Webinar Participants

2

Mechanics of the seminar

3

- The webinar is being recorded, the URL will be sent out to participants and posted at www.coe-sufs.org
- Participants from the US and Canada can:
  - Use Adobe Connect to receive the audio (PRIMARY method)
  - Dial 1-888-446-7584, access code 1120583
- International participants can:
  - Use Adobe Connect to receive the audio (PRIMARY method)
  - Use Skype or similar to dial 1-888-446-7584, code 1120583
  - Dial 212-372-3742 (caller paid call)
- Submit questions using the Chat feature

Now offering Professional Development Hours

4

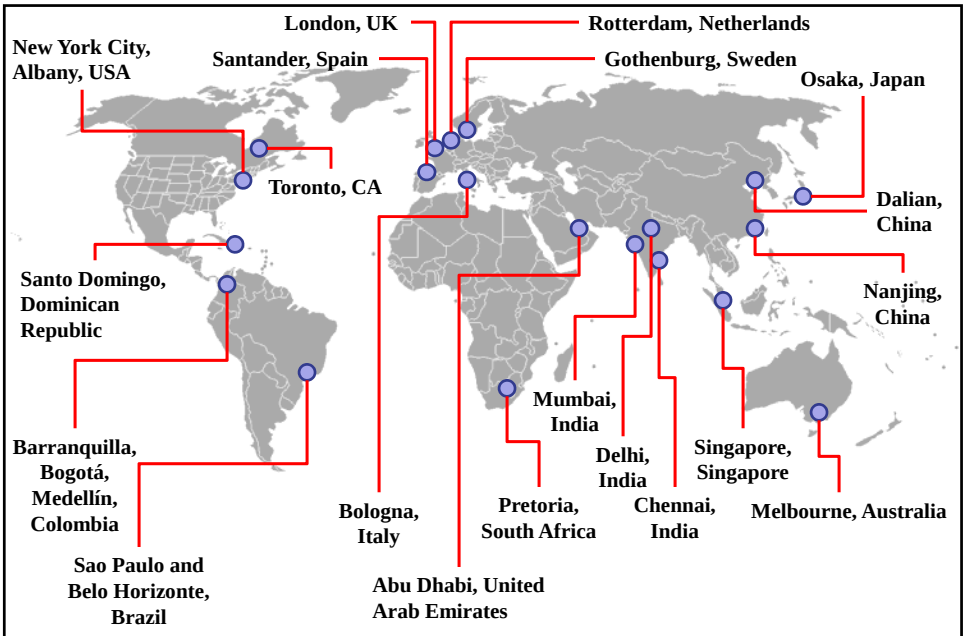
- Professional Development Hours (PDH) for Professional Engineers (PE) now available
  - 1.0 PHD for this webinar
- Credits issued through the NYS Department of Education. Please confer with the state or country in which you register as a PE to determine whether or not the credit will transfer.
- For more information on obtaining PDH please email wojtoj@rpi.edu

The VREF Center of Excellence for Sustainable Urban Freight Systems (CoE-SUFS)

CoE-SUFS

6

- Funded by the Volvo Research and Educational Foundations (VREF)
- Main Goal: To jumpstart an integrative process, involving cities, private sector, and researchers to develop new freight systems paradigms that:
  - Are sustainable
  - Increase quality of life
  - Foster economic competitiveness and efficiency
  - Enhance environmental justice



CoE-SUFS Dissemination Programs

8

- **Peer-to-Peer (P2P) Exchange** to share global best practices and real world examples of sustainable urban freight systems
- Next P2P (June, 2015):
  - Freight Bikes in Urban Areas: Experiences and Challenges
- **Workshops** to bring together public/private sectors and academia, to jointly work to address urban freight issues
  - Already held at: India, Brazil, Colombia, Canada, Mexico, Chile, and Australia

Role of High Productivity Freight Vehicles in Metropolitan Areas: The Australian Experience

Russell Thompson, Les Bruzsa, and Kim Hassall

Section I: Introduction

Russell Thompson

Outline

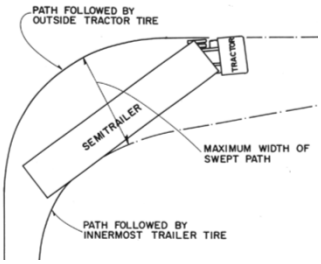
11

- Overview of Performance Based Standards (PBS) and High Productivity Freight Vehicles (HPFVs)
- Regulator Perspective
- Operator Perspective
- Concluding Remarks
- Additional resources
- References

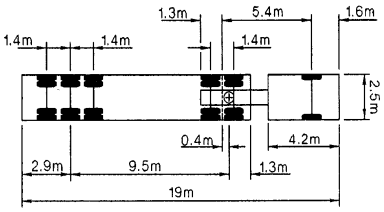
PBS Concepts

12

What a vehicle should do...



