MOVEMENT

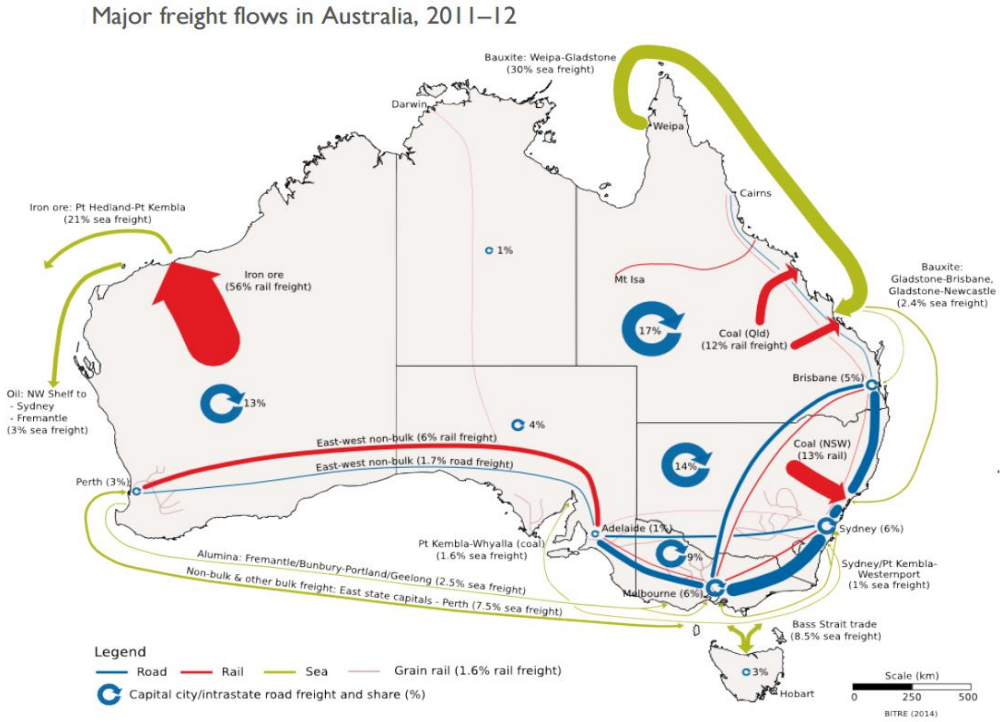
transport energy environment

Energy productivity in freight transport

Technical potential versus practical reality

