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Paper title: **The demand for very high speed rail on the east coast of Australia**

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Abstract (200 words):
In 2001, DoTARS commissioned a scoping study of Very High Speed Train (VHST) for the Brisbane-Melbourne corridor. This paper summarises the demand forecasting component of the study. A base market size and VHST model were developed that enable patronage passenger kilometres user benefit and impacts on 'donor modes' to be forecast under a wide range of scenarios. The model tailored to east coast conditions was then compared with a 'benchmarking' model developed from overseas experience in Europe and Japan. Three VHST technology options involving new track and rolling stock were forecast and compared against current technology. Four corridor sectors were evaluated: Brisbane-Newcastle; Newcastle-Sydney; Sydney-Canberra and Canberra-Melbourne. Business, non-business and metropolitan (mainly commuting) trips were forecast. The size of each market was projected according to population, employment and income growth with two socio-economic. A diversion model compared VHST with other modes. Induced demand was also forecast and ramp-up allowed for. The demand model tailored to the east coast was less sensitive to travel time than the 'benchmarking' model. Lower forecasts at short distances are forecast and higher forecasts at long distances. Although far easier to construct, the paper expresses the need for caution in transferring overseas experience.

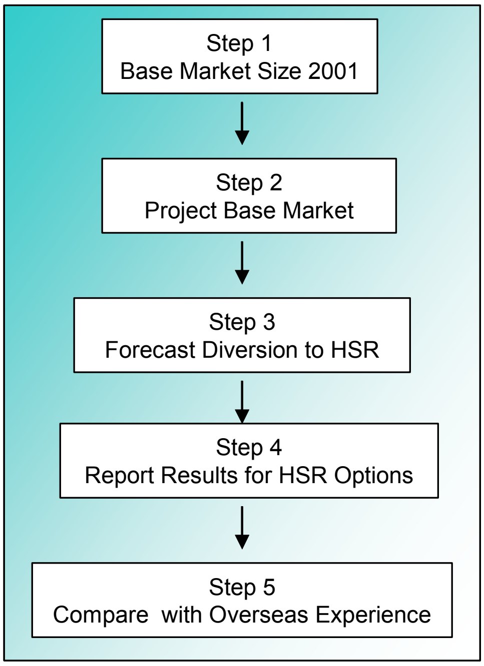
Introduction

In 2002, the Department of Transport and Regional Services commissioned TMG International[1] to undertake a scoping study of a Very High Speed Train system for the Brisbane-Melbourne corridor. The scoping study embraced demand, operations, engineering, environmental, financial and economic viability of higher speed rail services in the Brisbane - Melbourne corridor. This paper[2] summarises the demand modelling component of the study.

A demand forecasting model was developed that enable patronage, passenger kilometers, user benefit and impacts on 'donor modes' to be forecast under a wide range of scenarios. The model tailored to east coast conditions was then compared with a 'benchmarking' model developed from actual overseas experience.

The forecasting methodology involved five steps. A base market model forecast the existing and future size of the east coast travel market. A diversion model forecast the likely patronage High Speed Rail (VHST) could achieve based on travel times and fares relative to air, car, coach and conventional rail. The model output a range of results: trip, passenger kilometres, revenue, mode shares, source of VHST demand and user benefit measures.

Figure 1: Study steps



The model was based on the 1996/7 Domestic Tourism Monitor and 1997 International Visitor Survey supplemented by Aviation statistics, Countrylink and Metropolitan data supplied by Queensland Rail, Brisbane City Council, NSW SRA and National Express. No new market research surveys were undertaken. The study looked at three VHST technologies: 250km/h (tilt trains), 350km/h (e.g. TGV) and 500 km/h (Maglev). The forecasts were compared with 'current 160km/h rail technology'.

Four corridor sectors were evaluated: Brisbane-Newcastle; Newcastle-Sydney; Sydney-Canberra and Canberra-Melbourne. For each sector, inland and coastal routes were compared.

The patronage forecasts were 'benchmarked' against overseas experience by comparing the forecast VHST - air shares for main city pairs (e.g. Sydney-Melbourne) with overseas shares (e.g. Madrid – Seville).

Base Market Estimation

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[1] TMG International was the lead consultant for the study and led a team which included Arup, Douglas Economics, P/P/M Consultants, Westpac Bank, John S Bryan Consulting, Pty Ltd, SGS Economics and Planning, and Environmental Affairs Pty Ltd.

[2] Permission to publish this paper was given by the Department of Transport and Regional Services and is gratefully acknowledged. The full study may be found at www.dotars.gov.au/transinfra/vhst.htm. A summary was presented by P.B.Thornton at CORE 2002, Wollongong entitled 'Studies for an East Coast Very High Speed Train' and also at the 2002 EurailSpeed conference in Madrid.

Figure 2: Inscope corridor

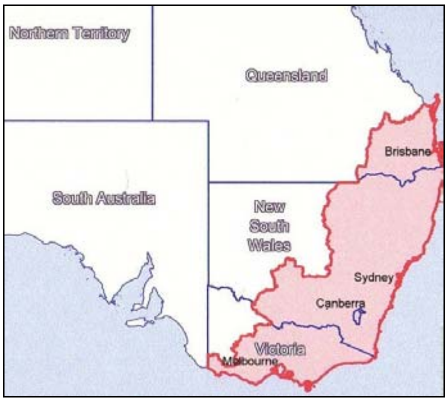
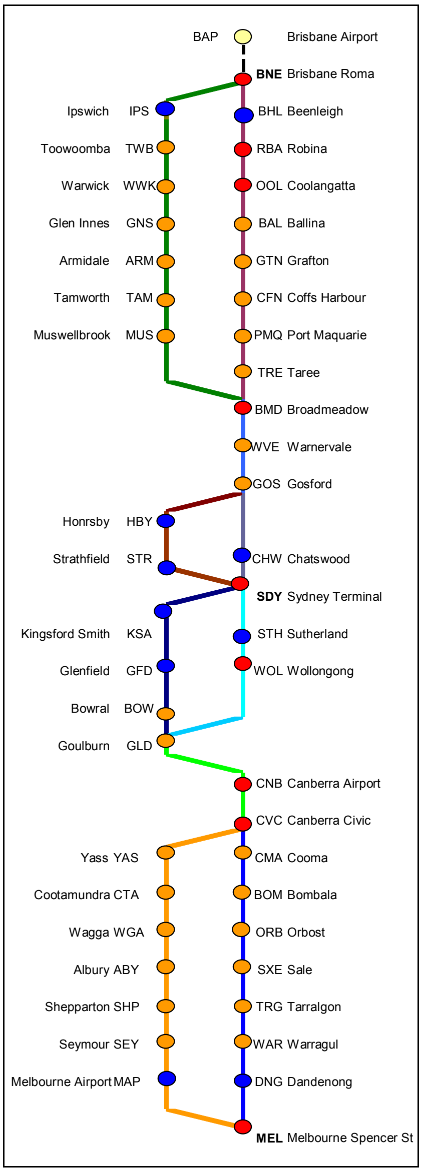


Figure 3: VHST schematic



The study area included southeast Queensland, NSW excluding central western areas and Victoria excluding northwestern areas.

The study area was split into 55 travel zones. Potential VHST stations were assigned a travel zone each. Seven 'outer' zones allowed for patronage away from the immediate VHST corridor. In total, travel between 1,240 zone pairs was considered.

The patronage model was developed to assess alternative VHST sectors and routes. Four sectors by two alternative routes were modelled.

Table 1: Routes modelled

Corridor	Route	Via
Brisbane-Newcastle	Inland	Coastal
Newcastle-Sydney	Via Hornsby	French's Forest
Sydney-Canberra	Bowral / Mittagong	Wollongong
Canberra-Melbourne	Inland	Coastal Via

A total of 47 potential VHST stations were included. The stations were representative rather than definitive. Stations were positioned 100 kilometres apart excepting city outskirts where 'parkway' stations were included to cater for suburban passengers. Stations were defined as either main stations (red), stations (orange) or 'parkway' stations (blue). Express VHST services stop at main stations and 'Parkway' stations only (to pick or set down depending on direction).[3] Stopping services served all stations. Station dwell times were longer at main stations. The travel market was defined to include only relevant flows i.e. trips that might consider a VHST service from the Central West to Sydney (e.g. Orange) would not find the VHST corridors of relevance. Such trips were excluded. Intra-capital movements (e.g. Hornsby-Sydney) were also considered non-relevant. Business trips (trips in the course of work but excluding commuting trips) tend to be of a different nature to leisure and commuting. Their willingness to pay higher fares to save travel time is generally higher for instance. The forecasting model was therefore structured to forecast the size and VHST diversion for business and non-business

[3] The term 'Parkway' is used loosely. Capital city stations were defined such that short distance trips between them were disallowed.

trips separately.

The 1996/97 Domestic Tourism Monitor (DTM) supplemented by the 1997 International Visitors Survey provided the core data. The DTM survey included trips that involved an overnight stay or longer and was expanded to include day trips and trips by children through the application of expansion parameters provided by the Bureau of Transport Economics (BTE). Trips were manipulated to the VHST zones using Statistical Local Authority population and employment figures provided by SGS. Trips within DTM zones were synthetically estimated for car and coach. Models were estimated on the DTM data in conjunction with population and road distances to estimate synthetically car and coach trips within DTM zones.

Countrylink provided trip data which replaced the DTM estimates where judged more reliable. For metro areas around Brisbane, Sydney and Melbourne, rail and car travel data was obtained from Queensland Rail, Brisbane City Council, NSW SRA and National Express to estimate rail and car trips.

Aviation Statistics data was used to factor the 1996/97 DTM data to 2001, validate the air trip estimates and estimate the number of air transfer trips (connecting air trips made to or from east coast airports to destinations (or origins) outside the study area). Road traffic data dating back to 1972 was obtained for twelve sites to project car travel to 2001.