Instead of what it should be like



PBS in Australia

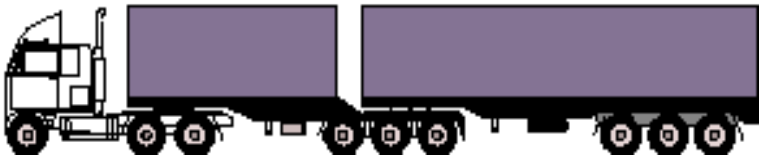
13

- PBS developed to improve productivity efficiency & safety
- Innovative vehicle designs promoted
- Criteria developed for safety & infrastructure protection
- National Heavy Vehicle Regulator established in 2014

Semi Trailer vs B-Double

14

Semi Trailer: Length 19m, Width 2.5m Height max 4.3m
Weight 42.5 tonnes GVM (45.5 Tonnes with MMA)



B-Double: 9 axle configuration
Length 25m, Width 2.5m Height max 4.3m
Weight 62.5 tonnes GVM (68 Tonnes with mass management accreditation)

B-Double Experience

15

- Have access to 99% arterial road network
- Productivity benefits for freight operators & their customers
- Reduced total number of freight trips
- Are safer: moving 45% freight task in loaded tkm, 23.6% large truck crashes

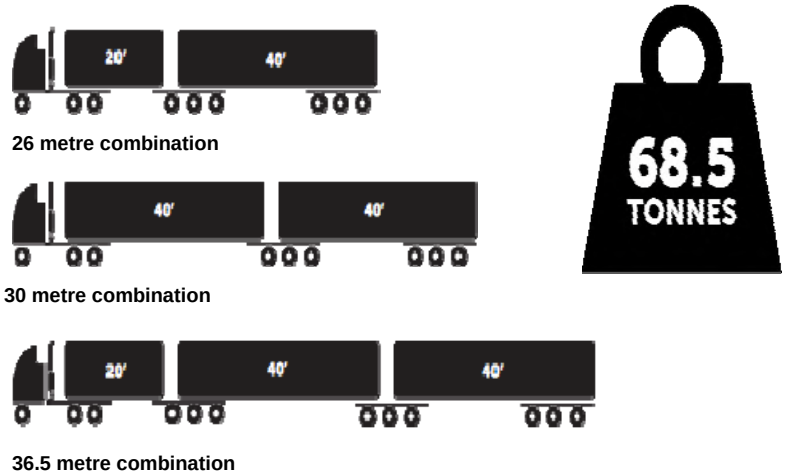
PBS: Moving more with less

16

- Access for PBS carrying cubic (lightweight) freight up to 68.5 tonnes on high quality duplicated roads
- These PBS are no heavier than a standard B-double

What are PBS?

17



PBS

18

- Offers significant potential to further lower costs, improve safety & protect environment by reducing number of truck movements
- Use concentrated on key strategic segments of road network on freeways & major highways
- No increase in truck mass required for 'cubic HPFVs' does not require costly upgrades to road pavements & bridges

Dimensions of PBS

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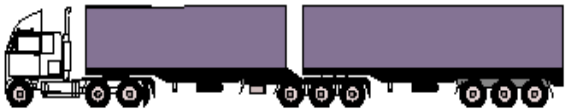
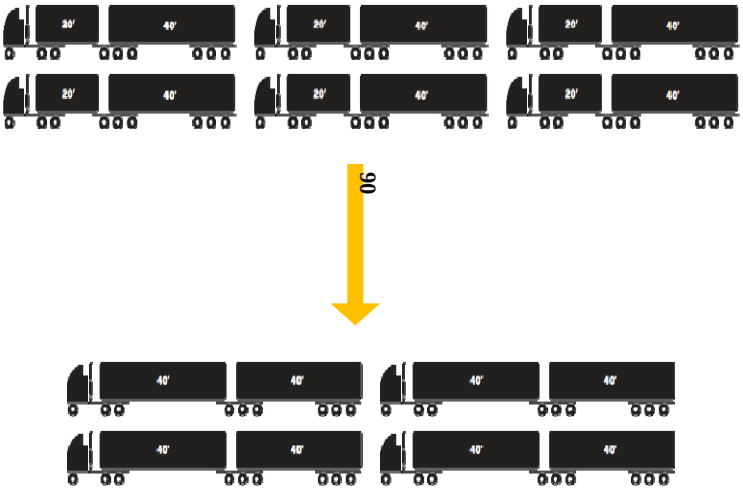
***B Triples*: Approx. 33m long, 63t to 90t**
Axle configuration dependent



