Deloitte Access Economics

Opportunities for Greater Passenger Rolling Stock Procurement Efficiency

Australasian Railway Association

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Contents

Joint Foreword

The Australian rail industry has long been a crucial part of our manufacturing sector but it is facing a crossroad.

With growing populations and ageing rail fleets, it is clear there will be higher demand for rail in the future. We need to ensure that Australian industry is well prepared and ready to meet this growing demand. Understanding the future plans for rail in Australia is essential in achieving this.

Over the next 30 years, state governments could spend approximately $30 billion on procuring rolling stock. This report demonstrates that by undertaking some necessary actions to achieve more efficient planning around these purchases, not only will Australian businesses have the foresight to help them win more work but that governments can save nearly $6 billion on their upcoming rail projects.

This is a significant opportunity. Crucial savings are there to be made and through providing rail businesses with more consistent work, they are projected to be able to retain nearly $15.5 billion in economic activity over the next 30 years. It is our aim to help governments and industry work together to realise these benefits and secure the future of our industry through a more national, consistent and holistic approach to procuring rolling stock.

The benefits of this work cannot be overstated. It will support Australian jobs, regional development, higher productivity, result in a more functional and well-coordinated supply chain and increased innovation for the industry.

This work is essential for the future growth and sustainability of the Australian rail industry. We will be working hard to ensure that government and industry take these important actions forward.

Bryan Nye

CEO, Australasian Railway Association

Bruce A Griffiths OAM

Rail Supplier Advocate

Executive Summary

A time for change

Over the next 30 years, approximately $30 billion will be spent by state governments on the procurement of heavy rail passenger rolling stock to meet the increasing demands of public transport and replace ageing fleets.

Improved coordination and planning across government would provide considerable opportunity for efficiencies, offering governments the ability to generate direct procurement savings in the region of nearly $6 billion over the next 30 years. These savings would accrue from avoiding small orders and increasing commonality in rolling stock platforms and componentry.

Failing to address existing inefficiencies may serve to diminish the Australian rolling stock manufacturing base. There is increasing pressure on domestic rolling stock manufacturing and there exists a risk that all production could be sourced internationally. Based on industry consultation, smoother demand could assist in relieving some of this pressure and in turn, assist in retaining some production domestically. If domestic production could be maintained at 30% of the value of future rolling stock orders, this would equate to approximately $15.5 billion in economic activity that could be retained over the next 30 years.

This activity would be concentrated in specific areas including regional towns including Newcastle and Maryborough and in metropolitan areas including Auburn and Dandenong.

This *Opportunities for Greater Passenger Rolling Stock Procurement Efficiency Report* was prepared by Deloitte Access Economics for the Australasian Railway Association (ARA) and partly funded by the Department of Industry. It draws on national and international research, consultations with transport operators and manufacturers and sets out the existing limitations of passenger rolling stock procurement, outlines strategies to address these limitations, the impact on economic activity of improving procurement and presents a staged series of actions to realise savings and to support key regional economies.

The need for action

Three factors are driving an urgent need for action:

- An estimated 1,900 cars will need to be replaced while an additional 1,100 cars will be required within the next 10 years to support anticipated patronage growth, expected to cost around $9 billion
- Projected public transport patronage growth requires an increase in the fleet from around 4,000 cars today to almost 11,000 cars by 2043
- Increasing pressure to achieve greater efficiencies in rail, given low current cost recovery levels for public transport, which average 25% nationally.

These pressures mean that new rolling stock will need to be added over the next decade. A failure to act quickly to refine procurement processes could mean a considerable portion of potential savings will be foregone.

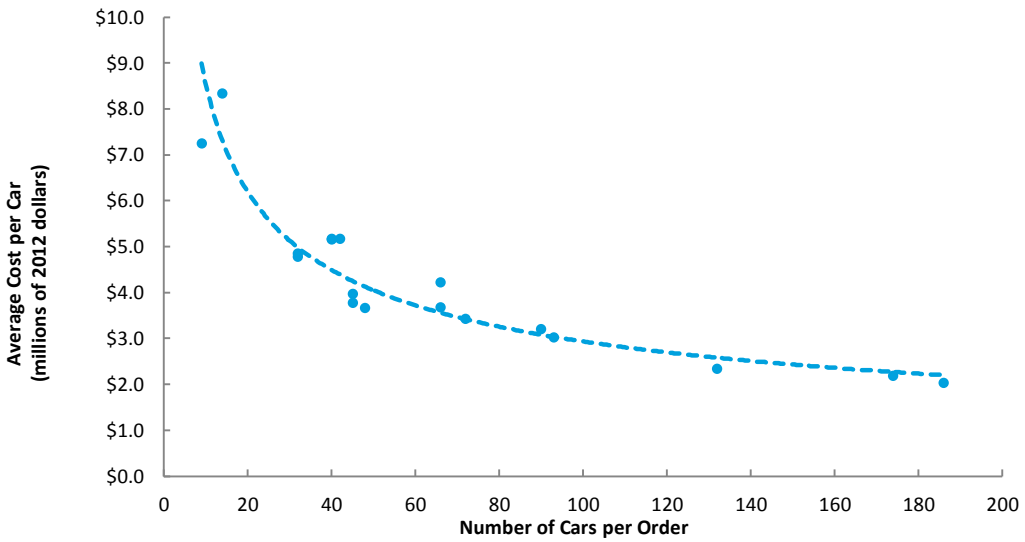
Delivering sustainable efficiencies

Small order sizes, sporadic ordering and resultant production volatility, variations in rolling stock standards and the administrative effort required to move from previous practice all contribute to procurement inefficiencies.

Decisions made early in the rolling stock life cycle substantially influence committed whole of life costs. Whilst only accounting for 20% of costs incurred, the early stages of procurement (before primary build) lock in approximately 80% of whole of life rolling stock costs. Effective interventions in the form of greater transparency for planning and increased harmonisation in design and components are therefore essential.

Simply increasing order sizes to achieve economies of scale, as illustrated in **Figure E.1**, could contribute to savings over the 30 year estimate period of $2.3 billion.

Figure E.1: Impact of Order Size on Average Cost per Car (Single Deck Trains)



Source: Deloitte Access Economics. The cost of historical orders have been adjusted using the ABS' Producer Price Index: Other transport equipment manufacturing series

Better planning of production encourages investment in more efficient technology and reduces the need for retraining and retooling. It also assists in avoiding very large orders in short timeframes that typically need to be met offshore, given local production capacity.

Rolling stock standards are complicated by legacy development of Australia's passenger networks including differing track gauges, loading gauges and traction arrangements, even before operational and customer requirements are taken into account. Political considerations can also influence the design, timing and funding arrangements for new rolling stock. Whilst this may make it challenging to achieve a single platform, clear opportunities exist to at least reduce Australia's 36 different passenger rolling stock classes.

Eight key responses have been identified to tackle these limitations. All responses are beneficial in their own right yet become progressively more difficult to achieve as greater levels of coordination between states and harmonisation are required.

Improved planning and coordination of rolling stock procurement has the potential to offer the greatest impact. Coordinated long term rolling stock planning combined with the use of

financing arrangements that smooth the upfront financing requirements have the potential to deliver $2.3 billion in savings from improved order scale. Approximately $15.5 billion in economic activity could be maintained should coordinated planning result in the demand for rolling stock being smoothed.

Planning to realise greater harmonisation in rolling stock platforms and componentry could also deliver further benefits. It is estimated that $2.5 billion in planning and design cost savings and $1.1 billion in component cost savings could be realised if rolling stock platforms and componentry were harmonised across the nation.

Table E.1 outlines how each of the responses contributes to the realisation of each identified benefit.

Table E.1: Key Responses and their Impacts

Potential Responses	Savings from Improved Scale	Benefits to Industry from Smoother Demand	Savings in Planning and Design Costs	Savings due to Componentry Harmonisation
Long term rolling stock planning	●	●		
Long term train procurement programs	●	●	○	○
Coordinated rolling stock planning	●	●		
Alternative financing arrangements		●		
Reduce number of train classes			●	○
Joint procurement of rolling stock	○	○	●	
Harmonised componentry	○	○	●	●
Harmonised rolling stock platforms	○		●	●

Increasing difficulty

Impact of Coordinated Planning

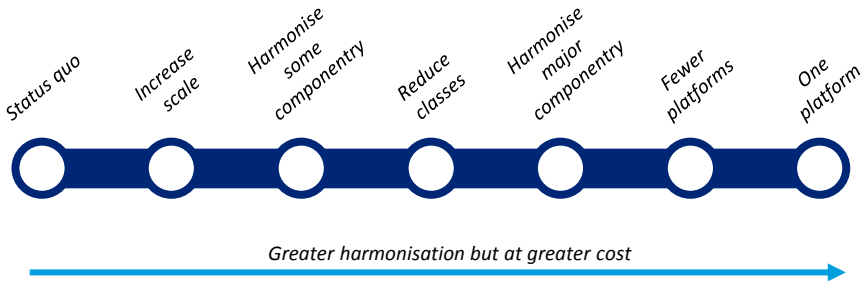
Impact of Harmonised Design

● *This response provides a major contribution to realising this saving/impact*

○ *This response provides a minor contribution to realising this saving/impact*

Harmonisation has the potential to deliver savings in its own right. However, harmonisation entails costs, whether it is in the form of retrofitting infrastructure, changing operating practices or changing rolling stock designs and build practices. An optimal level along the harmonisation spectrum set out in **Figure E.2** will be needed to balance standardisation and resultant procurement efficiencies against the cost of retrofitting infrastructure and operator/market requirements.

Figure E.2: Rolling Stock Harmonisation Spectrum



The responses have therefore been grouped into a series of sequential actions that can be used to progress along the harmonisation spectrum at a measured pace. Both government and industry stakeholders have a key role to play in progressing identified actions and identifying the optimal level of harmonisation.

The first three actions, as shown in **Table E.2**, are designed to realise $2.3 billion in cost savings from improved scale and potentially maintain up to $15.5 billion in economic activity with relatively low effort.

Table E.2: Short Term Actions

Action	Key Elements	Status / options to progress
Action 1: *Prepare integrated long term rolling stock strategies*	20 to 30 year plans of expected rolling stock demand including: • Potential network expansions • Levels of future patronage by year and market segment • Whole of life costs • Ancillary infrastructure • Current and future infrastructure standards • Current and future operating requirements • Current and future customer requirements • Potential financing arrangements.	Development already commenced
Action 2: *Develop a national rolling stock pipeline database*	Develop a publicly available database of anticipated rolling stock demand by: • Jurisdiction • Expected year of procurement • Type of train • Number of cars	The National Infrastructure Construction Schedule may provide a potential platform
Action 3: *Initiate a Coordinated Rolling Stock Planning Program*	A Coordinated Rolling Stock Planning Program enabling jurisdictions to put forward their own individual rolling stock programs, and potentially identify opportunities to: • Match potential orders with lulls in demand • Smooth out rolling stock orders • Identify funding requirements • Identify opportunities for joint procurements • Identify opportunities to harmonise rolling stock platforms and infrastructure standards.	

Actions 4, 5 and 6 represent the ability to capture significant additional harmonisation savings over time, whilst ensuring that the impacts and quantified infrastructure effects of extensive platform harmonisation are progressively understood.

Table E.3: Longer Term Actions

Action	Key Elements	Status / options to progress
Action 4: *Establish a pilot to prove partial harmonisation benefits*	A pilot program aimed at developing harmonisation principles and standards for one class of train may provide the basis for establishing key operating and infrastructure constraints limiting harmonisation and the level of appetite for harmonisation. The development of a harmonised platform for regional rail may provide an ideal test case to prove the harmonisation concept. A harmonised platform for regional rail would serve to consolidate a market segment whereby the number of cars per class is typically small. Furthermore, a regional rail initiative could highlight design elements that are most amenable to harmonisation, taking into account variations in operating and infrastructure parameters between different rail networks. Such a pilot could require involvement from a range of transport agencies as well as industry participation to identify a rollingstock platform/market that would be most amenable to harmonisation.	Potential regional rail rolling stock projects
Action 5: *Develop harmonisation principles and harmonised rolling stock standards*	Should it be considered desirable by industry, the formalisation of principles and standards to guide the greater harmonisation of rolling stock design and where necessary, infrastructure would be developed. An engineering assessment of the following elements should be undertaken to assess the potential for a reduction of train classes and a harmonisation of rolling stock platforms: • Current and emerging platforms and standards • Current fleet designs and standards • Key elements and "non-negotiable" standards • Operating arrangements impacting on train design • Infrastructure constraints impacting on train design. Should it be considered desirable by industry, the formalisation of principles and standards to guide the greater harmonisation of rolling stock design and where necessary, infrastructure could be developed. This action would be largely informed by the findings from Action 4.	Could draw on assessments undertaken by bodies including Rail Industry Safety and Standards Board (RISSB) and transport agencies
Action 6: *Develop cross-state procurement arrangements*	To further progress the potential for joint procurement, the feasibility of such arrangements should first be assessed. The assessment should consider: • Potential obstacles that may impede joint procurements • Regulatory and legislative issues • Competition issues.	Models for joint procurement could be based on whole of Australian government procurement arrangements developed by the Department of Finance

Acting now will enhance the sustainability of the Australian rolling stock manufacturing industry. Growing demand for rolling stock and the fragility of the domestic manufacturing industry provides a setting whereby considerable savings of $5.9 billion and economic activity of $15.5 billion over the next 30 years are at stake for both government and

industry respectively. With better planning and changes to procurement practices, these benefits are realisable without the need to resort to interventionist policy.

1 Introduction

1.1 Purpose

The **Opportunities for Greater Passenger Rolling Stock Procurement Efficiency Report** (the Report) was prepared by Deloitte Access Economics for the Australasian Railway Association (ARA) and partly funded by the Department of Industry.

The Report considers the potential benefits from improving the procurement of heavy rail passenger rolling stock networks operated by:

- New South Wales: Sydney Trains and NSW Trainlink[1]
- Victoria: Metro Trains Melbourne and V/Line
- Queensland: Queensland Rail
- Western Australia: Transperth and Transwa
- South Australia: Adelaide Metro.

Improving procurement processes have the potential to generate significant benefits for governments including greater value for money. The sustainability of the industry is likely to be enhanced from a better understanding of future demands from government for rolling stock.

Although there are benefits to be gained from improving procurement nationally, such improvements will only result in greater value for money if the specific needs of individual passenger rail owners, operators and their respective markets are considered. This Report draws on national and international analysis, supported by consultations with a wide range of government agencies and rolling stock manufacturers across Australia to validate assumptions and findings. It provides economic and market evidence and an approach to stimulate planning and policy deliberations at the state and national levels, in order to assist government, operators and industry in moving towards improved procurement of passenger rolling stock. This Report is focused on passenger rail and therefore specifically excludes freight and light rail rolling stock procurement[2].