Base market travel was projected using population, employment and income forecasts. Different models were used for business, non-business and international visitor travel. Two socio-economic scenarios developed by SGS and NIEIR were used. The central patronage forecasts were based on a trend or central population scenario. An alternative high growth scenario was also tested. A base market model share sub-model was estimated to allow for an anticipated shift to faster travel modes as future incomes grow. At the lowest level, rail and coach mode shares were forecast. The resultant composite cost for ground public transport was fed into the next level to compare ground public transport and air. A composite cost for public transport was then fed into the upper level and compared with car.

Service level was based on travel time, access and egress times, service frequency, the number and type of any transfers and cost (including access/egress fares). For car and car access and egress to public transport by car or taxi, cost was expressed per trip by dividing by the average party size (1.2 for business and 1.75 for leisure).

All times were expressed in equivalent travel time minutes. Different weights were applied for business and non-business travel.

Table 2: Main competing service level attributes

Service Level Attribute	Car	Air	Rail	Coach
Cost	Distance based petrol cost + operating cost. Cost factored by party size.	Advertised 21 day advance economy fares. surcharge/ discount factors for business and non business trips	Estimated function of distance. Discount factors for business and non-business trips.	Estimated function of road distance. Discount factors for business and non-business trips.
Overnight Stay	Cost of overnight stay included.	n.a.	n.a.	n.a.
In-vehicle Time	Drive time including stops and overnight stay.	Estimated according to type of aircraft (propeller or jet) and air distance functions.	Estimated from Countrylink and metro timetables.	Function of road distance and type of flow (capital or non-capital).
Transfers	n.a.	Direct or indirect service.	Number of transfers and estimated transfer time.	Services assumed to be direct.
Service Frequency	n.a.	Based on Avstats giving the number of services per day.	Estimated from Countrylink and metro timetables.	Capital and non-capital service frequencies assumed.
Access Cost	n.a.	Function of access distance and access mode purpose.	Function of access distance to rail system and access profile by purpose.	Factor of Rail estimated rail access.
Access Time	n.a.	Function of access distance and access mode purpose.	Function of access distance and access mode purpose.	Factor of Rail estimated rail access.
Comfort	Expressed as a function of travel time.	Expressed as a function of travel time.	Expressed as a function of travel time.	Expressed as a function of travel time.
Other Aspects: Check-in, Baggage Reclaim & Service Reliability	Reliability estimates.	Assumed check in and baggage times. Service reliability assumptions.	Assumed check in and baggage times. Service reliability assumptions.	Assumed check in and baggage times. Service reliability assumptions.

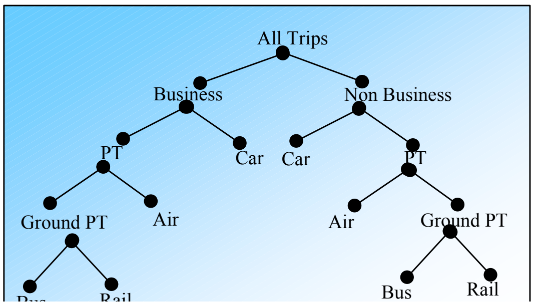
Table 3: Values of Travel Time
Dollars per hour by mode by purpose in 2001

	Business	Non Business	
		Non Metro	Metro
Air	53	27	-
Car	30	11	12
Coach	22	8	-
Rail	22	7	8

The willingness to pay to save travel time was a crucial determinant in the choice of travel mode. Air business users were assumed to have the highest value of time of $53 per hour. Car business travellers were assumed to value travel time at $30 per hour with coach and rail travellers valuing travel time at $22 per hour.

Non-business air travellers were assumed to value travel time at $27 per hour with car users valuing travel time at $11 per hour. Coach and rail non-business travellers were assumed to value travel time at $8 per hour and $7 per hour respectively. Metro trips (car and rail), that have a higher share of commuting trips, were assumed to value travel time $1 per hour higher than other non-business trips.

Figure 4: Base mode share model structure



Ten diversion models were estimated, one for each donor mode and trip purpose. A generalised time measure was calculated that added travel time and fare together and expressed the total in equivalent VHST train hours.

Mode share sensitivity was assumed to decline with distance. Thus an hour's difference between VHST and car for a Sydney-Canberra trip was more important in determining mode share than for an hour on a Brisbane-Melbourne trip. Only part of the car market was considered 'divertible'. For some trips such as sightseeing, car may be an intrinsic part of the journey. 80% to 90% of business trips and 40% to 70% of non-business trips were assumed divertible, the percentage being dependent on distance.

Table 4: Induced Demand Factors
Applied to diverted air, car and coach trips

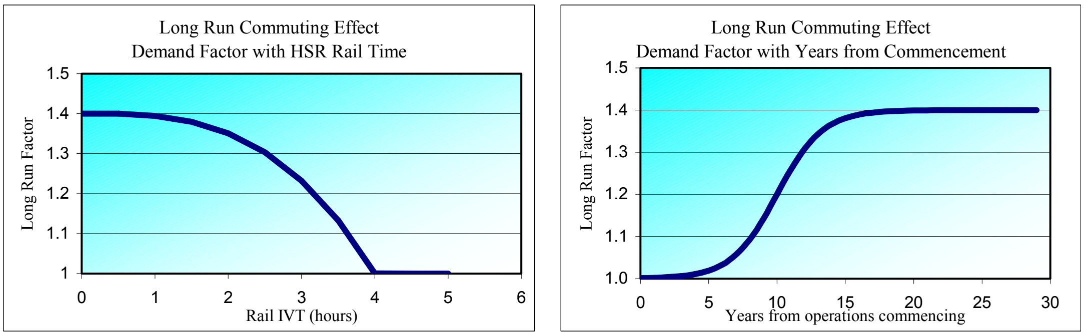
Market	Factor
Business	15%
Non Business	30%
Metro	1%

Induced demand (trips previously not made) was incorporated by applying a factor to trips diverted from air, car and coach.

The forecasts also took account of 'ramp-up' – a delay in patronage response due to marketing 'lags' and 'learning curves'. Factors of 70% in the first year, 90% in second year and 100% in the third year were applied.

Figure 5: Long run 'commuting' effects

Applied to diverted plus induced non business trips



A long run commuting effect was applied to capital city flows (Brisbane, Sydney and Melbourne) for non-business trips only based on evidence from the UK (which suggests that major improvements to rail services can have a marked long term impact on the distance people are willing to commute either daily or weekly).

Long distance 'commuting effects' were forecast to be strongest up to two hours from the capital cities of Brisbane, Sydney and Melbourne with a demand factor of 1.4 for a one-hour journey time. The long run commuting effect was then assumed to decline to zero at four hours. With the parameters assumed, the rail 'commuter belt' was forecast to extend further out the faster the VHST technology. The second aspect of the sub-model was the take-up rate. Up to five years from the commencement of VHST operations, the long run commuting effect was assumed to be negligible. From then onwards the factor increases to reach the maximum effect after 15 years. The long run commuting effect was varied in the sensitivity tests.

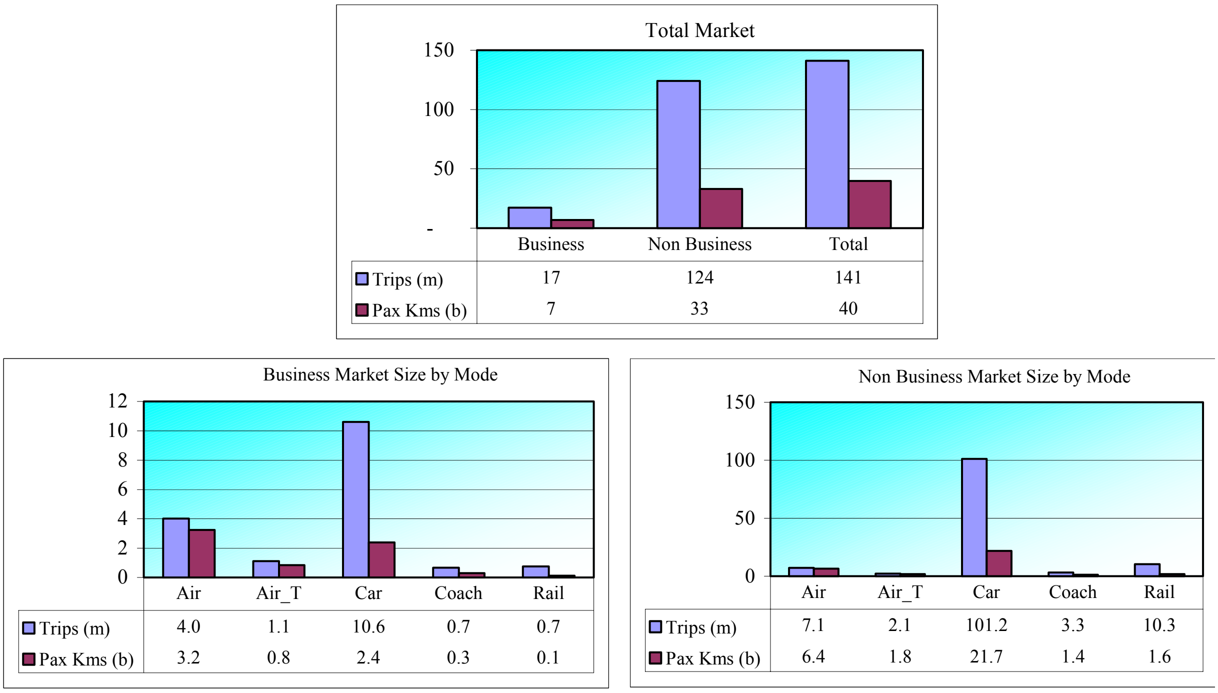
The patronage forecasts were conditional on maximum revenue fare structures developed for each VHST technology. The fare function was based on a flag fall fare of $5 and a distance taper introduced at 500 kilometres. Higher fares were forecast as VHST speed increased. In this way patronage differences between the VHST technologies were dampened whilst revenue differences were heightened.