***Super B-Doubles*: Approx. 30m long; 62.5t to 68t**
Quad axles will be also used

Dimensions of PBS

20



Usage of PBS

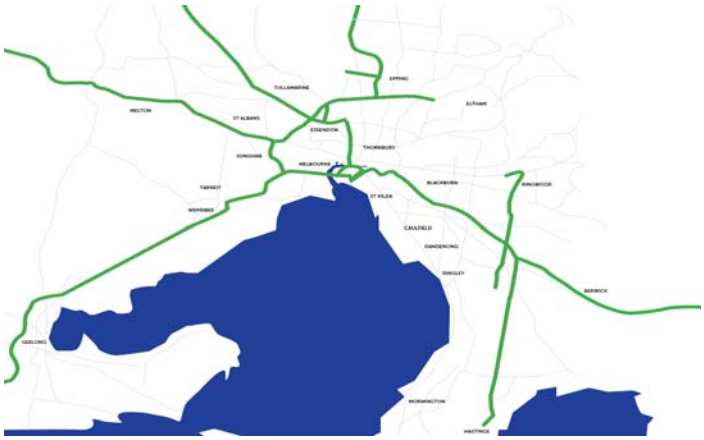
21

- Primary produce, intermodal containers & for transport of parts & components between major manufacturing establishments
- Suited to certain commodities & uses, on specific routes
  - Lighter commodities: eg. paper products & empty shipping containers
  - fill currently permitted trucks before they reach the current truck mass limit

Metro Routes

22

- For exclusive operation within metropolitan Melbourne HPFV limit of 30m length



Regional Routes

23

- For operations in regional Victoria, limit of 36.5 metres in length

High Productivity Vehicles (PBS) in Australia

24

- There are some 12 classes of HPV/PBS vehicles examined in the study
  - However, not all are doing urban work
- From smallest to largest:

Parcel 8x4 Extended length, 36 Mail

8 X 4 Twin Steer PBS Semi

4 Axle Dog HPV / HML

8x4 Quad axle Axle Dog Tanker

5 Axle Dog HML / PBS
Urban and Regional

Super B-Double – Quad / Quad Configuration
Urban, Regional and Long Distance

A Double Bulk Grain HML / HPV
Regional to Urban

B Triple Volumetric HPV
Regional, Linehaul and outer regional

AAB Quad Tipper HPV
Remote Regions - Linehaul

Section II: The Regulator's Perspective of the Performance Based Standards (PBS)

Les Bruzsa

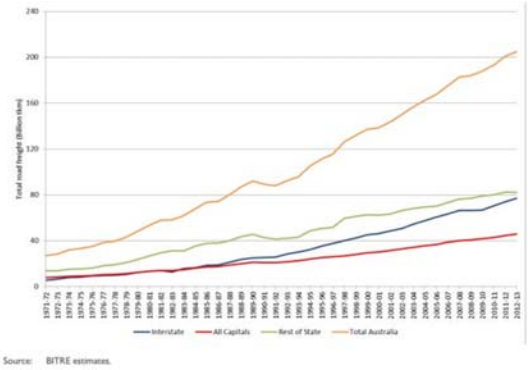
Who is the NHVR?

35

- The National Heavy Vehicle Regulator (NHVR) is Australia's first national independent regulator for all vehicles over 4.5 tonnes gross vehicle mass;
- NHVR is an independent, statutory body corporate;
- Administration of the National Heavy Vehicle Law (NHVL);
- For the first time in Australia's history, from February 2014, participating states and the ACT are working from the same heavy vehicle law as opposed to their own interpretation of the previous model law.

Productivity– what is the task?

36



Source: BITRE 2014

- In the period from 1971-1972 to 2012-2013 the total freight estimate within all capital cities increased from 8 billion tkms to 46.7 billion tkms.
- For the same period all freight increased from 27.0 billion tkms to 204.9 billion tkms
- Containerized trade through Australian ports is forecasted to grow at 5.1% a year from 7.2 million 20 foot equivalent units (TEU) in 2012-13 to 19.4 million TEU in 2032-33

Video of Performance Standards

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What is PBS?