[1] Formerly RailCorp and CountryLink

[2] Light rail rolling stock demand was forecast to remain a relatively small proportion of the Australian rail rolling stock fleet. Preliminary investigations suggested that potential procurement savings for light rail were relatively limited compared to heavy rail rolling stock given the small size of the light rail fleet and existing levels of homogeneity in light rail platforms.

1.2 Policy Context

In May 2009, the Council for the Australian Federation noted the potential benefits of a coordinated approach to procuring rolling stock. The Council agreed to establish a taskforce to examine the opportunities that might exist from improving the coordination of rolling stock procurement and to deliver better value for money for rolling stock purchasers.

The Australian Rail Industry Development Strategy was subsequently developed by key rail industry stakeholders including the ARA and the former Department of Innovation. The Strategy outlines the need to prepare a clear, long term demand profile; and harmonised national product specifications, policy and standards.

"Coordinated national demand is worth proceeding with as a core objective of national rail industry policy"

Orion Advisory (2012)

The need for improving coordination of passenger rolling stock was further reinforced in the rail industry's roadmap, *On Track to 2040*[3], which was funded by the Commonwealth Government, the state governments of NSW, Victoria and Queensland and the ARA on behalf of industry. Over 110 different organisations were involved in the development of the roadmap.

To provide a view on the potential industry order book, *The Future of Australian Passenger Rolling stock*[4] report was commissioned by the ARA and partly funded by the former Department of Innovation. The report outlined anticipated fleet requirements and the need for a more coordinated approach to procurement.

This Report builds on the database of current rolling stock fleet developed by Orion Advisory and adjusts demand forecasts to reflect:

- Retirements and additions to the national fleet
- The use of city specific task growth rates
- A separation of single and double deck car demand
- The potential reintroduction of single deck cars in Sydney.

The database provides a more current and state-specific perspective of rolling stock demand over the next 30 years that has been used to determine potential procurement efficiencies.

This Report reflects on the challenges the rail industry faces in delivering the predicted level of new rolling stock, what measures might be available to remedy these challenges and the benefits of doing so.

[3] ANU Edge (2012)

[4] Orion Advisory (2012)

Although the primary motivation for this Report is to deliver better value for money in the procurement of passenger rolling stock, it also evidences the risks to the long run longevity of the rail manufacturing industry of not taking action. As with other manufacturing sectors in Australia, rail manufacturing faces considerable challenges in remaining competitive in a global environment. Whilst rail manufacturers are likely to retain a local role in repair, maintenance and refurbishment, the future of the Australian rail manufacturing industry is heavily dependent on its ability to remain relevant to its key customers, state government asset owners, for new rolling stock.

This Report does not seek to set out a detailed implementation strategy. Rather, it identifies the opportunities and the steps for the industry and government to pursue to increase the efficiency, agility and sustainability of the industry whilst delivering value for money to government procurers.

1.3 Approach

To provide an assessment of the opportunities from improving the procurement of passenger rolling stock, this Report has been structured as follows:

Chapter 2 – Current procurement arrangements: sets out the current procurement process to identify the components of costs within procurement processes.

Chapter 3 – Identification of barriers to efficiency: identifies key shortfalls within current rolling stock procurement arrangements which restrict more efficient procurement arrangements.

Chapter 4 – Demand for rolling stock: reassesses passenger rolling stock projections, to highlight opportunities for change.

Chapter 5 – Formation of policy responses: sets out a range of potential policy responses which address the barriers identified in Chapter 3 and enable the industry to accommodate the forecasted demand opportunities in Chapter 4.

Chapter 6 – Determination of benefits: estimates potential savings and changes in the level of economic activity from improving procurement through the identified policy responses.

Chapter 7 – Next steps: establishes a way forward to achieve opportunities for more efficient procurement of rolling stock.

This Report has drawn upon an extensive desktop review of domestic and international literature on the efficiency of rolling stock procurement to identify potential issues, their impacts and possible actions. This analysis has been informed and validated through consultation with government rolling stock owners and operators in each state, manufacturers and industry stakeholders.

2 Current Procurement Arrangements

This chapter outlines the process of procuring a new passenger train to provide some background on the issues that need to be faced when procuring rolling stock.

2.1 Overview of the Procurement Process

The procurement of passenger rolling stock is frequently a complex, costly and time consuming process. Depending on the size and complexity of the order, procuring a train generally takes around 5 to 7 years, and in some instances up to a decade, from the point where a decision to purchase a new train is made to actual delivery of the first car.

There are four key steps in the lifecycle of a new train. The first three steps are perhaps most critical for the purposes of this Report but all four steps may have procurement implications, depending on how a train is maintained, owned and operated. Each step is outlined as follows:

Table 2.1: Key Procurement Steps

Step	Key processes
Step 1: Needs assessment	Long term network transport planning and demand modelling often precedes planning for rolling stock as it provides the basis for forecasting the number of cars required. Transport planning and demand modelling take into account anticipated peak period patronage growth and planned network expansions, key variables influencing the demand for rolling stock. In this step, the performance and operating parameters of new rolling stock are considered at a high level. Ancillary needs including stabling, maintenance and traction supply may also be considered at this point.
Step 2: Approvals, Tendering and Design	The procurement task is generally preceded by an approvals process. As a reflection of public ownership, formal procurement and Cabinet processes would need to be followed prior to approval for the procurement of new trains. This may include a value for money assessment, detailed design, establishing tendering and evaluation procedures, and increasingly an assessment of potential financial arrangements including the use of public-private partnerships. Potential prime rolling stock suppliers would then be invited to submit expressions of interest and ultimately detailed proposals, with tenders being filtered until a preferred supplier is identified. Negotiations are then organised to refine contractual arrangements, culminating in financial close. At this point in time, a final detailed design would be developed and confirmed.
Step 3: Primary Build, Testing and Acceptance	The primary build phase may be preceded by a ramp-up phase whereby the prime manufacturer secures the necessary materials, component suppliers, staff, training and production lines to undertake the primary build. The 'primary build' phase involves the physical construction of the train chassis, development of various sub-systems including the electrical, communications, motor systems and all other

	components. Fit out, systems integration and testing follow. As each new train set comes off the production line, it is tested by the end customer to ensure that each set conforms to pre-agreed standards and performance measures. Where testing identifies issues that may impact on operating performance, compatibility, safety, reliability and amenity, train sets may be sent back to the production line for rework. Once each set has passed testing, it is generally transferred to the rail operator for use. For many train orders, the procurement lifecycle concludes after train acceptance.
Step 4: Operations & Decommissioning	Once the fleet is accepted by the rail operator, rolling stock would be maintained and repaired at routine intervals by either the manufacturer, the rail operator or a third party. Componentry is often replaced during routine maintenance or component change out. Where a particular train type is being manufactured on a long term basis, 'real-world' learnings may be used to inform and evolve the design and production of future train sets contributing to ongoing planning and design costs. Mid-life, rolling stock is generally refurbished with updated or new systems installed to improve amenity, extend component life, optimise operating and maintenance costs or comply with new standards. Where a secondary market exists, rolling stock may be disposed of and used elsewhere. Generally, passenger rolling stock becomes age-expired after 30 years although depending on the level of use and maintenance, rolling stock may be divested prior to 30 years or refurbished again to further extend life. Depending on condition, useful lives of 35, 40, 45 years may be achievable. Ultimately, rolling stock will be divested based on its physical condition but other factors including ongoing costs, technical obsolescence, prevailing standards, level of passenger demand, amenity and availability of replacements may impact on the exact timing of disposal.

2.2 Costs of Procurement

"It rarely costs less than £10 million even for repeat orders of trains, and as much as £100 million for completely new train specifications"

UK Railway Industry Association[5]

The cost of planning, procuring, designing and building new trains can be substantial.

A significant proportion of the cost of procuring a new train lies in the planning and design stage, even for trains based on proven platforms. For rolling stock based on new specifications, the design costs can be considerable. In a UK context, the design costs associated with the development of a new rolling stock platform can be as high as £100m[5] (A$224m[6]).

Invariably, the level of costs incurred will depend on the nature of the order, the nature of the rolling stock being purchased and the practices of the manufacturer.

Desktop research and consultation suggests, broadly speaking, that approximately half of whole of life costs is spent prior to operations. A significant proportion of costs are spent on planning and design. Consultation suggests that prior to the commencement of primary

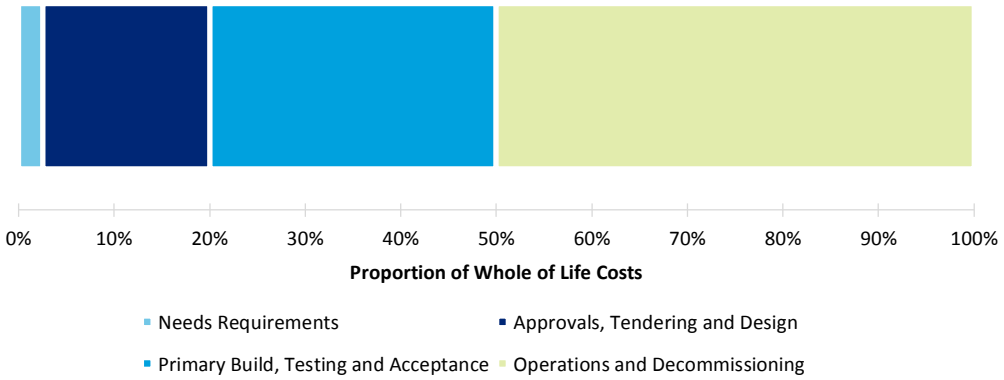
[5] Network Rail (2011)

[6] Based on purchasing power parity exchange rate of £1 = $2.24. Sourced from OECD.Stat

build, the cost incurred due to planning and design typically accounts for up to 20% of whole of life costs. This is consistent with UK research[7]. This level of cost is not surprising given the relatively high levels of customisation typically applied to Australian trains. Approximately 30% of whole of life costs are incurred during primary build. The remaining 50% of whole of life costs are incurred during operations. Even during operations, capital costs can account for over 50% of ongoing costs, incurred through changes in componentry, refurbishments and disposal.

Figure 2.1 provides an indicative outline of the level of costs incurred through each step of the procurement lifecycle.

Figure 2.1: Breakdown of Whole of Life Costs by Procurement Stage



Source: Deloitte Access Economics

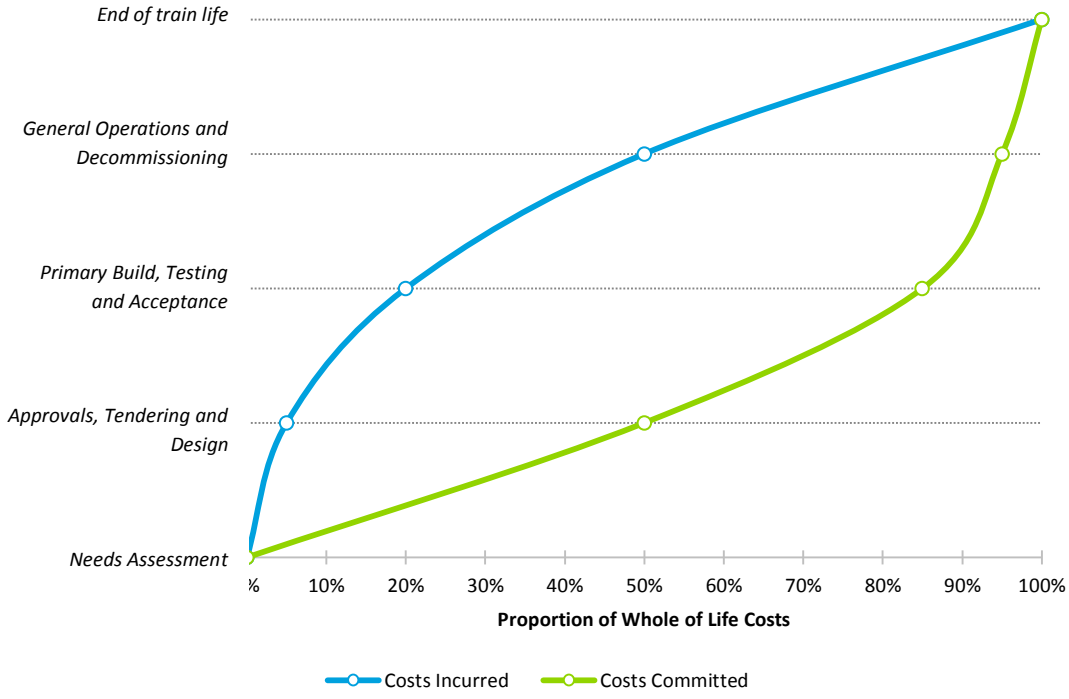
The decisions made prior to primary build are critical in influencing the capital costs of rolling stock. These decisions impact on the:

- Train design
- Number of cars built
- Speed at which the cars are built
- Ongoing maintenance and operating practices.

As **Figure 2.2** illustrates, even before the first train of an order is built, a high proportion of the eventual cost of the train is "locked in" by the decisions made during planning and design. Ensuring the right decisions are made prior to build is critical in achieving cost savings.

[7] ARUP (2011)

Figure 2.2: Whole of Life Cost Committed and Incurred by Procurement Stage



Source: Deloitte Access Economics

2.3 Key Findings

This chapter highlights the key steps that need to be undertaken during any procurement of rolling stock. Decisions made during the early stages of procurement have a disproportional and irrevocable impact on rolling stock whole of life costs. The key barriers that impede the cost efficient procurement of rolling stock can be directly attributed to the decisions made during the planning and design of a train. The following chapter outlines what these barriers are and how they contribute to cost inefficiencies.

3 Barriers to Efficiency

The achievement of more effective rolling stock procurement has to date been elusive. This chapter outlines the key barriers that are continuing to reduce the efficiency of passenger rolling stock procurement.

"[We] urge that a broader and longer-term framework be made available and examined in the procurement of transport infrastructure"

NSW Auditor General (2003)

3.1 Introduction

Many of the challenges faced by the rail industry and governments, as their key customers in delivering passenger trains cost effectively are not unique to Australia. Other jurisdictions, such as the UK and across Europe, have grappled with how best to pursue the purchase of passenger trains in a cost effective manner. Of particular note are the McNulty Report[8] and Network Rail[9], which identified a number of opportunities to improve the procurement of rolling stock to deliver cost savings. This Report provides some perspective on these opportunities within an Australian context.

In Australia, the Bureau of Transport and Regional Economics[10] assessed the need for optimised harmonisation of technical standards. The NSW Auditor General[11] has also noted the need for a long term strategy to deliver standardisation, account for industry capacity, infrastructure requirements and lifecycle costs.

