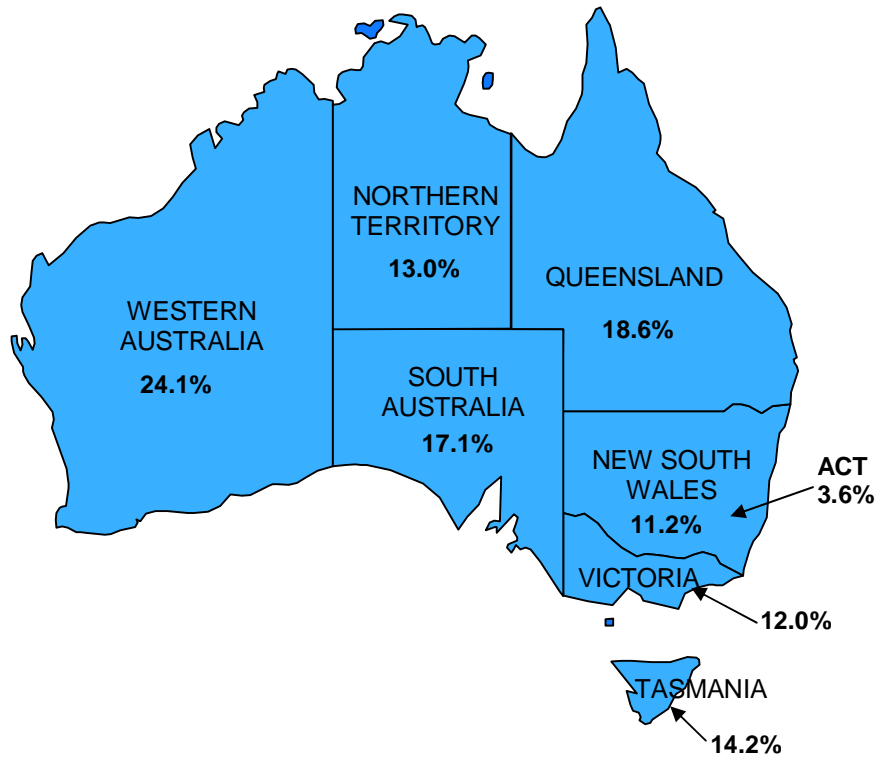
The estimate of the role of H&R T&L to GDP only partially reflects the contribution of the entire T&L sector, as it excludes the role of T&L within the broader Australian business sector. By incorporating the value added of ancillary T&L to the Australian business sector, it has been concluded that the value added by Australian T&L may be equivalent to 14.5 per cent of GDP. This outcome is comparable to the 15.0 per cent suggested by the BTE if in-house (or ancillary) services are included¹⁸ and to a recent study undertaken in the USA indicating that “logistics alone represented between 10 and 15 per cent of the GDP of most North American, European and Asia/Pacific economies”¹⁹.

The value of T&L to the economy is particularly influential in WA (equivalent to 24.1 per cent of GSP), Queensland (18.6 per cent) and SA (17.1 per cent). **Figure 2** details the role of Australian T&L for each State/Territory.

¹⁸ BTE (2001), page 33, footnote 11.

¹⁹ Rushton et al. (2006), page 10.

FIGURE 2: THE EQUIVALENCE OF TRANSPORT AND LOGISTICS TO GSP BY STATE/TERRITORY, 2004/05



Source:
Table B-2.

2.3 The Equivalence Of T&L To GDP

If ancillary T&L is disengaged from the remaining sectors of the Australian economy and combined with the H&R component, then it is estimated that the value added by the Australian T&L sector would be of the order of A\$130,192 million in 2004/05. Comparing this value to that provided by other sectors of the Australian economy (as provided in the national accounts) would be misleading as the gross value added by these sectors incorporates some component of in-house T&L. However, if the gross value added of these sectors is reduced to reflect the estimated component of T&L arising from ancillary activities (by proportionally adjusting according to the contribution of each sector to GDP, net of freight and logistics), then it can be concluded that the value added equivalence to GDP of T&L is the largest of any sector in the Australian economy, followed by manufacturing (10.3 per cent), property and business services (9.9 per cent), finance and insurance (6.0 per cent) and construction (5.6 per cent). **Table 2** provides a “league ladder” of the estimated value added by key industry sectors.

TABLE 2: LEAGUE LADDER OF AUSTRALIAN INDUSTRIES¹

<i>RANK</i>	<i>INDUSTRY</i>	<i>EQUIVALENCE OF GDP</i>
1.	Transport And Logistics	14.5%
2.	Manufacturing	10.3%
3.	Property And Business Services	9.9%
4.	Finance And Insurance	6.0%
5.	Construction	5.6%
6.	Health And Community Services	5.2%
7.	Retail Trade	5.1%
8.	Mining	4.7%
9.	Wholesale Trade	4.1%
10.	Education	3.8%
11.	Government	3.4%
12.	Agriculture, Forestry And Fishing	2.7%
13.	Communication	2.3%
14.	Electricity, Gas And Water Supply	1.9%

Note:

1. Excludes ownership of dwellings and taxes less subsidies on products.

Source:

ABS (2006), "National Income, Expenditure and Product", Cat No 5206.
Apelbaum Consulting Group.

3.0 THE CONTRIBUTION OF FREIGHT TRANSPORT TO AUSTRALIA'S CURRENT ACCOUNT

The purpose of Section 3 is to detail the contribution of Australian freight transport to international earnings and the current account. The analysis has been confined to 2004/05 so as to be consistent with the earlier value added and task, energy and emissions analyses.

3.1 Australian Transport And The Current Account – A Short Primer

The current account is a statistical statement of economic transactions between Australian residents and the international community. A resident is described as an economic entity that has a closer association with the territory of Australia than with any other territory. Resident enterprises are those that produce goods and/or services on a commercial or equivalent basis within the territory of Australia. These may be locally or foreign owned and/or controlled. An overseas entity owned by resident interests (or foreign owned) and producing goods and/or services on a commercial basis beyond the territory of Australia would be deemed to be a non-resident.

There are four (4) broad freight transactions associated with international transport:

- freight on exports by Australian operators;
- freight on imports by Australian operators;
- freight on exports by foreign operators;
- freight on imports by foreign operators.

Importantly, the current account does not include all of the above mentioned transactions. The International Monetary Fund (IMF) convention only recognises transactions between residents and non-residents and asserts that freight on imports is paid by residents and that freight on exports is paid by non-residents. Consequently, the current account only addresses:

- freight on exports earned by Australian operators;
- freight on imports earned by foreign operators.

Consequently, international transport earnings sourced from the balance of payments under-report the contribution of transport to Australia's external trade. To overcome this omission, the ACG has estimated freight on imports by Australian operators and freight on exports by foreign operators according to a methodology detailed in Section A-2 of Appendix A.

In addition to freight earnings, net services on the current account acknowledges:

- goods and services procured in Australian ports by non-resident transport operators or crew;
- time charter and operational charter services provided by residents to non-residents or vice-versa;
- goods and services procured by residents, transport operators and crew in foreign ports.

The impact of international transport on Australia's current account is measured by the industry's contribution to:

- the balance on merchandise - the import and export of vessels, aircraft and other associated capital infrastructure;
- the balance on services - the earnings and expenditure pertaining to international transport;
- net income - predominantly interest payable on foreign debt.

This analysis is confined to international freight earnings and the impact of international transport on net services²⁰.

3.2 International Freight Earnings

Total transport earnings (including freight on exports by foreign operators and freight on imports by Australian operators) arising from Australia's external trade totaled A\$13.1 billion in 2004/05. Freight on exports equated to A\$5.0 billion (or 38.3 per cent of total freight earnings) with the remainder (A\$8.1 billion or 61.7 per cent) arising from imports. The vast majority of freight earnings were attributed to sea transport which generated A\$10.4 billion in 2004/05, of which A\$10.0 billion was repatriated offshore. **Figure 3** illustrates Australia's transport earnings on foreign trade by mode.

FIGURE 3: FREIGHT TRANSPORT EARNINGS FROM AUSTRALIA'S EXTERNAL TRADE, 2004/05 (A\$ Million)



Source:
Table B-3.

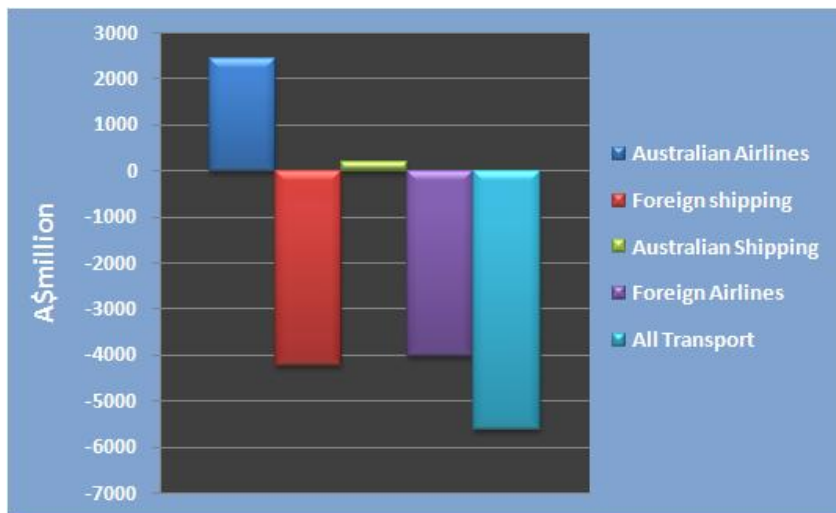
²⁰ For a complete assessment of the impact of Australian transport on the current account, refer to ASA (2007).

3.3 Impact Of Freight Services On Net Services

The total (freight and passenger) transport services deficit on net services totaled A\$5.6 billion in 2004/05²¹. The use of foreign transport resulted in a deficit on net services of A\$8.2 billion with Australian entities diminishing the net services deficit by A\$2.6 billion in 2004/05. Overall, the deficit on net services arising from passenger and freight transport servicing Australia's external trade equates to 9.8 per cent of the current account deficit.

The contribution of freight transport to the net services deficit equated to A\$5.0 billion or 8.7 per cent of the current account deficit. The vast majority of the freight transport deficit (A\$4.2 billion) arose from the use of foreign shipping while A\$1.4 billion emanated from foreign airlines. Australian freight transport contributed to a A\$0.6 billion reduction in the deficit on net services. **Figures 4 and 5** illustrate the impact of all international transport and international freight transport on net services.

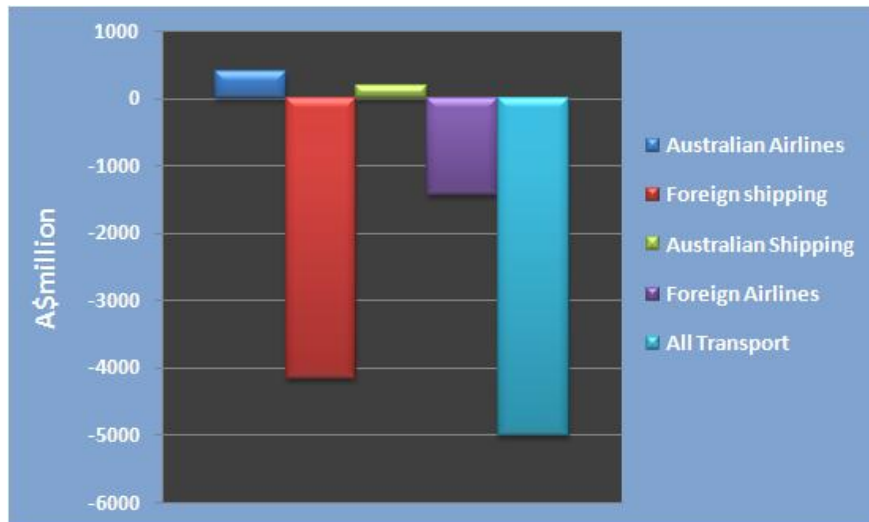
FIGURE 4: IMPACT OF ALL TRANSPORT ON NET SERVICES, 2004/05 (A\$ Million)



Source:
Table B-4.