38

- PBS aims to maximize the safe use of higher productivity vehicles by matching the right vehicles to the right roads
- Requirements are set in National Law
- World's first – only introduced in Australia
- Selected and nationally agreed Infrastructure and Safety Standards
- Accredited PBS Assessors and PBS Vehicle Certifiers
- Design Approvals for concepts/designs – reviewed by an independent panel
- Vehicle Approvals for actual combinations
- All approvals issued by the NHVR
- Access by Permit or Notice based on performance

Exemptions available for permitted PBS vehicles

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ADR43

- clause 6.1 (Length)
- clause 6.2 (Rear overhang)
- clause 6.3 (Height)
- clause 6.5 (Width)
- clause 9.4 (Retractable axles)
- clause 9.5 (Retractable axles)

ADR 62/63

- Tow coupling overhang and location

MDL Regulations

- Length
  - section 3 of Schedule 6 (general)
  - section 4 of Schedule 6 (trailers)
  - section 5 of Schedule 6 (rear overhang)
  - section 6 of Schedule 6 (Trailer drawbars)
  - section 7 of Schedule 6 (Width)
  - section 8 of Schedule 6 (Height);

VS Regulations

- Section 29(b&c) and Section 31 of Sch 3 - Coupling attachment and overhang

Road Managers

40

- Within Australia there are 6 States and 2 territories that control the major highway and arterial networks
- There are 560 local councils that control local arterial and road networks. Of these around 420 participate in the scheme. These are the "first and last mile" access routes usually in urban industrial areas
- In some cases there are already prescribed routes for Level 1 and Level 2 PBS vehicles
- There are also routes that allow higher mass
- In most cases, access to the networks must be consented to by the road managers in each state and/or council
- Access to the networks is the single biggest issue for the growth of High Productivity Vehicles in Australia
- Each state and local government road manager can apply their own conditions of operation or not allow access to their road network

Road networks

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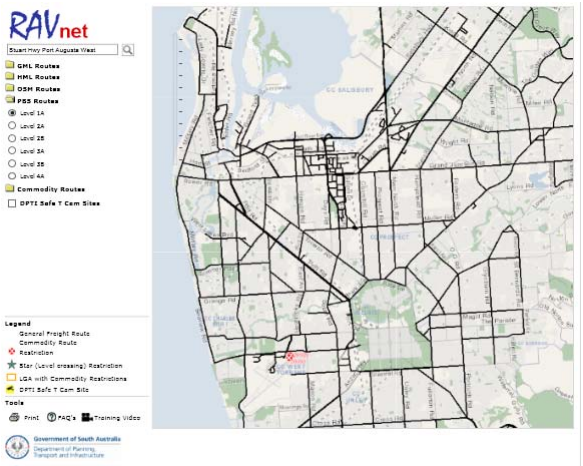
Prescriptive		PBS		
Road Access Level	Max Length	Vehicle Performance Level	Network Access by Vehicle Length, L (m)	
			Access Class 'A'	Access Class 'B'
General	≤ 19m	Level 1	L ≤ 20 (General Access*)	
B-Double	≤ 26m	Level 2	L ≤ 26	26 < L ≤ 30
Road Train 1	≤ 36.5m	Level 3	L ≤ 36.5	36.5 < L ≤ 42
Road Train 2	≤ 53.5m	Level 4	L ≤ 53.5	53.5 < L ≤ 60