3.2 Key Barriers

Four key barriers exist that impede the realisation of lower cost rolling stock:

- **Barrier 1: Lack of scale**
- **Barrier 2: Volatile production**
- **Barrier 3: Variation in standards**
- **Barrier 4: Political and financial considerations.**

These barriers are interrelated and can serve to feedback and reinforce each other. Each of these barriers is discussed in turn.

[8] McNulty (2011)

[9] Network Rail (2011)

[10] BTRE (2006)

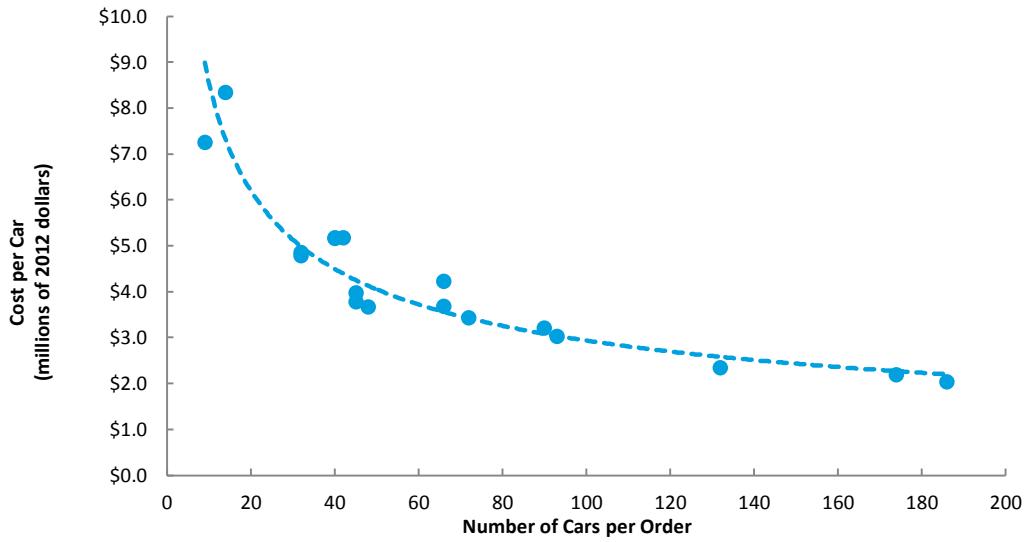
[11] NSW Auditor General (2003)

Barrier 1: Lack of Scale

There are significant fixed costs associated with the procurement and development of new trains. In addition to overheads in the form of factories and the production lines and tooling housed within, a significant level of upfront effort is expended in planning and designing. If recouped over a large number of cars, and potentially a large number of orders, the impact of these overheads is less significant.

Based on a desktop analysis of publicly available information of Australian train orders over the past 10 years, there appears to be a discernible impact on cost per car based on order size. **Figure 3.1** illustrates, for single deck trains, how smaller orders have resulted in higher average costs per car.

Figure 3.1: Cost per Single Deck Car Based on Australian Orders



Source: Deloitte Access Economics. The cost of historical orders have been adjusted using the Producer Price Index: Other transport equipment manufacturing series

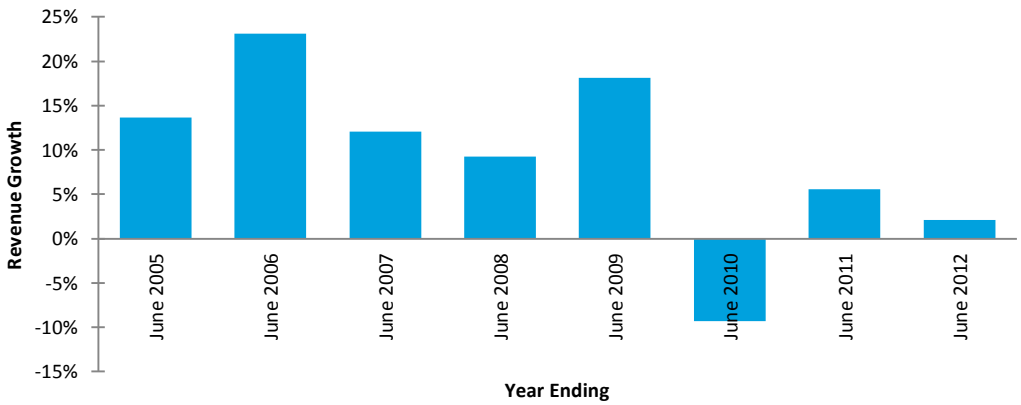
The cost of lack of scale can be significant. Based on previous orders, average costs per car for a 50 car order relative to a 150 car order would be two thirds (equivalent to $0.7 million) higher.

It should be noted that the point at which economies of scale can be achieved, and at what cost, does vary between manufacturers. Consultation suggests that for some firms, economies of scale could be reached with as few as 60 cars but for other firms orders of over 150 cars are required to achieve scale. Nevertheless in many cases, orders sizes have been too small for any rolling stock manufacturer to offer rolling stock cost effectively to government.

Barrier 2: Volatile Production

Although all industries face a degree of variability in production from time-to-time, rolling stock manufacturers and their suppliers face considerable uncertainty around new orders, given long life spans for rolling stock and the limited number of purchasers. Due to volatile production levels, rolling stock manufacturers experience high levels of profit volatility as shown in **Figure 3.2**. Reliability of cash flow is also a concern with expenses often preceding income flows[12].

Figure 3.2: Growth in Australian Rail Manufacturing Revenues

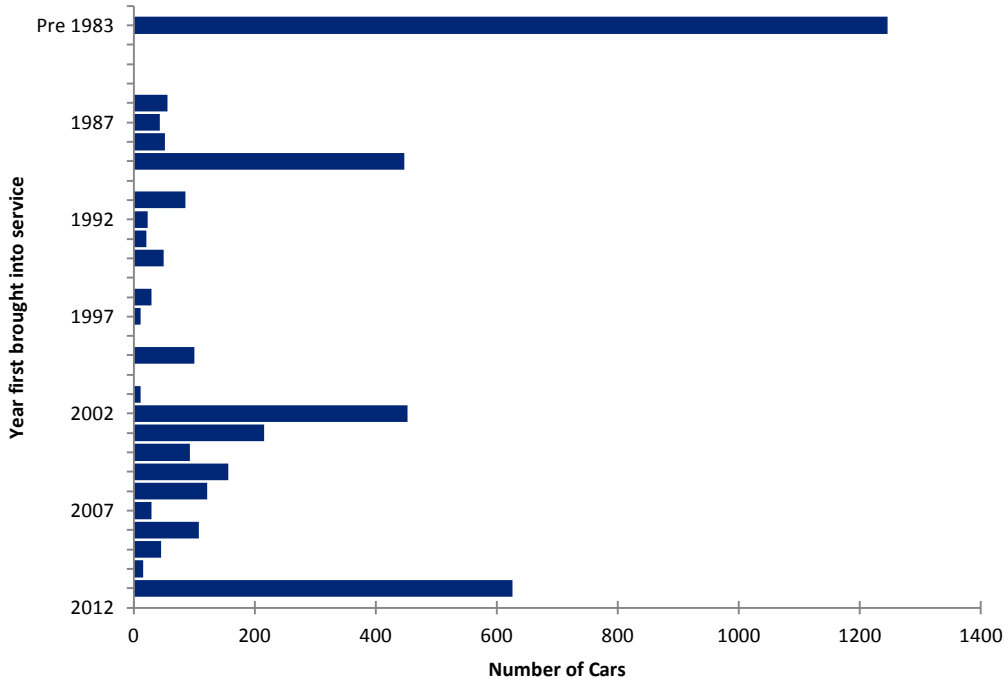


Source: IBISWorld (2012)

Although historical production figures were not available, the fleet database prepared by Orion Advisory provides a useful proxy for how production has varied over time. **Figure 3.3** illustrates the number of new cars brought into service over the past 30 years.

[12] IBISWorld (2012)

Figure 3.3: Introduction of Cars in Current Fleet



Source: Deloitte Access Economics

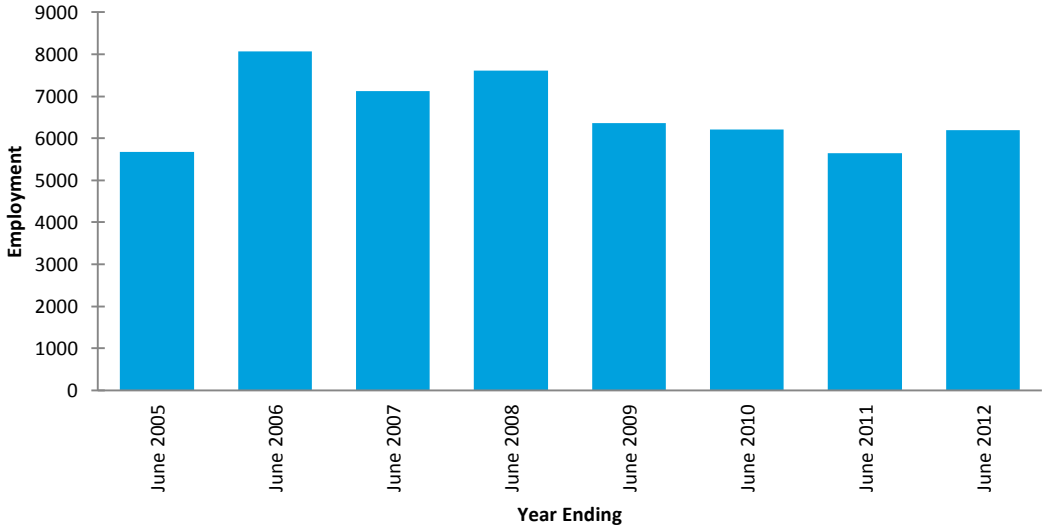
"We don't know when the next order will be or for what sort of train…so how can we invest?"

Manufacturer comment

Uncertainty associated with when, what type and how many new cars will be required does little to promote efficiency within the rolling stock supply chain. Although primary rolling stock manufacturers undertake some forecasting, these efforts are not replicated through the supply chain. Furthermore, lack of certainty over funding limits the reliability of such forecasting exercises.

As such, limited visibility of the production pipeline limits the ability of manufacturers and their suppliers to make appropriate decisions regarding staffing and training. As **Figure 3.4** shows, the industry has struggled to maintain and grow its workforce with the number of jobs within the industry fluctuating in recent years.

Figure 3.4: Employment in the Australian Rail Manufacturing Industry



Source: IBISWorld (2012)

Limited visibility of work also does little to facilitate investments and innovation that may provide opportunities to improve efficiency. The lack of visibility creates a significant investment risk for manufacturers, and accordingly may defer or reduce:

- Investments in research, equipment and technologies to increase efficiency
- Improving processes to further increase efficiency
- Opportunities to develop new markets.

"Volatile production levels make sustaining local facilities and workforce skills very difficult. Innovation is discouraged."

Manufacturer comment

Any investment that does occur feeds back into the rolling stock cost base. These upfront costs, which need to be recovered, are impacted by the volatility of production. Manufacturers may not be able to rely upon spreading the costs of research and development and new equipment over longer periods of time. The boom-bust cycle limits the ability of the supply chain to plan investments and to optimise production costs over a long period of time and accordingly increases mobilisation and depreciation costs, costs that would need to be passed on to the government purchaser in the next train order.

These costs can be considerable. As an example, the UK Railway Industry Association suggests that the lack of continuity of production added up to 20% to the cost of UK rolling stock between 1988 and 2010[13]. Rail suppliers in the UK also noted that uncertainty regarding future work has led to a number of suppliers being unwilling to invest in more efficient

[13] Ibid 5

"Opportunities do exist to improve manufacturing efficiencies…but we need visibility [of future demand]"

Manufacturer comment

manufacturing equipment. Where investments are made, suppliers plan to recoup the cost of these investments over a relatively short period of seven to ten years given this uncertainty[14].

Consequently, production volatility has encouraged practices that may not be efficient. For example, volatile production has encouraged the establishment of smaller sized entities, which have greater flexibility in switching between different rail markets as demand patterns change. Although smaller firms may be more resilient to changes in rolling stock demand, they can lack scale to deliver products and services at lowest cost.

In the context whereby international supply chains are increasingly becoming an option, volatile production may well have more profound implications for domestic rail manufacturers and suppliers. Combined with limited visibility, volatility in production levels limits the extent to which the industry can 'right size' capacity. In turn, this creates a significant risk that future capacity may not be able to meet spikes in rolling stock demand. Based on consultations with industry, without smoothing, these spikes in demand are more likely to be better met by greater sourcing of rolling stock from overseas. The economic implications of the displacement of local industry are significant and are discussed further in Chapter 6.

Volatile production may also work against encouraging greater competitive tension for rolling stock tenders. Gaps between orders require new potential suppliers to commit significant time and resources in developing a local presence before the next order, a significant impost. Alternatively, in lieu of such an investment, potential suppliers may accept that they cannot afford to be fully informed on the local market and may choose to incorporate a risk premium on any bids they submit, accept higher design, testing and acceptance risks or abstain from bidding. This effect can reduce the competitive tension that government may be seeking from potential new rolling stock providers.

Barrier 3: Variation in Standards

The variety of passenger rolling stock in the current fleet is diverse with at least 36 different classes of trains across the nation. As part of the Taig Review[15], one Australian based rail manufacturer noted that they needed to cater for 27 different loading gauges for Australian customers.

Whilst many are similar in style and specifications, there exist many differences between different classes, for example in terms of gauge, power supply, speed, acceleration, braking and fit out.

[14] Ibid 8

[15] Taig (2012)

"Standardisation of trains [to a single platform] isn't an option"

Operator comment

These differences arise due to:

- Differences in infrastructure
- Differences in operations
- Differences in passenger expectations and requirements
- Continual changes in standards and technology.

"We need trains that suit our customers, operations and infrastructure"

Operator comment

The state by state development of Australia's passenger railway networks has not been conducive to the development of harmonised train designs across the country. Obvious differences lie in the use of different gauges, power systems and in the case of Sydney, the use of double-deck trains. As a result, differences in infrastructure design and operating practices creates a need for different train designs.

In many cases, there may be good reason for rail operators to create variations in train design to respond to passenger expectations. For instance, the social and economic benefits of providing seating for long distance passengers is likely to outweigh the design costs and the fit out costs of installing the seats.

"…there may be some similarities between train classes"

Operator comment

Variations in rolling stock standards also arise over time as rolling stock standards are altered and new technologies emerge. Over time, train designs need to change to ensure compliance with current standards and to reduce the risk of technical obsolescence. Issues including the broader application of accessibility standards, automatic train protection and associated signalling technology, digital radio technology and train-platform interfaces (e.g. platform screen doors) were identified by stakeholders as potential areas needing harmonisation to better manage obsolescence risk.

