

VREF COE Workshop Beijing 2011

Low-Carbon Freight Transport for Australia: Designing a Research Agenda

Leigh Glover

Australasian Centre for the Governance & Management of
Urban Transport (GAMUT)

University of Melbourne, Australia

www.unimelb.edu.au/gamut



National Policy	Addresses Freight Sustainability?
<u>National Environmental Sustainability Strategies</u>	
<i>Clean Energy Future</i> [Climate change strategy, 2011]	No
<i>State of Australian Cities 2010</i> [Major cities strategy, 2011]	No
<i>Sustainable Australia—Sustainable Communities</i> [Population strategy, 2011]	No
<u>National Freight Strategies</u>	
<i>National Ports Strategy</i> [2010]	No
<i>National Land Freight Strategy</i> [Discussion paper, 2011]	No

What are the Major Environmental Issues for Freight transport?

- Rising GHG emissions: Road #1 problem
- Erosion of rail freight for road (esp., long-haul, non-bulk & inter-capital corridors)
- Peak Oil/ Energy Security
- Forecasts for high freight growth rates to 2050
- Growth of 'Little White Vans'?

Overview of the Australian Freight Task

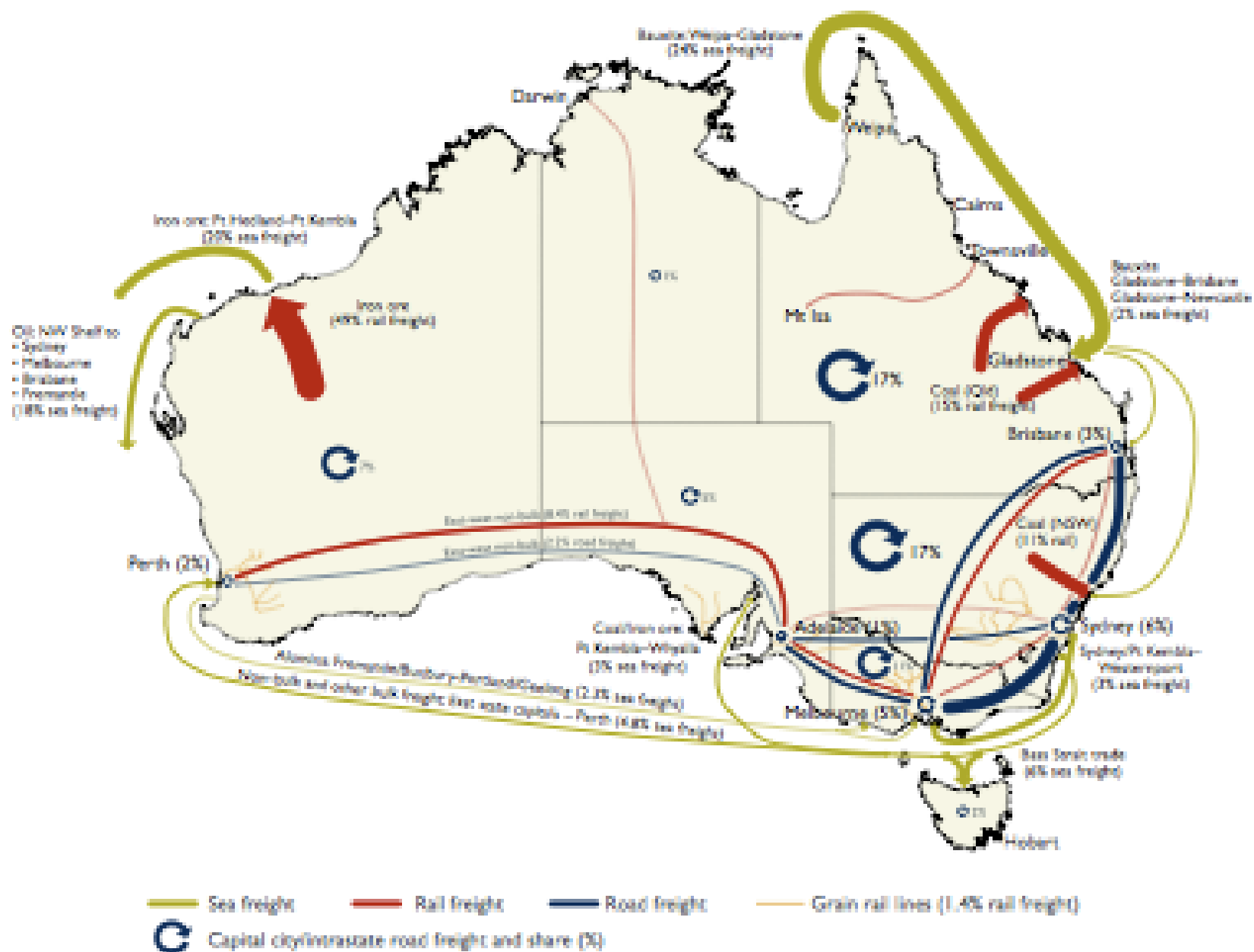
Task	Location	Mode
Bulk minerals	Mining regions to ports	Rail, shipping, pipelines
Agricultural produce & livestock	Regional to urban areas & ports	Road & rail as complements/ substitutes, shipping (+ some aviation)
General freight, interstate line haul	Between major urban areas & industrial centres	Road & rail as complements/ substitutes
General freight, urban distribution	Urban centres	Road
Industrial freight	Between major industrial centres	Road & rail as complements/ substitutes, shipping