²¹ In accordance with the IMF accounting convention.

FIGURE 5: IMPACT OF FREIGHT TRANSPORT ON NET SERVICES, 2004/05 (A\$ Million)



Source:
Table B-4.

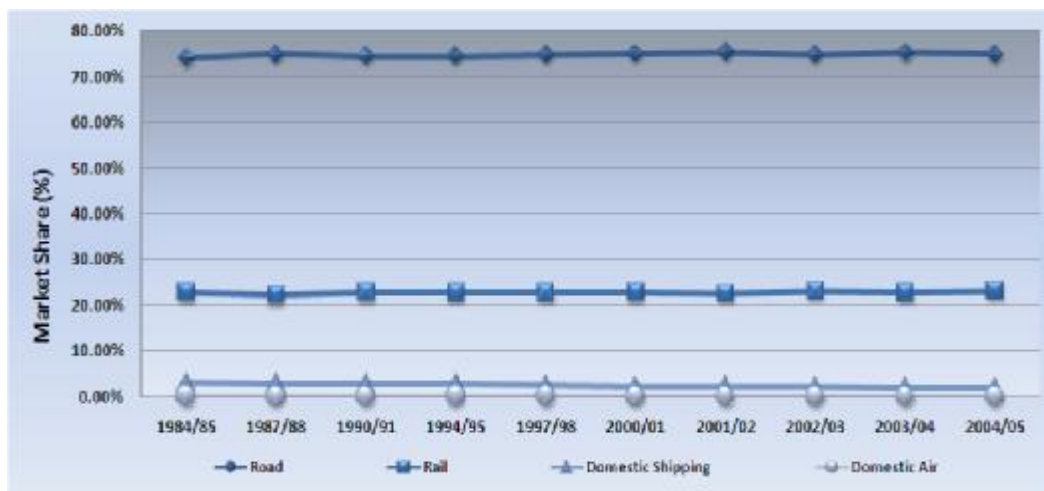
4.0 THE AUSTRALIAN FREIGHT TRANSPORT TASK – A MODAL PERSPECTIVE

The Australian domestic and international freight transport sector transported 3.5 billion tonnes of freight in 2004/05, an increase 1.3 billion tonnes or 56.7 per cent compared with 1994/95. The growth in the freight trade coupled with an increase in average travel distances resulted in the national freight transport task increasing by 2,755.4 billion tonne-kilometres (btkm) or 57.1 per cent (compared with a decade ago) to 7,584.2 btkm in 2004/05. Despite international transport carrying only 19.2 per cent of the total Australian trade (tonnes carried), the vast majority of the national freight task (7,067.0 btkm or 93.2 per cent of the total task) emanated from international transport.

4.1 The Domestic Freight Task

Cargo handled by the domestic freight transport sector (excluding pipelines) totaled 2.7 billion tonnes in 2004/05, an increase of 54.5 per cent or 1.0 billion tonnes relative to 1994/95. The share of cargo handled by road transport has remained relatively constant during the past decade, with rail marginally increasing its share (from 22.7 per cent in 1994/95 to 23.2 per cent in 2004/05) at the expense of coastal shipping. **Figure 6** graphically outlines the movement in cargo shares of the major domestic freight transport modes.

FIGURE 6: TONNES CARRIED BY AUSTRALIAN DOMESTIC TRANSPORT BY MODE, 2004/05



Note:

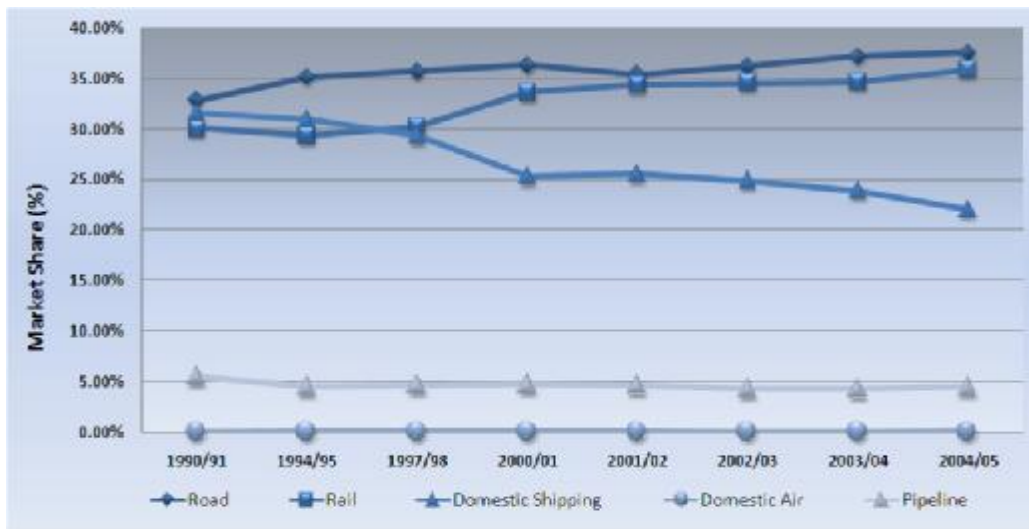
1. Excludes pipelines.

Source:

Table B-5.

The domestic freight task has grown by 43.3 per cent since 1994/95 to 517.2 billion tonne-kilometres in 2004/05. Road and rail transport increased their share of the domestic freight task to 37.5 per cent and 35.9 per cent, respectively, at the expense of domestic shipping, whose market share declined to 22.1 per cent. Pipelines increased their share of the national non-urban freight task to 4.5 per cent in 2004/05. **Figure 7** illustrates the trend in the relative share of the various domestic freight modes since 1990/91.

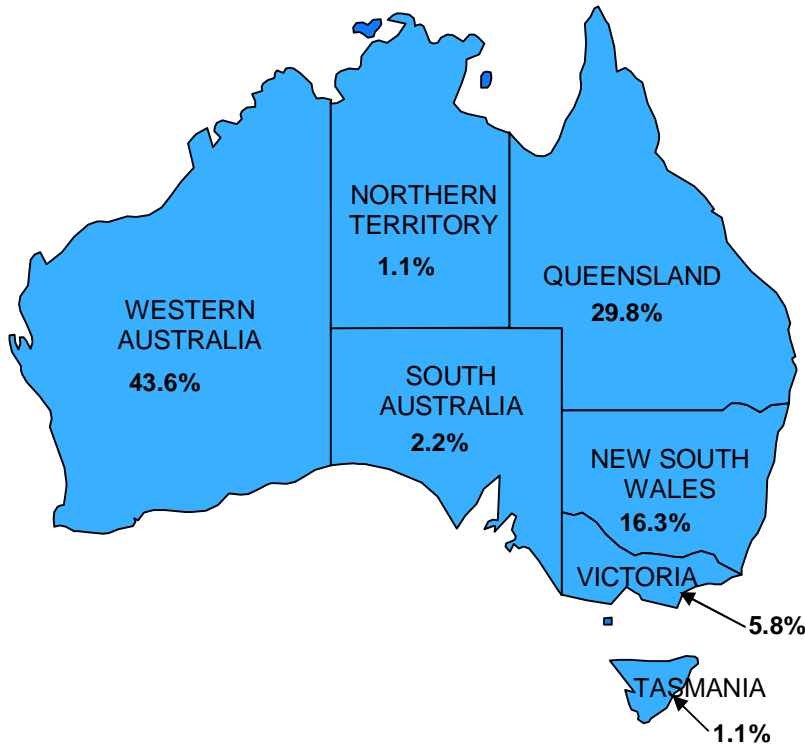
FIGURE 7: AUSTRALIAN DOMESTIC FREIGHT TASK BY MODE, 2004/05



Source:
Table B-6.

Almost 74.0 per cent of the Australian freight task (domestic and international) was undertaken by activity in Western Australia and Queensland, followed by New South Wales (16.3 per cent), Victoria (5.8 per cent) and South Australia (2.2 per cent). Tasmania and the Northern Territory both generated 1.1 per cent of the national freight task. **Figure 8** outlines the share of the national freight task by State/Territory.

FIGURE 8: SHARE OF THE DOMESTIC AND INTERNATIONAL FREIGHT TASK BY STATE/TERRITORY, 2004/05



Source:
Table B-7.

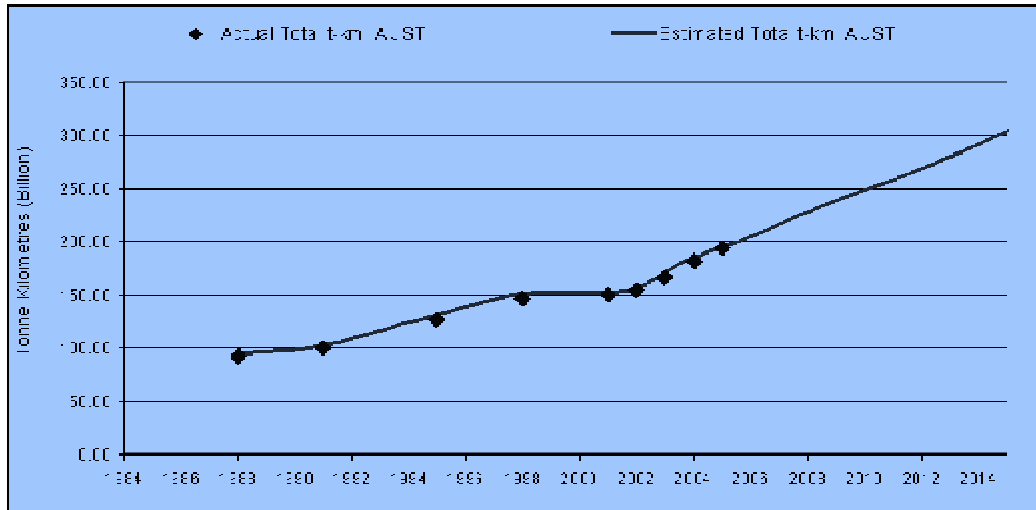
4.1.1 Road

It is estimated²² that the Australian road freight sector carried 2,148.0 million tonnes of cargo in 2004/05, an increase of 763.7 million tonnes or 55.2 per cent compared with 1994/95. Continued growth in average laden distance traveled for rigid and articulated trucks and growth in tonnes carried resulted in the annual national road freight task increasing by 53.1 per cent or 67.3 billion tonne-kilometres (compared with a decade ago) to 194.0 billion tonne-kilometres in 2004/05.

Growth in economic activity is projected to increase annual road freight tonnes by 1,024.2 million tonnes or 47.5 per cent by 2014/15. Given likely trends for average distance traveled, average loads and road freight productivity, the annual road tonne-kilometre task is projected to increase by 56.2 per cent to 303.1 billion tonne-kilometres, by 2014/15 (see **Figure 9**).

²² Apelbaum Consulting Group (2007).

FIGURE 9: OUTLOOK FOR THE ROAD FREIGHT TASK



Source:
Apelbaum Consulting Group (2007).