Base market size

The 2001 in-scope east coast travel market was estimated at 141 million trips and 40 billion passenger kilometres. Non-business trips accounted for 124 million trips with business trips accounting for 17 million trips; one-eighth of the market.

Car dominated the short distance market but air was dominant over long distances. Coach and rail were minor modes. 11 million business trips were made by car compared to 4 million by air. Air business passenger kilometres were 4 times higher than car however. Just over 100 million non-business trips were made by car out of 124 million. Nine million non-business trips were made by air including 2 million transfer trips.

Figure 6: Base market size 2001



Total Market

	Business	Non Business	Total
Trips (m)	17	124	141
Pax Kms (b)	7	33	40

Business Market Size by Mode

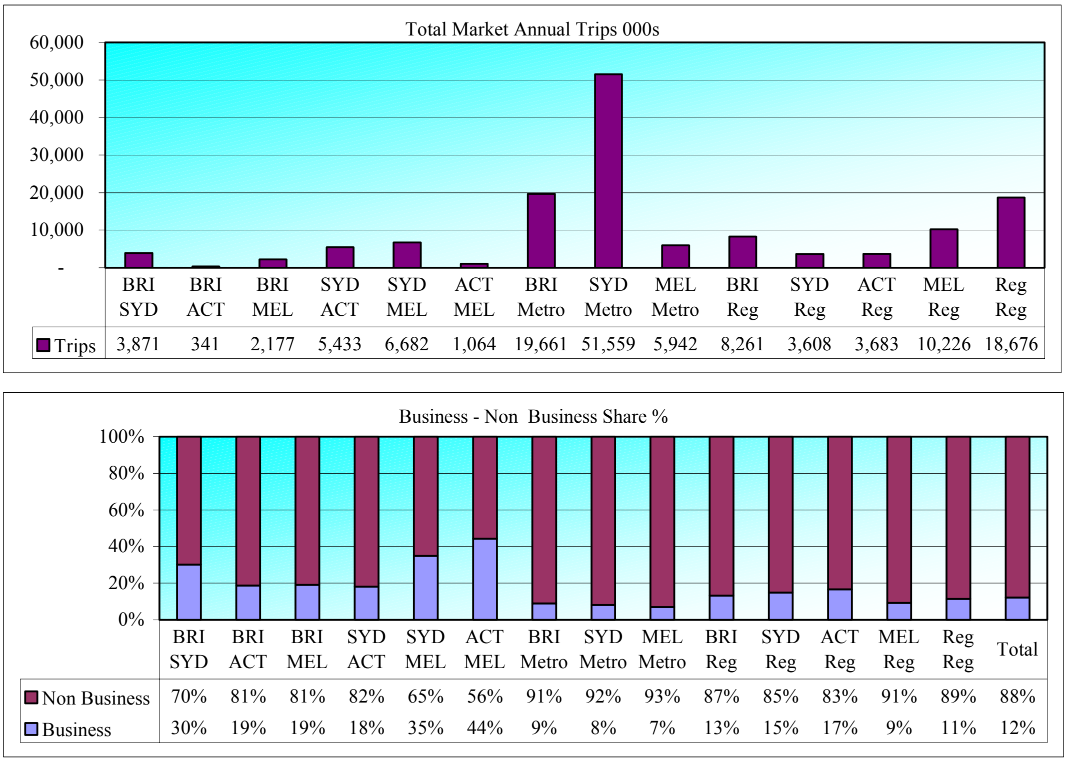
	Air	Air_T	Car	Coach	Rail
Trips (m)	4.0	1.1	10.6	0.7	0.7
Pax Kms (b)	3.2	0.8	2.4	0.3	0.1

Non Business Market Size by Mode

	Air	Air_T	Car	Coach	Rail
Trips (m)	7.1	2.1	101.2	3.3	10.3
Pax Kms (b)	6.4	1.8	21.7	1.4	1.6

Sydney-Melbourne was the largest inter-capital market with 6.7 million trips. Sydney-ACT was second with 5.4 million trips. At one million trips, Melbourne-ACT was one-fifth the size of Sydney-ACT.

Figure 7: Market size by flow 2001



Total Market Annual Trips 000s

	BRI SYD	BRI ACT	BRI MEL	SYD ACT	SYD MEL	ACT MEL	BRI Metro	SYD Metro	MEL Metro	BRI Reg	SYD Reg	ACT Reg	MEL Reg	Reg Reg
Trips	3,871	341	2,177	5,433	6,682	1,064	19,661	51,559	5,942	8,261	3,608	3,683	10,226	18,676

Business - Non Business Share %

	BRI SYD	BRI ACT	BRI MEL	SYD ACT	SYD MEL	ACT MEL	BRI Metro	SYD Metro	MEL Metro	BRI Reg	SYD Reg	ACT Reg	MEL Reg	Reg Reg	Total
Non Business	70%	81%	81%	82%	65%	56%	91%	92%	93%	87%	85%	83%	91%	89%	88%
Business	30%	19%	19%	18%	35%	44%	9%	8%	7%	13%	15%	17%	9%	11%	12%

Brisbane-ACT was the smallest inter-capital market with 340,000 trips. Melbourne was the largest regional market with 10.2 million trips. Excluding the Gold Coast, 8.3 million trips were made between Brisbane and regional centres.
The inter-regional market was estimated at 18.6 million trips, 12% of the total inscope market. Metro travel, mostly commuting trips, dominated the inscope market. Trips between the Central Coast, Central Highlands, Illawarra and Sydney accounted for over one-third of the total market. Metropolitan trips between Brisbane and the Gold Coast approached 20 million.

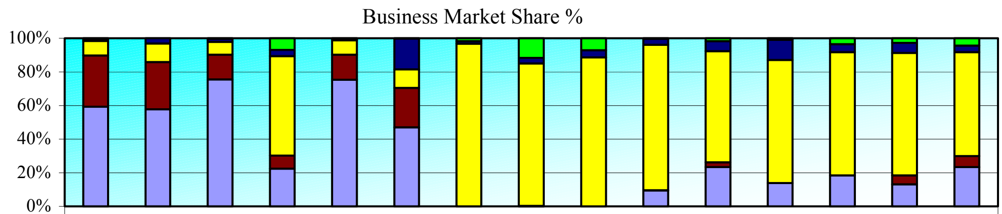
Six million metropolitan trips were made on the eastern corridor out of Melbourne. Altogether, metro trips accounted for just under one-half the total inscope market.

Business trips accounted for one third of Sydney-Melbourne trips and reached 44% on ACT-Melbourne. Business was relatively less important on non-capital flows falling to 13% for Brisbane-Regionals and under 10% for capital-metro trips.

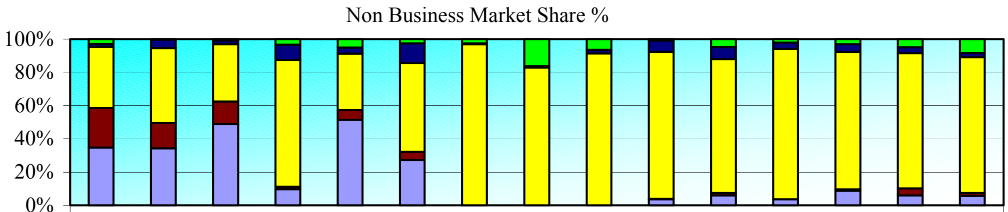
Air carried three-quarters of business trips on Sydney-Melbourne with air transfers excluded and 90% when air transfer trips were included. Car carried 8% with coach and rail having negligible shares. On Brisbane-Sydney, air achieved a 59% business share excluding transfers and 89% including transfers. Car carried 9% of trips. Car carried 59% of Sydney-ACT business trips with air carrying 30% (including transfers), coach 4% and rail 7%. Air achieved 47% share of the ACT-Melbourne business market (70% with transfers included). Car dominated the capital-regional and regional business travel markets with 86% of Brisbane-regional trips, three-quarters of ACT and Melbourne regional trips and two-thirds of Sydney-regional trips. Air achieved capital-regional business shares ranging from 10% for Brisbane to 23% for Sydney (26% including air transfers). Trips made by international visitors totalled 4.6 million in 2001, 3.4% of the market.

For non-business trips, Sydney-Melbourne at 52% had the highest inter-capital O-D air share (58% incl. air transfer trips). Car carried 34% with coach and rail carrying 9% together. Air carried 35% of non-business trips on Brisbane-Sydney (59% incl. transfer trips). Car carried 37% with coach rail carrying the remaining 5%. Car was dominant on Sydney-Canberra carrying 75% of non-business trips but was less dominant on Canberra-Melbourne carrying just over half non-business trips. Car carried 85% of metro non-business trips and also dominated the inter-regional market with 80% of non-business trips.