National Land Freight Strategy
Discussion Paper
February 2011



Figure 2 Major Australian domestic freight movements, 2006–07



TES.1 Road freight tasks and growth rates for interstate, all capitals, rest of state and total Australia, 1972–2030

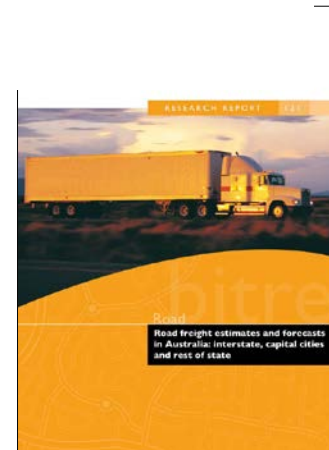
Road freight components	Units	Estimates			Forecasts		
		1972	2007	Growth ^a (per cent)	2008	2030	Growth ^a (per cent)
Interstate	Task (billion tkm)	5.4	64.7	7.4	70.4	159.1	3.8
	Share of total (per cent)	19.9	35.5		36.8	46.5	
All capitals	Task (billion tkm)	7.9	38.4	4.6	40.2	66.6	2.3
	Share of total (per cent)	29.2	21.0		21.0	19.5	
Rest of state	Task (billion tkm)	13.8	79.3	5.1	80.9	116.4	1.7
	Share of total (per cent)	50.9	43.5		42.2	34.0	
Total Australia	Task (billion tkm)	27.1	182.5	5.6	191.5	342	2.7
	Share of total (per cent)	100	100		100	100	

^a Average annual growth rate from 1972 to 2007 (estimates) and from 2008 to 2030 (forecasts).

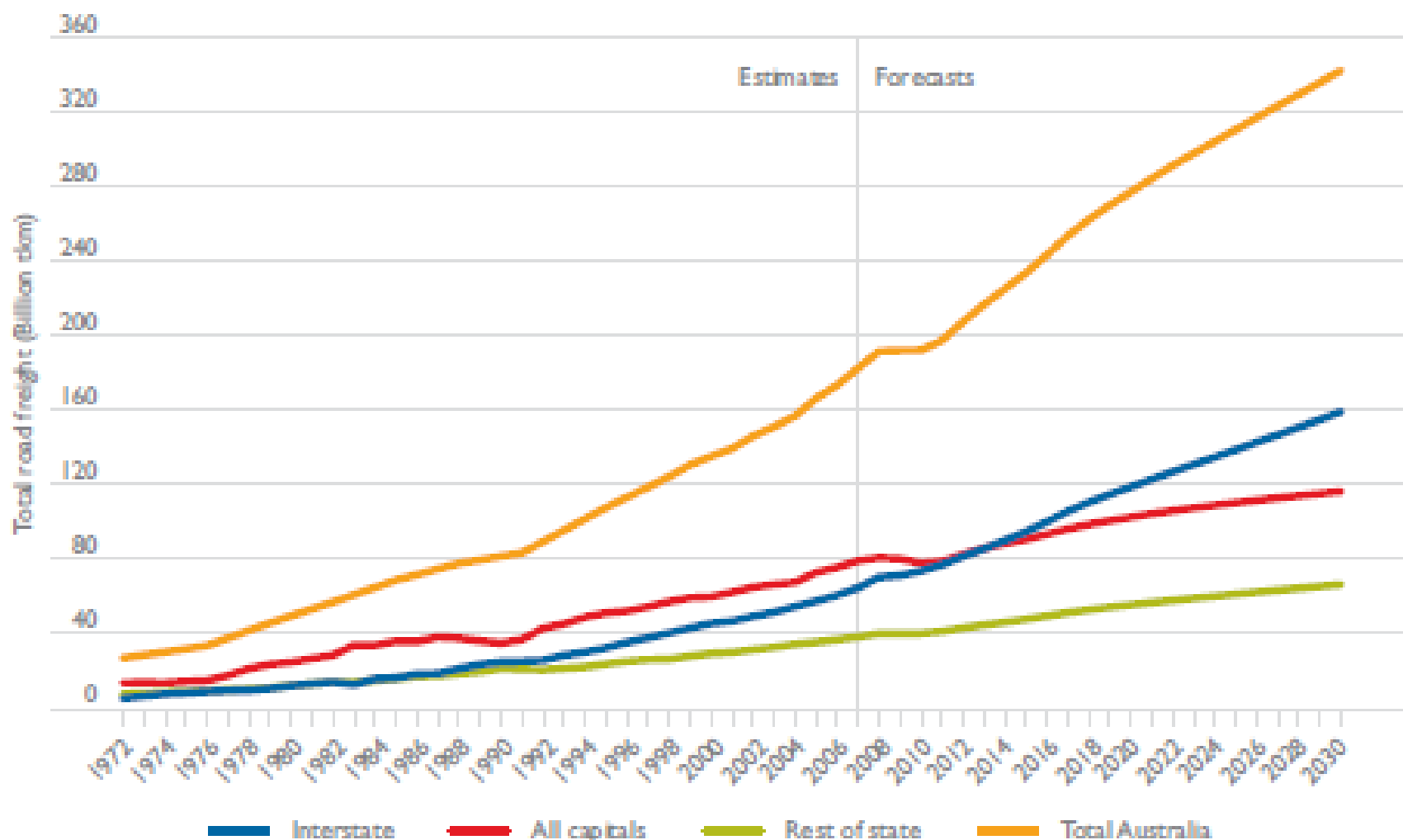
Note: Share of total may not add to 100, due to rounding.