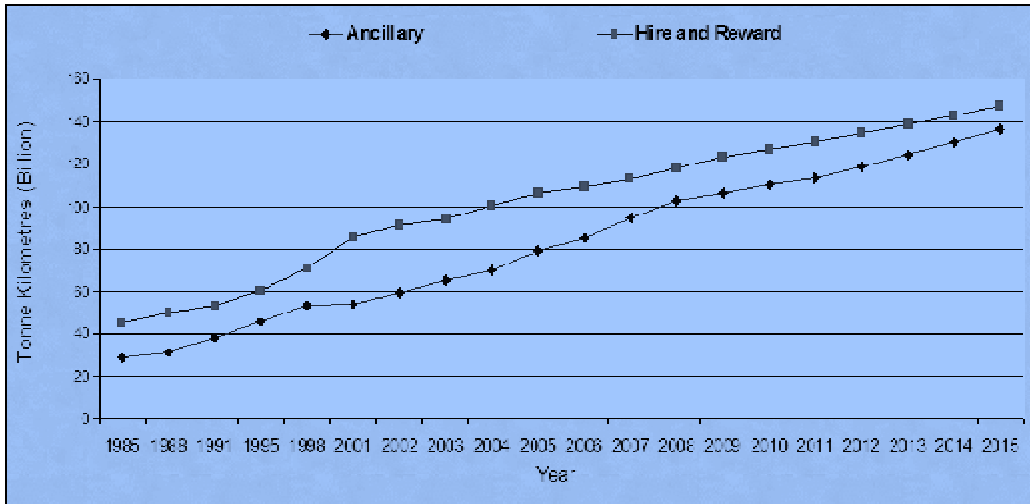
4.1.2 Rail

Cargo carried by Australian rail freight services totaled 664.1 million tonnes in 2004/05. Compared with a decade ago, the annual tonnes carried have grown by 242.8 million or 57.6 per cent. The role of hire and reward (H&R) rail services in the movement of cargo carried by Australian freight rail services equated to 54.2 per cent (of total cargoes) in 2004/05 and is projected to decline to 51.1 per cent by 2014/15. Non-bulk traffics amounted to 19.6 million tonnes in 2004/05, and now constitute 3.0 per cent of total rail tonnes. Interstate traffics (bulk and non-bulk) increased to 14.8 million tonnes in 2004/05.

The annual net tonne-kilometre task grew by 15.4 billion tonne-kilometres or 9.0 per cent (relative to 1994/95) to 185.6 billion tonne-kilometres in 2004/05. The interstate non-bulk freight task (which has grown by 133.3 per cent during the past decade) now constitutes 25.6 per cent of the national H&R freight task and 14.7 per cent of the total domestic rail freight task (compared to 15.7 per cent in 1994/95). The demand for ancillary rail freight services totaled 304.2 million tonnes and 78.4 billion tonne-kilometres in 2004/05.

Expected industry growth is projected to increase the annual rail freight task by 98.2 billion tonne-kilometres, or 52.9 per cent, to 283.8 billion tonne-kilometres by 2014/15 (see **Figure 10**).

FIGURE 10: OUTLOOK FOR THE RAIL FREIGHT TASK



Source:
Apelbaum Consulting Group (2007).

4.1.3 Air

Freight and mail cargo transported by domestic aviation (incorporating scheduled domestic, non-scheduled domestic and general aviation services) grew to 242,870 tonnes in 2004/05. Compared with 1994/95, annual freight uplifts have increased by 44,348 tonnes or 22.3 per cent.

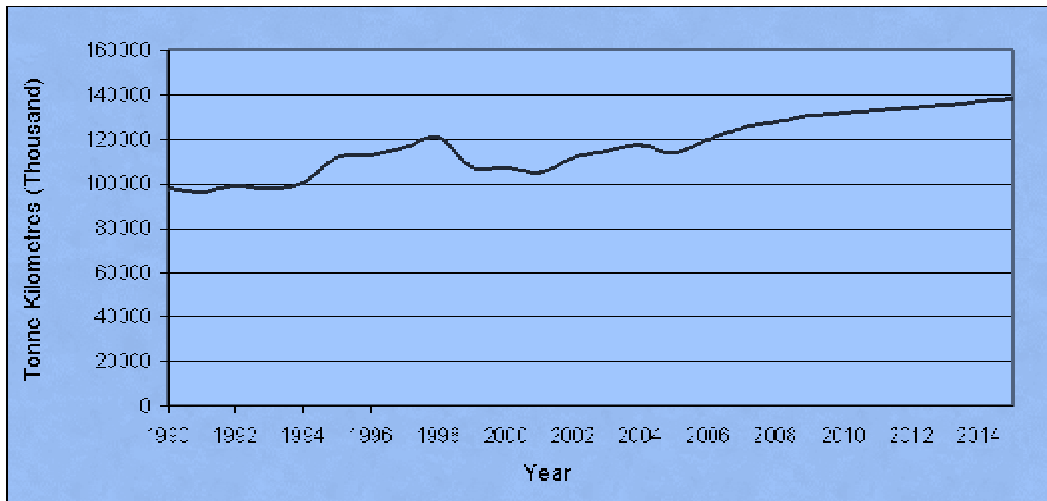
The higher demand for domestic air freight services resulted in the annual tonne-kilometre task increasing by 82.6 million tonne-kilometres or 39.3 per cent (compared with a decade ago) to 0.3 btkm in 2004/05.

4.1.4 Sea

Despite declines in the carriage of petroleum oil and oil products, the annual domestic shipping trade grew by 0.5 million tonnes or 0.9 per cent to 53.7 million tonnes in 2004/05, due to an 11.8 per cent and 5.4 per cent increase in the movement of bauxite/alumina and iron ore, respectively. During the past decade, annual tonnes carried by domestic shipping have grown by 4.5 million tonnes or 9.1 per cent.

However, a 3.8 per cent reduction in the average distance traveled resulted in the annual freight task declining by 2.9 per cent, or 3.5 billion tonne-kilometres, to 114.0 billion tonne-kilometres in 2004/05. Estimates for the likely production of key commodities (such as bauxite/alumina, petroleum products, oil, coal, fertiliser and iron/steel) suggest that the annual domestic shipping task may grow by 24.3 billion tonne-kilometres or 21.3 per cent to 138.3 billion tonne-kilometres in 2014/15 (see **Figure 11**).

FIGURE 11: OUTLOOK FOR THE DOMESTIC SHIPPING FREIGHT TASK



Source:
Apelbaum Consulting Group (2007).

4.1.5 Non-Urban Pipelines

Australia's major gas and oil non-urban pipeline network transported 74.2 million tonnes of gas, oil and product in 2004/05. In recent years, the growth in product piped emanated largely from increased production in the Northwest Shelf. As a result, the transport task (measured by tonne-kilometres) has grown to 23.2 billion tonne-kilometres in 2004/05, of which gas pipelines contributed an increasing share of the national oil and gas pipeline task (85.0 per cent compared with 67.1 per cent a decade ago).

Australia's diminishing supply of indigenous oil contributed to the ongoing reduction in the annual oil pipeline task. Since 1994/95, the annual oil pipeline task has declined by 1.9 billion tonne-kilometres or 34.7 per cent.

4.2 International Freight Task

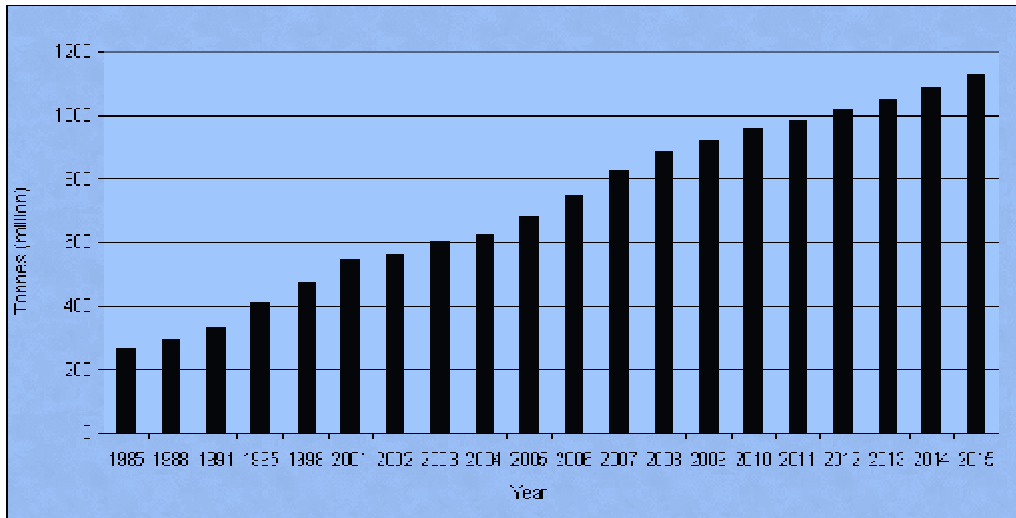
In 2004/05, the international freight task totaled 7,067.0 billion tonne-kilometres, an increase of 2.6 billion tonne-kilometres or 58.8 per cent, compared with a decade ago. The growth was almost entirely due to the demand for international shipping in servicing Australia's foreign trade.

4.2.1 Sea

Australia's annual seaborne trade totaled 680.6 million tonnes in 2004/05. China's spectacular growth rate, higher farm exports and international demand for coal and iron ore influenced the recent boost in demand for Australia's commodities. Ninety (90.1) per cent of the 2004/05 growth in Australia's seaborne trade emanated from exports, which grew by 9.4 per cent to 610.6 million tonnes. Strong domestic demand arising from an increase in real income and the favourable exchange rate resulted in Australian seaborne imports growing to 69.9 million tonnes in 2004/05.

Expected growth in the demand for bulk export commodities particularly ores, coal, bauxite, LNG, crude oil and refined products and growing imports of crude oil and petroleum product is projected to increase the annual tonnes carried by international shipping by 448.0 million tonnes or 65.8 per cent by 2014/15 (see **Figure 12**).

FIGURE 12: OUTLOOK FOR TONNES CARRIED BY INTERNATIONAL SHIPPING



Source:
Apelbaum Consulting Group (2007).

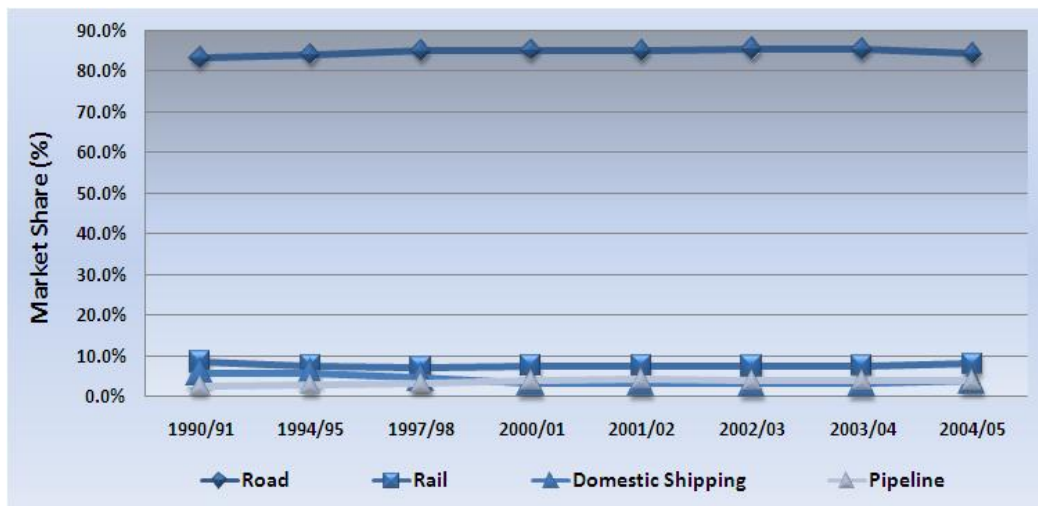
4.2.2 Air

Freight and mail transported by scheduled international air services grew by 58,749 tonnes (or 8.9 per cent) to 0.7 million tonnes in 2004/05, the largest annual freight task since 1997/98. Compared with a decade ago, the annual air transport freight trade has grown by 114.5 per cent or 384,856 tonnes. At the same time, the Australian international airline freight and mail task totaled 5.1 billion tonne-kilometres in 2004/05, an increase of 1.0 btkm or 22.8 per cent compared with 1994/95.