Figure 8: Aggregated flow market shares by travel mode



	BRI SYD	BRI ACT	BRI MEL	SYD ACT	SYD MEL	ACT MEL	BRI Metro	SYD Metro	MEL Metro	BRI Reg	SYD Reg	ACT Reg	MEL Reg	Reg Reg	Total
Rail	0.3%	0.0%	0.2%	7%	0.4%	0.2%	2%	12%	7%	0.4%	1.7%	1.0%	3%	3%	4%
Coach	1.1%	3%	2%	4%	1%	18%	2%	3%	4%	3%	6%	12%	5%	6%	4%
Car	9%	11%	8%	59%	8%	11%	97%	85%	89%	86%	66%	73%	73%	73%	62%
A_Transfer	30%	28%	15%	8%	15%	23%	0.0%	0.1%	0.0%	0.2%	3%	0.0%	0.0%	5%	6%
Air	59%	58%	76%	23%	75%	47%	0.1%	0.1%	0.0%	10%	23%	14%	19%	13%	23%



	BRI SYD	BRI ACT	BRI MEL	SYD ACT	SYD MEL	ACT MEL	BRI Metro	SYD Metro	MEL Metro	BRI Reg	SYD Reg	ACT Reg	MEL Reg	Reg Reg	Total
Rail	3%	0.4%	1%	3%	5%	3%	3%	16%	6%	0.9%	5%	2%	3%	5%	8%
Coach	2%	5%	2%	9%	4%	12%	0.6%	0.9%	2%	7%	7%	4%	5%	4%	3%
Car	37%	45%	34%	76%	34%	53%	97%	83%	91%	88%	81%	90%	83%	81%	82%
A_Transfer	24%	15%	14%	1.4%	6%	5%	0.0%	0.1%	0.0%	0.1%	1.4%	0.0%	0.8%	4%	2%
Air	35%	34%	49%	10%	52%	27%	0.0%	0.0%	0.0%	4%	6%	4%	9%	6%	6%

Projected Base Market Size

Road traffic grew strongly between 1970 and 2000. Growth was strongest in the north averaging 4.2% p.a between Brisbane and the Gold Coast. North of Newcastle, traffic on the Pacific Highway averaged 3.2% p.a. compared to 2.7% on the New England Highway.

South of Sydney, growth in road traffic was generally lower. Between Sydney and Wollongong, annual growth of 1.2% occurred between 1991 and 2000. Growth also tended to be higher inland than on the coast. Between Canberra and Melbourne on the Hume Highway, road traffic grew at 3.7% p.a., more than twice the rate experienced on the Princes Highway.

Growth in air travel was double that of road traffic during the 1990s. Sydney, Melbourne and Brisbane experienced greater domestic than international growth. Brisbane Domestic grew fastest, averaging 8.2% a year. Growth was lowest at Melbourne International, averaging 5%. Sydney Domestic averaged 7.5% with Sydney International averaging 5.7%. Large regional airports averaged 7.1% annual growth and small regional airports 6.1%. Growth was stronger between 1990-1995 than between 1995-2000. Sydney Domestic averaged 11.9% during 1990-1995 then 3.2% during 1995-2000. Coolangatta averaged 14.5% during 1990-1995 then declined during 1995-2000 at -1.3% p.a.

Figure 9: Trend in road traffic

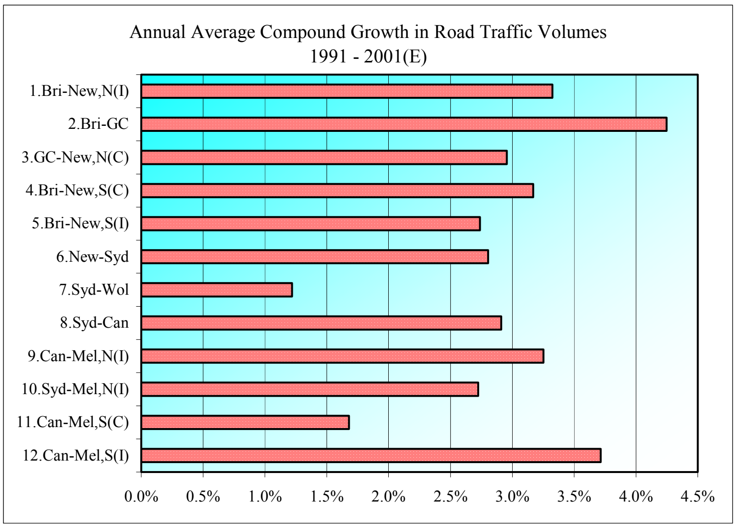
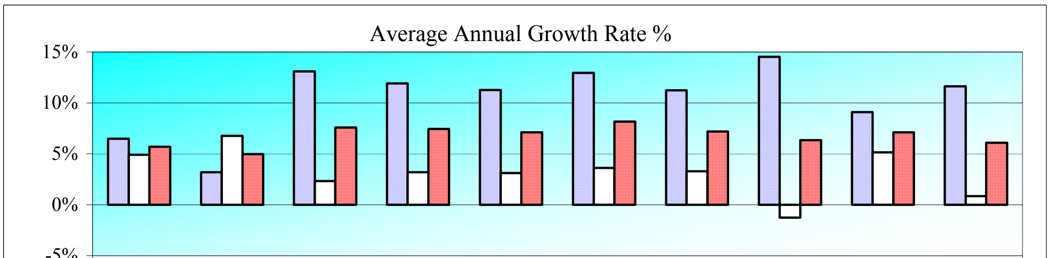


Figure 10: Trend in air traffic



	Sydney Int	Melb Int	Brisb'ne Int	Sydney Dom	Melb Dom	Brisb'ne Dom	Canb erra	Cool 'gatta	Large Regs	Small Regs
90-95	6.5%	3.2%	13.1%	11.9%	11.3%	12.9%	11.2%	14.5%	9.1%	11.6%
95-00	4.9%	6.8%	2.3%	3.2%	3.1%	3.6%	3.3%	-1.3%	5.1%	0.8%
90-00	5.7%	5.0%	7.6%	7.5%	7.1%	8.2%	7.2%	6.3%	7.1%	6.1%

Brisbane-Melbourne air traffic grew from 0.6 million to 2 million trips, an annual rate of 12.3%. Sydney-Melbourne, the largest market, more than doubled from 2.5 to 5.5 million trips, an annual rate of 8.2%. Brisbane-Sydney doubled from 1.7 to 3.4 million trips (7.5% p.a.). Brisbane-Canberra grew from virtually nothing to 280,000 trips. Sydney-Canberra grew 1.6 times from 560,000 to 910,000 (5% p.a.). Canberra-Melbourne increased from 430,000 to 730,000, (6% p.a.).

Together, the eight largest airport pairs averaged growth of 8.2% during the 1990s. Growth rates eased during 1995 to 2000 compared to 1990 to 1995 however. Melbourne-Sydney grew by 5.6% p.a. between 1995 and 2000 compared to 11% p.a. between 1990 and 1995. Brisbane-Sydney grew by 4.7% p.a. between 1995 and 2000 compared to 10.4% p.a. between 1990 and 1995. Capital-regional air routes also experienced growth albeit at a slower pace than inter-capital routes. Coffs Harbour-Sydney grew from 95,000 in 1990 to 174,000 in

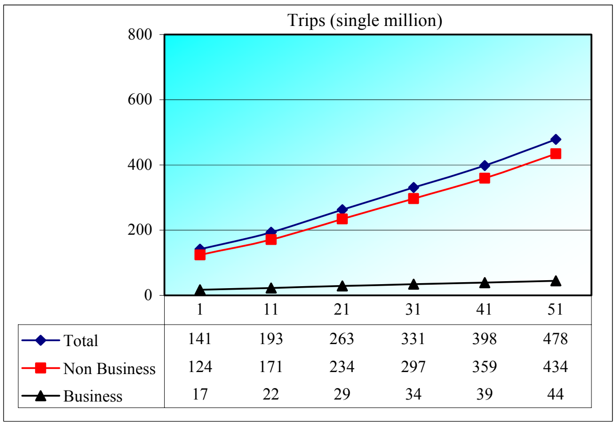
2000, an increase of 6% a year whilst Newcastle Sydney grew from 115,000 to 148,000. The twelve larger regional pairs averaged annual growth of 6.6%.

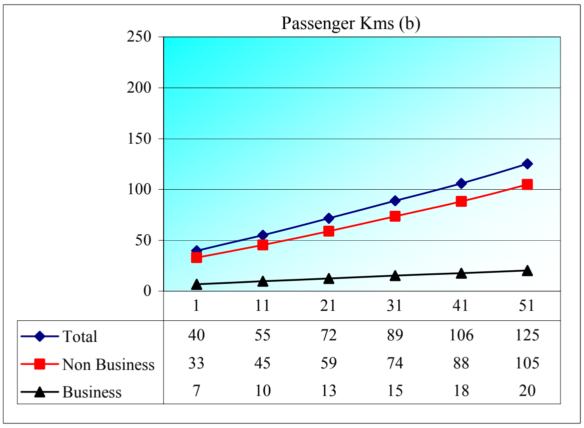
The twelve middle sized regional pairs averaged 3.7% annual growth with the twelve smallest pairs collectively averaging 10.7%. Growth was more variable however. Some markets experienced declines such as Glen Innes/Inverell to Sydney (declining from 14,000 in 1990 to 10,000 in 2000). In some cases, direct routes were established such as Newcastle to Coffs Harbour, Newcastle to Tamworth and Newcastle to Port Macquarie.

Projected Base Market

The base travel market was forecast to increase from 141 million trips in 2001 to 263 million trips in 2021 under the central trend population and employment scenario. The travel market was then forecast to reach 478 million trips in 2051, more than three times the 2001 market size. The business travel market was forecast to grow from 17 to 44 million trips with the non-business market increasing from 124 to 434 million trips. Passenger kilometres grew from 40 to 125 billion. The high population and employment growth scenario produced a market 9% larger than the central scenario in 2021 and one-third larger in 2051.

Figure11: Total market growth





Air's share of the business travel market was projected to rise from 29% in 2001 to 43% in 2051 (including air transfers) in terms of trips and from 70% to 78% in terms of passenger kilometres. Car's share was forecast to fall from 62% in 2001 to 51% in 2051 in terms of business trips and from 25% to 19% in terms of passenger kilometres. Rail and coach forecast trip shares declined by a quarter and nearly half respectively over the fifty-year period.

Air was forecast to have a lower non-business market share. Air's trip share including air transfers was 8% in 2001 rising to 11.4% in 2051. Air's passenger kilometre share was 4.6 times higher however, increasing from 37% to 46% in 2051 (including air transfers). Car was forecast to retain its dominant position of the non-business market with 82% of trips in 2001 and 80% in 2051 although passenger kilometres were forecast to decline from 56% to 50%. Rail was forecast to retain the long distance commuter market but lose leisure market share to air. Coach was forecast to experience a significant decline in both trips and passenger kilometres.