"There appear to be 'vested' interests in maintaining differences in standards"

Manufacturer comment

However, procurement arrangements can contribute to variations in train standards. Lengthy procurement processes, some of which may last up to 7 years from conception to acceptance, may result in the build of "new trains" with componentry that may be technically obsolete by the time a train order has been fulfilled. Long lead times between train orders serve to encourage revolutions rather than evolutions in train standards.

The cost of implementing new standards on an ad-hoc basis through a new platform can be considerable. For instance, it was estimated that heterogeneous specifications added between 5% and 10% onto the cost base for rolling stock in the UK[16]. This is consistent with Network Rail's[17] view that approximately 8% of the average procurement cost is spent on non-recurring costs including research and development of bespoke rolling stock. As noted

[16] Ibid 8

[17] Ibid 9

previously, these costs can run into the hundreds of millions of dollars for bespoke platforms.

In the Australian context, the impact of heterogeneous standards is most evident with the cost of double deck trains. Using historical Australian train order cost data, the projected average cost of a double deck car is estimated to be $4.1 million per car based on a 150 car order. Using the same order size, the projected average cost of a single deck car is estimated to be $2.4 million per car, or 40% less than the double deck cost. The costs of heterogeneous trains are reflected in part through higher planning, design, testing and acceptance costs, which are discussed further in Chapter 6.

"Platforms are becoming increasingly globalised"

Manufacturer comment

Variations in train standards have broader implications for the ability of the Australian rail manufacturing industry to compete in global markets. The limited compatibility of many components, developed specifically for Australian trains, for use in trains overseas presents a barrier for export opportunities. This in turn, limits the use of exports as an instrument to smooth out local production and to develop specialisation to further improve the viability of local rail manufacturing.

Variations in train standards, particularly standards which deviate significantly from world practice also serve to discourage entry by potential international providers.

Barrier 4: Political and Funding Considerations

State governments have played an important role in the instigation and growth of Australia's railways. Historically, Australia's railways, owned and operated by various state governments, played an important role in the development of its cities and opening up the hinterland.

More recently, the low levels of cost recovery on Australia's passenger networks (discussed further in Chapter 4), invariably requires some form of financial support from government to ensure ongoing operation and expansion. As such, as the ultimate owners of rail passenger operations, governments are the rail manufacturing industry's customers.

Political imperatives and funding availability are both major impacts on procurement timing and cannot be ignored

The link between government ownership and rolling stock demand is inextricable, with a variety of factors influencing the nature and size of rolling stock purchases. For instance, passenger concerns with respect to crowding may require the expedient delivery of new cars. The timing of elections can also influence the timing of rolling stock purchases.

The high level of involvement from government within the rail sector often means that government agencies are involved in both what needs to be delivered and how it is to be delivered. Accordingly, rolling stock procurement tends to be volatile, high profile, complex and influenced by political as well as operating considerations.

Funding

A critical issue where political factors come into play is the availability of funding. Traditionally, rolling stock has been funded through the use of consolidated revenue or government debt. Given the many competing demands (e.g. schools and hospitals) for such revenue and the high levels of expenditure required for rolling stock, the purchase of rolling stock can often be linked to the availability of funding or the propensity to use debt facilities. This can be further compounded by the link between new rail links and new rolling stock, with the latter only being funded once the former has committed funding. Recent turbulence in the economy has served to impact adversely on the availability of funding and the willingness to use debt.

"Tendering is increasingly complex and time-consuming"

Manufacturer comment

In lieu of government financing, public private partnerships (PPPs) have emerged as a potential tool to spread the cost of rolling stock over a longer period of time. Rather than funding rolling stock upfront, PPPs generally requires a manufacturer to finance, build and maintain rolling stock. In return, governments make a periodical payment based on the availability of rolling stock available for revenue service. In addition to smoothing out costs of assets, PPPs offer the potential benefits of greater budget certainty and timelier delivery[18].

"Engineers + bankers + lawyers = high cost"

Stakeholder comment

One key challenge with PPPs is their potential complexity. The specification, build, financing and maintenance of trains and the demarcation of responsibilities need to be well defined and anticipated prior to financial close and often leads to the compilation of complex documentation. Accordingly, PPP arrangements can be time consuming and costly for industry participants to interpret and depending on how the PPP is structured, may constrain the innovations and improvements that can be made to the rolling stock once the contract has been struck.

Probity Concerns

Current procurement arrangements require government agencies to conduct open, competitive tendering processes. These processes require government agencies to approach suppliers in such a way that there can be no actual or perceived discrimination against potential suppliers. This constrains how and when agencies can engage with industry to discuss potential rolling stock purchases, with first consultations often occurring once funding has been obtained, when some key decisions have already been made.

Some rail manufacturers expressed concerns that the arms-length approach to engaging industry was leading to opportunities to optimise procurement being missed. One manufacturer noted that closer engagement between government and manufacturers occurs overseas to identify production gaps. Although there may be competition issues that may arise from such practices, consultation undertaken earlier in the planning process can provide opportunities to reduce delivery costs.

[18] NSW Treasury (2010)

3.3 Key Findings

Four key barriers have been identified as significantly reducing the efficiency of rolling stock procurement in Australia. Small orders, variable lead times between orders and variations in standards which continue to change frequently result in unique fleets that are expensive to design, procure and ultimately operate and maintain. Governments may also play a role in perpetuating some barriers.

These barriers are interrelated and can be self-reinforcing. For instance, small orders and volatile production have the potential to promote bespoke train specifications. In turn, these specifications may limit export opportunities and exposure to overseas markets which may further exacerbate the volatility in production. Uncertainty regarding the availability of government funding contributes to volatility in production and variations in train specifications.

The next chapter shows that there is an urgency to remove these barriers as the cost of the barriers is significant. If left unresolved, the cost of these barriers is likely to increase with time.

4 The Need for Change

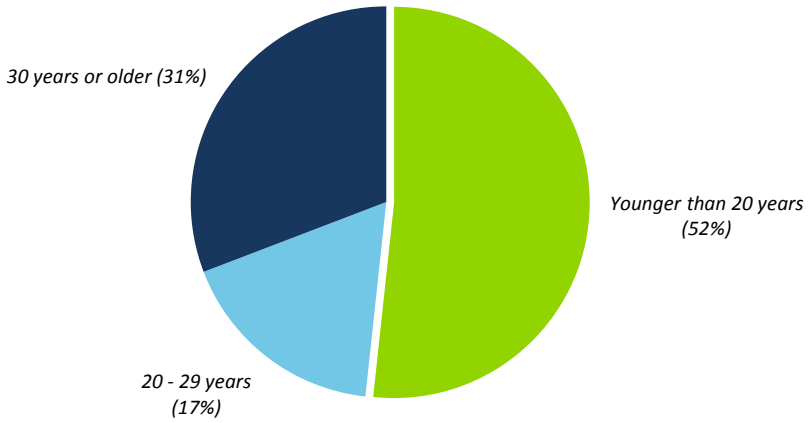
There are clear issues associated with the cost effective procurement of passenger rolling stock. The magnitude of the implications is considerable and likely to grow over time with higher demand for rolling stock. This chapter outlines drivers that collectively contribute to a need to change the way rolling stock is procured. The drivers of change extend from an increased pressure to demonstrate greater value for money, an imminent need to replace age-expired rolling stock and a requirement to deliver growth capacity to address increasing patronage and proposed network extensions. In addition, there is increasing industry discussion of the need for greater coordination around rail standards.

4.1 Imminent Need to Replace Age-Expired Rolling stock

On average, passenger rolling stock has a commercial life of around 30 years although this may vary depending on factors including the level of use, asset condition, cost of maintenance and operation, technical obsolescence and customer expectations. Although the life of rolling stock can be extended with intensive maintenance and refurbishment, a decision to replace (or refurbish) rolling stock will need to be made once the age of a car passes 30 years.

As **Figure 4.1** illustrates, there exists a need to consider replacing about 30% of Australia's current fleet. Almost half of Australia's current rolling stock fleet will need to be replaced in the next 10 years, equating to more than 1,900 cars.

Figure 4.1: Breakdown of Australia's Rolling Stock Age



Source: Deloitte Access Economics

Over the next 10 years, the replacement of age-expired rolling stock will cost approximately $6 billion

The replacement of close to half of Australia's passenger fleet would require large numbers of rolling stock at considerable investment. Based on our assessment and the average cost of acquisition over the past decade, the replacement of the fleet over the next decade is projected to cost around $6 billion to fulfil. This does not include the need to procure growth trains, which will add another $3 billion in costs over the next decade. Regardless of whether rolling stock is replaced or refurbished, decisions that will require significant levels of capital expenditure will be required to maintain the passenger fleet at current levels.

4.2 Need to Deliver Growth in Fleet

Over the long run, the demand for rolling stock is anticipated to increase, not only to replace age-expired rolling stock but also to provide additional rolling stock to meet the growing transport task. The size of the rolling stock task is expected to be underpinned by the desire for rail to handle a greater proportion of passenger trips, driven by a range of factors including:

- Growth in population
- Growing levels of road congestion
- Planned network expansions.

Population

Table 4.1 sets out median projected population levels for Sydney, Melbourne, Brisbane, Adelaide and Perth, and illustrates that population levels are anticipated to continue to grow near or above 1% per annum, with the exception of Adelaide. Continued population growth will continue to underpin rail patronage and network expansion will provide new markets for rail to serve.

Table 4.1: Projected Population Levels

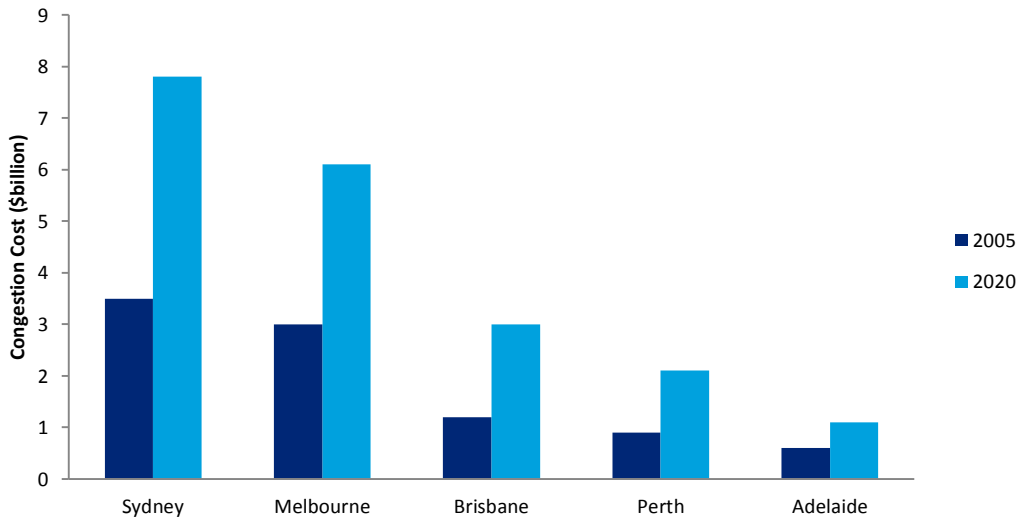
City	2011	2031	Average Annual Growth Rate
Sydney	4,672,433	6,017,088	1.3%
Melbourne	4,137,432	5,411,938	1.4%
Brisbane	2,076,817	2,627,511	1.2%
Perth	1,522,500	2,276,900*	2.7%*
Adelaide	1,222,495	1,470,680	0.9%

Sources: BTS (2012a), Victorian Department of Planning and Community Development (2012), Queensland Office of Economic and Statistical Research (2011), PlanningWA (2012), Government of South Australia (2010). * Population forecasts for Perth are available up to 2026.

Road Congestion

With challenges in increasing the supply of road space, a by-product of population growth and economic growth will be road congestion. The Bureau of Transport and Regional Economics (2007) forecasted that the cost of road congestion would at least double in most Australian cities by 2020 as shown in **Figure 4.2.**

Figure 4.2: Projected Road Congestion Costs



Source: Bureau of Transport and Regional Economics (2007)

The resultant longer travel times, lower travel time reliability and higher vehicle operating costs on the urban road network will increase the relative cost of travel by car and bus compared to train. This factor, combined with network enhancements (discussed below) will increase the attractiveness of rail as a mode of transport.

Network Enhancements

To service anticipated patronage growth, major rail passenger infrastructure works are being proposed by various governments to increase service levels on existing corridors and to expand the coverage of rail. Network enhancements either under construction or being planned over the next 20 years include:

- South West Rail Link (NSW)
- North West Rail Link (NSW)
- Second Harbour Crossing (NSW)
- Melbourne Metro Tunnel (VIC)

- Rowville Line (VIC)
- Melbourne Airport Line (VIC)
- Cross River Rail (QLD)
- Butler Extension (WA).

Many of these projects are either being driven by a desire to service populations in new greenfield development areas or to augment existing lines with capacity limitations. For example, levels of spare capacity on rail services approaching central business districts during morning peaks is rapidly being exhausted with increasing levels of on-board crowding, particularly in Sydney, Melbourne and Brisbane.

Projected Fleet

The impacts of the above-mentioned factors are projected to lead to a significant increase in demand for rolling stock. Projected demand for rolling stock has been based on the fleet database that underpinned the preparation of the *Future of Australian Passenger Rolling stock Report*. Adjustments to the database were then made to reflect recent additions to the fleet and retirements.

Future demand for rolling stock was projected using city specific task growth rates, based on rolling stock forecasts where available, although in most cases forecast changes in peak patronage or train service kilometres were used as proxies. **Table 4.2** outlines the growth rate in rolling stock assumed for each network and the basis for each growth rate.

Table 4.2: Projected Growth in the Fleet Task by Network

Network	Assumed Task Growth per Annum	Basis
NSW	2.4%	Train service km
VIC	4.3%	Morning peak capacity
QLD	4.3%	Morning peak patronage
WA	2.4%	Rolling stock forecast
SA	3.6%	Weekday patronage

Sources: BTS (2012b), PTV (2012), BCC (2011), WA DOT (2011), Williams (2011)

The national fleet is projected to grow from 4,000 cars to above 11,000 cars over the next 30 years

It is projected that the national rolling stock fleet would more than double in size. The current fleet of 4,044 cars is projected to increase to 10,930 cars by 2043, at an average growth rate of 3.2% per annum nationwide. The cost of replacing the existing fleet and procuring additional trains is projected to be approximately $30 billion over the next 30 years.

4.3 Low Cost Recovery

Passenger rail systems in Australia play a vital role in shaping the economic development of our cities by providing critical links between skilled workforces in the suburbs to highly specialised central business districts. By enabling lower levels of road travel, rail contributes to reduced road congestion, lower greenhouse gases, improved amenity and improved social inclusion.