5.0 THE CONTRIBUTION OF FREIGHT TRANSPORT TO FUEL CONSUMED

Energy consumed in servicing Australia’s major domestic and international transport freight modes²³ totaled 981.6 PJ (on a full fuel cycle basis) in 2004/05, an increase of 52.6 PJ or 5.7 per cent relative to that evidenced a decade ago. Of the energy (FFC) consumed by domestic freight transport in 2004/05, 84.2 per cent arose from the use of road vehicles (LCVs and trucks), 7.9 per cent from rail transport, 4.0 per cent from non-urban pipelines and 3.8 per cent from domestic sea transport. **Figure 13** illustrates the share of FFC energy consumed by the major domestic freight modes.

FIGURE 13: SHARE OF FFC ENERGY CONSUMED BY DOMESTIC FREIGHT TRANSPORT (%)

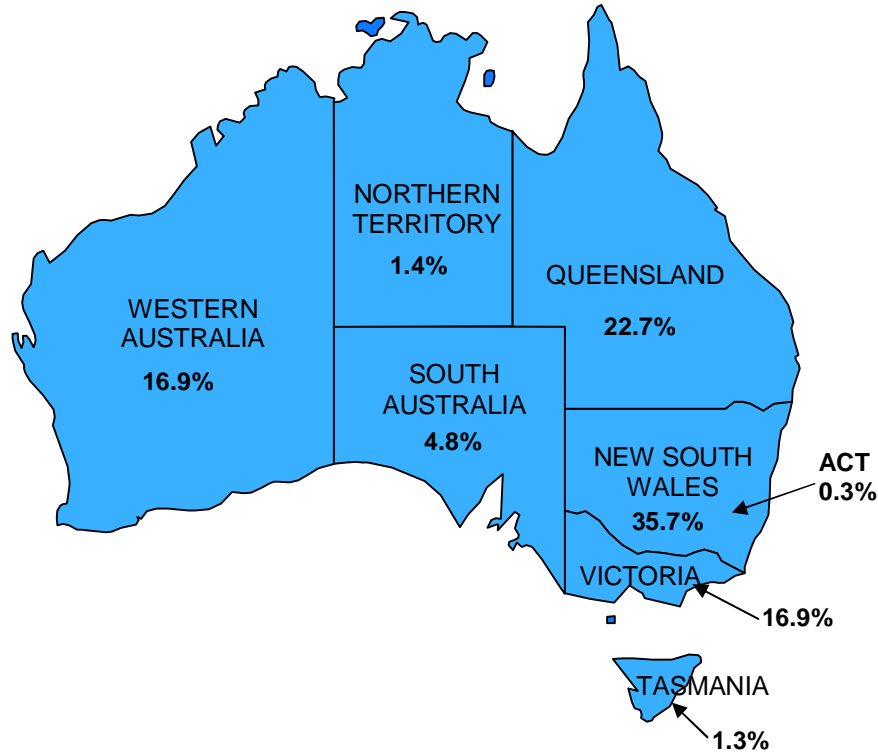


Source:
Table B-8.

NSW transport activity consumed 35.7 per cent of the direct energy required by freight transport (excluding air transport) followed by Queensland (22.7 per cent), WA and Victoria (16.9 per cent each), South Australia (4.8 per cent), NT (1.4 per cent), Tasmania (1.3 per cent) and the ACT (0.3 per cent). **Figure 14** details direct energy consumed by freight transport by State/Territory.

²³ Road, rail, sea and pipelines.

FIGURE 14: DIRECT ENERGY CONSUMED BY FREIGHT TRANSPORT BY STATE/TERRITORY, 2004/05

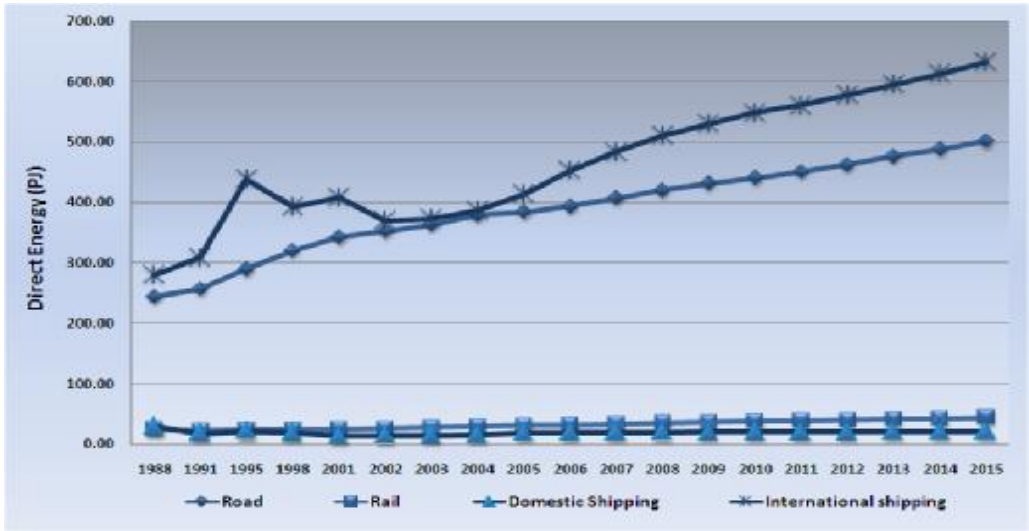


Source:
Table B-9.

5.1 Direct Energy Projections

Projections suggest that direct energy consumed by *major* Australian domestic and international freight transport modes (excluding pipelines) may increase by 350.2 PJ or 41.3 per cent by 2014/15. Much of this growth (62.1 per cent) may be incurred by international shipping. From a domestic perspective, direct energy consumed in servicing the major national freight modes may grow by 132.7 PJ or 30.6 per cent during the next decade, with road freight transport consuming 88.5 per cent of direct energy in 2014/15, followed by rail transport (7.8 per cent) and sea transport (3.7 per cent). **Figure 15** details the BAU direct energy projections for each of the *major* freight modes.

FIGURE 15: PROJECTIONS OF DIRECT ENERGY CONSUMED BY MAJOR FREIGHT MODES (PJ)

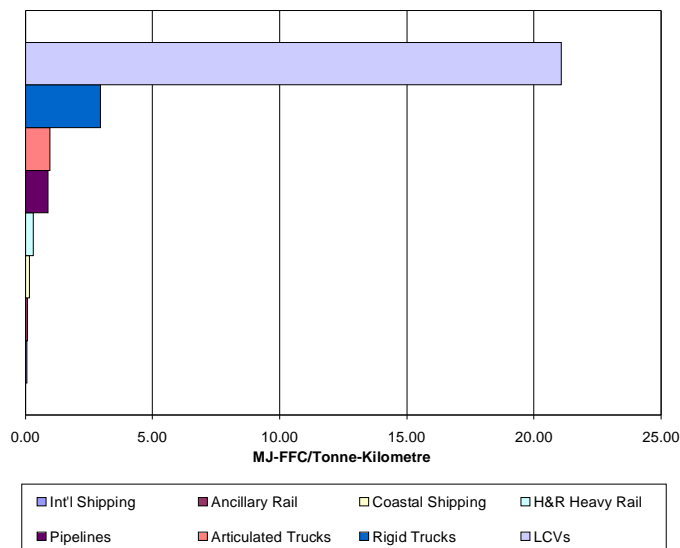


Source:
Table B-9.

5.2 Energy Intensity

In the movement of Australian freight, international shipping is the most energy efficient mode (on a FFC basis) followed by ancillary rail, coastal shipping, hire and reward rail, pipelines, articulated trucks, rigid trucks and light commercial vehicles (see **Figure 16**).

FIGURE 16: ENERGY INTENSITY IN UNDERTAKING THE FREIGHT TASK (FFC/TONNE-KILOMETRE), 2004/05



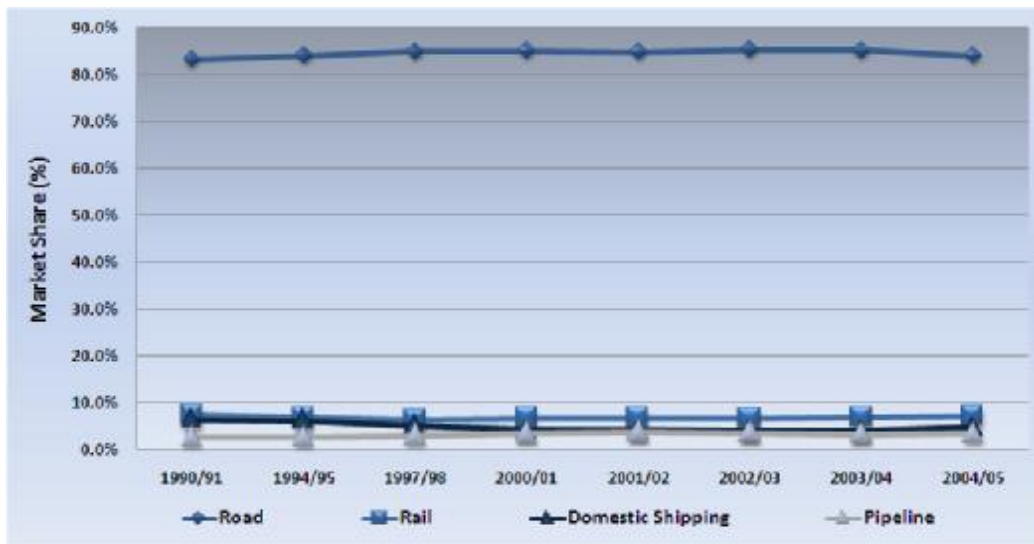
Source:
Table B-10.

6.0 THE IMPACT OF FREIGHT TRANSPORT ON EMISSIONS

Domestic and international freight transport services²⁴ in, to or from Australia generated 71,992.6 Gg of CO₂ equivalent greenhouse gas emissions in 2004/05. Annual greenhouse gas emissions (CO₂ equivalent) arising from Australian domestic freight transport increased by 6,481.1 Gg or 21.5 per cent during the past decade.

The share of domestic freight transport CO₂ equivalent emissions generated by road transport declined to 84.9 per cent in 2004/05 (see **Figure 17**) followed by rail (increased to 7.0 per cent), domestic shipping (increased to 4.7 per cent) and pipelines (static at 3.4 per cent).

FIGURE 17: CO₂-e EMISSIONS FROM DOMESTIC FREIGHT TRANSPORT¹

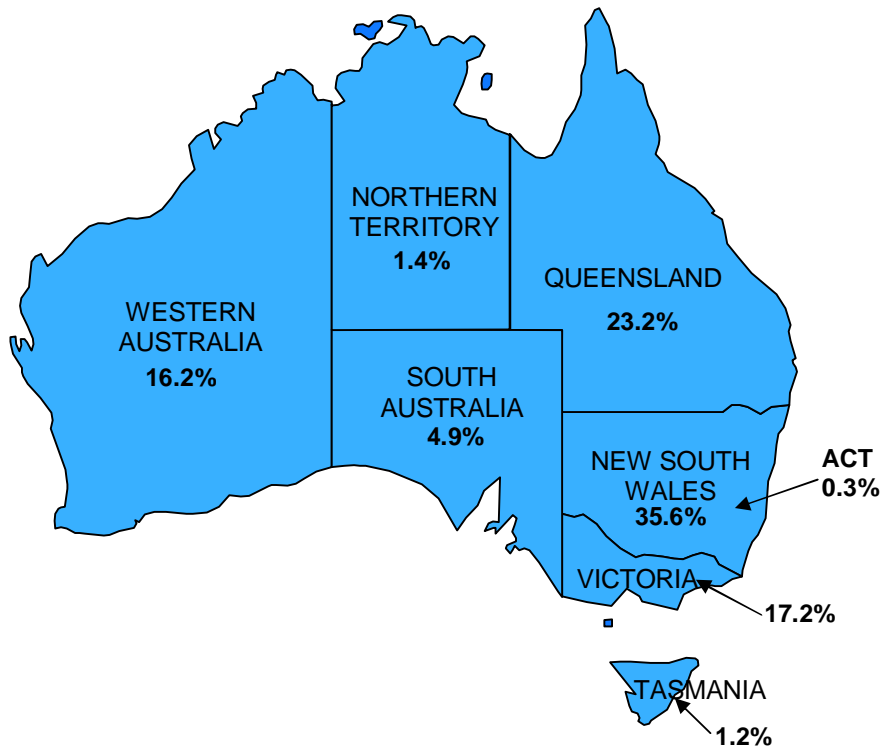


Source:
Table B-11.