Source: BITRE estimates.

- Expected road freight growth to exceed population growth (but about = to GDP growth)



F2.2 Road freight estimates and forecasts by interstate (sum of 'from', 'to' and 'through'), capital cities and rest of state, Australia, 1972–2030

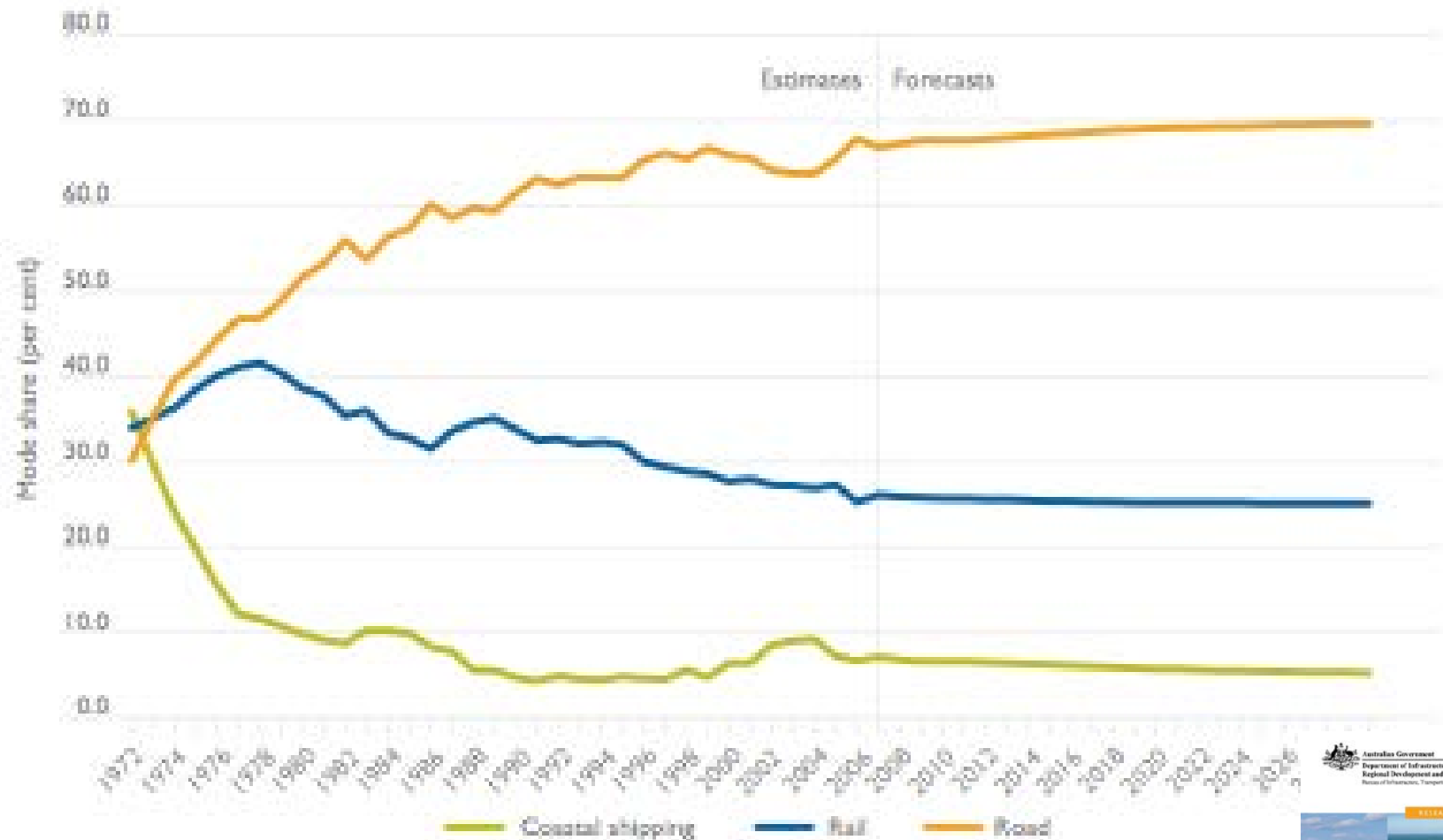


Note: From 1972 to 2007, estimates, while from 2008–30, forecasts.

Source: BITRE estimates.