However, the economic benefits of passenger rail do not match the financial outlay required to sustain existing operations or expand rail operations. For instance, on the CityRail network, costs exceeded revenues by $2.5 billion with an implied cost recovery ratio of 22% in 2011/12[19]. Cost recovery rates on other rail systems in Australia are similarly challenged with the level of cost recovery in each of Australia's five largest cities ranging from 25-45% on average across all transport modes with lower cost recovery rates for rail[20].

Invariably, these gaps between costs and farebox revenues need to be covered by governments. Opportunities that reduce costs and improve cost recovery such as improving the way in which rolling stock is procured would be highly valued.

4.4 Key Findings

The limited level of cost recovery achievable from rail services requires governments to approve funding for major capital expenses such as rolling stock. The tight fiscal environment further reinforces the need for rolling stock to be procured cost-effectively to ensure that cost recovery can be enhanced.

With a need to replace close to half the fleet over the course of the next decade at an expected cost of around $6 billion, governments must consider urgently how they could lock in procurement savings.

However, the issue of how to procure new trains cost efficiently will continue to be an issue over the long run. With the current fleet expected to grow from 4,000 cars to almost 11,000 cars by 2043, without intervention Australian governments could be expected to spend approximately $30 billion over the next 30 years. Given the level of capital expenditure, even small savings could result in a tangible reduction in capital spend. Measures that may assist in substantially reducing costs are discussed in **Chapter 5**.

[19] NSW Independent Pricing and Regulatory Tribunal (2012)

[20] Transport and Tourism Forum (2011)

5 Proposed Policy Responses

There exists a range of short, medium and longer term responses to stimulate action to resolve the key barriers precluding more cost efficient procurement. This chapter identifies potential measures that could address the barriers that currently prevent more efficient procurement of rolling stock.

5.1 Introduction

Chapter 3 identified four key barriers limiting the efficient procurement of rolling stock. Accordingly, a series of policy responses are required to:

- **Optimise the number of trains per order** to better ensure that economies of scale can be achieved by manufacturers
- **Smooth the level of production** to further assist in achieving economies of scale and to provide better signals to industry as to the appropriate level of investment in plant, people and training
- **Reduce the variations in train standards** to reduce the need for one-off designs, the avoidance of which would remove significant design costs during the procurement process
- **Smooth out funding** to reduce the significant one-off financial burden that rolling stock purchases can impose that can affect timing and the political will for procurement
- **Encourage greater engagement** between government and industry to assist in smoothing out production and encouraging harmonisation of train platforms.

The recent purchase of 171 cars by Auckland Transport provides anecdotal evidence of what can be achieved with the right planning:

> *"The purchase of the 19 extra trains, 50% more than originally planned, resulted from a positive business case showing the savings involved in operating a homogenous fleet, additional central and local government funding and the intensity of competition providing a very good price"*[21]

[21] Auckland Transport (2011)

In this chapter, eight areas have been identified as potential policy responses to addressing the barriers identified in **Chapter 3**. These solutions include:

- Undertake long term rolling stock planning
- Introduce long term train procurement programs
- Coordinate the planning of rolling stock purchases
- Apply alternative funding arrangements
- Reduce the number of train classes
- Procure rolling stock jointly with other jurisdictions
- Harmonise componentry
- Harmonise rolling stock platforms.

Table 5.1 illustrates how these responses could be applied to each of the identified barriers:

Table 5.1: Potential Responses

Potential Responses	**Barrier 1** *Lack of Scale*	**Barrier 2** *Volatile Production*	**Barrier 3** *Variation in Standards*	**Barrier 4** *Political and Funding Constraints*
Long term rolling stock planning	●	●		●
Long term train procurement programs	●	●	●	●
Coordinated rolling stock planning	●	●		●
Alternative funding arrangements				●
Reduce number of train classes	●	●	●	
Joint procurement of rolling stock		●	●	
Harmonised componentry	●	●	●	
Harmonised rolling stock platforms within fleets and between fleets	●	●	●	

As **Table 5.1** suggests, there is no single 'silver bullet' that will address the barriers in their entirety. The proposed responses will require rolling stock owners to commit to a higher

and comprehensive level of planning. Some of these responses may need to be executed together to maximise the chance that each barrier can be overcome. Each is discussed below.

5.2 Potential Responses

5.2.1 State by State Long Term Rolling Stock Planning

The longer term planning of rolling stock purchases on a state by state basis is the first step towards improving the planning and procurement of trains. The development of long term passenger rolling stock procurement plans is important as rolling stock and the infrastructure they operate on are long life assets. The procurement of trains has the best chance of being optimised if considered with the design and constraints of other longer life railway assets, avoiding train designs that meet short term requirements without consideration of longer term needs and opportunities.

The Taig Review note that where the local norm is not standard gauge, rail investments are designed and developed to be made 'standard gauge ready'.

In Adelaide, new investments in broad gauge passenger transport in the city are being designed with the possibility of future conversion to standard gauge in mind

Industry participants consulted in this study identified that ideally, such plans would span a 20 to 30 year period to cover the anticipated life of a typical car and assess the following aspects:

- Potential network expansions
- Levels of future patronage by year and market segment
- Whole of life costs
- Industry capacity and capabilities
- Ancillary infrastructure (e.g. traction, maintenance and stabling)
- Current and future infrastructure standards
- Current and future operating requirements
- Current and future customer requirements.

Public Transport Victoria's *Network Development Plan*[22] and Network Rail's *Rollingstock RUS*[23] serves as useful templates, providing a comprehensive assessment of future patronage, future service levels and infrastructure parameters to inform its rolling stock strategy. The development of similar long term plans by all jurisdictions would provide a useful basis for:

- Informing industry of government's intentions regarding procurement
- Assessing the feasibility of consolidating rolling stock platforms

[22] Public Transport Victoria (2012)

[23] Ibid 5

- Assessing the feasibility of altering and harmonising train design standards
- Assessing the feasibility of altering fixed infrastructure to remove or reduce the need for train variants
- Providing input into longer term train procurements and the coordination of planning across jurisdictions.

Rolling stock planning could be undertaken to involve other stakeholders including passenger rail operators, other government agencies, rolling stock manufacturers and industry associations. The plan would require periodic updates to provide greater predictability of orders and potential specifications.

Ideally, the plan would then translate into a rolling stock program aligned to the following documents:

- Relevant corporate plans
- State government strategies and objectives
- State government asset management plans
- Potentially, Commonwealth Government strategies and objectives.

This would reinforce the reliability of the plan, as part of a whole of rail system program to fund future rolling stock purchases and ancillary infrastructure.

5.2.2 Longer Term Train Procurement Programs

Typical train orders require the build, testing and delivery of trains over relative short periods of anywhere between one and three years.

Longer term train procurements provide opportunities for production to occur over a longer period of time, with the primary aim of smoothing out production. Longer term procurement programs offer both manufacturers and government procurers a range of other, but no less important, benefits including:

- Allow new technologies to be integrated during the production phase for trains waiting to be built
- Opportunities for ‘continuous’ learning - learnings from stock that has already been brought into service which can then be used to improve production of trains waiting to be built
- Promote a continuous evolution of train designs
- Provide opportunities for alliance style cooperative working arrangements whereby manufacturers, operators and owners are incentivised to improve train designs
- Facilitate smoother testing and acceptance

- Better match demand against industry capacity
- Moderate the level of political pressure on the procurement of rolling stock.

5.2.3 Coordinated Rolling Stock Planning

At present, jurisdictions have limited visibility of potential rolling stock purchases being considered by other jurisdictions. This can serve to limit the extent to which a given jurisdiction can plan to procure new trains during times when rolling stock demand could be low.

Coordinated rolling stock planning would see jurisdictions put forward their own individual rolling stock programs and potentially identify opportunities to:

- Reallocate the timing of potential orders to align with lulls in production
- Smooth out the volume of rolling stock orders in each period
- Identify funding requirements early
- Identify opportunities for joint procurement or specification of common platforms
- Identify opportunities to harmonise rolling stock platforms and infrastructure standards.

Similar databases that record and publish details of future capital projects exist, which could serve as examples for a future rolling stock procurement database. For instance, the National Infrastructure Construction Schedule (NICS)[24] developed by the Department of Infrastructure and Regional Development, outlines the timing and expenditure of potential and confirmed infrastructure projects.

> The NICS provides the infrastructure sector with a database of all known and forecast infrastructure investment by all three levels of Government.
>
> Within one year of its inception, the NICS received nearly 2 million hits[20].

As an alternative to developing a standalone rolling stock database, the NICS could be expanded to encompass rolling stock projects. A database similar to the NICS was developed by Infrastructure UK and included both rail infrastructure and rolling stock projects. Extending the NICS to include rolling stock projects would require some amendments to the NICS, additional resourcing and approval of the Council of Australian Governments' Infrastructure Working Group. However, given the links between new below-rail infrastructure and rolling stock, linking the two appears to have merit.

Contact between transport agencies would also be desirable to facilitate discussion of strategic issues including joint procurement and harmonisation.

[24] Former Minister for Infrastructure and Transport (2013)

Longer term pipelining would allow jurisdictions to combine replacement trains with growth trains to increase scale, identify funding constraints earlier and identify ancillary infrastructure requirements.

Subject to addressing probity and procurement concerns, this provides industry with some form of visibility of a future pipeline and could serve to facilitate planning within the industry with respect to investments, supply chain arrangements and required capacity.

5.2.4 Alternative Funding Arrangements

More often than not, rolling stock purchases have been financed through large upfront payments. As the size of these payments can be considerable, they can act as a significant constraint in the purchase of new rolling stock. However, there exists a range of financing techniques to spread purchasing costs to increase the ease of purchase, which are outlined as follows:

Public Private Partnerships

As mentioned in Chapter 3, the use of PPPs is emerging in Australia to fund rolling stock purchases. The Waratah PPP Program is perhaps the most notable example of PPP rolling stock procurement in Australia. The Queensland Government is currently in the process of procuring new suburban train sets through a PPP arrangement.

The use of PPP arrangements have been advocated for their ability to better manage the cost of delivery, ensure better timely delivery, ease the burden of financing over a longer period and to wrap up procurement and maintenance into one package[25].

PPP arrangements for rolling stock require a manufacturer to secure the initial capital costs to procure, produce and maintain rolling stock in return for a periodic payment, often linked to the availability of rolling stock for revenue service. A PPP arrangement could be extended to cover operations as well. Financing is often sourced from third parties rather than from the manufacturer.

The periodic payment is conditional on the manufacturer meeting the service requirements set out in the contract, including availability of the rolling stock and upkeep of the assets (cleaning/routine maintenance/major overhauls). If these conditions are not met, each performance failure incurs a deduction against the periodic payment. At the end of the contract, ownership of the rolling stock reverts to the public sector.

However, these agreements can be complicated and often require manufacturers to comply with strict and comprehensive standards and requirements although it is possible for these specifications to be defined on performance terms.

PPP arrangements, which create a direct contractual arrangement between government and manufacturer, offer real opportunities to lower the upfront costs for rolling stock

[25] See NSW Treasury (2010)

procurement, despite being complex financial instruments. Simplifying PPP documentation would be of considerable value in helping to reduce the cost of tendering and increase the viability of using PPPs for rolling stock procurement.

Vendor Financing

Financing from manufacturers rather than from third parties may provide another source of funding available to government to fund rolling stock purchases. Similar to a car lease, funding is secured directly from the manufacturer with government paying the manufacturer a periodic payment to cover the capital and financing costs.

Under this model, government takes ownership of the rolling stock and is responsible for its maintenance and operations.

Vendor financing may be practical for smaller, longer term procurements whereby lease payments could be used by the manufacturer to fund both financing costs and future production costs. However, the viability of this approach is reliant on the manufacturer's cost of capital which may be higher than the government's cost of capital, the financial strength of the manufacturer, the availability of free cash and its borrowing capacity.

Sale and Leaseback

This model is often used in the property industry where businesses are seeking to unlock the value tied up in existing assets to fund new growth. In this model, rolling stock currently owned can be sold to an external party (e.g. superannuation fund, a specialist rolling stock company) who then lease it back to the previous owner, freeing up finances for use on other investments, such as new rolling stock construction for growth.

The key advantage of this method is that it can make available finance that could be used to purchase new rolling stock without drawing from contested government funding. This approach can also include maintenance or refurbishment requirements that may present opportunities to better manage whole of life costs.

However, this method can only be used once. The value of the return on rolling stock will be subject to the condition of current rolling stock. There may also be issues regarding who and how rolling stock may need to be maintained.

Sale and leaseback arrangements have been used in the UK and in Europe for passenger fleets. Domestically, sale and leaseback arrangements are perhaps more common for freight rolling stock although as part of the 1999 Victorian passenger franchising agreements, franchisees were required to acquire all rolling stock and make arrangements for lease back[26].

[26] Productivity Commission (2009)

Rolling Stock Leasing Companies

Rolling stock leasing companies (ROSCOs) may provide an indirect means of procuring rolling stock. With the privatisation of mainline railway operations in the UK in 1993, the ownership and purchase of rolling stock was vested to specialist financing companies who purchased and financed existing and new rolling stock. Private sector train operators then leased rolling stock from these ROSCOs. Government takes the role of planning, defining train specifications, providing the necessary ancillary infrastructure and guaranteeing lease payments through the use of a tripartite agreement between itself, the train operator and the ROSCO.

ROSCOs can provide benefits by buying rolling stock in bulk and providing a means of off-balance sheet financing. With a relatively low level of rail franchising, low fleet numbers and heterogeneity in rolling stock, the ROSCO financing option may not deliver efficient procurement and financing outcomes over the short to medium term. However, should private sector involvement in train operations and harmonisation in rolling stock and infrastructure increase, ROSCOs may provide an alternative means to PPPs to financing new rolling stock.

5.2.5 Reduce the Number of Train Classes

There appear to be opportunities to rationalise the number of different types of cars. Across Australia's passenger fleet, there exist 36 different train classes. Whilst some train classes are similar in design, there exists significant difference between others. Contributing to the wide variety of trains is the small size of many classes. Of the 36 different train types of trains within the current fleet, 23 classes have less than 100 cars.

There may be good reason for a rolling stock operator to procure different types of trains. For instance a metro train may be built on a different platform to a long distance train. It is recognised that on some networks, such as the Transperth rail network, there exists a high degree of similarities between different rolling stock classes. However, there is considerable scope for the consolidation of train classes within other fleets.

The impending retirement of RailCorp's XPT, Xplorer and Endeavour fleet may provide the first opportunity to consolidate train classes. Relatively small in terms of fleet numbers compared to fleet used for urban operations, there is likely to be value in consolidating the design of regional rail trains. Already, trains used by V/Line and Transwa are similar in design (as shown in **Figure 5.1** and **Figure 5.2** respectively).