In accordance with the state-wide assessment of energy consumed by domestic freight transport, freight movements in NSW generated 35.6 per cent of freight CO₂-e transport emissions, followed by Queensland (23.2 per cent) Victoria (17.2 per cent), WA (16.2 per cent), South Australia (4.9 per cent), NT (1.4 per cent), Tasmania (1.2 per cent) and the ACT (0.3 per cent). **Figure 18** illustrates the State/Territory contributions.

²⁴ Excludes air transport.

FIGURE 18: CO₂-e EMISSIONS FROM DOMESTIC AND INTERNATIONAL FREIGHT TRANSPORT BY STATE/TERRITORY, 2004/05



Source:
Table B-12.

BIBLIOGRAPHY

Apelbaum Consulting Group Pty Ltd (2007), "Australian Transport Facts, 2007".

Apelbaum Consulting Group Pty Ltd (2002), "The Case For A Victorian Freight Strategy - A Preliminary Market Audit", Prepared for The Victorian Department of Infrastructure, unpublished.

Australian Bureau of Statistics (2006), "Australia and New Zealand Standard Industry Classification 2006", Cat No. 1292.0.

Australian Bureau of Statistics (2006a), "Australian National Accounts – State Accounts", Cat No. 5220.0.

Australian Bureau of Statistics (2006b), "International Trade in Goods and Services", Cat No 5368.0.

Australian Bureau of Statistics (2006c), "Balance of Payments and International Investment Position", Cat No 5302.0.

Australian Bureau of Statistics (2006d), "National Income, Expenditure and Product", Cat No 5206.0.

Australian Bureau of Statistics (1998), "Survey of Motor Vehicle Use", Cat No 9208.0.

Australasian Railway Association Inc (2006), "Australian Rail Industry Report | 2005", Prepared by the Apelbaum Consulting Group.

Australian Shipowners Association (2007), "Australian Maritime Transport 2006", Prepared by the Apelbaum Consulting Group.

Australian Shipowners Association (2006), "Australian Maritime Transport 2005", Prepared by the Apelbaum Consulting Group.

Australian Shipowners Association (1996), "Industry Report | Annual Review 1996", Prepared by the Apelbaum Consulting Group.

Bureau of Transport Economics (2001), "Logistics in Australia- A Preliminary Analysis", Working Paper 49.

Canadian Association of Supply Chain and Logistics Management at website www.infochain.org

Deutsche Bank (2005), "The Changing Face of Asian Global Logistics", Australasian Conference, 29 November 2005.

Federal Highway Administration (2005), "Logistics Costs and the U.S. Gross Domestic Product", Prepared for the Department of Transportation by MacroSys Research and Technology.

Industry Steering Committee of the Freight Transport Logistics Industry Action Group (2002), "Freight Logistics in Australia – An Agenda for Action", Prepared for the Department of Transport and Regional Services.

NRTC (1996), "Structure of the Road Transport Industry", unpublished report.

OECD (1992), "Advanced Logistics and Road Transport", Paris.

Qantas (2006), "Qantas Annual Report 2006".

Reserve Bank of Australia (2006), Bulletin, July 2006.

Rushton, A., Croucher, P. and Baker, P. (2006), The Handbook of Logistics and Distribution Management” 3rd edition.

Strategic Design and Development (2006), “The Australian Logistics Council Industry Data Project. Stage 1 Report”.

UNCTAD Secretariat (2006), “Managing The Request –Offer Negotiations Under The GATS: Logistics Services.

GLOSSARY

ABS	Australian Bureau of Statistics
ACG	Apelbaum Consulting Group Pty Ltd
ACT	Australian Capital Territory
ALC	Australian Logistics Council
ANZSIC	Australian and New Zealand Standard Industrial Classification
ASA	Australian Shipowners Association
AUST	Australia
BAU	Business As Usual
BTE	Bureau of Transport Economics
btkm	billion tonne-kilometres
CO ₂	Carbon Dioxide
CO _{2-e}	Carbon Dioxide Equivalent
CPI	Consumer Price Index
DWT	Deadweight Tonnes
FFC	Full Fuel Cycle
GDP	Gross Domestic Product
Gg	Gigagram (10 ⁹ grams), equal to a thousand tonnes
GSP	Gross State Product
GVA	Gross Value Added
GWT	Gross Weight Tonnes
H&R	Hire and Reward
IMF	International Monetary Fund
Km	Kilometres
LCV	Light Commercial Vehicle
LNG	Liquefied Natural Gas
MJ	Megajoule (million joules)
MT	Million Tonnes
n.a.	not available
NSW	New South Wales
NRTC	National Road Transport Commission
NT	Northern Territory
OECD	Organisation for Economic Co-operation and Development
pers. comm.	personal communication
PJ	Petajoule
pkm	passenger-kilometres
QLD	Queensland
SA	South Australia
SMVU	Survey of Motor Vehicle Use
TAS	Tasmania
T&L	Transport And Logistics
t-km	tonne-kilometres
UNCTAD	United Nations Conference on Trade and Development
US	United States
VIC	Victoria
WA	Western Australia

APPENDIX A: METHODOLOGY AND ASSUMPTIONS

A-1 GDP/GSP Analysis

A-1-1 The Freight Component Of Gross Value Added By Hire And Reward Transport By Mode

The first step in identifying the contribution of T&L gross value added (GVA) is to delineate the GVA contribution by passenger and freight services.

A-1-1-1 Road Transport

The ABS²⁵ indicated that the GVA by Australian road transport totaled \$13,872 million in 2004/05 of which \$3,912 million was attributed to passenger transport and \$9,960 million allocated to freight (chain volume measures). The total value differed from that published in ABS Cat No 5206.0 of \$14,417 million. In order to retain consistency with the published data, the passenger and freight value was linearly factored to \$4,066 million for passenger and \$10,351 million for freight.

A-1-1-2 Rail Transport

It was assumed that the vast majority of value added by rail, pipeline and other transport is attributable to passenger and freight rail transport. Accordingly, the disaggregation of value added by rail, pipeline and other transport, by passenger and freight transport, was undertaken according to the proportion of total domestic and international rail earnings achieved by rail freight, as at 2004/05²⁶.

A-1-1-3 Air Transport

Based upon Qantas operations, 92.6 per cent of passenger and freight revenue (for the Qantas Group) was attributable to passenger movements²⁷.

A-1-1-4 Sea Transport

Water transport is not separately identified within the national accounts but embedded within transport services and storage. The ABS indicated that the value added by the water industry approximated \$1,115 million in 2004/05²⁸.

Data pertaining to the financial performance of the Australian shipping industry is scarce, with the most recent data being the 1996 ASA Industry Report | Annual review²⁹. Revenue data from the report and current interstate and intrastate passenger-kilometre data³⁰ were used to estimate total passenger revenue relative to total shipping revenue. It was concluded that approximately 10.5 per cent of Australian shipping revenue (domestic and international) may be attributed to inter and intrastate passenger services.

²⁵ ABS (2007), pers. comm.

²⁶ Australasian Railway Association Inc (2006).

²⁷ Qantas (2006), pg 68.

²⁸ ABS (2007), pers. comm.

²⁹ Australian Shipowners Association (1996).

³⁰ Apelbaum Consulting Group Pty Ltd (2007), "Australian Transport Facts 2007".

A-1-1-5 Transport Services And Storage

The ABS³¹ indicated that the GVA by transport services and storage totaled \$14,182 million in 2004/05. However, this total includes the water transport component of \$1,115 million. Accordingly, transport services and storage net of water transport equated to \$13,067 million. Based upon the BTE working paper no. 49, approximately 7.9 per cent of transport services and storage was attributable to passenger services (largely services to air passengers), resulting in \$1,031 million of total transport and services being allocated to passenger services. Personal communication from the ABS indicates that storage constituted 17.7 per cent or \$2,310 million of annual national GVA from transport and storage. The remaining component of \$9,727 million (or 74.4 per cent of transport services and storage) was attributed to the freight component of transport services and storage. This outcome is consistent with the ANZSIC classification which indicates that the vast majority of services within transport services and storage relate to freight services.

A-1-2 Apportioning The Freight Transport - Hire And Reward GVA By State/Territory

Apportionment of the national hire and reward freight transport GVA, by State/Territory, was achieved according to the following:

- the Gross State Product (GSP) was referenced from the ABS³² and then totaled to provide a national value of \$896,565 million³³. The sum of the State/Territory totals was only 0.2 per cent greater than the national GVA;
- for each mode, the national passenger and freight GVAs were apportioned according to the State/Territory passenger (passenger-kilometre) and freight (tonne-kilometre) task, as derived by the Apelbaum Consulting Group (2007)³⁴;
- the value added by transport and storage in each State/Territory was derived by apportioning the national value added according to the total factor income (current prices – transport and storage);
- each value was then adjusted to concord with the estimated GVA (derived from total factor income) arising from transport and storage in each State/Territory;
- the splits were then further adjusted to concord with the national passenger and freight splits and the national storage value added of \$2,310 million.

A-1-3 Ascertaining The Contribution Of Ancillary Transport To GVA

The Australian T&L industry consists of the hire and reward and ancillary sectors. Within this context the H&R is defined as transport operators that predominantly carry freight for third party entities on a commercial fee for service basis while the ancillary sector involves the movement of an entity's own freight by in-house services.

It is extremely difficult to define the ancillary transport sector as these services are embedded within the accounts of the primary business activity and are not separately identified by national (or other) data collections. Accordingly, the contribution of the ancillary sector needs to be estimated from existing transport data. The process for estimating the ancillary sector is detailed below.

³¹ ABS (2006), Cat No. 5206.0.

³² ABS (2006a).

³³ The sum of the State/Territory totals was 0.2 per cent greater than the national GVA.

³⁴ Apelbaum Consulting Group Pty Ltd (2007), "Australian Transport Facts".

A-1-3-1 Road Transport

Estimates of trucks in H&R and ancillary fleets by the NRTC³⁵ suggest that 34.3 per cent of the truck fleet is operated by the H&R sector. However, disaggregation by vehicle numbers does not reflect the split by tonnes carried, distance traveled or the tonne-kilometre task (which are the preferred proxies for value added)³⁶.

The last available data pertaining to the national road task by vehicle use (H&R and ancillary) is the 1988 ABS Survey of Motor Vehicle Use. Data provided by the ABS to the ACG indicates that 51.4 per cent of tonnes carried by all LCVs, rigid trucks and articulated trucks were attributable to the H&R sector. In addition the NRTC (1996) suggested that while 60 to 70 per cent of trucks were operated by the ancillary sector, these vehicles traveled 50 per cent of all truck miles (which is quantitatively similar to the previously mentioned 48.6 per cent of tonnes being carried by ancillary vehicles). While recognising that the relative roles of the H&R and ancillary sectors may have changed since 1996, there is no national data (let alone State/Territory data) that enables a more recent assessment. Accordingly, it was assumed that 51.4 per cent of value added by the road transport sector is attributable to the H&R sector, for all States/Territories.

A-1-3-2 Air Transport

It is assumed that 100 per cent of the value added by air transport can be allocated to H&R transport.

A-1-3-3 Water Transport

As discussed earlier, the most recent data pertaining to the value added by Australian coastal and international shipping is available from the 1996 ASA Industry Report | Annual review prepared by the Apelbaum Consulting Group. The ACG was able to interrogate the data and it was considered that the industry tended to under report the market value of services provided for in-house purposes. Accordingly, gross weight tonnes carried (rather than earnings) was applied as a proxy for apportioning value added. **Table A.1** summarises the disaggregation of GWT by service type and trade.