Urban roads in Australia will fall within these two networks

Urban road network access

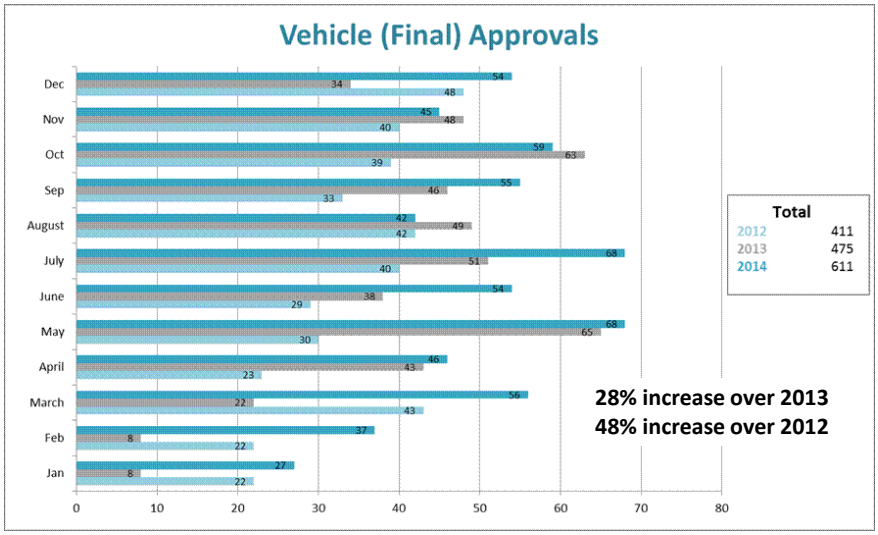
42



PBS Level 1 Access in Adelaide City

NHVR PBS Experience – Exponential Growth

43



PBS vehicles using urban networks

44

- PBS Level 1 – 20m max overall length, 45.5t of GCM – delivering groceries to stores (the prescriptive length limit is 19m)
- Productivity increase: from 20-22 pallets to 26 pallets
- A significant reduction of the number of trips to perform the freight task
- Reduction of environmental impacts (fuel usage and emission)
- A blueprint design is available for industry – no PBS assessment is required

PBS vehicles using urban networks

45

- The most prevalent PBS vehicle, a 7 axle truck and dog, operates on both level 1 and level 2 urban road networks.
- On level 1 roads the GCM is 50.5t and on level 2 roads it is 57.5t - significant payload increase
- No other vehicle can operate with this flexibility and deliver such productivity benefits
- Payload height is limited so that SRT levels are acceptable
- Combination is sensitive to tyre parameters for RA and HSOT

PBS vehicles using urban networks

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- Maximum height by law is 4.3m in this configuration
- Under prescriptive regulation these vehicles can operate at 4.6m with reduced mass (90% of GCM)
- PBS approved operation at 4.6m without the payload (GCM) reduction
- Increased cubic capacity over standard vehicles – 36 pallets
- Payload height could be limited due to the PBS stability (SRT) requirement

PBS vehicles using urban networks

47

- Quad-Tri B-double
- Overall length 30m – standard B-double 26m
- Carrying two 12m containers in the Melbourne metropolitan area
- A standard B-double can carry one 40′ and one 20′ container
- 73t of GCM compared to 68.5t GCM for a standard B-Double
- Payload height limited due to SRT
- PBS A-double
- Overall length 30m
- GCM of 85t
- Increased productivity (100%)

Video of PBS Benefits

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SUSTAINABLE URBAN FREIGHT SYSTEMS

NHVR

Industrial Logistics Institute

THE UNIVERSITY OF MELBOURNE

Impacts on community

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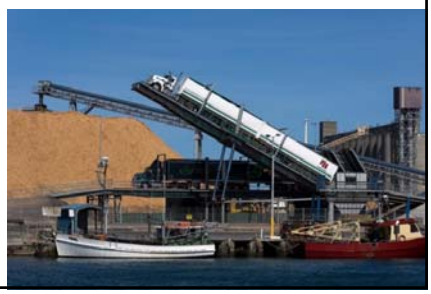
- Achieving community acceptance and support for PBS and High Productivity Vehicles (HPVs) is critical
- The vast majority of people do not realize that PBS vehicles are operating within their communities
- With a reduction in "freight exposure" there will be lower truck numbers within the community
- This will deliver a benefit in lower noise, emissions, hours of operation and accidents
- A potential benefit will also be a reduction in road maintenance costs of up to 3%

NHVR – What's driving us forward

50

Over the coming years we will continue to focus on:

- Building an effective National Heavy Vehicle Regulator
- Delivering nationally consistent rules and regulation
- Embracing innovation to enhance productivity & safety
- Using regulation to lift the industry standard



Section III: An Operator's Perspective of the Benefits of Performance Based Standards Vehicles in Australia