Figure 5.1: VLocity Train

Figure 5.2: Transwa Train

Consolidating the number of train classes as rolling stock is renewed would allow rolling stock owners to develop economies of scale at the tendering, design and primary build stage. Larger, more homogenous fleets may also provide opportunities to save on ongoing maintenance and operating costs.

5.2.6 Joint Procurement

Where two or more jurisdictions have orders that may otherwise struggle to achieve economies of scale, a potential option may be to combine the orders into one single approach to market.

This has the potential to deliver rolling stock owners two major benefits in the form of improved economies of scale as well as greater interest from the market.

The trains that are ordered may not necessarily need to have the same specifications. For instance, different train designs could be put to market jointly, although there would be significant benefits from having a high level of commonality between the different trains.

To facilitate joint procurement, long term rolling stock planning as well as coordinated planning of rolling stock procurement would provide potential channels to firstly identify potential train classes that have high degrees of commonality and are likely to become age-expired simultaneously.

Four narrow gauge rail operators in Western Switzerland, having reached the same point in their fleet renewal cycles, issued a joint invitation to tender.

The operators jointly selected Stadler to supply a total of 17 two and three-car electric multiple-units worth a total of Fr150 million (A$160.7 million[27]).

Stadler note joint procurement saved Fr28 million (A$30 million) compared to separate contracts and should offer long-term savings through maintenance synergies[28].

It is likely that joint procurement would be undertaken on an ad-hoc basis initially. For instance, the procurement of long distance trains and regional trains, could provide an opportunity to jointly procure rolling stock in a market which would otherwise be piecemeal. Also, the design of long distance trains and regional trains would need to

[27] Based on purchasing power parity exchange rate of Fr1 = $1.071. Sourced from OECD.Stat

account for freight train design and operations in addition to urban passenger train design and operations.

5.2.7 Harmonised componentry

A key element towards greater harmonisation of rolling stock platforms will be the harmonisation of componentry.

Over time as new operating practices and technologies emerge, new standards will be required in order to cater for new applications. For instance, the emerging demand for automatic train control systems and train-platform interfaces (e.g. platform screen doors) would require new types of componentry to deliver these systems and interfaces. Harmonised standards could play a useful role in streamlining and reducing the compliance costs associated with the roll out of these systems should they be developed upfront.

New regulations could also drive a need for harmonised componentry. For instance, all Australian passenger rail operators are required to comply with the *Disability Standards for Accessible Public Transport 2002* (DSAPT). The ARA is currently proposing a legal recognition of a Code of Conduct that translates the DSAPT requirements in a way that reflects the rail industry's constraints. If this process is successful, this could influence the manner in which componentry such as doors, ramps, seats and rails are designed.

Harmonisation of componentry may drive some cost savings through the rail manufacturing supply chain by improving scale, reducing inventory requirements and reducing the costs of sub-assembly. In the UK, it has been suggested that changing design standards by providing best practice guidance on specification, procurement and design to support greater innovation and cost-effectiveness could save between £10m - £20m per year (A$22.4m - A$44.8m), and if followed up with mandatory reviews, deliver a further £10m - £20m per year[28]. It is important to note however that these savings may largely overlap the savings from moving to a more common platform and depend on the extent to which componentry is harmonised. Harmonisation with overseas good practice would also offer opportunities for domestic suppliers to service both domestic and international customers and in turn expand their markets.

Ideally, harmonisation principles and standards can be undertaken in such a way that they incorporate overseas good practice, encourage innovation and evolve over time to account for emerging technologies, market practices and regulations.

5.2.8 Harmonised rolling stock platforms

Over time, the harmonisation of rolling stock platforms may be possible within individual fleets and potentially across the national fleet. Over the longer term, common platforms may emerge for the following market segments:

- Metro style services

[28] Little (2011)

- Suburban/commuter services
- Intercity services
- Regional services and long distance services.

In some cases, it may be possible to use the same platform for a variety of market segments.

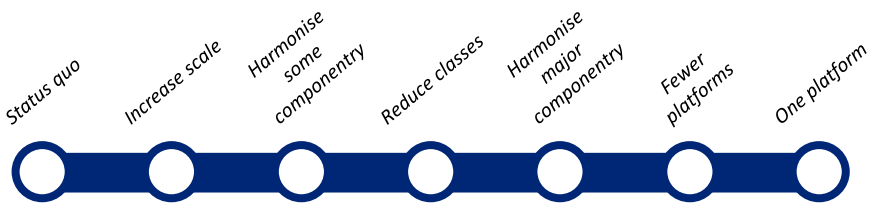
Regulators are already playing active roles both domestically and internationally in promoting harmonisation. Greater interoperability is currently being sought within the European Union, with a proposal for the European Railway Agency[29] to take the central role in the acceptance of new rolling stock. In light rail, UK Tram has been tasked with the responsibility of preparing guidance with respect to the design of both light rail rolling stock and infrastructure to assist in delivering greater value for money for future UK light rail projects.

"Where industry has procured trains without a detailed specification being imposed, there has already been a strong move towards common platform trains"

Angel Trains, a UK based rolling stock provider

Over the short to medium term, a number of steps could be taken to facilitate a harmonisation of platforms. All of the responses above contribute to some degree to greater harmonisation yet become progressively more difficult to achieve as greater coordination between states and between requirements (in the form of platform harmonisation) is required. An optimal level position along the harmonisation spectrum (see **Figure 5.3**) will be needed to balance standardisation and resultant procurement efficiencies against the cost of retrofitting infrastructure (for example, changing power supplies, station platform designs or bridge clearances) and operator/market requirements.

Figure 5.3: Steps towards a Harmonised Platform



The role of the market in promoting harmonisation of train platforms will be important. There is an inherent incentive for manufacturers to promote global platforms. The use of common platforms has the potential for rolling stock manufacturers to offer rolling stock

[29] International Railway Journal (2013)

more cost effectively, with the research, design and development costs spread over a greater number of orders. The use of common platforms is increasingly becoming market driven and is already evident in the use of platforms like the Siemens Desiro on commuter services as well as regional and intercity services in the UK and across Europe.

Siemens Desiro on the Graz S-bahn
Source: Wikipedia

Siemens Desiro on the Transpennine Express
Source: Wikipedia

It is important to emphasise that common platforms do not necessarily mean standardisation. Forcing standardisation has the potential to stifle innovation. Platforms require innovation to cost effectively maintain rolling stock on an ongoing basis, to replace obsolete componentry, to retrofit new/emerging technologies and to enhance the reliability of the fleet over time.

5.3 Key Findings

To overcome the four identified barriers limiting the cost-efficient procurement of trains, it is imperative that potential responses:

- Optimise the number of trains per order to better ensure that economies of scale can be achieved
- Smooth the level of production to further assist in achieving economies of scale and to provide better signals to industry
- Reduce the variations in train standards to reduce the need for one-off designs, the avoidance of which would remove significant design costs during the procurement process
- Smooth the upfront financial burden of rolling stock purchases to increase the ability to procure based on need rather than on when funding is available
- Encourage greater coordination of production and procurement between industry and government to improve visibility and encourage production efficiencies.

Eight potential policy responses have been identified to assist in delivering the above outcomes:

- Long term rolling stock planning
- Long term train procurement programs
- Coordinated rolling stock planning
- Use of alternative financing arrangements
- Reduce number of train classes
- Joint procurement of rolling stock
- Harmonised componentry
- Harmonised rolling stock platforms.

Specific actions will be required to deliver these policy responses. These actions are outlined in **Chapter 7**.

6 Potential Benefits

A range of responses have been identified which could smooth production, reduce variation and improve the scale of train orders. This chapter outlines the potential economic benefits and changes in the level of economic activity associated with the Policy case, which reflects improved procurement practices, against a Business as Usual case. This chapter outlines how the Business as Usual and the Policy case have been defined, how each economic benefit stream has been measured and the projected costs to government and to industry of not taking action to address the current barriers.

6.1 Evaluation Parameters

The key parameters underpinning the economic assessment reflect recommended parameters used by various agencies including the Standing Committee on Transport and Infrastructure, Infrastructure Australia and various state government treasuries. The following key parameters have been used to monetise benefits:

- **Real discount rate:** 7% per annum
- **Evaluation period:** 30 years
- **Price year:** 2012 prices.

6.2 Project Cases

Future Demand for Rolling Stock

As a prelude to defining the Business as Usual and Policy cases, establishing the size and the timing of rolling stock demand is key in establishing the absolute size of the potential economic benefits. As mentioned in Chapter 4.2, this assessment updates the rolling stock forecasts prepared by Orion Advisory[30] to improve the precision of the forecasts. The following adjustments to the forecasts have been made:

- Removal of recent train retirements
- Additions for new trains
- Removal of light rail vehicles
- Separation of single and double deck trains
- Additions to reflect the proposed development of a rapid transit network in Sydney
- Variations in task growth by network.

[30] Ibid 4

Based on these adjustments, the current heavy rail passenger fleet is estimated to increase in size from 4,044 cars to 10,930 cars by 2043. **Table 6.1** provides a breakdown of the current fleet and the 2043 fleet by network and deck type:

Table 6.1: Forecast Task Growth Rates

Network	Current Fleet			Annual Task Growth Rate	Projected 2043 Fleet		
	Single Deck	*Double Deck*	*All*		*Single Deck*	*Double Deck*	*All*
NSW[31]	130	1,792	1,922	2.4%	966	2,949	3,915
VIC	1,037		1,037	4.3%	3,615		3,615
QLD	737		737	4.3%	2,604		2,604
WA	248		248	2.4%	510		510
SA	100		100	3.6%	286		286
Sub-total	**2,252**	**1,792**	**4,044**		**7,981**	**2,949**	**10,930**

By 2043, close to 11,000 cars are projected to be demanded across Australia's passenger railways

It should be noted that internal network planning analysis within individual transport agencies may provide for additional capacity to cater for unexpected patronage growth. Therefore, actual rolling stock requirements may be higher than our projections and accordingly, the economic benefits may be higher. However, a conservative approach based on publicly available data validated in each state has been adopted for this analysis.

Business as Usual Case

The Business as Usual case assumes a current practice of each state continuing to procure rolling stock separately without consideration of the timing and size of orders from other states. Within the demand model, the following assumptions have been applied to reflect these practices:

- Train orders are not combined on a nationwide basis
- A new train order is prepared when a train class reaches 30 years of age
- No reduction or harmonisation of train platforms.

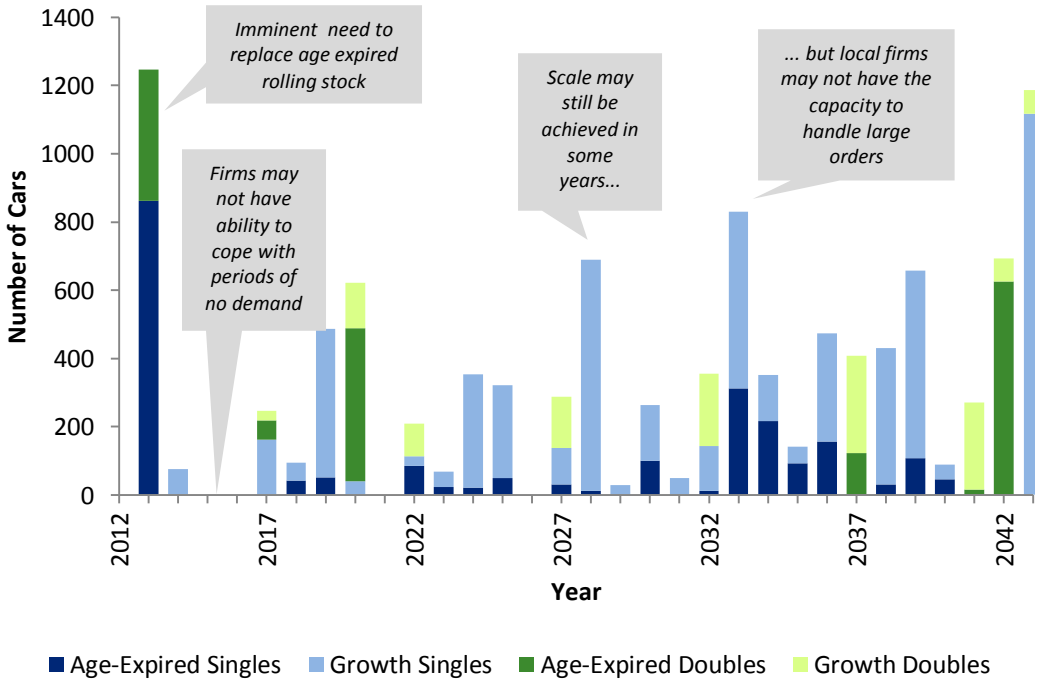
[31] Rolling stock projections for NSW have been adjusted to reflect the potential development of a separate rapid transit tier, which would see the reintroduction of single deck operations on the suburban network. Based on high level cycle time analysis, it has been assumed that 150 single deck cars would be required for Stage 3 of Sydney's Rail Future (North West Rail Link) and 300 single deck cars for Stage 5 of Sydney's Rail Future (conversion of the Bankstown Line and local Illawarra Lines to rapid transit). Assuming a sequential rollout of Sydney's Rail Future, it was assumed that the 141 of the 300 single deck cars would replace the Millennium train set around 2033, when the Millennium trains would be due for retirement.

In the midst of replacing age-expired trains, new growth trains will also need to be procured in order to meet future patronage growth. It has been assumed that growth trains would generally be combined with an order for replacement trains. The following assumptions were made with regards to the purchase of growth trains:

- Growth trains are purchased at the same time as replacement trains
- If no replacement trains are purchased for 5 years, a growth train order is assumed to be put to market
- A growth train order is put to market in the last year of evaluation to ensure that the cost of all growth trains up to 2043 is included.

Based on these assumptions, **Figure 6.1** outlines the timing and size of orders by deck type under the Business as Usual case.

Figure 6.1: Rolling Stock Orders under the Business as Usual Case



The above figure illustrates the high level of projected volatility associated with no coordination or smoothing. Of the 30 years evaluated, there are 11 years where annual orders will be less than 200 cars and 9 years where annual orders exceed 400 cars. Of particular note is the immediate need to procure more than 1,200 cars. The significant variation in order size under the Business as Usual case is likely to test the agility and capacity of the rolling stock supply chain to deliver to these variable volumes.