TABLE A-1: TONNES CARRIED BY AUSTRALIAN SHIPPING BY SERVICE TYPE AND TRADE ('000 GWT)

Trade	Hire and Reward	Ancillary	Total
Coastal	5,713	33,056	38,768
International	11,404	3,158	14,562
Total	17,117	36,214	53,330

From Table A.1, the proportion of trade undertaken by H&R services equated to 32.1 per cent. This proportion was applied to all States/Territories.

A-1-3-4 Rail Transport

As mentioned earlier, it was assumed that the vast majority of value added by rail, pipelines and other transport is attributable to passenger and freight rail transport. Disaggregation of the value added from rail transport by State/Territory was achieved by using the 2004/05 jurisdictional tonne-kilometre task²² as derived by the ACG. **Table A.2** summarises the rail freight task by State/Territory.

³⁵ NRTC (2007), pers. comm. As derived by the ABS and the BTRE in 1996

³⁶ NRTC (1996)

TABLE A-2: RAIL FREIGHT TRANSPORT TASK BY JURISDICTION (btkm)

Service	State/Territory							Total
	NSW	Victoria	Queensland	SA/NT	WA	Tasmania	ACT	
H&R	22.69	8.19	47.70	9.95	17.17	0.60	-	106.30
Ancillary	0.13	-	0.76	-	78.45	-	-	79.34
Total	22.82	8.19	48.46	9.95	95.62	0.60	-	185.64
% H&R	99.43	100.00	98.43	100.00	17.96	100.00	-	57.26

Each of the percentage H&R values was applied to the national value added by rail, pipeline and other transport to derive State/Territory estimates.

A-1-3-5 Transport Services And Storage

The proportion of freight services within transport services and storage allocated to H&R was derived by the weighted average of the value added of the H&R transport modes and total (H&R and ancillary) transport modes.

The final component of the analysis estimated the proportion of national storage and logistics attributable to the H&R sector. These estimates were derived from the proportion of freight transport attributable to H&R services, the proportion of the value of freight and logistics attributable to the H&R sector and the proportion of total costs attributable to transport, for each State/Territory.

Australian data for the last two components is extremely limited. With regard to the proportion of total freight and logistics costs attributable to transport, Ruston et al. (2006)³⁷ indicated that a 2005 survey of US logistic costs suggested that transport generated 45 per cent of total costs. This analysis was broadly supported by a European logistic study indicating that transport constituted 41 per cent of total logistic costs. For the purposes of the analysis, a midpoint value of 43 per cent was chosen and applied to each State/Territory. This differed from the BTE assumption of 40 per cent which, if applied to this analysis, would increase the contribution of Australian T&L to GDP from 14.5 per cent to 15.5 per cent.

The Deutsche Bank³⁸ valued the Australian and New Zealand freight and logistic sector at A\$66 billion of which 45 per cent was out-sourced. This percentage value was applied together with the assumed proportion of total logistic cost generated by transport and the proportion of freight transport attributable to transport (in each State/Territory) to estimate the proportion of total storage and logistic cost directed to the H&R sector.

³⁷ Rushton, A., Croucher, P. and Baker, P. (2006).

³⁸ Deutsche Bank (2005).

A-2 CURRENT ACCOUNT ANALYSIS

The current account is broadly divided into two components:

- resident transport operators or credits incorporating resident transport operators (freight on exports, passenger services, other earnings abroad and insurance) and foreign operators (expenditure in Australia);
- foreign operators or debits including foreign operators (freight on imports, passenger services, other earnings and insurance on imports) and resident operators (including expenditure abroad).

In addition, estimates for freight on imports generated by Australian resident operators, freight on exports derived by foreign operators and delineation of air and sea for freight on exports by resident transport operators is necessary as this data is not available from the ABS, due to confidentiality requirements.

Base data is provided by the ABS to the ACG as a special data service. However, the ABS is largely unable to delineate the data by sea and air transport or in some cases by passenger and freight due to confidentiality requirements. The assumptions enabling the disaggregation of the ABS data by sea, air, passenger and freight transport is summarised below.

A-2-1 Resident Transport Operators

A-2-1-1 Freight On Exports

Provided by the ABS³⁹.

A-2-1-2 Passenger Services - Earnings

From the historical series, passenger earnings equated to 49.2 per cent of passenger fares. This proportion was applied to the 2004/05 analyses.

A-2-1-3 Other Earnings Abroad

From the historical series, other earnings abroad equated to 25.0 per cent of passenger earnings. This proportion was applied to the 2004/05 analyses.

A-2-1-4 Shipping Component Of Passenger Services

The last published value was A\$4 million in 2000/01. An estimate for 2004/05 was derived by adjusting the 2000/01 value according to international shipping passenger movements⁴⁰ and inflating the resultant monetary value using the transport component of the CPI⁴¹.

A-2-1-5 Insurances

The last published value was A\$12 million in 2000/01. An estimate for 2004/05 was derived by inflating the 2000/01 value according to the value of all insurance services⁴².

A-2-1-6 Foreign Operators – Expenditure In Australia

Previous time series analysis (reflecting ABS data) confirmed that total expenditure approximated 4.4 times that of goods procured in port and that shipping constituted about 0.41 of total expenditure. These factors were applied to the value of goods procured in port.

³⁹ ABS (2007, pers. comm).

⁴⁰ Apelbaum Consulting Group (2007).

⁴¹ Reserve Bank of Australia (2006).

⁴² ABS (2006b), Table 11.

A-2-2 Foreign Operators

A-2-2-1 Freight On Imports

Total receipts were derived by summing the value of freight on imports and passenger fares (both sourced from the ABS) and adding this subtotal to other earnings. On the basis of historical ABS data, other earnings equated to 0.25 per cent of the value of freight on imports and passenger fares. This resultant value was applied for 2004/05.

A-2-2-2 Insurance On Exports

An estimate for 2004/05 was derived by inflating the 2000/01 value according to the value of insurance services⁴³.

A-2-2-3 Port Services

Summation of the value of operational leases, goods procured in port and other port expenses as provided by the ABS (pers. comm.).

A-2-2-4 Resident Operators – Expenditure Abroad

Defined as the difference between the value of port services and other earnings.

A-2-3 Freight Earnings

A-2-3-1 Australian Resident Operators – Freight On Imports

Estimates are derived from annual trade volumes and sectoral based freight rates measured as freight earnings (\$) per million tonne. The analysis is predicated upon historical time series data (2000/01) that indicates that the ratio of actual freight on imports for Australian operators to the freight on imports derived from unit rates is 1.68. This factor was applied to the unit rates achieved by foreign operators for imports to estimate the post 2000/01 time series for freight on imports by Australian resident operators.

A-2-3-2 Australian Air Transport Operators – Freight On Exports

As in the above mentioned analysis, the dearth of data pertaining to international transport earnings and expenses due to confidentiality requirements has necessitated a number of assumptions reflecting historical data.

From the historical data we knew that:

- Qantas generated 96.7 per cent of total air freight revenue;
- air freight on imports equated to 52.2 per cent of total air freight revenue.

From 2002/03, Qantas no longer published gross freight revenue but rather net freight revenue. From the 2002/03 Qantas annual report it is evident that net freight revenue excludes sales discounts and interline/ATA commission which equate to 7.97 per cent of net freight revenue. This factor was applied to subsequent values of net freight revenue to impute gross freight revenue. Having derived gross freight revenue, the above two factors (see dot points above) were applied to estimate freight on imports from air transport with the residual (gross freight revenue less import revenue) being freight on exports.

⁴³ ABS (2006), Table 16.

A-2-3-3 Foreign Operators – Freight On Exports

The most recent value for freight on export earnings by foreign operators was that provided by the 1996 ASA survey of the Australian shipping sector⁴⁴. This value was converted by the ACG into a sectoral freight rate. The freight rate was factored according to the ratio of the Australian freight rate in 2004/05 and the Australian freight rate in 1995/96. The imputed foreign rate for exports was then applied to the export tonnes carried by foreign operators to derive foreign earnings on exports.

While it is recognised that the above assumes that the relationship between Australian and foreign operators for export freight rates has been maintained since 1995/96, there is no empirical evidence to suggest otherwise.

A-2-3-4 Earnings By Foreign Air Operators

Assumed that the growth in earnings for foreign operators would be identical to that for Australian operators.

A-2-3-5 Resident Operators – Expenditure Abroad

The most recent data for expenditure abroad by resident operators was last published by the ABS in 1994/95. It is assumed that the ratio of expenditure abroad to total earnings from Australian ship operators is applicable for 2004/05. This ratio (0.905) is applied to total earnings to impute the 2004/05 value for expenditure abroad.

A-2-3-6 Net Income – Australian Shipping

During periods when the ABS published this value, it remained consistently at A\$3 million per annum. Given no additional data for recent years it has been assumed that net income from Australian shipping approximated A\$3 million.

⁴⁴ ASA (1996).

APPENDIX B: ADDITIONAL TABLES

TABLE B-1: THE EQUIVALENCE OF HIRE AND REWARD TRANSPORT AND LOGISTICS TO GDP/GSP, 2004/05
Gross Value Added (\$M¹)

Component	State/Territory								
	Australia	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
GDP/GSP	896,565.0	305,859.0	222,221.0	160,986.0	59,457.0	102,837.0	16,054.0	10,678.0	18,473.0
Transport and Logistics - Hire And Reward	40,090.0	12,488.5	8,768.3	8,545.6	2,882.8	5,714.1	765.4	489.0	436.3
- Road	14,417.0	4,802.9	4,042.0	2,734.6	1,152.9	1,049.8	270.9	169.5	194.4
- Passenger	4,066.0	1,641.7	1,041.8	662.2	276.0	215.1	88.6	31.6	109.0
- Freight	10,351.0	3,161.1	3,000.2	2,072.4	876.9	834.6	182.4	137.9	85.5
- Air and space	5,891.0	2,001.3	1,347.5	1,287.0	348.9	469.9	116.6	146.4	173.5
- Passenger	5,496.3	1,853.9	1,230.0	1,230.0	334.0	426.0	112.1	140.9	169.5
- Freight	394.7	147.4	117.6	57.0	14.9	43.9	4.5	5.5	4.0
- Water	1,115.0	146.1	88.6	351.7	95.7	299.7	111.5	21.6	-
- Passenger	116.5	51.2	0.1	3.5	1.8	0.1	59.9	-	-
- Freight	998.5	94.9	88.6	348.2	93.9	299.7	51.6	21.6	-
- Rail, pipeline and other transport	5,600.0	2,452.8	1,041.1	905.0	271.0	920.2	10.0	-	-
- Passenger	3,074.8	1,838.3	876.4	222.3	106.1	31.6	-	-	-
- Freight	2,525.2	614.5	164.7	682.7	164.8	888.6	10.0	-	-
- Transport services and storage	13,067.0	3,085.4	2,249.2	3,267.3	1,014.4	2,974.5	256.3	151.5	68.4
- Passenger	1,030.9	415.8	261.4	171.1	68.0	55.6	22.1	9.6	27.1
- Freight	9,726.5	2,355.9	1,686.9	2,468.0	777.9	2,106.2	192.9	101.9	37.0
- Storage	2,309.6	313.7	300.9	628.2	168.5	812.7	41.4	40.0	4.3
Sub total - freight transport	23,996.0	6,373.8	5,057.8	5,628.3	1,928.4	4,173.0	441.4	266.9	126.4
Hire & reward freight transport - % equivalent of GDP/GSP	2.68%	2.08%	2.28%	3.50%	3.24%	4.06%	2.75%	2.50%	0.68%
Hire & reward freight transport, logistics and storage - % equivalent of GDP/GSP	6.22%	4.85%	5.29%	8.13%	7.54%	9.44%	6.39%	5.81%	1.59%

Table B-1

Note:

1. Chain volume measures as at 1999/00.

Other Notes:

- nil or negligible.
Apelbaum Consulting Group estimates.