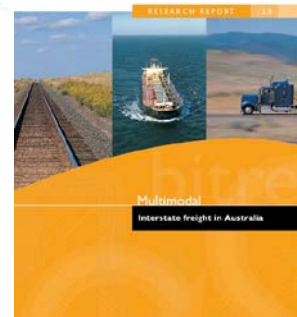
F2.4

Transport mode shares of total interstate freight estimates and forecasts, 1972–2030

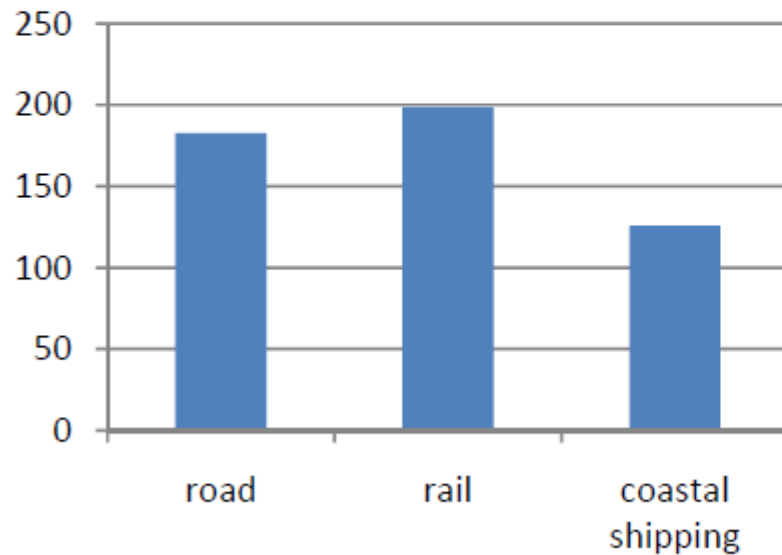


Notes: From 1972 to 2007, estimates, while from 2008 to 2030, forecasts.

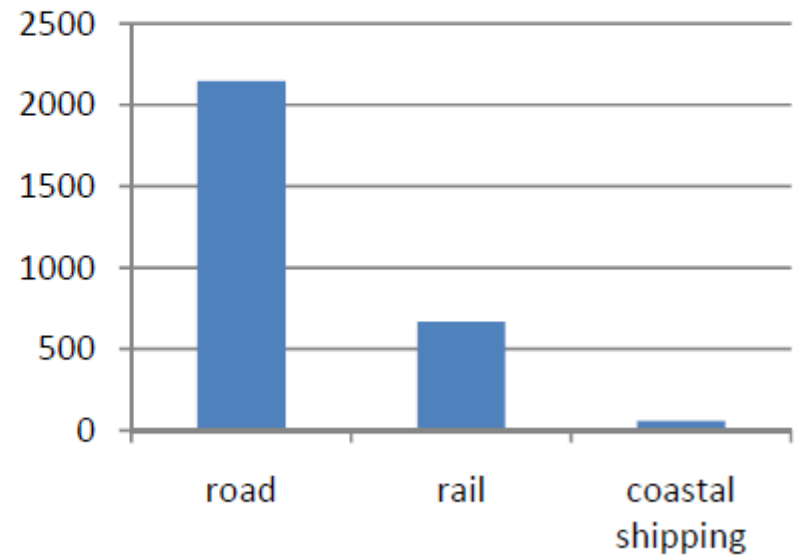
Source: BITRE estimates.



domestic freight billion tonne kilometres, 2006-07



domestic freight million tonnes, 2006-07



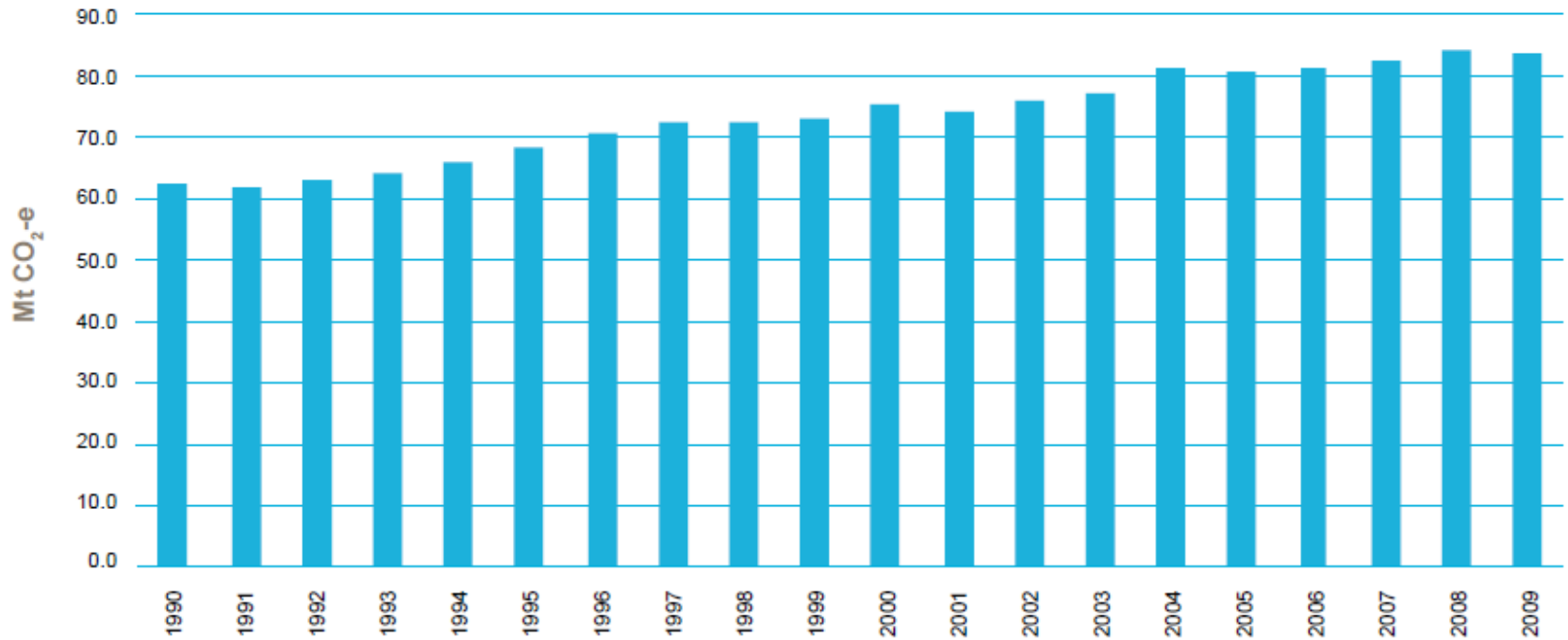
Source: Bureau of Infrastructure, Transport and Regional Economics and the Office of the Infrastructure Coordinator. June 2009.