The international visitor market was forecast to more than double from 5 million visits in 2001 to 10.7 million visits in 2021, a growth of 4% p.a. then to reach 14 million visits in 2051. Business and non-business visits were forecast to grow at roughly the same rate.

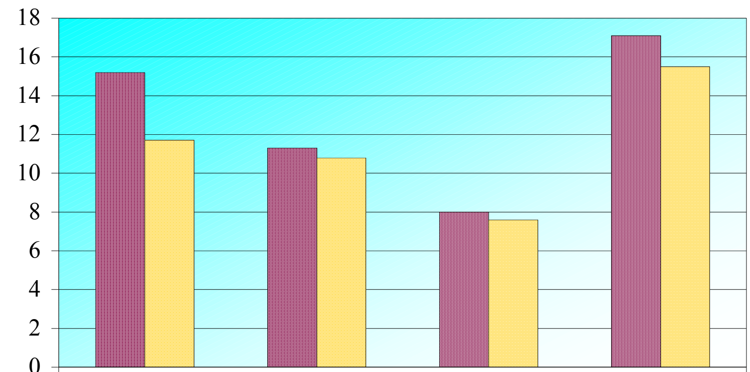
VHST Patronage

The highest total patronage was 39.7 million trips with 500km/h (Maglev) VHST running the full east coast corridor along the following route: Brisbane to Newcastle via the NSW coast; Newcastle to Sydney via new track under French's Forest; Sydney-Canberra via Wollongong then Canberra-Melbourne via the coastal route. I.e. the shortest route addressing the highest population centres.

Brisbane-Newcastle (coastal route) generated the most trips, revenue and user benefit of the four individual route sectors: Brisbane-Newcastle, Newcastle-Sydney, Sydney-Canberra and Canberra-Melbourne. Canberra-Melbourne (inland or coastal) generated the least trips. Newcastle-Sydney (Hornsby or French's Forest) generated the least revenue and user benefit.

Brisbane-Sydney was forecast to achieve greater patronage than Sydney-Melbourne. For 350km/h VHST via the coast and through Hornsby, Brisbane-Sydney ridership was forecast at 15.2 million trips in 2021 compared to 11.7 million trips for Sydney-Melbourne via Bowral and the Coast.

Figure 12: Comparison of Brisbane-Sydney and Sydney-Melbourne Corridors
350km/h VHST for 2021, Brisbane-Sydney via Coastal-Hornsby route
Sydney-Melbourne via Bowral-Coastal route



	Trips million	Gross Revenue $ 100 million	Passenger kms billion	User Benefit $100 million
Brisbane-Sydney	15.2	11.3	8.0	17.1
Sydney-Melbourne	11.7	10.8	7.6	15.5

Brisbane-Sydney patronage was therefore 3.5 million trips higher than Sydney-Melbourne (30% higher). The gross revenue percentage difference was less with Brisbane-Sydney achieving gross revenue of $1.13 billion, 5% higher than Sydney-Melbourne with $1.08 billion. The closer revenues resulted mainly from a longer average trip distance on Sydney-Melbourne. The average distance was 650 kilometres, 124 kilometres longer than 526 kilometres on Brisbane-Sydney. Total passenger kilometres were forecast at eight billion for Brisbane-Sydney and 7.6 billion for Sydney-Melbourne. Brisbane-Sydney produced user benefit of $1.55 billion, 10% higher than Sydney-Melbourne with $1.3 billion.

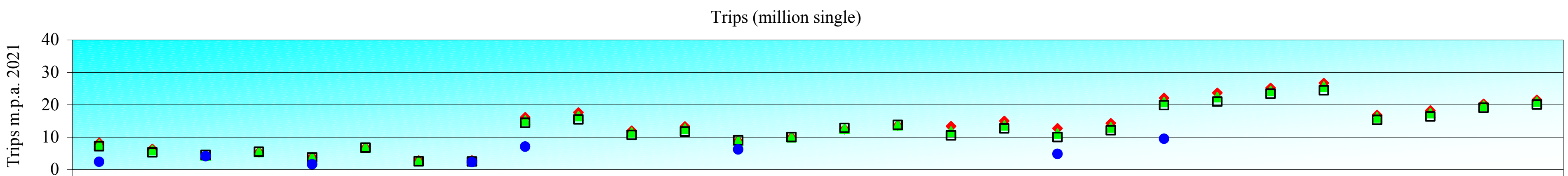
Patronage also increased step-like as the VHST network was extended. Generally, the increase in patronage from faster VHST speed was greater the longer the VHST corridor. The steepest jump was from 160km/h to 250km/h VHST. Further speed improvements increased demand but less than proportionately.

Brisbane-Newcastle (coastal) generated the highest patronage of the four single sectors with Canberra-Melbourne generating the least. North of Newcastle, the coastal route serving the northern NSW coastal towns and the Gold Coast produced higher demand than an inland route via Armidale and Tamworth. South of Canberra, the inland and coastal routes produced similar demand. Between Brisbane and Newcastle, a coastal 350 VHST generated 7.7 million trips, 28% more than inland. Gross revenue and passenger kilometres were closer due to longer inland trips. User benefit was higher with the inland route due to lower base service levels. 500km/h VHST increased patronage by 8% over 350km/h VHST that produced in turn an increase of 7% over 250km/h VHST. Between Newcastle and Sydney, a new French's Forest route increased patronage by one quarter over a Hornsby route. Brisbane-Sydney achieved 3.5 million more trips than Sydney-Melbourne in 2021. The revenue difference was less at with Brisbane-Sydney achieving gross revenue of $1.13 billion, 5% higher than Sydney-Melbourne with $1.08 billion.

The Sydney-Canberra sector achieved higher patronage via Wollongong than the Central Highlands (Bowral). At 6.7 million trips, patronage for 350km/h VHST was 75% higher via Wollongong than Bowral. Much of the increase via Wollongong was metro-commuting. For the Bowral route, 500km/h VHST did not increase forecast patronage over 350km/h VHST due to higher fares although revenue was 11% higher. 250km/h VHST increased patronage by 131% and revenue by 300% over the base 160km/h option. A Canberra-Melbourne VHST achieved similar demand with an inland or coastal route. 500km/h VHST patronage was 2.8 million trips for both routes with revenue and user benefit 5% higher for the coastal route.

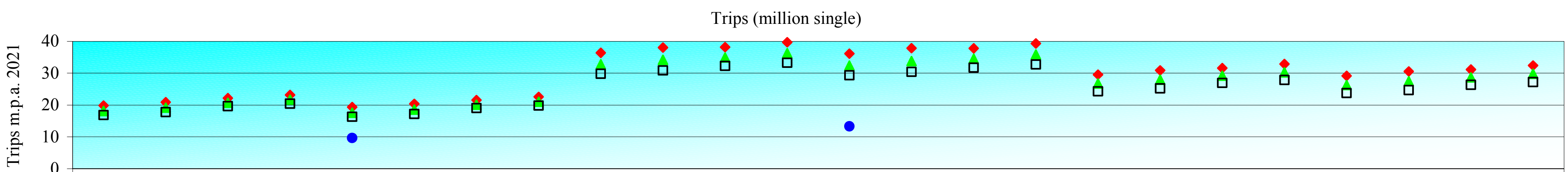
Brisbane-Sydney patronage was 25% higher via the coast north of Newcastle. Demand was also higher with a new more direct route under French's Forest between Sydney and Newcastle. Revenue increased by 22% for 500km/h over 350km/h, which in turn, was 24% higher than 250km/h VHST. Sydney-Melbourne patronage was highest via Wollongong although revenue and user benefit were both higher via the Central Highlands. South of Canberra, the coastal route produced higher demand than inland. With a Bowral-Coastal route, Sydney-Melbourne patronage was 11.7 million trips for 350km/h VHST, 4% higher than with an inland route south of Canberra. For a Bowral-Inland route, 350km/h VHST patronage was 11.2 million trips, 13% less than 500km/h and 11% more than 250km/h VHST.

Figure 13: Patronage by technology, section and route 2021



	B_N C	B_N I	N_S H	N_S F	S_C B	S_C W	C_M C	C_M I	B-S CH	B-S CF	B-S IH	B-S IF	N-C HB	N-C FB
◆ 500	8.3	6.4	4.3	5.4	3.8	6.7	2.8	2.8	16.1	17.6	12.0	13.3	8.8	10.0
▲ 350	7.7	6.0	4.3	5.4	3.8	6.7	2.7	2.6	15.2	16.5	11.4	12.7	8.8	10.0
□ 250	7.2	5.3	4.5	5.5	3.7	6.8	2.5	2.5	14.4	15.4	10.7	11.7	9.0	10.0
● Base	2.4		4.1		1.6			2.3	7.1				6.2	

	N-C HW	N-C FW	S-M BC	S-M WC	S-M BI	S-M WI	B-C CHB	B-C CFB	B-C CHW	B-C CFW	B-C IHB	B-C IFB	B-C IHW	B-C IFW
◆ 500	12.5	13.6	13.4	15.0	12.7	14.3	22.1	23.7	25.2	26.7	16.8	18.2	20.3	21.5
▲ 350	12.6	13.7	11.7	13.6	11.2	13.0	20.9	22.3	24.3	25.6	16.1	17.4	19.8	21.0
□ 250	12.8	13.7	10.6	12.7	10.0	12.1	19.9	21.0	23.4	24.4	15.3	16.4	19.1	20.0
● Base					4.8		9.5							



	N-M HBC	N-M FBC	N-M HWC	N-M FWC	N-M HBI	N-M FBI	N-M HWI	N-M FWI	B-M CHBC	B-M CFBC	B-M CHWC	B-M CFWC
◆ 500	19.8	20.9	22.1	23.2	19.3	20.4	21.6	22.5	36.4	38.1	38.2	39.7
▲ 350	18.1	19.2	20.7	21.7	17.6	18.6	20.1	21.1	32.8	34.2	35.0	36.3
□ 250	16.9	17.8	19.6	20.5	16.3	17.2	19.0	19.8	29.8	30.9	32.3	33.3
● Base					9.7							