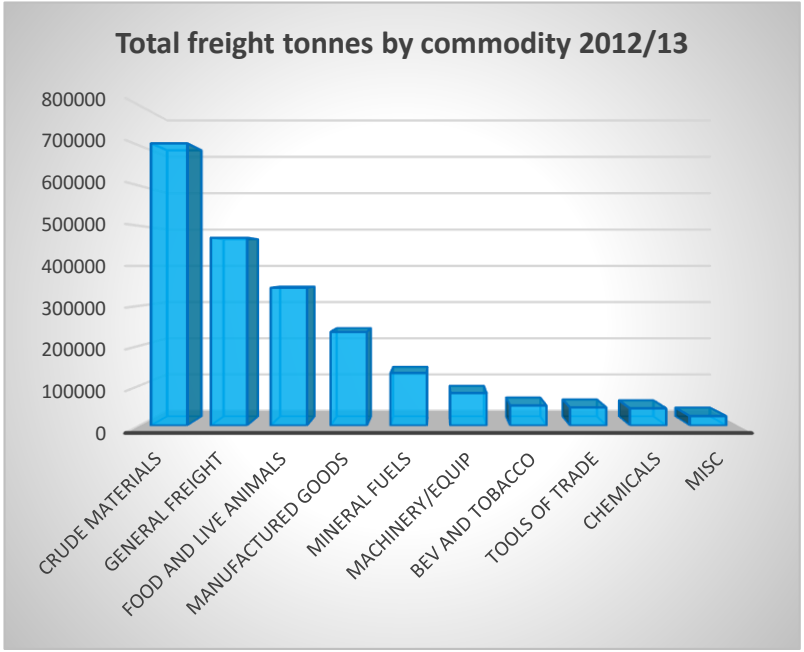
Freight in Australia

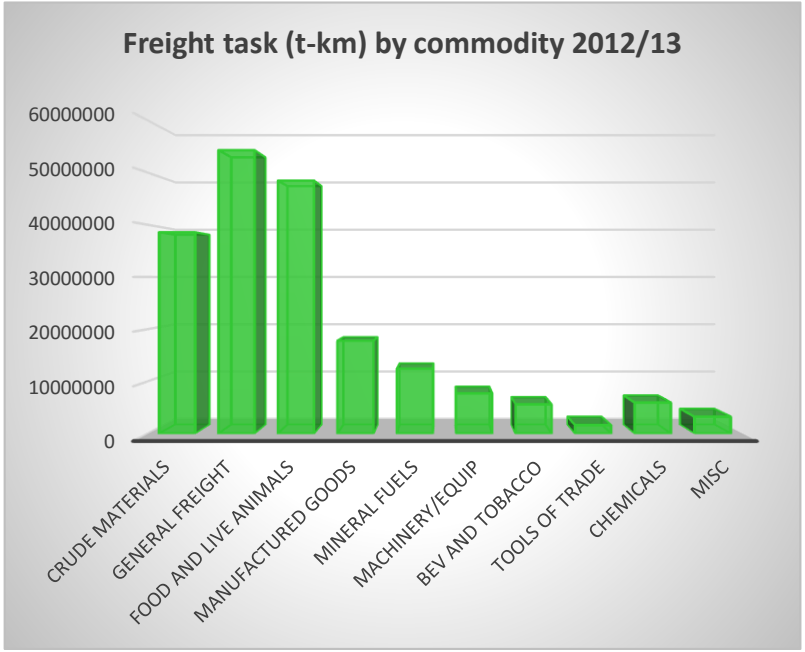
What is moved, and where does it go?