Dominance of Road-based Domestic Freight (as t/km) (2007/08)

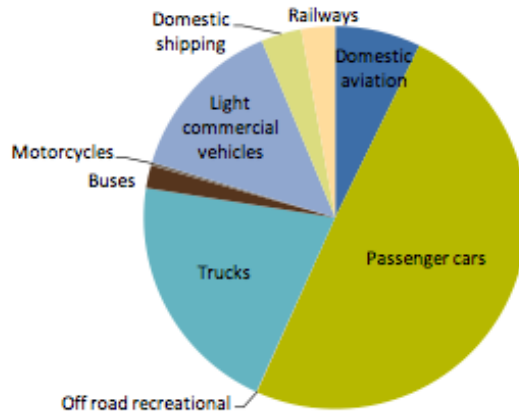
- Non-bulk: Road: 78%, Rail 15%, Ship 1%,
- Bulk: Road: 17%, Rail 50%, Ship 33%



Transport GHG Emissions, 1990-2009



Transport emissions in 2009



Transport Sector (2009)	84 Mt CO ₂ -e
Road	72 (86%)
Aviation	6
Railways	3
Navigation	2
Sector increase since 1990:	33%

Australia's GHG Reduction Targets

As per *Clean Energy Future* (Australia, 2011):

- Confirmed Rudd govt's Copenhagen Summit commitments
- 5% below 2000 levels by 2020
- Depending on the responses of other nations in international CC negotiations, Aust. to consider 15--25% cuts below 2000
- New long-term target: 80% below 2000 by 2050 (formerly 60% cut)
- Long-term target aligns with UK & Germany

Implications

- Transport sector emissions have proved very difficult to reduce: 95%+ reliance on oil
- 2020 target will be very difficult under current trends (i.e., 23% cut from BAU, from 97 to 71 MTCO₂e)
- 80% cut by 2050 implies almost carbon-free mobility (i.e., $75 \times 0.2 = 15$ MTCO₂e)