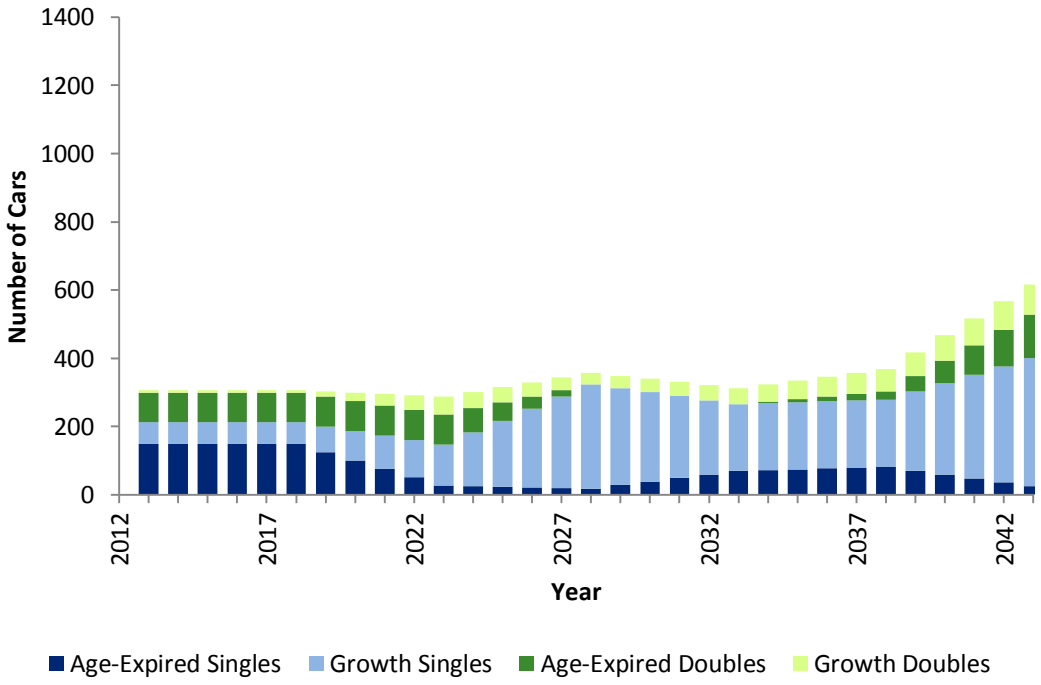
Policy Case

The Policy case assumes a "perfect" level of coordination between the states. The policy case assumes that:

- Train orders are procured collaboratively for all states
- Long term procurement programs are in place
- Two harmonised train platforms, one each for single deck and double deck trains.
- Train orders are smoothed across time.

Within the demand model, train orders by year in the base case have been continuously smoothed using a 5 year moving average to produce estimates of rolling stock demand under the Policy case. **Figure 6.2** outlines the timing and size of orders by deck type under the Policy case.

Figure 6.2: Rolling Stock Orders under the Policy Case



Under the improved case of continual smoothing, the procurement profile for new trains illustrates a fairly constant demand of around 300 cars per year with a ramp up in demand towards the end of the 30 year forecast period. Based on industry consultations, consistent production of approximately 300 cars per annum could be sufficient for two or three domestic rolling stock manufacturers to operate sustainably.

6.3 Benefits to Government

Chapter 5 noted eight potential policy responses that could be enacted to overcome the barriers impacting on the efficient procurement of rolling stock. Should all identified policy responses be implemented, this would give rise to the following savings:

- Savings from improved scale
- Savings in planning and design costs
- Savings from componentry harmonisation.

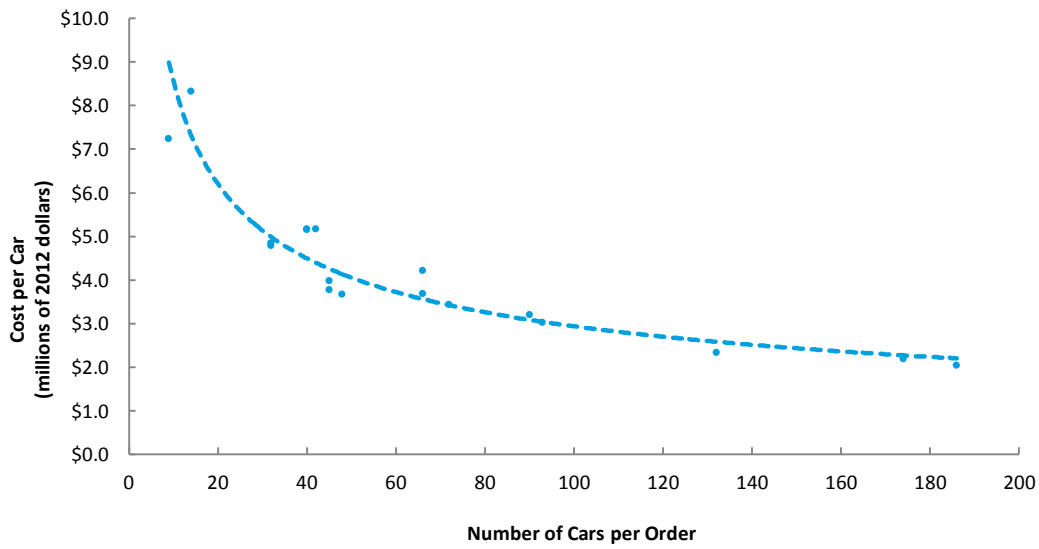
The approach used to monetise each saving stream is discussed below.

6.3.1 Savings from Improved Scale

As mentioned previously in Chapter 3, the first barrier that inhibits the cost-efficient delivery of rolling stock is the lack of scale of many rolling stock orders. An analysis of previous single and double deck orders in Australia indicates that many orders are below 150-200 cars, a level at which economies of scale are achieved by manufacturers.

Figure 6.3 and **Figure 6.4** outline the cost curves for single and double deck cars based on order data.

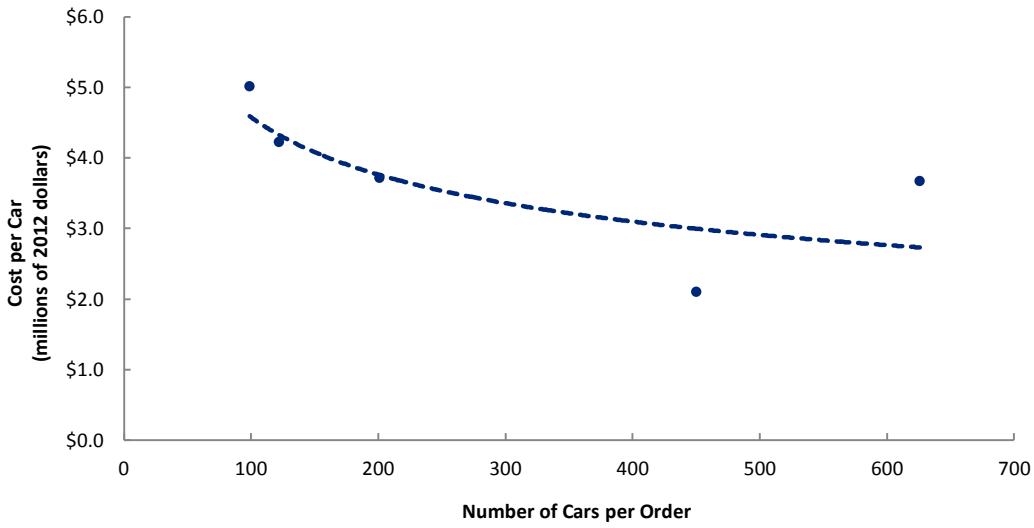
Figure 6.3: Australian Cost Curve for Single Deck Cars



Source: Deloitte Access Economics

To illustrate the impact of scale, for single deck cars, an increase in order size from 50 cars to 150 cars, based on empirical data, would reduce the average cost per car from $4.0 million to $2.4 million, a reduction of 40%.

Figure 6.4: Australian Cost Curve for Double Deck Cars



Source: Deloitte Access Economics

For double deck cars, an increase in order size from 50 cars to 150 cars, based on empirical data, would reduce the average cost per car from $5.6 million to $4.1 million, a reduction of 37%.

For the purposes of the economic assessment, the empirical cost curves have been used to estimate the cost per order. For train orders beyond 200 cars, a further assumption has been made whereby economies of scale are assumed to be exhausted where orders exceed 200 cars.

6.3.2 Savings in Planning and Design Costs

Procurement costs incurred by government and manufacturers can be quite significant. As mentioned in Chapter 2, a number of time consuming and costly steps are taken prior to primary build. These steps include:

- Transport planning and modelling
- Engineering design and standards
- Business cases and approvals
- Tendering and evaluation.

Research undertaken by the UK Department for Transport indicates that the typical planning and design costs associated with the procurement of trains ranges between 9% and 12% of total capital costs. However, for the development of bespoke rolling stock, this proportion can be as high as 20%. Based on a historical average cost of $3.3 million per car, average procurement costs in Australia could range between $0.3 million per car and $0.7 million per car. Given the high proportion of relatively bespoke trains, small numbers of cars for many train classes and multiple platforms, the costs of planning may be towards the upper end of the range.

Under the Policy case, whereby a common platform would be used across the nation, considerable savings in design, planning and tendering could be made. For instance, a common platform could:

- Deliver gradual iterations in train specifications rather than step changes, avoiding the need to undertake new rounds of research, development and testing
- Improve the viability of joint procurements and harmonisation efforts, which in turn would result in reduced tendering costs through fewer tenders and greater standardisation in tendering processes.

According to research undertaken by ARUP[32], approximately 75% of the pre-build costs are "locked in" after tendering, evaluation and detailed design. Under the Policy case, harmonisation and joint procurement have the potential to significantly reduce costs during this stage. Based on the outcomes of industry consultation, an assumption was made that it would be possible to reduce planning and design costs by half should harmonisation and joint procurement initiatives be pursued. Some allowance for ongoing planning and design costs is required - this still allows for costs to be incurred for a simplified tendering and evaluation process and gradual iterations in detailed design.

For the purposes of the assessment, it has been assumed that the average cost of procurement under the Business as Usual case is $0.60 million per car and under the Policy case, this reduces to $0.38 million per car, or a saving of $0.22 million per car.

6.3.3 Savings due to Componentry Harmonisation

Harmonisation of componentry may drive some cost savings through the rail manufacturing supply chain by improving scale, reducing inventory requirements and reducing the cost of sub-assembly. The level of benefit from componentry harmonisation will depend on the ultimate level of harmonisation achieved, a function of the benefits of harmonisation but also the costs and market appetite for harmonisation. It is important to note some of these savings may overlap the savings from moving to a more common platform and increasing order scale.

[32] Ibid 7

To gauge what the level of benefit that could be attributed to the harmonisation of componentry, estimates developed for the UK have been drawn upon. Based on a fleet that is currently three times as large as the Australian passenger fleet, it has been estimated that changing design standards by providing best practice guidance on specification, procurement and design to support greater innovation and cost-effectiveness could deliver savings of between £20m - £40m per year[33] (A$44m - A$90m[34]). Taking the midpoint of this range and prorating, harmonisation of componentry could deliver benefits of about $22 million[35] in the first year, growing in size in line with growth in the fleet size.

6.3.4 Headline Savings

Table 6.2 outlines the value of each savings stream. Relative to the Business as Usual case, the Policy case is projected to deliver $5.9 billion in core capital expenditure benefits, directly attributable to government, in undiscounted terms over the next 30 years (assuming that cost savings are passed onto government in the form of lower prices). This level of savings represents a 19% decrease in rolling stock costs relative to the base case.

Table 6.2: Estimated Savings ($m)

Benefit Stream	Undiscounted	Discounted
Savings from Improved Scale	$2,323	$490
Savings in Planning and Design Costs	$2,459	$898
Savings due to Componentry Harmonisation	$1,126	$407
Total savings	**$5,908**	**$1,794**

Where values have been discounted, a 7% real discount rate has been applied

6.4 Benefits to Industry

There is considerable concern amongst domestic rolling stock supply chain participants that continued volatility in production levels is likely to contribute to a decline in domestically based rolling stock manufacturing. Reflecting consultation with industry, in the absence of local content rules under a Business as Usual case, primary build is not expected to continue to occur onshore.

Volatility in production increases the risk for rolling stock manufacturers to develop their supply chain to scale up for large orders as this capacity could well be underutilised for long periods of time. This in turn can lead to situations where orders are in excess of the local industry's capacity, and are in turn filled through the use of international supply chains. This

[33] Little (2011)

[34] Ibid 7

[35] A mid-point of A£30m p.a. was adopted which was divided by 3 to account for the relative difference in size between the UK and Australian passenger fleet. The £10m was converted to local currency using the above noted PPP exchange rate.

trend was recently evidenced through the use of an international rolling stock manufacturer partner to fulfil the Waratah train order.

Coordinated planning, order smoothing and joint procurements have the potential to limit the erosion of domestic market share. Greater pipeline visibility would provide a range of benefits including:

- Better foresight on the appropriate level of investment in plant, people and training
- A more stable environment from which to encourage investment in innovation and better production practices
- Flow-on potential opportunities for regional specialisation and clustering of rail supply chain participants
- The potential for greater competitive tension by encouraging rolling stock manufacturers to consider entering the domestic market.

Industry consultation suggests that with the greater use of global rolling stock platforms and higher relative labour costs, the proportion of rolling stock production occurring domestically is expected to decline with time.

However, industry participants have suggested that with greater visibility of future production, certain aspects of rolling stock production can be retained on shore such as detailed design, production of some rolling stock componentry, localised fit-out, testing and acceptance. Consultation suggests that should future production levels be smoothed, the value of rolling stock production undertaken domestically may only decline from current levels of around 50% to approximately 30% of the upfront capital cost of rolling stock. This represents a considerable improvement compared with industry's view that no domestic production may occur under the base case.

Using industry's perspective that 30% of production value occurs domestically, this is projected to generate $8.6 billion of rolling stock production being undertaken on shore over the next 30 years.

Smoothing in production may assist in maintaining up to $15.5b of domestic economic activity

In turn, domestic production can be expected to have broader impacts beyond the rolling stock manufacturers. Domestic expenditure of $8.6 billion would flow through other sectors of the rail supply chain and the broader economy. ABS Input-Output data was used to impute a multiplier – a value of 1.8[36] was derived. Hence, the initial $8.6 billion expenditure is projected to equate to a $15.5 billion impact in undiscounted terms (or $6.5 billion in discounted terms) over the next 30 years - $8.6 billion direct and $6.9 billion indirect.

Conversely should no action be taken, industry stakeholders have suggested that it is conceivable that no rolling stock manufacturing would occur domestically, with all primary build undertaken overseas.

[36] Deloitte Access Economics assessment based on ABS (2012)

Without change, this means that economic activity of up to $15.5 billion could be at risk and lost to domestic industry.

6.4.1 Industry Impacts by Region

The manufacture of rolling stock is highly specialised and is a significant employer in many regional economies. The 2011 Census indicates that about 6,000 people were directly employed by entities involved in rolling stock manufacturing and repair across Australia.