	B-M CHBI	B-M CFBI	B-M CHWI	B-M CFWI	B-M IHBC	B-M IFBC	B-M IHWC	B-M IFWC	B-M IHBI	B-M IFBI	B-M IHWI	B-M IFWI
◆ 500	36.1	37.9	37.8	39.3	29.5	30.9	31.6	32.9	29.2	30.5	31.2	32.4
▲ 350	32.4	33.8	34.5	35.9	26.7	28.0	29.2	30.3	26.3	27.5	28.7	29.8
□ 250	29.3	30.4	31.7	32.7	24.3	25.2	27.0	27.9	23.7	24.7	26.4	27.3
● Base	13.3											

Codes:

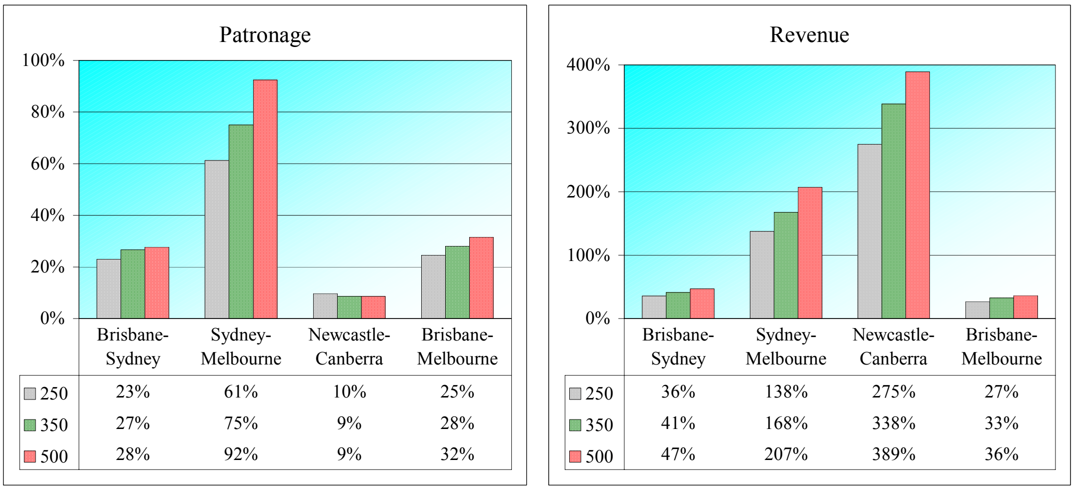
Sectors	B_N: Brisbane-Newcastle	N_S Newcastle-Sydney	S_C: Sydney-Canberra	C_M: Canberra-Melbourne	B_S: Brisbane-Sydney	B_C: Brisbane-Canberra	B_M: Brisbane-Melbourne	S_M: Sydney-Melbourne
Routes	C: Coastal	I: Inland	H: Hornsby	F: French's Forest	B: Bowral	W: Wollongong	-	-

A significant network or 'package' effect was forecast to result from the joining VHST sectors by removing passenger interchange. Corridor patronage was greater than the sum of the constituent sector forecasts. The removal of interchange had greater impact, the faster the VHST technology and was greatest for Sydney-Melbourne. Joining the Sydney-Canberra and Canberra-Melbourne sectors increased patronage by 75% for 350km/h VHST. For Brisbane-Sydney the effect was lower at 25%. Joining the north and south corridors to produce a full east coast corridor increased patronage by between 25% for 250km/h VHST and 32% for 500km/h VHST.

Figure 14: Percentage patronage and revenue package effect

Percentage Difference for Patronage and Revenue in 2021 for Section Combinations

Coastal, Hornsby, Bowral, Inland Route



PCIE Forecasts <package1.xls>

VHST corridor patronage was forecast at 16 million trips in 2011. Between 2011 and 2021 a rapid ramp-up in patronage was forecast. By 2021, patronage doubled to 32 million trips under the central growth scenario and then doubled again to reach 66 million trips by 2051. Under a higher population growth scenario (D), VHST patronage growth was forecast to reach 88 million trips by 2051.

Figure 15: VHST patronage projections

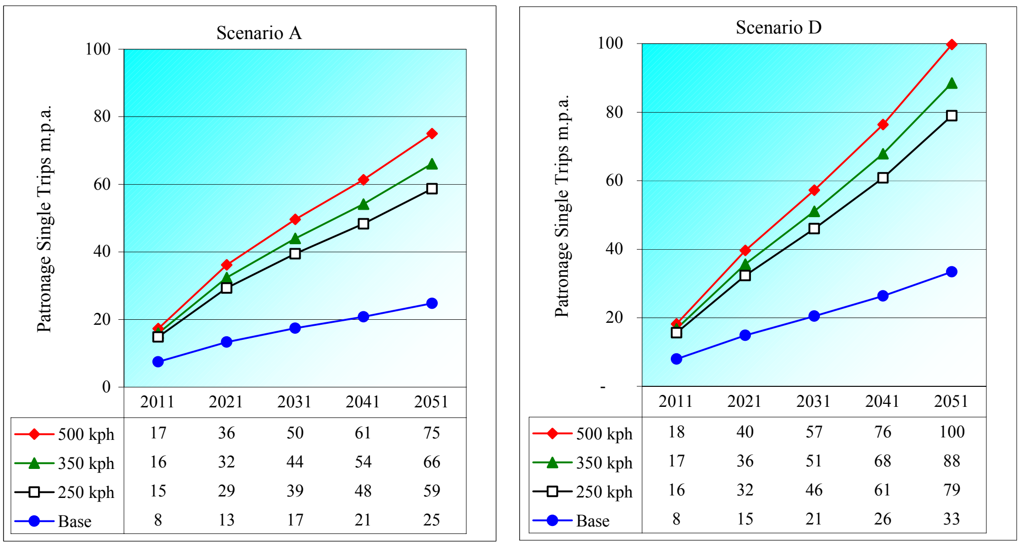
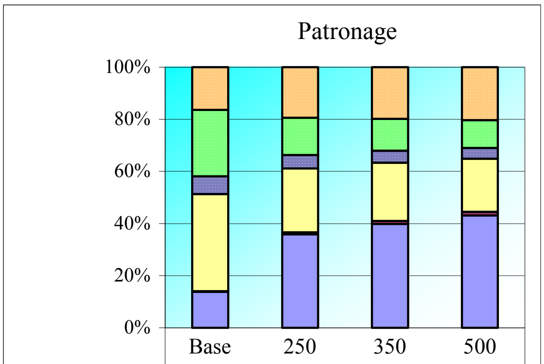


Figure 16: VHST source mode 2021 (trips %)

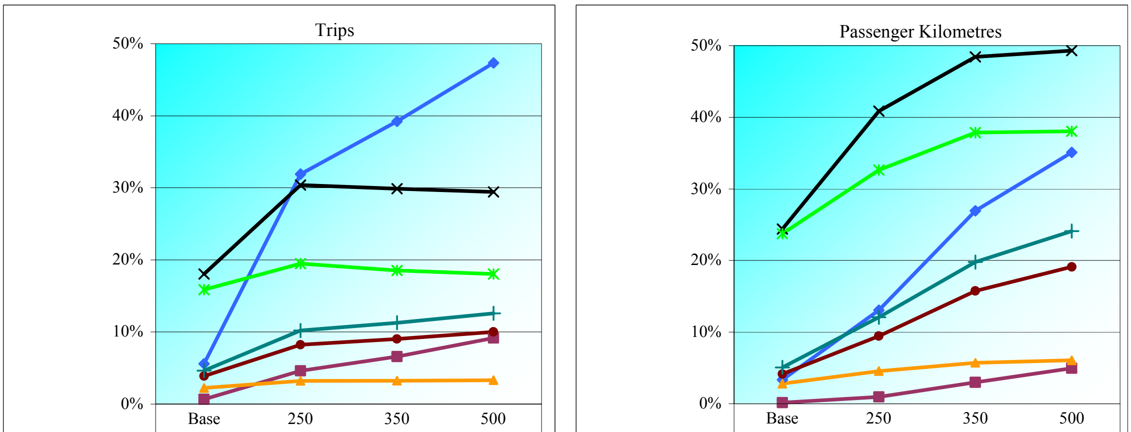


	Base	250	350	500
Induced+LR	16%	19%	20%	20%
Rail	25%	14%	12%	11%
Coach	7%	5%	5%	4%
Car	37%	24%	22%	20%
Air Trnsf	0.3%	0.9%	1.1%	1.4%
Air	14%	36%	40%	43%

350km/h VHST achieved a 17% share of business trips. Longer business trips pushed up the passenger kilometre share to slightly more than 20%. As VHST speed rose, patronage sourced from air increased although fare rises dampened patronage diversion from coach and rail. For 350km/h VHST, diversion from air contributed 41% of VHST patronage, car 22%, rail 12%, and coach 5%, with induced demand contributing 20%. Very few air transfer trips were forecast to divert. Air travel contributed a large share of VHST usage measured in passenger kilometres reaching 60% share for 500km/h VHST.

350km/h VHST was forecast to achieve an 11% market share of the east coast market (including induced demand). Market share rose to 13% for 500km/h VHST and declined to 10% with 250km/h VHST. The share for the base 160km/h rail option was 5%. 350km/h VHST diverted 39% of direct air trips and 3% of car trips. VHST abstracted just under 20% of rail trips and 30% of coach trips. VHST achieved a lower passenger kilometre share due to air travel retaining the longer distance market. 350km/h VHST achieved a forecast 27% share. Diverted car passenger kilometres were double the share of diverted trips however. Diverted rail and coach passenger kilometres were also relatively higher than diverted trips. VHST achieved a higher business than non-business share. For 350km/h VHST, the trip shares were 18% and 10% respectively.