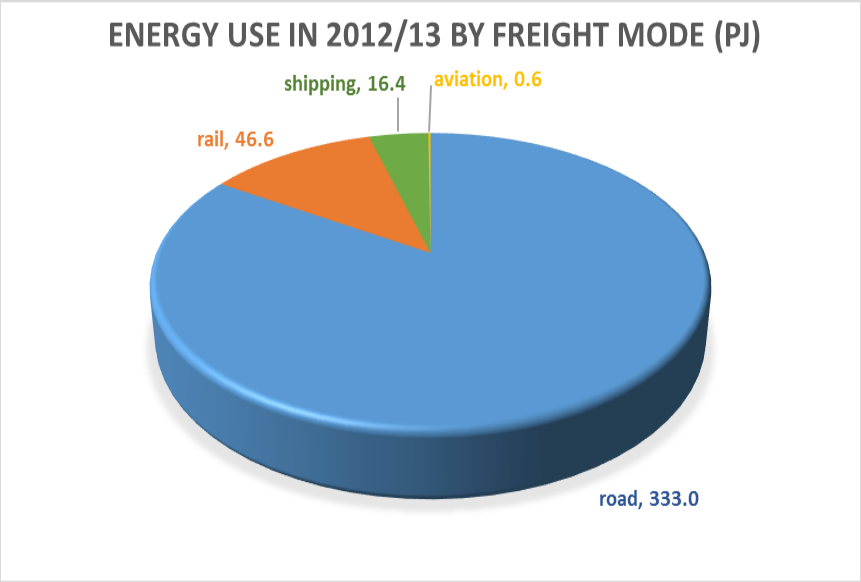
Source: BITRE 2014

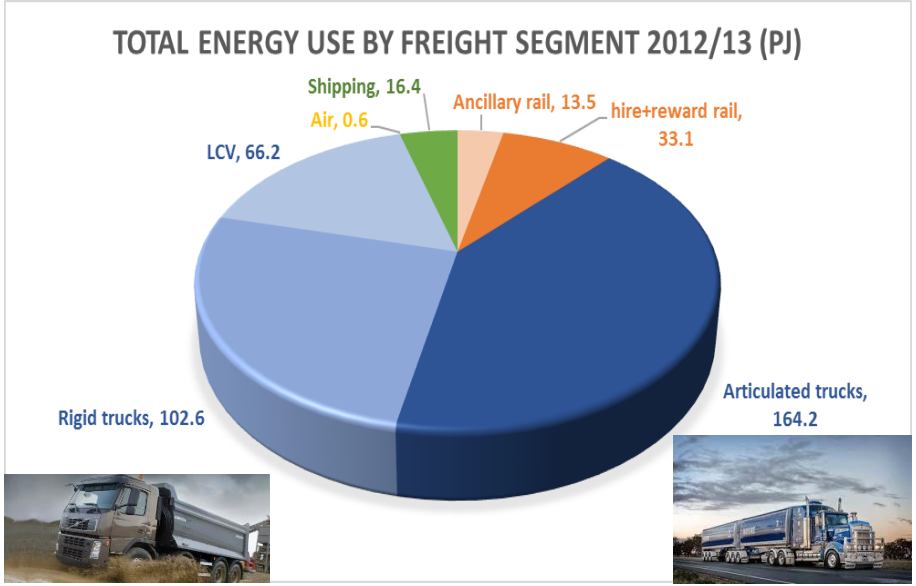
Road freight focus





How much energy is used, and by what?



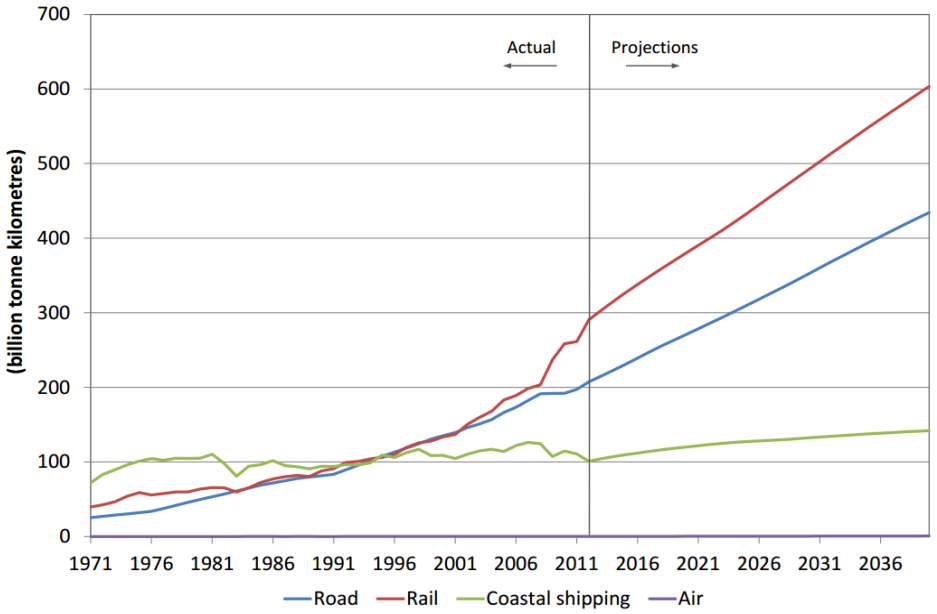


Data source: DIS 2015

The challenge: accommodating future growth…

- The total freight task will nearly double to 2040.
- Driven almost entirely by road and rail freight.