Kim Hassall

PBS Survey Response Rate

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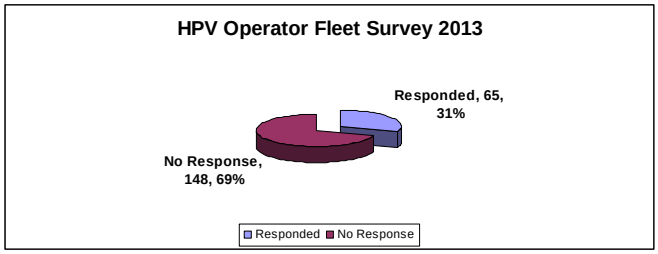
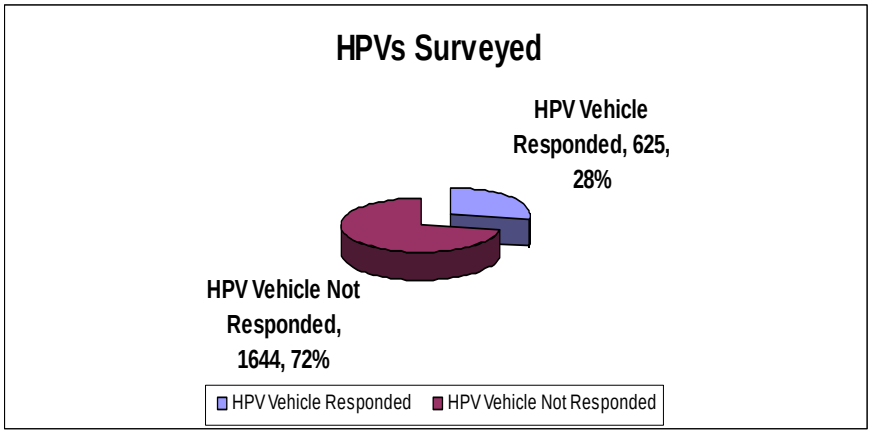