Sources:

- ABS (1989).
- ABS (2006a).
- ABS (2006d).
- ABS (2007), pers. comm.
- Apelbaum Consulting Group (2007).
- Australasian Railway Association Inc (2006).
- Australian Shipowners Association (1996).
- BTE (2001).
- Qantas (2006).

TABLE B-2: THE EQUIVALENCE OF ALL TRANSPORT AND LOGISTICS TO GDP/GSP, 2004/05
Gross Value Added (\$M¹)

Component	State/Territory								
	Australia	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
GDP/GSP	896,565.0	305,859.0	222,221.0	160,986.0	59,457.0	102,837.0	16,054.0	10,678.0	18,473.0
Transport and Logistics- H&R and Ancillary									
- Road									
- Freight	20,148	6,153	5,840	4,034	1,707	1,625	355	268	166
- Air and space									
- Freight	395	147	118	57	15	44	5	5	4
- Water									
- Freight	3120	297	277	1088	293	936	161	67	-
- Rail, pipeline and other transport									
- Freight	6,599	618	165	694	165	4,948	10	-	-
- Transport services and storage									
- Freight	21,883	4,231	3,202	4,586	1,474	7,697	412	211	70
- Storage	5,279	849	767	1,638	430	1,394	95	94	11
- Logistics	72,769	22,024	16,334	17,816	6,102	8,094	1,246	739	415
Sub total	52,144	11,446	9,601	10,459	3,654	15,249	943	552	241
Freight transport and services	52,144	11,446	9,601	10,459	3,654	15,249	943	552	241
Freight transport % equivalent of GDP/GSP	5.8%	3.7%	4.3%	6.5%	6.1%	14.8%	5.9%	5.2%	1.3%
T&L (\$m)	130,192	34,319	26,702	29,913	10,186	24,737	2,284	1,385	667
T&L % equivalent of GDP/GSP	14.5%	11.2%	12.0%	18.6%	17.1%	24.1%	14.2%	13.0%	3.6%

Table B-2

Note:

1. Chain volume measures as at 1999/00.

Other Notes:

- nil or negligible.
- Apelbaum Consulting Group estimates.

Sources:

- ABS (1989).
- ABS (2006a).
- ABS (2006d).
- ABS (2007), pers. comm.
- Apelbaum Consulting Group (2007).
- Australasian Railway Association Inc (2006).
- Australian Shipowners Association (1996).
- BTE (2001).
- Deutsche Bank (2005).
- NRTC (1996).
- NRTC (2007), pers. comm.
- Qantas (2006).
- Reserve Bank of Australia (2006).
- Rushton, A., Croucher, P. and Baker, P.(2006).

**TABLE B-3: TOTAL FREIGHT TRANSPORT EARNINGS FROM AUSTRALIA'S
EXTERNAL TRADE, 2004/05
(A\$ Million)**

AUSTRALIAN RESIDENT OPERATORS	
FREIGHT ON EXPORTS	
SHIPPING	298
AIRLINES	406
TOTAL	704
FREIGHT ON IMPORTS	
SHIPPING	148
AIRLINES	443
TOTAL	591
FOREIGN OPERATORS	
FREIGHT ON EXPORTS	
SHIPPING	3,930
AIRLINES	388
TOTAL	4,318
FREIGHT ON IMPORTS	
SHIPPING	6,067
AIRLINES	1,433
OTHER TRANSPORT SERVICES	--
TOTAL	7,500
TOTAL FREIGHT EARNINGS	
SHIPPING	10,442
AIRLINES	2,670
OTHER TRANSPORT SERVICES	--
TOTAL	13,113

-- nil or negligible.

Sources:

ABS (2006), pers. comm.

Apelbaum Consulting Group estimate.

Australian Shipowners Association (2006).

**TABLE B-4: IMPACT OF INTERNATIONAL TRANSPORT ON NET SERVICES ON THE CURRENT ACCOUNT, 2004/05
(A\$ Million)**

MODE/OPERATOR	TASK								
	FREIGHT			PASSENGER			TOTAL		
	CREDIT	DEBIT	BALANCE	CREDIT	DEBIT	BALANCE	CREDIT	DEBIT	BALANCE
SHIPPING									
AUSTRALIAN	594	-404	190	2	-	2	596	-404	192
FOREIGN	1936	6094	-4158		76	76	1936	6170	-4234
TOTAL	2530	-5197	-2667	2	-76	-74	2532	-6673	-4142
AIRLINES									
AUSTRALIAN	406	-	406	4203	-2107	2096	4609	-2107	2502
FOREIGN	-	-1433	-1433	2788	-5374	-2586	2788	-6807	-4019
TOTAL	406	-1433	-1027	6991	-7481	-490	7497	-8914	-1417
ALL TRANSPORT									
AUSTRALIAN	999	-404	595	4205	-2107	2098	5004	-2511	2493
FOREIGN	1936	-7027	-5091	2788	-5450	-2662	1722	-12577	-10855
TOTAL	2935	-7431	-4496	6993	-7557	-564	6726	-15088	-13362

- nil or negligible.

Sources:

ABS (2006), pers. comm.

Apelbaum Consulting Group estimate.

Australian Shipowners Association (2006).

TABLE B-5: TONNES CARRIED BY AUSTRALIAN TRANSPORT BY MODE, 2004/05
(Million Tonnes)

Year/Mode	Domestic Mode ¹								Sub Total m tonnes	International Mode				Sub Total m tonnes	Total m tonnes
	Road		Rail		Sea		Air			Sea		Air			
	m tonnes	% share	m tonnes	% share	m tonnes	% share	m tonnes	% share		m tonnes	% share	m tonnes	% share		
1984/85	1,043.78	74.18%	320.29	22.76%	42.73	3.04%	0.20	0.01%	1,407.00	269.26	99.71%	0.79	0.29%	270.04	1,677.04
1987/88	1,159.58	74.97%	343.73	22.92%	43.34	2.80%	0.20	0.01%	1,546.85	294.80	99.85%	0.34	0.11%	295.14	1,842.00
1990/91	1,212.00	74.90%	370.77	22.74%	44.20	2.66%	0.19	0.01%	1,606.01	306.70	99.98%	0.27	0.11%	306.97	2,002.79
1994/95	1,384.35	74.63%	421.27	22.71%	49.19	2.66%	0.20	0.01%	1,855.01	408.28	99.99%	0.34	0.08%	408.62	2,263.63
1997/98	1,623.35	74.87%	492.20	22.70%	52.52	2.42%	0.23	0.01%	2,168.34	478.79	99.95%	0.82	0.17%	479.61	2,647.95
2000/01	1,620.17	75.96%	563.65	22.79%	62.00	2.14%	0.22	0.01%	2,429.04	619.69	99.97%	0.72	0.10%	620.41	2,979.01
2001/02	1,605.66	75.37%	570.60	22.69%	62.44	2.07%	0.19	0.01%	2,229.71	664.66	99.98%	0.64	0.11%	665.30	3,095.01
2002/03	1,647.30	74.98%	601.45	23.11%	52.53	2.02%	0.17	0.01%	2,302.15	603.24	99.95%	0.69	0.11%	603.93	3,226.08
2003/04	2,050.90	75.33%	621.39	22.72%	63.10	1.95%	0.19	0.01%	2,734.51	622.78	99.99%	0.69	0.11%	623.47	3,357.65
2004/05	2,140.00	74.95%	664.00	23.17%	60.67	1.87%	0.24	0.01%	2,865.59	600.67	99.99%	0.72	0.11%	601.39	3,467.00

Note:

1. The Australian pipeline sector transported 74.2 million tonnes of crude, product oil and gas in 2004/05.

Source:

Apelbaum Consulting Group (2007).

TABLE B-6: AUSTRALIAN FREIGHT TASK BY MODE, 2004/05
(Billion Tonne-Kilometres)

Year/Mode	Domestic Mode										International Mode				Total b TKM		
	Road		Rail		Sea		Air		Pipelines		Sub Total	Sea		Air ¹		Sub total	
	b TKM	% share	b TKM	% share	b TKM	% share	b TKM	% share	b TKM	% share	b TKM	b TKM	% share	b TKM	% share	b TKM	
1984/85	75.38	n.a.	74.07	n.a.	97.25	n.a.	0.16	n.a.	n.a.	n.a.	n.a.	3,106.52	99.95%	1.57	0.05%	3,107.19	n.a.
1987/88	92.40	n.a.	81.67	n.a.	96.54	n.a.	0.16	n.a.	n.a.	n.a.	n.a.	3,438.41	99.93%	2.42	0.07%	3,440.83	n.a.
1990/91	100.07	32.61%	91.52	30.93%	96.40	31.63%	0.14	0.05%	16.02	0.51%	700.00	3,772.70	99.93%	2.74	0.07%	3,775.44	4,000.55
1994/95	126.77	35.12%	105.79	29.31%	111.97	31.02%	0.21	0.05%	16.22	0.49%	360.06	4,162.55	99.91%	4.15	0.09%	4,166.70	4,328.73
1997/98	147.02	35.71%	124.32	30.19%	120.91	29.37%	0.25	0.05%	15.21	0.37%	411.74	5,188.91	99.91%	4.65	0.09%	5,193.56	5,506.91
2000/01	150.51	35.30%	119.55	28.50%	105.15	25.32%	0.25	0.05%	15.62	0.37%	415.40	5,054.10	99.91%	5.14	0.09%	5,059.24	5,374.54
2001/02	154.59	35.56%	150.29	34.37%	111.73	25.65%	0.24	0.05%	20.28	0.44%	437.23	6,068.48	99.92%	4.64	0.08%	6,073.12	6,510.35
2002/03	166.07	36.17%	159.61	34.67%	114.94	24.91%	0.21	0.05%	15.03	0.30%	461.06	6,403.90	99.93%	4.00	0.07%	6,407.90	6,870.14
2003/04	182.10	37.10%	170.25	34.67%	117.49	23.82%	0.20	0.04%	20.98	0.37%	494.11	6,551.11	99.93%	4.45	0.07%	6,555.56	7,046.71
2004/05	194.04	37.12%	185.64	36.34%	114.00	22.65%	0.25	0.05%	20.15	0.40%	517.20	6,061.84	99.93%	5.11	0.07%	6,066.95	6,506.20

Note:

1. Scheduled air.

Other Note:

n.a. not available.

Source:

Apelbaum Consulting Group (2007).

TABLE B-7: AUSTRALIAN FREIGHT TASK BY STATE/TERRITORY, 2004/05

Mode	State/Territory																	
	NSW		Vic		Qld		SA		WA		Tas		NT		ACT		Australia	
	btkm	% share	btkm	% share	btkm	% share	btkm	% share	btkm	% share	btkm	% share	btkm	% share	btkm	% share	btkm	% share
Domestic																		
- Road	38.92	3.2%	49.48	11.3%	48.78	2.2%	17.56	10.6%	29.78	0.9%	3.62	4.2%	5.00	6.0%	0.91	100.0%	194.04	2.6%
- Rail ¹	22.82	1.8%	8.19	1.9%	48.46	2.1%	9.95	6.0%	95.62	2.9%	0.60	0.7%	-	-	-	-	185.64	2.5%
- Sea	5.29	0.4%	6.61	1.5%	37.09	1.6%	8.51	5.1%	48.38	1.5%	4.63	5.4%	3.54	4.3%	-	-	114.04	1.5%
- Air ¹	0.09	0.01%	0.03	0.01%	0.04	0.002%	0.02	0.01%	0.05	0.001%	0.003	0.003%	0.01	0.01%	0.0002	0.02%	0.24	0.003%
- Pipelines	3.36	0.3%	3.51	0.8%	1.79	0.1%	2.12	1.3%	12.02	0.4%	-	-	0.39	0.5%	-	-	23.19	0.3%
- Sub total	70.48	5.7%	67.82	15.5%	136.15	6.0%	38.16	23.1%	185.85	5.6%	8.85	10.3%	8.94	10.8%	0.91	100.0%	517.16	6.8%
International																		
- Sea ²	1,164.23	94.3%	369.17	84.5%	2,119.00	94.0%	127.19	76.9%	3,113.36	94.4%	76.70	89.7%	73.71	89.1%	-	-	7,043.34	93.2%
- Air ¹	0.22	0.02%	0.10	0.02%	0.09	0.004%	0.14	0.1%	0.08	0.002%	-	-	0.06	0.1%	-	-	0.69	0.01%
- Sub total	1,164.45	94.3%	369.27	84.5%	2,119.09	94.0%	127.32	76.9%	3,113.44	94.4%	76.70	89.7%	73.76	89.2%	-	-	7,044.04	93.2%
Total	1,234.93	100.0%	437.10	100.0%	2,255.24	100.0%	165.49	100.0%	3,299.28	100.0%	85.55	100.0%	82.70	100.0%	0.91	100.0%	7,561.20	100.0%
Col %		16.3%		5.8%		29.8%		2.2%		43.6%		1.1%		1.1%		0.0%		100.0%

Notes:

1. Jurisdictional.
2. Excludes cargo otherwise not allocated by State/Territory.

Other Note:

- nil or negligible.
Numbers may not equate to previous tables due to rounding.