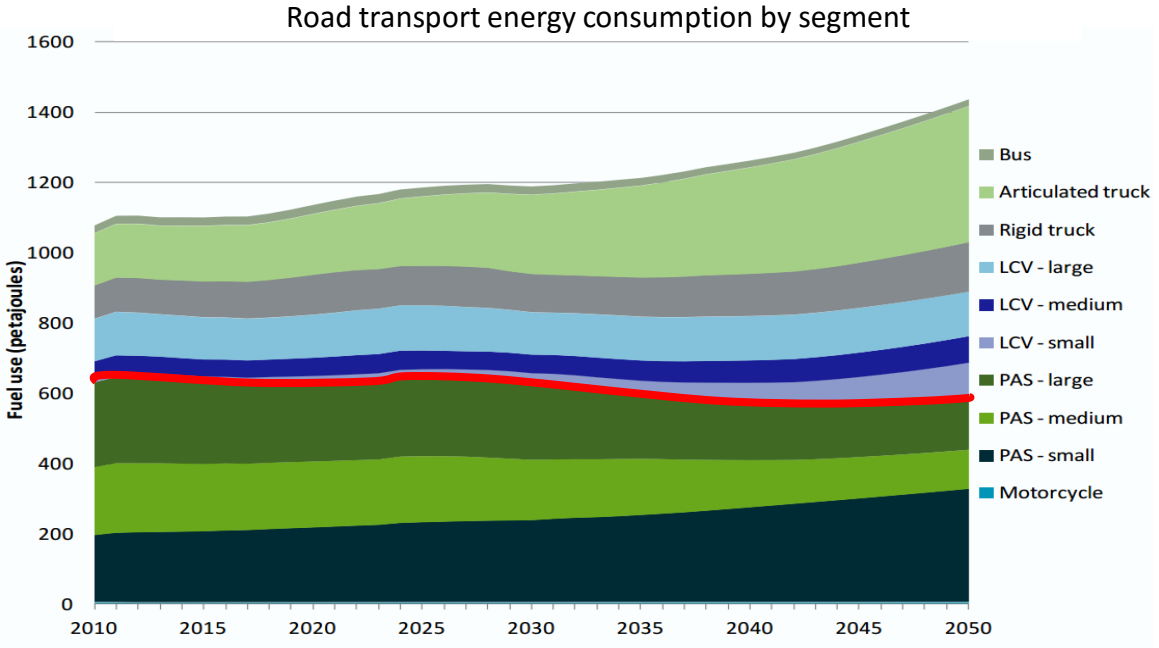
Historic and projected freight task by mode



Source: DIRD 2014

…as freight becomes the driver of transport energy use

- Freight currently consumes less energy than passenger transport.
- But will become the most significant consumer of energy as the freight task grows.



Source: CSIRO 2013 (central policy scenario)

Freight energy productivity opportunities

EP in freight transport

- For our purposes:

$$EP_t = \frac{Revenue\ from\ freight\ (\$)}{Energy\ required\ to\ move\ it\ (GJ)} \quad \text{OR } EP_t = \frac{Revenue\ from\ freight\ (\$)}{Energy\ cost\ to\ move\ it\ (\$)}$$

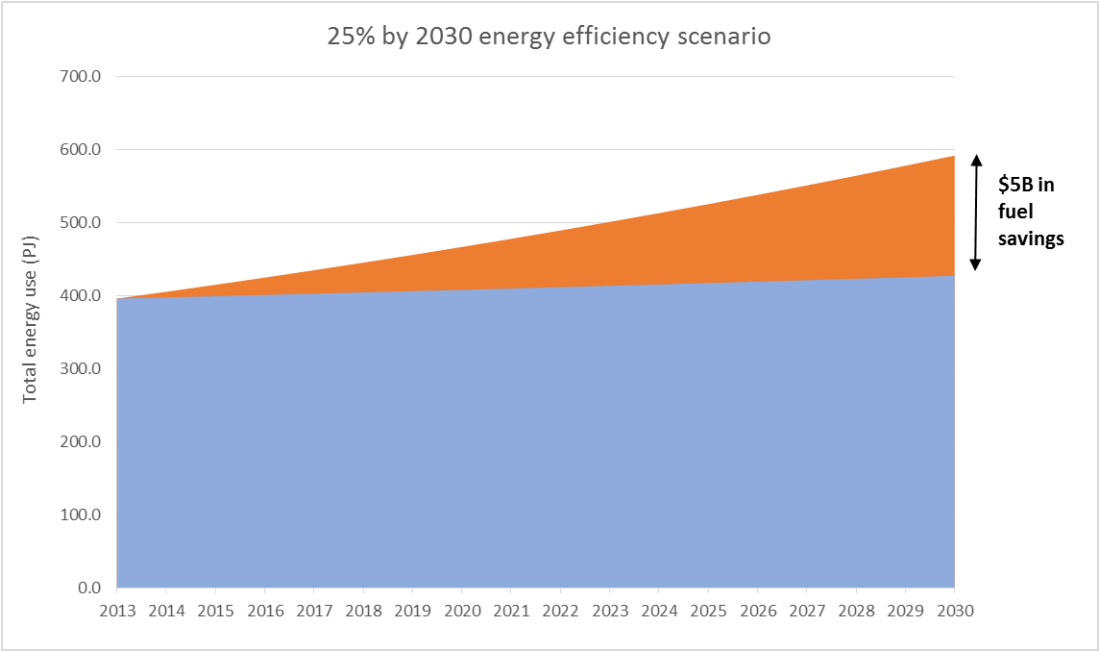
- Increasing energy productivity is then about:
  - moving more stuff (or further)
  - charging differently
  - using less energy
  - using lower cost energy.