Figure 17: VHST total market share (%)



Trips

	Base	250	350	500
Air	6%	32%	39%	47%
Air Transfer	1%	5%	7%	9%
Car	2.2%	3.2%	3.3%	3.3%
Coach	18%	30%	30%	29%
Rail	16%	19%	19%	18%
Total Div.	4%	8%	9%	10%
HST Share	5%	10%	11%	13%

Passenger Kilometres

	Base	250	350	500
Air	3%	13%	27%	35%
Air Transfer	0%	1%	3%	5%
Car	2.8%	4.6%	5.7%	6.1%
Coach	24%	41%	48%	49%
Rail	24%	33%	38%	38%
Total Div.	4%	9%	16%	19%
HST Share	5%	12%	20%	24%

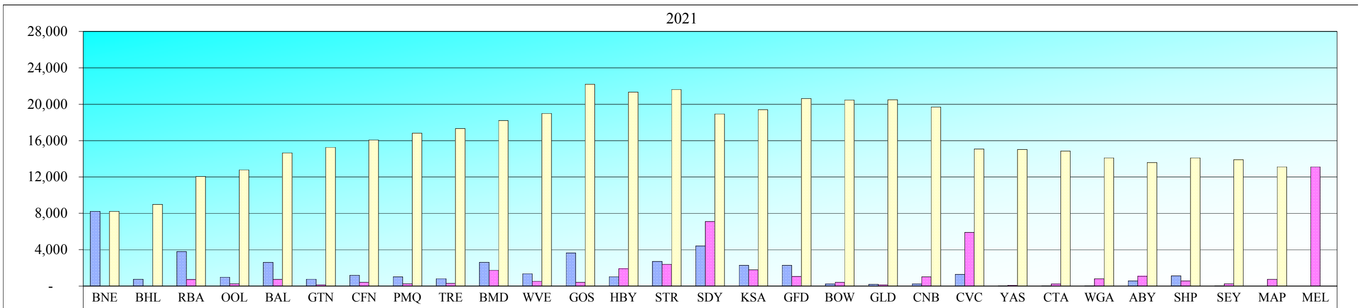
The largest VHST market the Central Coast- Sydney at five million trips in 2021. The second largest was Sydney-Melbourne with 4.3 million trips. Sydney-ACT was third with 3.1 million trips. Other major flows were Brisbane-Sydney with 1.9 million trips, North NSW Coast-Sydney with 2.1 million trips and Gold Coast-Sydney with 1.4 million trips. ACT-Melbourne was estimated at 0.9 million trips, 30% the size of Sydney-ACT. Melbourne-Shepparton & Seymour was estimated at 0.8 million trips.

350km/h VHST was forecast to dominate shorter and medium distance air markets such as Sydney-ACT, ACT-Melbourne and Sydney-NSW Coast although air remained dominant on longer distance markets such as Brisbane-Melbourne with a share of 89%. On the Gold Coast-Melbourne route, VHST trip diversion rose to 28%. For Brisbane-Sydney and Sydney-Melbourne, VHST diverted a third of the origin-destination air market. For Sydney-ACT, and Melbourne-ACT, VHST share reached 72% and 59% respectively. The VHST was forecast to abstract the majority of non-capital air trips. On Sydney-NSW Coast flows (e.g. Port Macquarie), VHST diverted 84% of air passengers.

Overall, 350km/h VHST was forecast to divert 10% of the base inscope market in 2021 (i.e. excluding induced demand and long run commuting effects). Diversion was forecast to reach a maximum at medium distance regional pair markets then decline as air's faster service help retains its dominant position. 29% of Sydney-Melbourne trips was forecast to divert to a 350km/h VHST, 7 percentage points more than Brisbane-Sydney. On Sydney-ACT, VHST diverted 26% of the market. VHST achieved a higher 41% share on ACT-Melbourne and diverted nearly the entire ACT-Gold Coast market.

With a Coastal-Hornsby-Bowral-Inland route, the highest station boardings were forecast at Brisbane and the highest alightings at Melbourne. In 2021, Brisbane ons were forecast at 8,210 in 2021 rising to 24,700 in 2051. Melbourne alightings were forecast at 13,130 in 2021 and 24,700 in 2051.

Figure 18: Average daily southbound station usage and line loading



	BNE	BHL	RBA	OOL	BAL	GTN	CFN	PMQ	TRE	BMD	WVE	GOS	HBY	STR	SDY
Ons	8,208	765	3,786	991	2,610	776	1,214	1,015	823	2,623	1,373	3,634	1,036	2,713	4,399
Offs	-	-	717	249	734	162	416	262	322	1,766	555	433	1,919	2,406	7,090
OnBoard	8,208	8,973	12,042	12,785	14,661	15,275	16,073	16,827	17,328	18,185	19,003	22,203	21,320	21,627	18,936

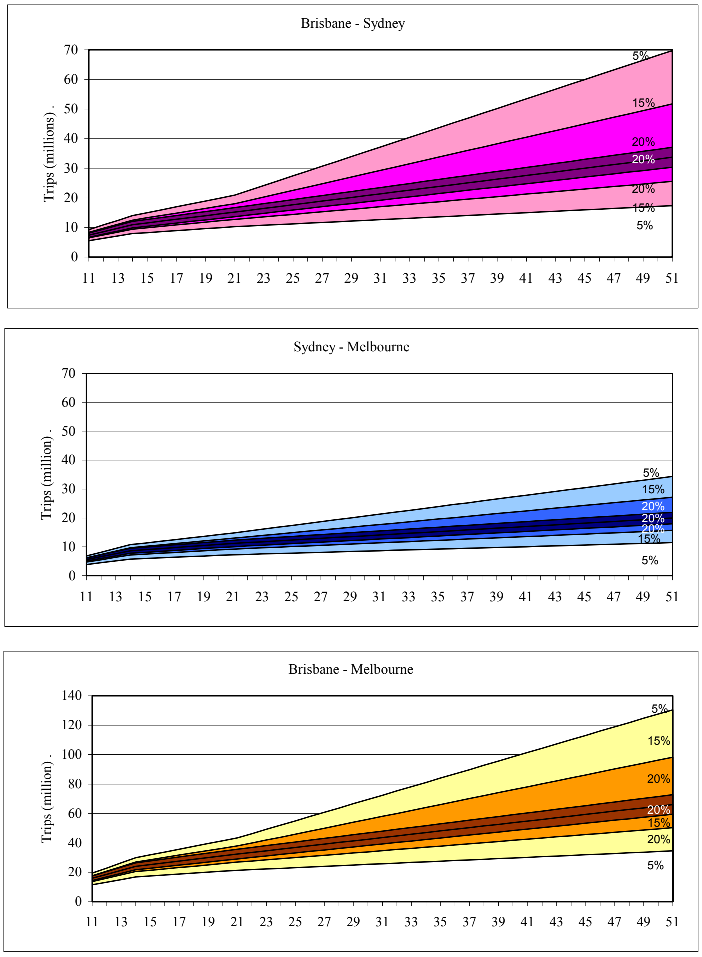
	KSA	GFD	BOW	GLD	CNB	CVC	YAS	CTA	WGA	ABY	SHP	SEY	MAP	MEL
Ons	2,279	2,292	235	194	226	1,286	32	66	73	574	1,113	36	-	-
Offs	1,807	1,066	414	169	1,010	5,910	97	229	803	1,110	581	264	760	13,125
OnBoard	19,408	20,635	20,455	20,480	19,697	15,072	15,007	14,845	14,115	13,579	14,111	13,884	13,125	-

The maximum load was forecast between Gosford and Hornsby at 22,200 in 2021 and 50,050 in 2051. Strathfield, serving western Sydney, was the fifth largest station with 5,120. Robina was sixth with 4,500. Broadmeadow's throughput was 4,390. Kingsford Smith was the largest airport station with 4,090. Gosford was ninth with 4,100 and Glenfield tenth with 3,360. Ballina was the largest station on the north NSW coast with 3,350. Hornsby throughput was just under 3,000. There was then a gap before a group of eight stations with 1,000-2,000 throughputs: Warnervale, Shepparton, Albury, Coffs Harbour, Port Macquarie, Coolangatta, Canberra Airport and Taree. Five stations had throughputs of 500-1,000: Grafton, Wagga, Beenleigh, Melbourne Airport and Bowral. Four stations had throughputs of under 500: Goulburn, Seymour, Cootamundra and Yass.

A range of sensitivity tests were undertaken. VHST patronage was forecast to be particularly sensitive to airfares. With high airfares, VHST patronage increased by 30%. With low airfares, VHST patronage was reduced by 15%. If passengers were forced to change trains at Sydney Central, patronage reduced decline by 12%. With higher average real income growth (increased by 14% on the central scenario), VHST patronage increased by 10%. Patronage declined by 15% with a reduction in real income growth of 30%.

With a 25% higher value of time, patronage declined by 4%. Discontinuing Countrylink and other long distance services increased VHST patronage by 15%. High international visitor growth increased patronage by 2%. Low growth reduced trips by 2%. The variation in group size made little impact on VHST demand. Similarly VHST patronage was not forecast to be significantly affected by car costs. VHST patronage declined by 8% in response to a 25% increase in the sensitivity of mode share (diversion). VHST patronage was moderately sensitive to VHST frequency. Doubling VHST frequency from hourly to half hourly increased patronage by 13%. Halving frequency reduced VHST patronage by 20%.

Figure 19: Range in Forecast VHST Trips by Corridor [350 km/h Coastal-Inland Routes]



The range in patronage widened the further out the forecast year. For 2011, the forecast range for the full corridor for 350km/h VHST (Coastal-Hornsby-Bowral-Inland) was 13 to 19 million trips with a 90% confidence level. For 2021, the forecast widened to 25-40 million trips. By 2051, uncertainties in population, employment, real average incomes and tourism growth widened the range to 35-100 million trips. Considered in terms of the central forecast, the forecast range represented ±19% of the mean forecast in 2011, 24% in 2021 and 47% in 2051.