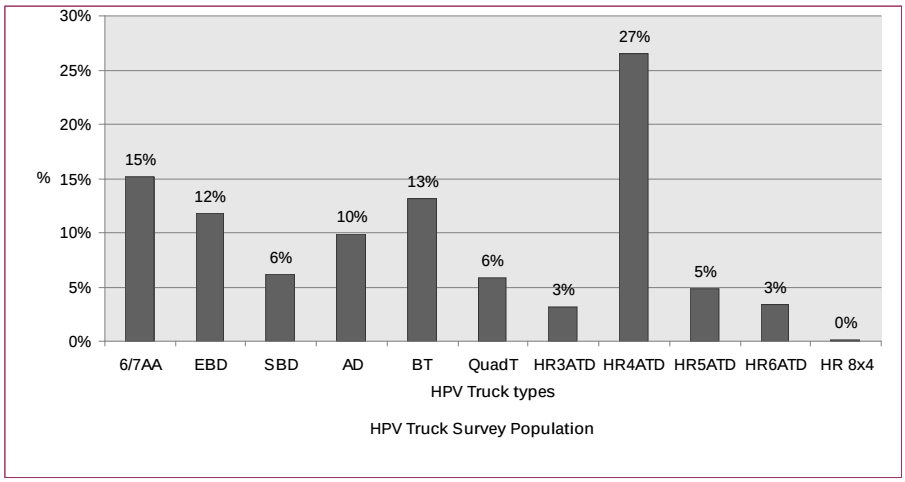
PBS Vehicle Data in Responses

53



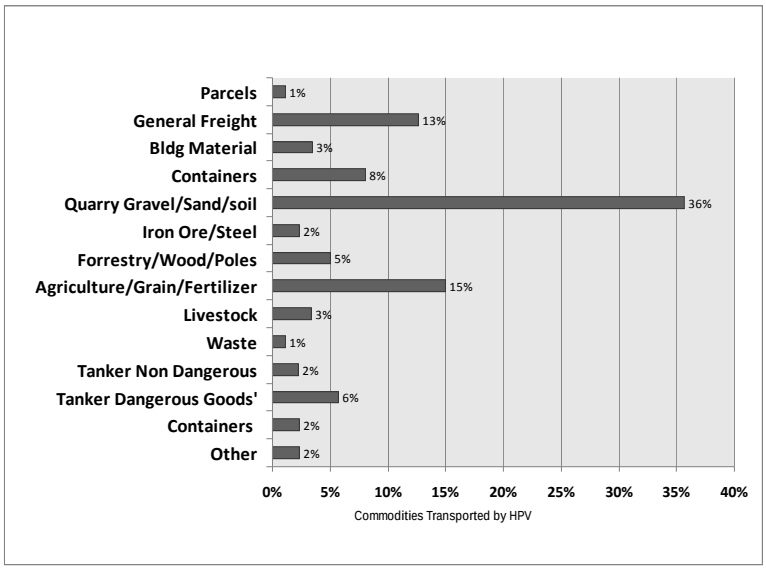
PBS Configuration Breakdown

54



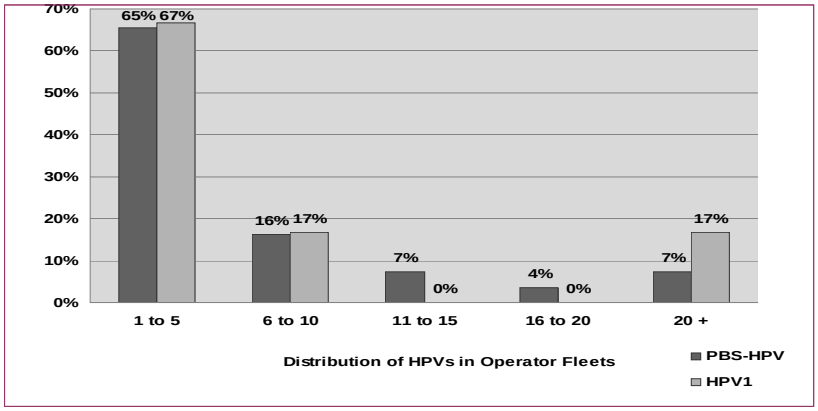
PBS Commodities Carried

55



PBS Holdings Mix Within Existing Fleets

56



National Truck Accident Study Classifications

57

- Minor accidents, value less than $5,000:– shall be deemed to be no more than bumps and scrapes. In many incidents, such minimal damage may on occasions go unrepaired for a period of time. (No involvement from Police or other reporting agencies.)
- Moderate accidents, value from $5,000 to $15,000 - will in most cases will result in the vehicle being taken off road for repairs. The cost of replacement parts influence this classification. (No involvement from Police or other reporting agencies.)

NTARC Study Accident Classifications

58

- Serious accidents, value $15,000 to $50,000, – vehicle usually immobilized and requires recovery and towing. The accident vehicle is expected to off the road for a minimum of 14 days.
- Major accidents, value greater than $50,000 ranging to several million dollars. Extensive damage – refers to any major loss incident. The incident will usually involve police and traffic agencies. If the equipment is not written off in the damage assessment, the repair program may involve weeks of the vehicle being off the road for repairs.

Examining MAJOR Truck Accidents per annum

59

	Average Incidents pa	Average Insured trucks pa	Ave km p a	R100mK	R10k
Single Articulated	174	11855	71000	20.6	146
B-Double	79	6502	162606	7.5	121
B-Triple (HPV)	1	73	226204	4.4	(99) [1]
Road Train Type I	23	907	135600	18.9	(256) [1]
Road Train Type II	15	515	151461	19.3	(292) [1]
Quad Trailer (HPV)	2	42	196286	26.5	nsv
Combined Articulated	294	19894	106800	13.8	148
Rigid Truck & Dog	17	2783	30386	7.9	61
Rigid Truck	50	17006	77034	9.6	29
Combined Rigid	67	19789	36946	9.1	34

PBS Fleet Operators Survey – Major Accidents

60

HPV Class	Major Incidents from Survey	HPV R100mK	Conventional Vehicle	Conventional Vehicle R100mK
Single Articulated 6/7AA	0	na	6AA	20.6
Enhanced B-Double	5	6.7	BD	7.5
A-Double	4	13.5	RT I	19.3
Super B-Double	0	na	BD	7.5
B-Triple	2	4.0	RT I	19.3
Quad Trailer	0	na	QT	26.5
Combined Articulated	11	5.5		13.8
Rigid Truck & 3ADog	0	na	HR in combination	7.9
Rigid Truck & 4ADog	2	4.3	HR in combination	7.9
Rigid Truck & 5Dog	0	na	HR in combination	7.9
Rigid Truck & 6Dog	0	na	HR in combination	7.9
Rigid 8 x 4	0	na	HR	9.6
Combined Rigid	2	2.2		9.1
Total Combined	13	4.5		10.0

Mixed PBS Fleet Accident Rate per 100m kms

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Accident type by severity R100k		Minor	Moderate	Serious	Major	Total Accidents	Total Serious & Major Accidents
Conventional Truck	Articulated (69%)	21	22	16	13	72	29
	Rigid Trucks (31%)	42	34	19	7	102	26
Benchmark Conventional Trucks Incident Weighted Total		27.5	25.7	16.9	11.1	81.3	28
HPVs	Articulated (69%)	8	2	2	5	18	7
	Rigid Trucks (31%)	20	26	4	2	53	6
Observed HPV incident Weighted Total		11.7	9.4	2.6	4.1	27.9	6.7
Total HPV Incident Savings R100mk		15.8	16.3	14.3	7.1	53.5	21.4
Observed HPV Weighted Incident Savings %		57%	63%	85%	63%	66%	76%