Pathways to better productivity

Pathway	Opportunities	Energy saving	Examples
Mode shift	Road to rail Rail to ship	Up to 75%	
Demand reduction	Land use planning, hub location Load consolidation, load sharing Higher productivity vehicles	Up to 60%	
Increase system capacity	Route capacity upgrades HPV access First/last mile	Up to 40%	Double stacked trains 
System / network efficiency	Night time deliveries Intelligent Transport Systems/ICT Congestion charging	Up to 25%	 
Fuel switching	Natural gas, electricity, wind	Up to 40%	
Operator behaviour	Driver training Maintenance/inspection process Trip routing	10–20%	Telematics, Condition Monitoring  
Vehicle/fleet efficiency	Engine downsizing, hybrids Tyres, aero	Up to 25%	Fuel eff. standards 

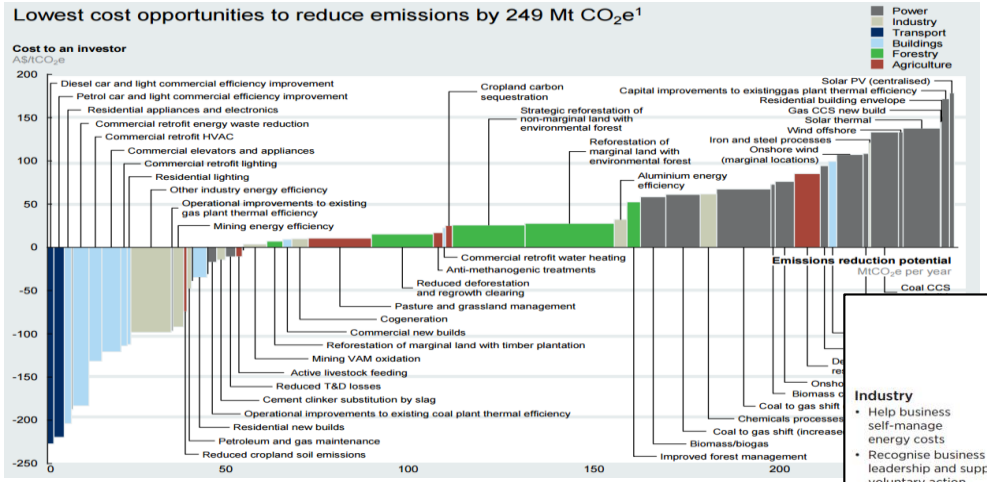
Size of the opportunity for EP in freight transport

- Assuming BAU growth for road, rail shipping…
- 5% mode shift road➔ rail; 5% shift rail ➔ shipping…
- And 25% improvement in energy efficiency for each mode over the next 15 years (1.9% p.a.)