Source:

Apelbaum Consulting Group (2007).

TABLE B-8: ENERGY (FFC) CONSUMED BY FREIGHT TRANSPORT

Year/Mode	Domestic Mode ¹										International Mode ¹		Total ¹ FFC PJ
	Road		Rail		Sea		Pipelines		Sub Total ¹		Sea	% share	
	FFC PJ	% share ²	FFC PJ	% share ²	FFC PJ	% share ²	FFC PJ	% share ²	FFC PJ	% share ²			
1984/85	278.49	n.a.	37.44	n.a.	33.46	n.a.	n.a.	n.a.	n.a.	n.a.	408.16	n.a.	n.a.
1987/88	297.31	n.a.	30.42	n.a.	33.27	n.a.	n.a.	n.a.	n.a.	n.a.	322.25	n.a.	n.a.
1990/91	280.31	83.3%	29.15	8.1%	19.81	6.7%	9.00	2.6%	317.32	100.0%	357.13	56.6%	702.95
1994/95	365.02	61.2%	31.62	7.6%	23.50	6.0%	11.92	2.0%	423.06	100.0%	506.13	51.1%	920.69
1997/98	375.54	65.1%	31.65	7.2%	19.74	4.6%	14.70	3.3%	442.54	100.0%	447.95	50.3%	890.63
2000/01	377.97	65.2%	33.09	7.5%	14.62	3.3%	17.79	4.0%	443.47	100.0%	466.05	51.2%	909.66
2001/02	393.06	65.0%	34.43	7.4%	15.26	3.3%	19.50	4.2%	462.36	100.0%	424.36	47.9%	896.74
2002/03	410.20	65.1%	36.10	7.1%	15.55	3.2%	16.61	4.0%	469.57	100.0%	420.70	46.7%	910.32
2003/04	420.41	65.0%	38.01	7.6%	15.00	3.2%	19.00	3.9%	501.90	100.0%	441.90	46.6%	943.64
2004/05	432.20	64.2%	40.75	7.9%	18.67	3.8%	20.63	4.0%	513.15	100.0%	468.42	47.1%	991.67

Notes:

1. Excludes air as this mode was deemed to be essentially a passenger mode.
2. Domestic.

Other Note:

n.a. - not available.

Source:

Apelbaum Consulting Group (2007).

FIGURE B-9: PROJECTIONS OF DIRECT ENERGY CONSUMED BY MAJOR FREIGHT MODE (PJ)

	Mode							
	Road	Rail			Sea		Total	Total
		H&R	Anc	Total	Domestic	International	Domestic	
1985	n.a	23.46	4.00	27.46	29.63	350.18	n.a	n.a
1988	243.57	20.40	4.42	24.83	29.68	279.49	577.56	298.08
1991	256.52	17.67	4.57	22.24	18.17	308.74	605.67	296.93
1995	289.64	19.18	4.44	23.62	21.42	438.48	773.16	334.68
1998	319.91	19.08	4.76	23.84	18.37	392.97	755.09	362.11
2001	341.61	19.75	4.88	24.64	13.91	407.77	787.93	380.16
2002	351.99	20.64	5.01	25.66	14.46	369.67	761.78	392.11
2003	362.35	21.59	5.28	26.86	14.72	373.15	777.08	403.93
2004	379.55	23.37	5.55	28.92	15.27	386.34	810.08	423.74
2005	383.50	25.03	6.16	31.18	18.88	414.16	847.73	433.57
2006	393.36	25.63	6.51	32.14	18.95	452.21	896.65	444.45
2007	406.56	26.56	7.08	33.64	19.62	483.37	943.18	459.82
2008	419.66	27.82	7.57	35.39	19.89	510.10	985.04	474.94
2009	431.46	29.08	7.74	36.81	20.32	529.86	1018.45	488.59
2010	440.22	29.96	7.88	37.85	20.32	548.20	1046.59	498.38
2011	450.22	30.83	7.99	38.81	20.30	560.80	1070.14	509.33
2012	461.94	31.88	8.22	40.10	20.47	577.83	1100.34	522.50
2013	475.60	32.95	8.46	41.40	20.65	595.41	1133.06	537.65
2014	487.46	34.02	8.70	42.72	20.83	613.00	1164.00	551.01
2015	501.16	35.16	8.95	44.11	21.02	631.65	1197.94	566.29

n.a. not available.

Source:
Apelbaum Consulting Group (2007).

TABLE B-10: ENERGY INTENSITY IN UNDERTAKING THE FREIGHT TASK (FFC/TONNE-KILOMETRE), 2004/05

Transport Mode	Freight (MJ-FFC/tonne-km)		
	Urban	Non-Urban	All Areas
Road			
- Light Commercial Vehicles	17.36	30.91	21.07
- Rigid Trucks	2.89	3.04	2.95
- Articulated Trucks	1.41	0.88	0.98
Rail			
- Hire and reward	..	0.32	0.32
- Ancillary	..	0.09	0.09
Sea			
- Coastal	..	0.17	0.17
- International	..	0.07	0.07
Pipelines	..	0.89	0.89

.. not applicable.

Source:
Apelbaum Consulting Group (2007).

TABLE B-11: CO₂-e EMISSIONS FROM DOMESTIC AND INTERNATIONAL FREIGHT TRANSPORT

Year/Mode	Domestic Mode ¹								International Mode ¹		Total ¹ Gg		
	Road		Rail		Sea		Pipelines		Sub Total ¹			Sea	
	Gg	% share ²	Gg	% share ²	Gg	% share ²	Gg	% share ²	Gg	% share ²		Gg	% share
1967/05	n.a.	n.a.	1,992.02	n.a.	2,002.44	n.a.	n.a.	n.a.	n.a.	n.a.	29,791.00	n.a.	n.a.
1967/03	23,902.56	n.a.	1,960.71	n.a.	2,000.31	n.a.	n.a.	n.a.	n.a.	n.a.	23,629.03	n.a.	n.a.
1990/01	20,361.24	83.5%	1,939.02	7.3%	1,608.83	6.4%	670.72	2.7%	24,975.81	100.0%	26,259.29	51.3%	51,234.06
1994/05	25,412.43	84.3%	2,165.09	6.8%	1,884.66	6.3%	746.80	2.6%	30,147.91	100.0%	37,276.82	56.3%	67,424.44
1997/03	27,103.27	86.6%	2,019.14	6.4%	1,627.50	5.1%	945.40	3.0%	31,695.39	100.0%	33,403.09	51.0%	65,098.20
2000/01	25,747.00	85.7%	2,099.40	6.7%	1,256.10	4.0%	1,120.78	3.6%	31,223.48	100.0%	34,810.27	52.7%	66,033.73
2001/02	27,757.50	85.5%	2,181.00	6.7%	1,306.72	4.0%	1,234.97	3.8%	32,480.20	100.0%	31,510.45	49.2%	63,990.65
2002/03	29,462.50	85.8%	2,287.99	6.7%	1,328.50	3.9%	1,254.58	3.7%	34,323.50	100.0%	31,839.80	48.1%	66,163.00
2003/01	30,130.21	86.9%	2,400.31	6.8%	1,331.39	3.9%	1,190.90	3.4%	35,111.75	100.0%	33,005.26	48.2%	68,110.00
2004/05	31,087.29	84.9%	2,578.70	7.0%	1,700.16	4.7%	1,253.82	3.4%	36,623.95	100.0%	35,363.65	49.1%	71,987.61

Notes:

1. Excludes air as this mode was deemed to be essentially a passenger mode.
2. Domestic.

Other Note:

n.a. not available.

Source:

Apelbaum Consulting Group Pty Ltd (2007).

TABLE B-12: CO₂-e EMISSIONS FROM DOMESTIC AND INTERNATIONAL FREIGHT TRANSPORT BY STATE/TERRITORY, 2004/05¹

Mode	State/Territory																											
	NSW			VIC			QLD			SA			WA			Tas			NT			ACT			Australia			
	Cy	% share Domestic	Int	Cy	% share Domestic	Int	Cy	% share Domestic	Int	Cy	% share Domestic	Int	Cy	% share Domestic	Int	Cy	% share Domestic	Int	Cy	% share Domestic	Int	Cy	% share Domestic	Int	Cy	% share Domestic	Int	
Domestic																												
- Road	8,037.04	88.75%	31.4%	7,011.37	83.10%	55.8%	8,237.47	78.43%	43.1%	2,258.22	79.72%	62.5%	4,030.28	79.10%	35.1%	753.18	97.24%	58.2%	573.17	83.07%	65.7%	226.77	100.00%	100.0%	31,037.70	81.87%	43.7%	
- Rail ²	539.54	6.75%	2.7%	216.73	2.58%	1.8%	1,175.74	11.47%	7.0%	351.05	12.53%	9.5%	247.31	4.78%	2.1%	15.33	1.85%	1.7%	-	-	-	-	-	-	2,578.70	7.04%	3.5%	
- Sea	246.27	3.00%	1.4%	210.22	2.67%	1.0%	824.42	8.02%	5.4%	20.21	0.72%	0.0%	170.77	3.20%	1.1%	7.15	0.09%	0.0%	44.21	6.29%	4.4%	-	-	-	1,729.16	4.97%	2.4%	
- Pipelines	154.71	1.70%	0.5%	56.52	0.68%	0.2%	130.73	1.28%	0.8%	212.51	7.53%	6.2%	659.54	12.52%	5.7%	-	-	-	5.20	0.51%	0.6%	-	-	-	1,253.52	3.42%	1.7%	
Sub total	9,107.16	100.00%	29.5%	7,921.12	100.00%	61.0%	10,240.26	100.00%	61.4%	2,826.40	100.00%	79.2%	5,170.81	100.00%	44.2%	815.87	100.00%	60.7%	723.20	100.00%	71.6%	226.77	100.00%	100.0%	35,620.56	100.00%	10.5%	
International																												
- Sea	15,453.30		54.4%	4,873.47		35.0%	6,448.10		35.6%	737.24		20.7%	5,459.58		55.7%	53.10		0.3%	285.30		25.3%	-		-	35,353.55		40.1%	
Total	25,660.35		100.0%	12,794.59		100.0%	16,688.34		100.0%	3,562.64		100.0%	11,630.39		100.0%	869.97		100.0%	1,008.57		100.0%	226.77		100.0%	71,972.81		100.0%	
CO₂-e			35.8%			17.2%			23.2%			4.9%			16.2%			1.2%			1.4%			0.3%			100.0%	

Note:

1. Jurisdictional.

Other Notes:

- nil or negligible.

Numbers may not equate to previous tables due to rounding.

Source:

Apelbaum Consulting Group (2007).