Workers within the rolling stock manufacturing sector are concentrated in specific hubs. The top ten regions account for over 60% of employment with the sector with concentrations of workers in both metropolitan areas, including Auburn and Dandenong, as well as in regional areas including Newcastle, Maryborough and Bendigo. With respect to the latter, rail often plays a disproportionate role in underpinning the local manufacturing base. The benefits of retaining a domestic rolling stock manufacturing base would likely be concentrated in these locations. A breakdown of major rolling stock manufacturing and repair locations are shown in **Table 6.3**.

Table 6.3: Major Locations for Rolling Stock Manufacturing and Repair in Australia

Region	Key Rail Manufacturing and Repair Centres	Workers	Share of Industry Employment	Share of Manufacturing Jobs in Region
Newcastle/Lake Macquarie (NSW)	Cardiff, Waratah, Broadmeadow	1072	18.1%	7.7%
Sydney – Parramatta (NSW)	Clyde-Auburn	769	13.0%	2.8%
Wide Bay (Qld)	Maryborough	490	8.3%	6.3%
Adelaide – North (SA)	Dry Creek	239	4.0%	1.3%
Melbourne – South East (VIC)	Dandenong	200	3.4%	0.4%
Melbourne – West (VIC)	Spotswood	191	3.2%	0.7%
Melbourne – Inner (VIC)	West Melbourne	171	2.9%	0.7%
Fitzroy (Qld)	Rockhampton	157	2.7%	1.8%
Brisbane – Inner City (Qld)	Bowen Hills	154	2.6%	1.9%
South Australia – Outback (SA)	Whyalla	149	2.5%	4.9%
Sydney - Inner South West (NSW)	Eveleigh (Redfern)	139	2.3%	0.8%
Mid North Coast (NSW)	Port Macquarie	134	2.3%	3.2%
Ballarat (VIC)	Ballarat, Bendigo, Castlemaine	124	2.1%	2.1%
Australia		**5,923**	**100%**	**0.7%**

Source: ABS 2011 Census

Table 6.4 illustrates the potential distribution of economic activity under the Policy case if it were to be spread based on the breakdown of employment. Under the Policy case, economic activity could be enhanced by over a $1 billion in Maryborough and over $2 billion in Auburn and Newcastle over a 30 year period.

Table 6.4: Projected Difference in Economic Activity under the Policy Case by Key Rolling Stock Manufacturing and Repair Regions in Australia

Region	Key Rail Manufacturing and Repair Centres	Direct Benefits ($m)	Indirect Benefits ($m)	Total Benefits ($m)
Newcastle/Lake Macquarie (NSW)	Cardiff, Waratah, Broadmeadow,	$1,557	$1,241	$2,799
Sydney – Parramatta (NSW)	Clyde-Auburn	$1,117	$891	$2,008
Wide Bay (Qld)	Maryborough	$712	$567	$1,279
Adelaide – North (SA)	Dry Creek	$347	$277	$624
Melbourne – South East (VIC)	Dandenong	$291	$232	$522
Melbourne – West (VIC)	Spotswood	$277	$221	$499
Melbourne – Inner (VIC)	West Melbourne	$248	$198	$446
Fitzroy (Qld)	Rockhampton	$228	$182	$410
Brisbane – Inner City (Qld)	Bowen Hills	$224	$178	$402
South Australia – Outback (SA)	Whyalla	$216	$173	$389
Sydney - Inner South West (NSW)	Eveleigh (Redfern)	$202	$161	$363
Mid North Coast (NSW)	Port Macquarie	$195	$155	$350
Ballarat (VIC)	Ballarat, Bendigo, Castlemaine	$180	$144	$324

Australian governments have gone to great lengths to promote employment and regional economic activity, particularly within manufacturing, in the past. In this case, a sustainable domestic manufacturing presence could be achieved by simply changing approaches to procurement and better planning.

Better planning and procurement would go a long way in complementing other government initiatives currently being developed to increase domestic involvement in rolling stock manufacturing. Recently, there was an announcement on Industry Innovation Precincts that aims to help businesses and researchers collaborate, share knowledge, create products and services and take advantage of business opportunities. Manufacturing Taskforce Excellence Australia (META) is one of the first Industry Innovation Precincts to be established. META will build a critical mass of Australian manufacturers and researchers

with the capability to take full advantage of domestic and international opportunities including integration into global supply chains and opportunities arising out of Asia. Organisations across all manufacturing sectors are encouraged to engage with META. META will enable firms to collaborate and build scale with each other and researchers both at home and abroad to improve knowledge and skills and develop a cohort of growth-oriented businesses.

In addition, where government procurement is involved, local industry participation plans may be required by state government agencies. These plans promote involvement and the consideration of competitive local small to medium sized business in major projects. Project proponents may be required to develop and implement a plan that sets out how full, fair and reasonable opportunity will be provided to local industry to participate.

6.5 Key Findings

The economic assessment, which considered the economic benefits and impact of improved procurement practices, relative to a Business as Usual situation, suggests that savings and changes in economic activity could be significant.

Over the next 30 years, these savings are projected to be $5.9 billion, accruable from improved scale, reduced planning and design costs and harmonised componentry.

Smoother demand also provides the chance for domestic rolling stock manufacturing to be sustained without resorting to interventionist policy. Assuming that domestic production reduces from the present levels to 30%, as assumed under the Policy case, smoother demand has the potential to maintain $15.5 billion in economic activity. Much of this activity could be concentrated in existing rail manufacturing hubs located in both regional and metropolitan areas. This activity requires changing approaches to procurement only, without the need for interventionist policy.

7 Next Steps

The potential benefits from improving how passenger rolling stock is procured are significant. This chapter sets out a high level plan of key actions required to drive the realisation of these benefits.

7.1 Realising the Benefits

Chapter 6 outlined that with better planning and harmonised platforms, the procurement of passenger rolling stock could realise significant savings and influence the level of economic activity. **Table 7.1** outlines how these savings and impacts align with each recommended response.

Savings from improved scale and the industry impact from smoother demand rely on responses that require better coordinated planning. These savings, if realised in full, could deliver cost savings of $2.3 billion and maintain up to $15.5 billion in economic activity domestically over the next 30 years.

Savings from planning and design and harmonised componentry rely on responses that deliver greater commonality in design. The collective benefits associated with these responses are projected to be around $3.6 billion over the next 30 years, although these benefits may be more difficult to realise.

Table 7.1: Impact of Key Responses by Benefit Type

Potential Responses	Savings from Improved Scale	Industry Impact from Smoother Demand	Savings in Planning and Design Costs	Savings due to Componentry Harmonisation
Long term rolling stock planning	●	●		
Long term train procurement programs	●	●	○	○
Coordinated rolling stock planning	●	●		
Alternative financing arrangements		●		
Reduce number of train classes			●	○
Joint procurement of rolling stock	○	○	●	
Harmonised componentry	○	○	●	●
Harmonised rolling stock platforms	○		●	●

Increasing difficulty

Impact of Coordinated Planning

Impact of Harmonised Design

● *This response provides a major contribution to realising this saving/impact*

○ *This response provides a minor contribution to realising this saving/impact*

Some responses are considered to contribute significantly or are necessary to the realisation of a particular benefit; these responses are highlighted with a bold circle (●). Other responses may make a minor contribution to the realisation of a particular benefit; these responses are highlighted with a hollow circle (○).

A considerable proportion of the projected savings and changes in economic activity can be attributed to better coordinated planning. However, the effort associated with greater harmonisation could be higher than the efforts required for better coordinated planning. In general, more effort will be required to realise benefits that require greater coordination between states and greater harmonisation.

The responses have therefore been grouped into a series of sequential actions that can be used to progress along the harmonisation spectrum at a measured pace.

Six key actions have been identified to assist in the realisation of the eight policy responses identified in **Chapter 5**. These key actions are:

- **Action 1:** Prepare integrated long term rolling stock strategies
- **Action 2:** Develop a national rolling stock pipeline database
- **Action 3:** Initiate a Coordinated Rolling Stock Planning Program
- **Action 4:** Establish a pilot to prove partial harmonisation benefits
- **Action 5:** Develop harmonisation principles and harmonised rolling stock standards
- **Action 6:** Develop cross-state procurement arrangements.

Table 7.2 outlines how these actions seek to address each policy response.

Table 7.2: Alignment of Key Actions against Potential Policy Response

		Key Actions					
		***Action 1**: Prepare integrated long term rolling stock strategies*	***Action 2**: Develop a national rolling stock pipeline database*	***Action 3**: Initiate a Coordinated Rolling Stock Planning Program*	***Action 4**: Establish a pilot to prove partial harmonisation benefits*	***Action 5**: Develop harmonisation principles and harmonised rolling stock standards*	***Action 6**: Develop cross-state procurement arrangements*
Key Responses	Long term rolling stock planning	●		●	●		
	Long term train procurement programs	●		●	●		
	Coordinated rolling stock planning	●	●	●	●		
	Alternative funding arrangements	●					
	Reduce number of train classes	●			●	●	
	Joint procurement of rolling stock	●			●	●	●
	Harmonised componentry				●	●	
	Harmonised rolling stock platforms within fleets and between fleets	●		●	●	●	

These actions are aimed at promoting a culture of planning to address the barriers impeding the cost efficient procurement of rolling stock. In the first instance, the actions are designed to encourage rather than mandate involvement from key stakeholders. If undertaken sequentially, learnings from previous actions may then inform subsequent actions.

There is great potential in the form of cost savings and broader economic benefits to pursue greater harmonisation. Further planning and assessment is considered vital in order to establish what harmonisation opportunities exist, particularly interstate opportunities, and provide the basis for whether further measures are required to improve the procurement of rolling stock.

7.2 Key Actions

Table 7.3 outlines the recommended actions to access these procurement efficiencies. Any and all of these activities would assist in moving the Australian rolling stock sector further along the harmonisation spectrum which will realise ongoing benefits.

Table 7.3: Key Recommended Actions

Action	Key Elements
Action 1: *Prepare integrated long term rolling stock strategies*	Develop plans spanning a 20 to 30 year period to project anticipated level of rolling stock demand accounting for: • Potential network expansions • Levels of future patronage by year and market segment • Whole of life costs • Ancillary infrastructure • Current and future infrastructure standards • Current and future operating requirements • Current and future customer requirements • Alternative financing options that could be used. These plans could: • Consider input from rolling stock manufacturers to identify industry's potential offerings and capabilities • Identify opportunities for rolling stock to be procured over longer term contracts / under different financing models • Balance the need for new train classes to better meet customer/operating needs against the benefits of rationalising the number of train classes.
Action 2: *Develop a national rolling stock pipeline database*	Develop a database that sets out anticipated rolling stock demand by: • Jurisdiction • Expected year of procurement • Type of train • Number of cars. The aim of the database would be to develop a profile of committed, planned and projected rolling stock requirements, informed by long term rolling stock planning undertaken by individual agencies. This would provide visibility to each State, to manufacturers and to industry suppliers.
Action 3: *Initiate a Coordinated Rolling Stock Planning Program*	A Coordinated Rolling Stock Planning Program would see jurisdictions put forward their own individual rolling stock programs, and potentially identify opportunities for agencies to: • Reallocate potential orders to match up with lulls in demand • Smooth out rolling stock orders • Identify funding requirements • Identify opportunities for joint procurements • Identify opportunities to harmonise rolling stock platforms and infrastructure standards.
Action 4: *Establish a pilot to prove partial harmonisation benefits*	A pilot program aimed at developing harmonisation principles and standards for one class of train. This pilot could provide the basis for establishing key operating and infrastructure harmonisation principles, issues that may limit the level of harmonisation and the appetite for harmonisation. The development of a harmonised platform for regional rail may provide an ideal

Action	Key Elements
	test case to prove the harmonisation concept. A harmonised platform for regional rail would serve to consolidate a market segment whereby the number of cars per class is typically small. Furthermore, a regional rail initiative could highlight design elements that are most amenable to harmonisation, taking into account variations in operating and infrastructure parameters between different rail networks. Such a pilot could require involvement from a range of transport agencies as well as industry participation to identify a rollingstock platform/market that would be most amenable to harmonisation to demonstrate benefits of harmonisation.
Action 5: *Develop harmonisation principles and harmonised rolling stock standards*	Should it be considered desirable by industry, the formalisation of principles and standards to guide the greater harmonisation of rolling stock design and where necessary, infrastructure would be developed. An engineering assessment of the following elements could be undertaken to assess the potential for a reduction of train classes and harmonisation of rolling stock platforms: • Current and emerging platforms and standards • Current fleet designs and standards • Key elements and "non-negotiable" standards • Operating arrangements impacting on train design • Infrastructure constraints impacting on train design.
Action 6: *Explore feasibility of cross-state procurement arrangements*	To further progress the potential for joint procurement, the feasibility of such arrangements could first be assessed. The assessment could consider: • Potential obstacles that may impede joint procurements • Regulatory and legislative issues • Competition issues.

7.3 Key Findings

As identified in **Chapter 5**, eight policy responses have been identified to improve economies of scale, smooth production and reduce variations in standards. These responses are:

- Long term rolling stock planning
- Long term train procurement programs
- Coordinated rolling stock planning
- Alternative funding arrangements
- Reduce number of train classes
- Joint procurement of rolling stock
- Harmonised componentry
- Harmonised rolling stock platforms.

In order to deliver these responses, the following actions should be carried out:

- **Action 1:** Prepare integrated long term rolling stock strategies
- **Action 2:** Develop a national rolling stock pipeline database
- **Action 3:** Initiate a Coordinated Rolling Stock Planning Program

- **Action 4:** Establish a pilot to prove partial harmonisation benefits
- **Action 5:** Develop harmonisation principles and harmonised rolling stock standards
- **Action 6:** Develop cross-state procurement arrangements.

These actions are aimed at promoting a culture that delivers sustainable cost efficiencies.

To realise the estimated benefits, buy-in from a range of key government and industry stakeholders would be required to achieve the potential policy responses outlined in **Chapter 5**. Both government and industry stakeholders have key roles to play in progression identified actions.

There are considerable economic benefits at stake for all stakeholders. For governments, these amount to cost savings of $5.9 billion over the next 30 years. For the rolling stock manufacturing industry, economic activity worth $15.5 billion may not be maintained without action. There is now a clear imperative to take action. This requires primarily better planning rather than major government intervention, to deliver benefits for all stakeholders, improve efficiencies and provide a platform for a more sustainable domestic rolling stock manufacturing industry.

8 Limitation of our work

This report is prepared solely for the use of the ARA. This report is not intended to and should not be used or relied upon by anyone else and we accept no duty of care to any other person or entity. The report has been prepared for the purpose set out in our engagement letter dated 7 February 2013. You should not refer to or use our name or the advice for any other purpose.

9 References

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