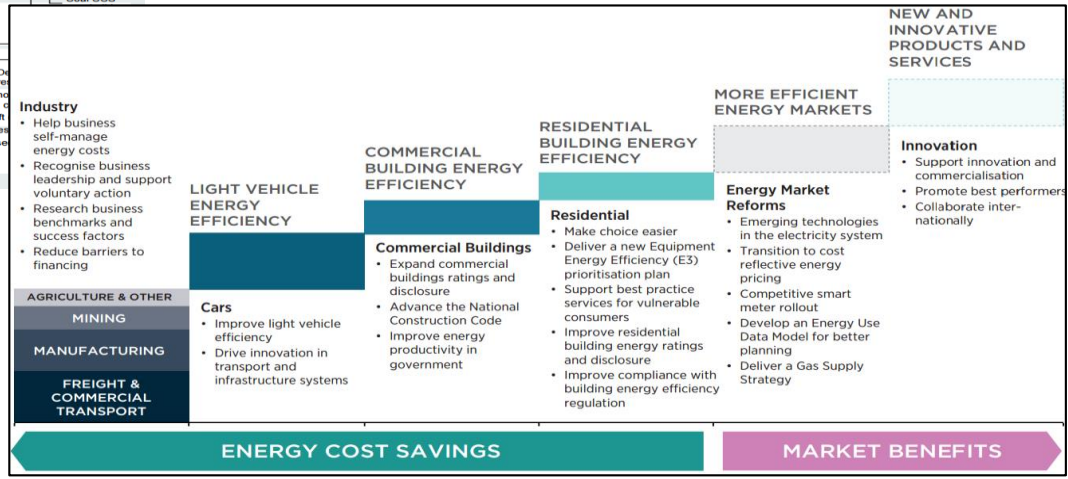
➔ $5 billion annual fuel savings alone

Many transport opportunities are cost effective



Source: ClimateWorks 2010

Source: COAG 2015



➔ Clearly there are non-economic barriers

Our current reality

The only way is up…

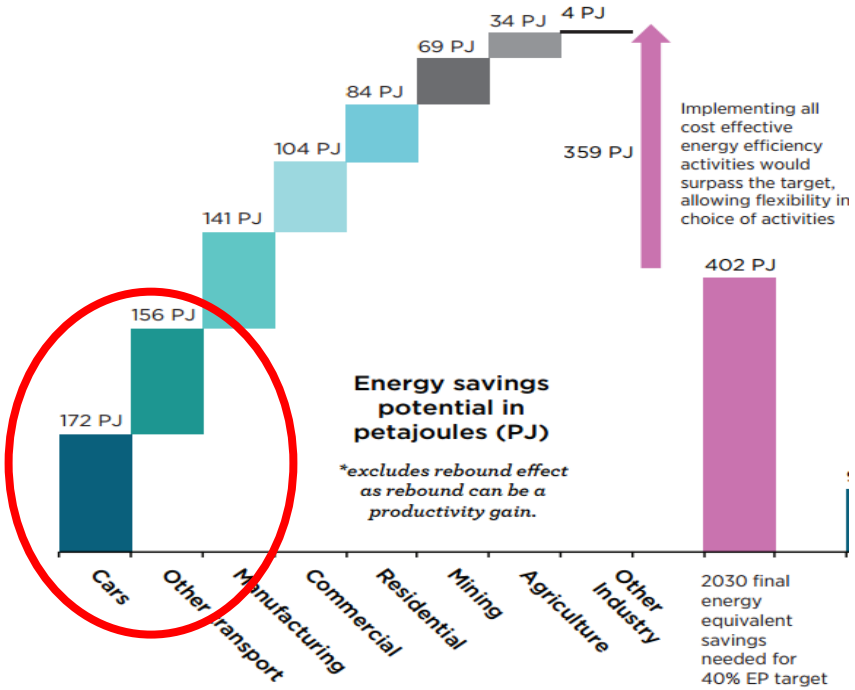
- ACEEE 2014 International Energy Efficiency Scorecard.
- Australia scored last in the transport sector.
- One positive was our freight score (based on high efficiency in bulk rail).

	Total score	Vehicle miles traveled per capita	Fuel economy of light-duty vehicles	Fuel economy standards for light-duty vehicles	Fuel efficiency standards for heavy-duty tractor trucks	Energy intensity of freight transport	Freight transport per unit economic activity	Use of public transit	Investment in rail transit vs. roads
Italy	17	2	3	4	0	1	3	1	3
India	16	3	3	2	0	2	1	3	2
Japan	15	1	2	3	1	1	3	3	1
UK	15	1	3	4	0	1	3	1	2
Brazil	14	2	2	1	0	2	1	3	3
China	14	3	1	1	2	2	0	3	2
France	14	2	2	4	0	1	3	1	1
Spain	14	2	2	4	0	1	2	1	2
EU	13	1	2	4	0	1	2	1	2
Germany	13	1	2	4	0	2	2	1	1
Canada	11	1	1	2	3	2	2	0	0
Russia	11	2	1	0	0	3	0	2	3
Mexico	10	2	1	1	0	0	2	3	1
South Korea	10	1	1	1	0	0	2	3	2
USA	8	0	0	2	3	2	1	0	0
Australia	7	1	0	0	0	3	1	1	1