Figure 3 Growth in transport emissions, 1990 to 2009

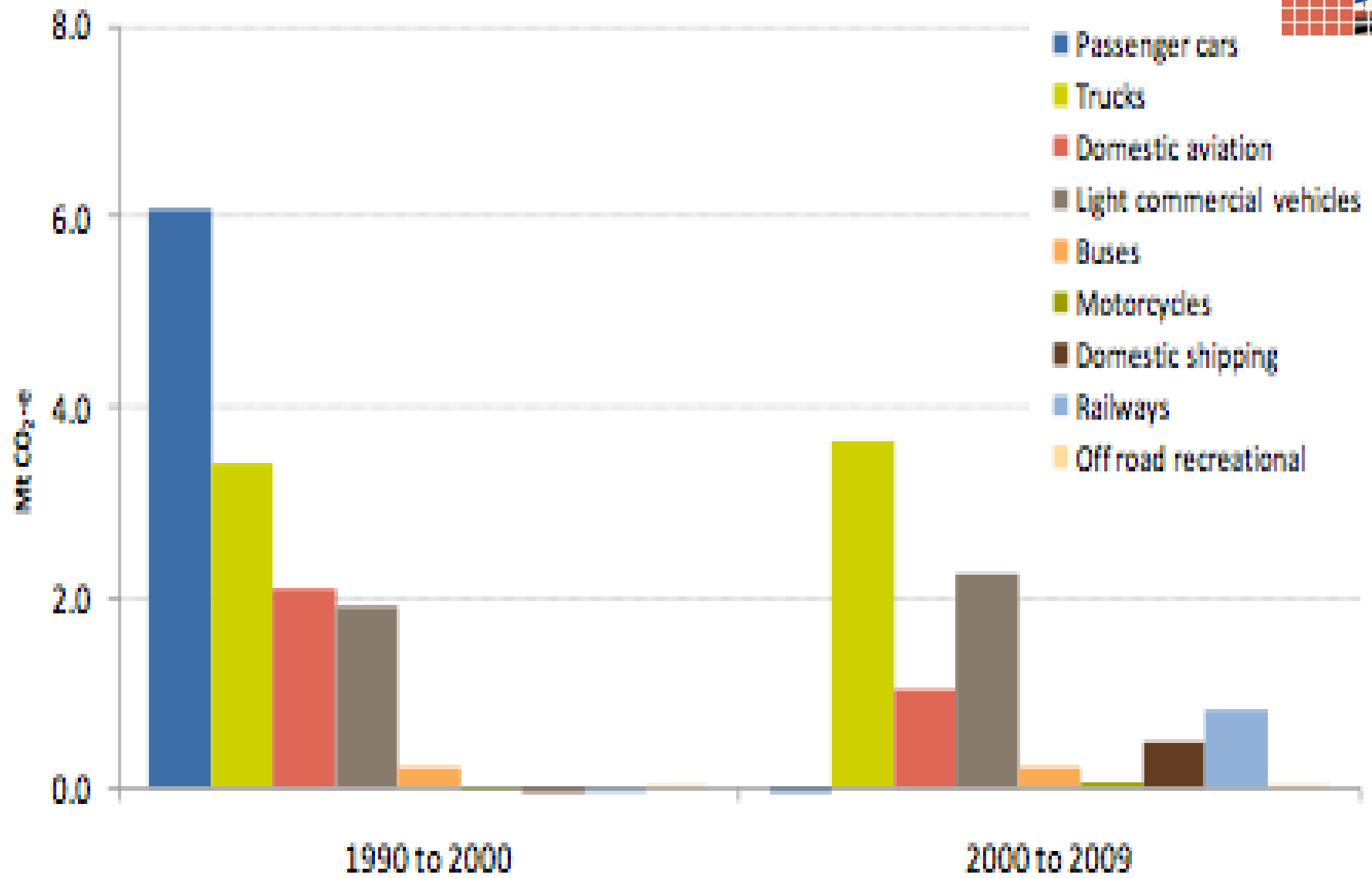


Table 4 Baseline transport emissions, Kyoto period average and 2020

	1990	2000	Kyoto period average 2008-12	2020	
	Mt CO ₂ -e	Mt CO ₂ -e	Mt CO ₂ -e	Increase on 1990 (%)	Increase on 2000 (%)
Road	54	66	73	35	25
<i>Passenger cars</i>	35	41	41	18	7
<i>Light commercial vehicles</i>	8	9	12	58	50
<i>Trucks</i>	10	14	18	75	60
<i>Buses</i>	1.2	1.4	1.7	43	47
<i>Motorcycles</i>	0.2	0.2	0.2	13	54
Domestic aviation	2.9	5	6	109	49
Domestic shipping	3.0	2.4	3.0	-0.7	46
Railways	1.7	1.6	2.5	41	94
Off road recreational	0.04	0.04	0.04	9	20
Total	62	75	85	37	29

Note: Totals may not add due to rounding. Source: BITRE (2010), SKM-MMA (2010), DCCEE analysis.



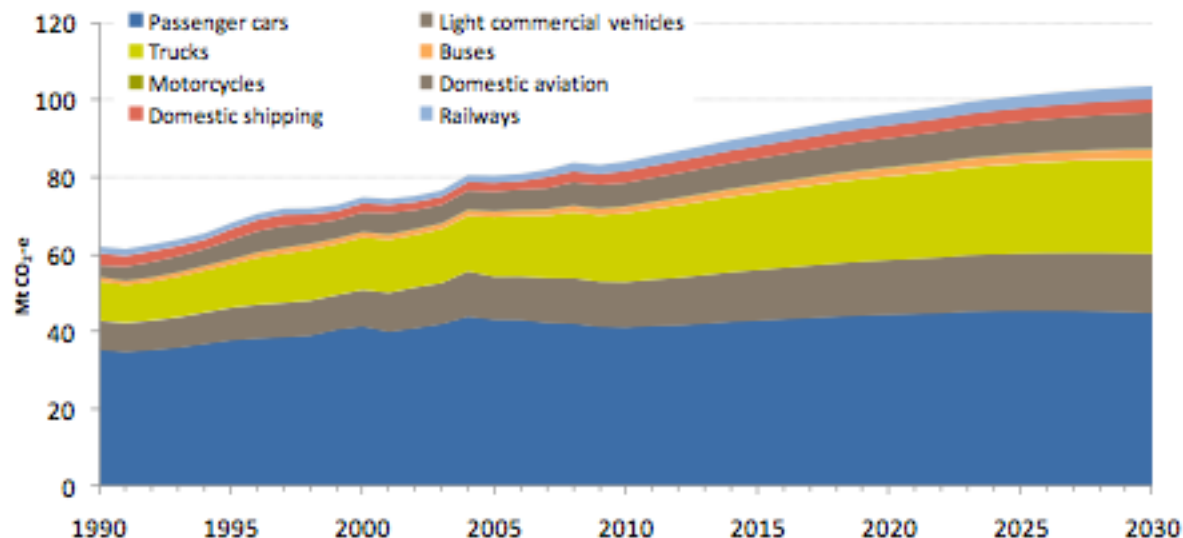
Table 5

Baseline transport emissions, 1990 to 2030, Mt CO₂-e

	1990	2009	KPA	2020	2030
Road	54	72	73	83	87
<i>Passenger cars</i>	35	41	41	44	45
<i>Light commercial vehicles</i>	8	12	12	14	15
<i>Trucks</i>	10	17	18	22	25
<i>Buses</i>	1.2	1.6	1.7	2.0	2.3
<i>Motorcycles</i>	0.2	0.2	0.2	0.3	0.3
Domestic aviation	2.9	6	6	7	9
Domestic shipping	3.0	2.8	3.0	3.4	3.7
Railways	1.7	2.4	2.5	3.0	3.4
Off road recreational	0.04	0.04	0.04	0.05	0.06
Total	62	83	85	97	104

Note: Totals may not add due to rounding. Source: BITRE (2010), SKM-MMA (2010), DCCEE analysis.