PBS Fleet Fatalities

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Truck Type	Fatalities per 100m kilometres (As at Sept 2012)	Fatalities per 10 K vehicles (As at Sept 2012)
Rigid Trucks	1.0	2.7
Articulated	1.8	15.9
Surveyed HPVs	0.3	nsv

PBS Higher per Unit km and Savings

63

HPV Truck Type	Ave HPV Km pa	Conventional Vehicle and Km pa	HPV kilometre savings
6AA extended length	NA	6AA - (71,013)	0.091
7AA	NA	6AA - (71,013)	0.207
Ave 6/7AA	161,200	6AA - (71,013)	0.149
Enhanced BD	301,600	BD - (166,001)	0.273
Super BD	88,400	Low Km BD – NA	0.365
A-Double	224,200	RTI – (111,203) ; BD - (166,001)	0.315
B-Triple	221,000	RTII - (151,461) BD - (166,001 BD - (166,001)	0.325
Quad Trailer	196,200	BD - (166,001)	0.405
HR3ATD	136,400	HR3ATD – (77,034)	0.129
HR4ATD	150,000	HR4ATD – (69,596)	0.221
HR5ATD	220,500	HR4ATD – (69.596)	0.264
HR6ATD	275,000	HR4ATD – (69,596)	0.300

Urban PBS Delivery & Shuttle Vehicle Parcels, Furniture, Single TEU etc (14.85m, 4 axle Rigid)

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Original Concept 2006/7

Prototype 1 – 2011 Unsuccessful

Prototype Number 2 ????

It's Coming …

Sydney's Freight and Ports Strategy

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ACTION 1C Develop a seamless interstate freight network

Task 1C-1 Maintain dialogue with national regulators to support the interests of freight

Task 1C-2 Improve cross border freight flows

ACTION 1D Improve productivity of the road freight network

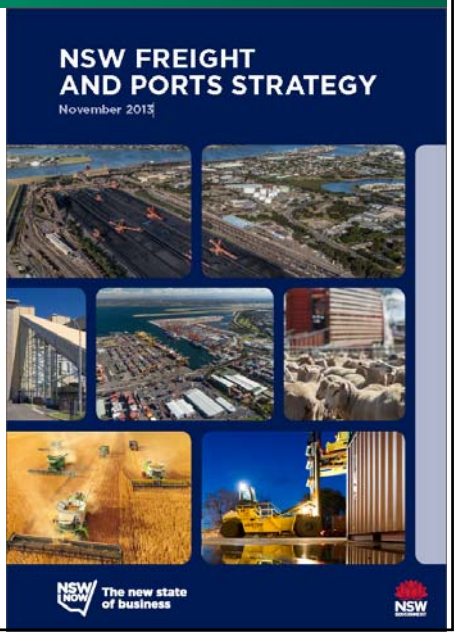
Task 1D-1 Develop national heavy vehicle charging and investment reforms

Task 1D-2 Provide necessary infrastructure to support High Productivity Vehicle access

Task 1D-3 Improve access for High Productivity Vehicles on State and local roads

Task 1D-4 Incorporate freight considerations into managed motorway access decisions

Task 1D-5 Manage oversize and overmass heavy vehicle movements



Concluding Remarks

Russell Thompson, Les Bruzsa, and Kim Hassall

Concluding Remarks

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- Performance Based Standards have been evolving in Australia since 1998… other countries can start where we are now.
- The Performance Standards are exceptionally important
- Matching vehicles to the right capacity roads equally so

<u>The benefits then flow:</u>

- Large productivity benefits: 20%+ for Rigids, 33%+ for articulated trucks
- Safety benefits are even larger (despite incorrect perceptions)
- Lower truck traffic leads to lower levels of congestion and lesser impacts on communities
- Improved pavement benefits through lower ESA kilometers
- PBS vehicles work well with other modes at ports and railheads

Thanks!
Questions?

Kim Hassall
Industrial Logistics Institute
University of Melbourne
hassallk@unimelb.edu.au

Russell Thompson
Civil and Environmental Engineering
University of Melbourne
rgthom@unimelb.edu.au

Les (Lazslo) Brusza
National Heavy Vehicle Regulator
Les.Bruzsa@nhvr.gov.au

Additional Resources

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For more information about impacts of vehicle size restrictions, see:

- https://coe-sufs.org/wordpress/ncfrp33/psi/traffic-management/

For more information on potential initiatives to address freight issues, go to:

- http://coe-sufs.org/wordpress/initiativeselector
- https://coe-sufs.org/wordpress/ncfrp33

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