Source: ACEEE 2014

The NEPP appears to rely heavily on transport for savings

- But there are just four measures (of 34) that directly relate to transport:
  - Light vehicle efficiency standards.
  - ITS policy framework.
  - Marine and aviation fuel efficiency.
  - Review Fuel Quality Standards.
- Some non-sector-specific measures might apply – once the details emerge.



Source: COAG 2015

Three fundamentals to move the game along

1. Efficiency data for trucks

- Currently we have:
  - no single classification for heavy vehicles
  - no agreed definition of duty/operating cycles
  - no standardised test for fuel efficiency.

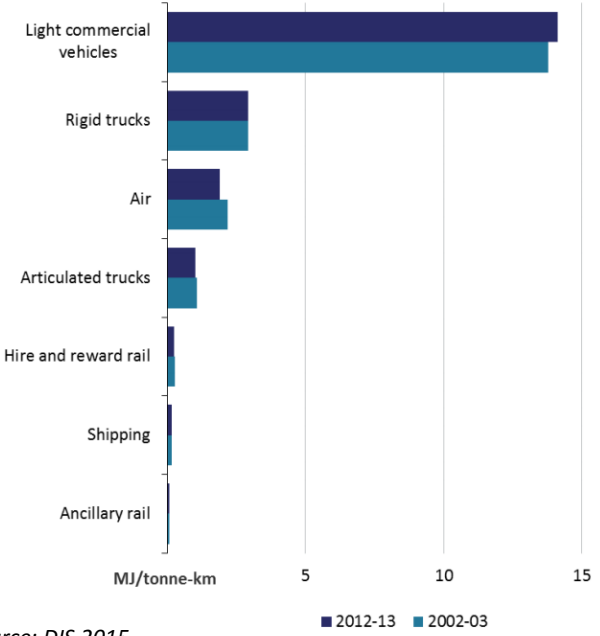
➔ No benchmarks for fuel efficiency/GHG.

- Why is that important?
  - influencing purchase decisions
  - freight sector modelling
  - continuous improvement in fleet management
  - eligibility for programs, financing, incentives

	GVM (t)	*Aust. vehicle standard*	*ABS*	*driver license*	*TIC*
Trucks	< 3.5	light goods vehicle	n/a		light truck
	3.5 - 4.5	medium good vehicle NB1	light rigid		
	4.5 - 6	medium goods vehicle NB2		light rigid	
	6 - 8				
	8 - 10		heavy rigid	medium rigid	medium rigid
	10 - 12				
	12 - 15	heavy goods vehicle			
	15 - 16				
	16 - 18				
	18 - 20			heavy rigid	heavy duty
	20 - 22.5				
	22.5 - 25				
	25 - 30				
	> 30				
Artic.				heavy combination	
Trailers	< 3.5	light trailer			
	3.5 - 10	medium trailer			
	> 10	heavy trailer			
Bus	< 5	light		Medium rigid	
	> 5	heavy		as per rigid	

2. Modal shift

- Energy intensity of rail is 75% lower than road, and shipping lower again.



Source: DIS 2015

- Contestability is limited, but should be exploited.
- Co-benefits include
  - Safer roads
  - Greater utilisation
  - Reduced traffic congestion

3. Incentives and policy for fleet renewal and retrofit

- Old fleet in both road and rail
  - Average age of trucks is 13.8 years[1] compared with 6.7 in US
  - Average age of diesel locomotive is 35 years[2] (c.f. 8 years in the US)
- A newer fleet is cleaner and more efficient.
- Co-benefits include:
  - reduced health spending (pollution)
  - safer roads
  - greater utilisation / reduced maintenance
  - economic stimulus.

1: ABS 2015, 2: Environ 2013

Source: TIC 2015

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