Figure 4 Baseline transport emissions trends, 1990 to 2030

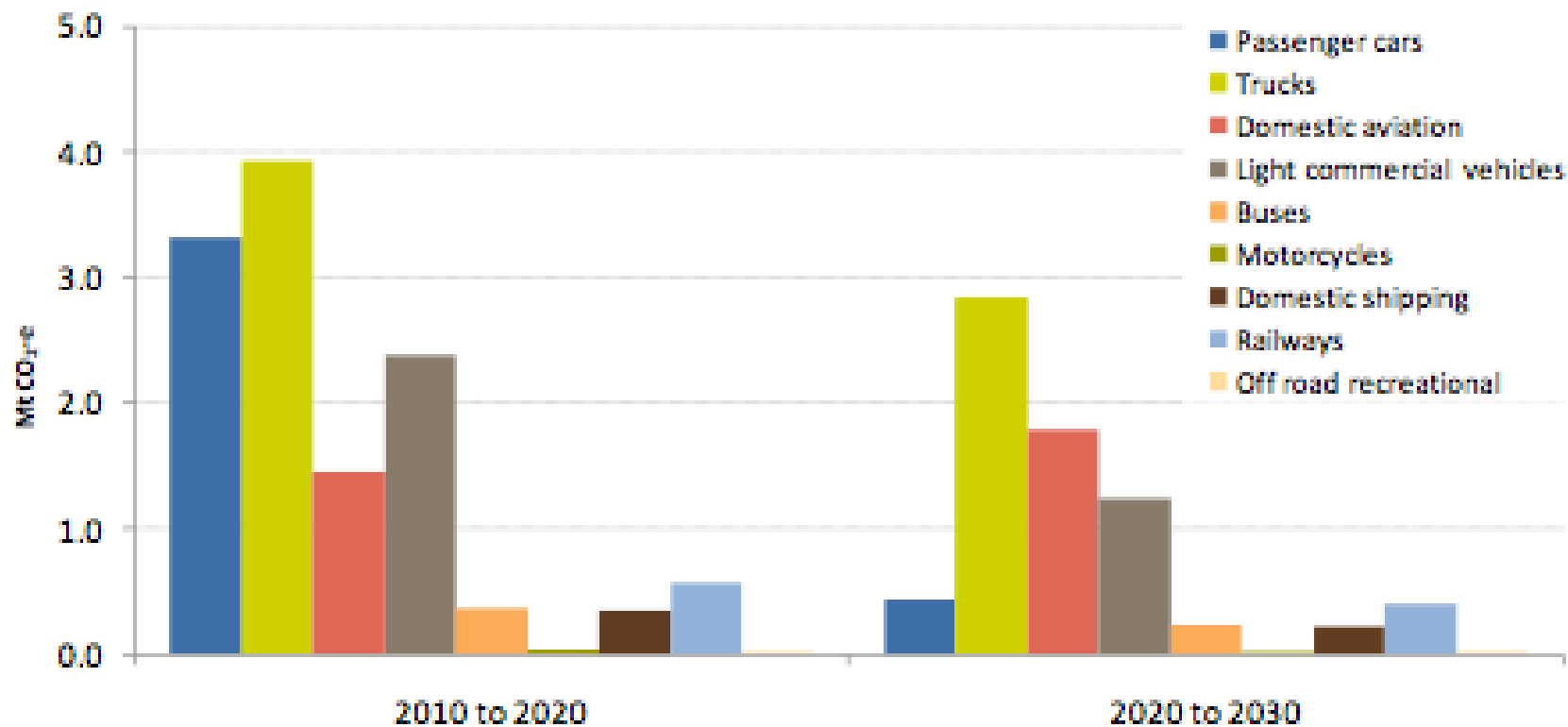


Australian Government
Department of Transport
and Infrastructure

Transport
emissions
projections



Figure 5 Growth in transport emissions, 2010 to 2030



Forecasts of GHG Emissions to 2030 (MtCO₂-e)

Figure 13 Rigid truck emissions, 1990 to 2030

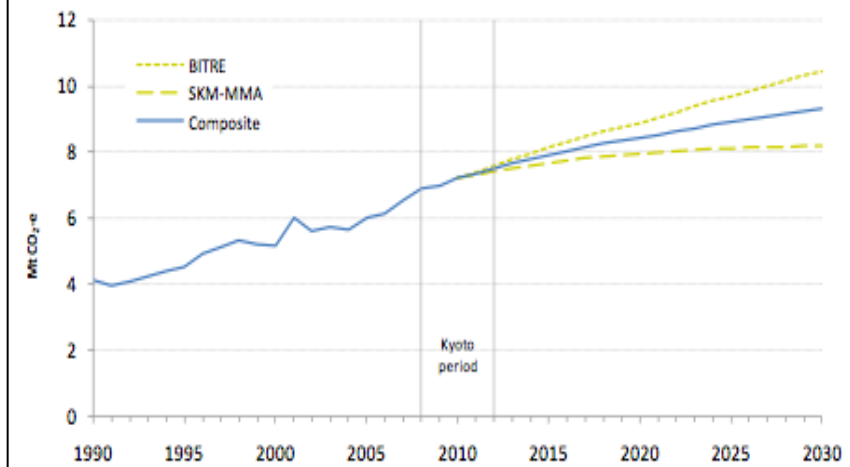


Figure 14 Articulated truck emissions, 1990 to 2030

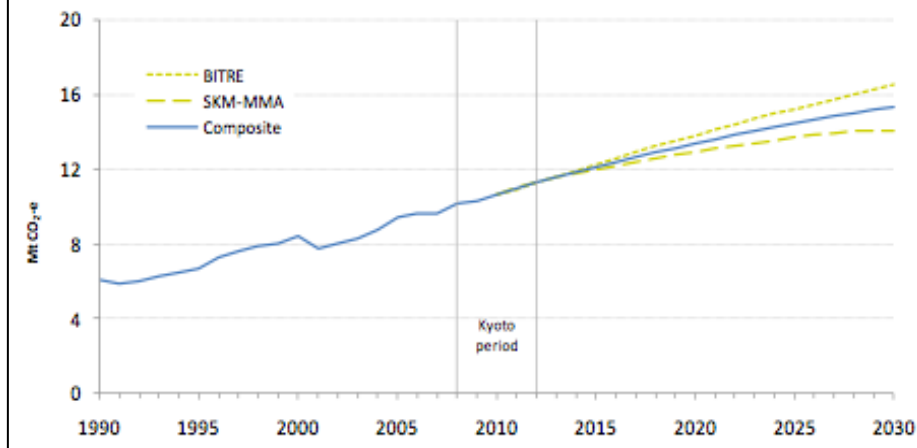
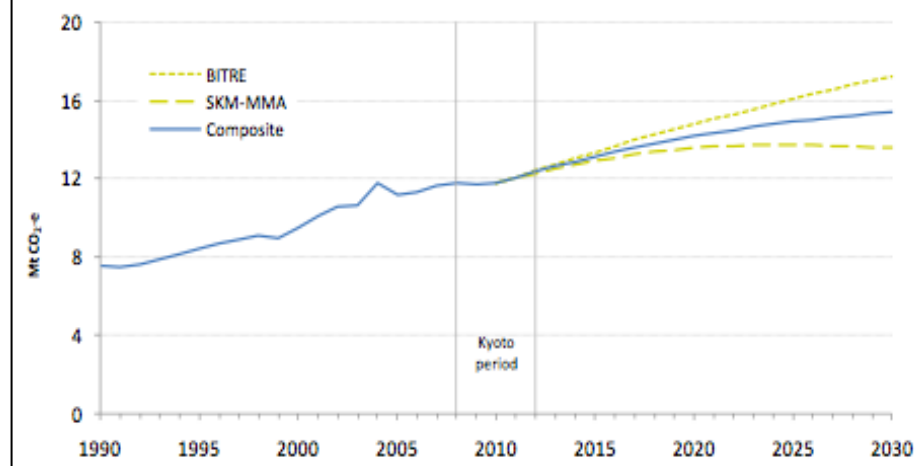


Figure 12 Light commercial vehicle emissions, 1990 to 2030



Research Agenda: Key Themes

1. Institutions for Freight Sector Governance
2. Short-term Responses
3. Policies & Instruments for Shorter-term Changes; Road freight #1 priority
4. Innovations for Long-term Change in a 'carbon-constrained world'; incl. addressing factors giving rise to demand

Research Agenda: Key Themes

1. Institutions for Freight Sector Governance

- Fundamental lack of national governance
- What nations functions/ structures/ institutions needed?
- Coordination across spheres of govt & existing institutions
- International best practices
- Identify barriers to improved environmental performance
- Problems with letting existing market failures continue
- Data & statistics to assess performance

Research Agenda: Key Themes

2. Shorter-term Responses

- Road vehicle energy/ GHG efficiency ↑
- System efficiency ↑ (Fleet differentiation/ Scheduling/ Reverse logistics)
- Inter-modality/ 'last mile' consolidation opportunities
- Mode choice: road to rail
- 'Eco-sourcing'
- Demand Management: Reducing distance/ reducing freight volumes
- Land use/ transport Planning (prevent short-term lost opportunities for longer-term benefits)

Research Agenda: Key Themes

3. Policies & Instruments for Short-term Changes

- More sophisticated performance assessment techniques, e.g., Energy/ GHG signature, Nick Low's "embodied mobility" concept
- Identify failings in existing systems
- Guidelines for regulatory reforms to achieve environmental goals
- Means to ensure accountability for performance
- Last Mile & Consolidation Models
- Carbon Tax/ Emissions Trading: Use of Revenue?

Research Agenda: Key Themes

4. Innovations for Long-term Change

- Australia to follow global leads on alternative liquid fuels for shipping/ aviation
- Potential for further electrification using renewable energy sources
- Address/ respond to: Drivers of freight demand
- Longer-term infrastructure needs may differ from current needs
- Does low-carbon freight imply 'de-materialisation' of the the economy?

Thank You

Selected References

BITRE (2011) *Truck Productivity: Sources, Trends & Future Prospects*

National Land Freight Strategy

BITRE (2010) *Interstate Freight in Australia*

BITRE (2010) *Road Freight Estimates & Forecasts in Australia:*

Interstate, Capital Cities & Rest of State

BITRE (2010) *Australian Rail Freight Performance Indicators 2007–08*

DCCEE (2011) *Clean Energy Future*

DCCEE (2011) *Transport Emission Projections 2010*

Russell (2010) *Rail Freight Governance Discussion Paper*. GAMUT