For Brisbane-Sydney, the 2021 forecast ranged from 7-19 million trips or ±25% the central forecast. For Sydney-Melbourne, the 2021 forecast ranged from 8.5-14 million trips or ±24%. The forecast range for Brisbane-Sydney was wider than for Sydney-Melbourne due to greater population and employment variability north of Sydney. The forecast error was also non-symmetrical. More upside downside risk was forecast especially for Brisbane-Sydney.

International Benchmarking

Studies of the Japanese Shinkansen suggest that half VHST trips were abstracted from existing rail services with the other half generated mainly from air. TGV Southeast services increased rail patronage by 60% over five years with 30% of new rail patronage sourced from air, 20% from car and 50% induced. ICE services in Germany increased rail patronage by 40% with 55% of new rail trips diverted from car, 40% from air and 5% induced. The X2000 services in Sweden increased rail patronage by 60% with 60% of new rail patronage sourced from air. By comparison, the forecasts for a 350km/h east coast VHST (Coastal-Hornsby-Bowral-Inland route) were an increase in rail patronage of 60% with 47% of new rail trips sourced from air, 25% from car, 6% from coach and 23% induced. The proportion from air tended to be higher and that from road lower than the overseas examples. The proportion induced was midway amongst the overseas examples.

US VHST patronage forecasts have estimated a higher diversion rate from air than car. Car diversion has also been forecast to be relatively insensitive to VHST technology. The highest car diversion rate was 7% for Maglev technology on the California-North corridor. The lowest rate was 0.5% for the North-East corridor. The forecast diversion rate for air diversion has ranged from 8% to 55%. Air diversion to Maglev was forecast to be 25% higher than for VHST, which in turn was 70% greater than for 240km/h electric 'Accelerail'. The east coast forecasts were similar. For car, diversion at 3% was one percentage point lower than the US average. For air, the 500km/h and 350km/h VHST diversion forecasts were 14% and 17% higher than their US counterparts. In terms of induced demand however, the average of the US studies was 13%, around half the 23% estimated for Brisbane-Melbourne for 350km/h VHST.

Estimated VHST - air shares were obtained for twenty-three city pairs in Europe and Japan. A model was fitted to the overseas estimates that related VHST share to rail travel time. VHST was found dominant over air travel for journeys of less than 2½ hours by rail (excluding access and egress). Indeed for Madrid-Cordoba, air services were withdrawn soon after commencement of services in 1992.

$$\text{Prop}(\text{VHST}) = 1 - \frac{1}{1 + \exp(\alpha + \beta(\text{VHST Rail Time}))}$$

	Parameter		|t| value			
	α	β	α	β	R^2	Obs
Overseas Data	5.12	-1.27	8.2	9.4	0.67	27
East Coast Model	1.56	-0.31	7.3	6.1	0.53	18

For Madrid-Seville (470kms), the 2¼-hour service has achieved an 80% share. The Thalys TGV has obtained a 95% share on the 1½ hour Paris-Brussels route. The Tokyo-Nagoya Shinkansen has obtained a 100% share for the 312 kilometre route. VHST has generally obtained more than half of the rail-air market within the 2½ to 3½ hour rail travel band. Examples include the Eurostar Paris-London service with 70% and 55% for the Stockholm-Gothenburg X2000. VHST shares fall below 50% when rail travel times extend over 3½ hours. The dual gauge Talgo Madrid–Cadiz service has achieved a 28% share with a 3¾-hour travel time. There are examples however of VHST retaining half the market such as Paris-

Nimes with a four-hour service and Madrid-Malaga with 46%. At five hours and beyond VHST becomes increasingly uncompetitive with air leading to a steep drop in share. The TGV-Atlantique has captured 25% of the Paris-Toulouse market, the Tokyo-Hakata Shinkansen and TGV Sud-Est/Rhone-Alpes services have captured 10%.

The forecast 500km/h VHST-air share for Sydney-Melbourne, the largest east coast city pair market, was nearly identical to that predicted from overseas experience. With a 4-hour rail travel time (via the Central Highlands-Inland route), VHST share was 50% compared to 48% predicted on overseas experience. By contrast, the forecasts for 350km/h VHST and 250km/h VHST were higher than overseas experience. For 350km/h VHST, the share was 39% compared to 20%. For 250km/h VHST, the forecast was 30% compared to 7%. The Sydney-ACT forecasts appear conservative. For a 1¾ hour 350km/h VHST travel time, an 83% share was forecast compared to 95% based on overseas experience. The forecasts were also lower for ACT-Melbourne. For Brisbane-Sydney, the 500km/h VHST forecast appeared low whilst that for 250km/h VHST appeared high. With a 4-hour 500km/h VHST travel time, rail share was 41% compared to 52% predicted on overseas experience. A five hour 350km/h VHST service obtained 33% compared to 25% predicted on overseas experience. For Brisbane-Melbourne, the overseas experience model predicted a zero rail share. At these journey lengths however, the overseas model was an extrapolation since no observed data was available.

Figure 20: Air-VHST Share with VHST Journey Time [VHST / (VHST + Air)]

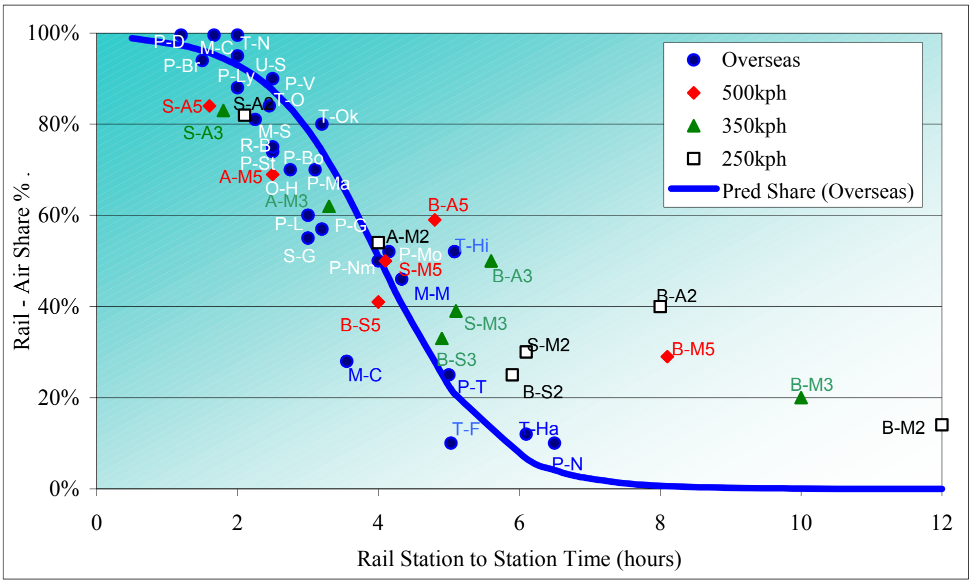


Table 4: Air-VHST Share with VHST Journey Time [VHST/ (VHST + Air)]

Route	Code	Time Hrs:mins	Distance Kms	Actual Rail-Air Share %	Predicted Rail-Air Share %
Paris-Dijon (TGV)	P-D	1.15		100%	97%
Paris Brussels (Thalys)	P-Br	1:30	312	94%	96%
Madrid-Cordoba (AVE)	M-C	1:40	343	100%	95%
Tokyo-Nagoya (Shinkansen)	T-N	2:00	342	100%	93%
Ueno-Sendai (Shinkansen)	U-S	2:00		95%	93%
Paris-Lyon (TGV Sud-Est)	P-Ly	2:00	430	88%	93%
Madrid-Seville (AVE)	M-S	2:15	471	81%	91%
Tokyo-Osaka (Shinkansen)	T-O	2:45	515	84%	88%
Paris-Valence (TGV)	P-V	2:30		90%	87%
Paris-St Etienne (TGV)	P-S	2:30		74%	87%
Rome-Bologna (TAV)	R-B	2:30		75%	87%
Paris-Bordeaux (TGV-Atlantique)	P-B	2:45		70%	84%
Paris-London (Eurostar)	P-Lo	3:00	494	60%	79%
Stockholm-Gothenburg (X2000)	S-G	3:00	455	55%	79%
Paris-Marseilles (TGV)	P-M	3:00		60%	79%
Osaka-Hakata (Shinkansen)	O-Ha	3.06		76%	76%
Tokyo-Okayama (Shinkansen)	T-Ok	3:12		80%	74%
Paris-Geneva (TGV)	P-G	3.12		57%	74%
Madrid-Cadiz (Talgo)	M-C	3.45	628	28%	65%
Paris-Nimes (TGV)	P-Nm	4:00		50%	51%
Paris-Montpellier	P-Mo	4:15		52%	46%
Madrid-Malaga (AVE)	M-M	4.20		46%	41%
Paris-Toulouse (TGV-Atlantique)	P-T	5:00	827	25%	23%
Tokyo-Fukuoka (Shinkansen)	T-F	5:03		10%	22%
Tokyo-Hiroshima (Sanyo-Shinkansen)	T-Hi	5:05	821	52%	21%
Tokyo-Hakata (Shinkansen)	T-Ha	6.06	1,069	12%	7%
Paris-Nice (TGV Sud-Est/Rhone-Alpes)	P-N	6.30	1,003	10%	4%
Brisbane-Sydney (500km/h)	B-S5	4:00	923	41%	51%
Brisbane-ACT (500km/h)	B-A5	5:36	1,203	59%	27%
Brisbane-Melbourne (500km/h)	B-M5	8:06	1,928	29%	1%
Sydney-ACT (500km/h)	S-A5	1:36	280	84%	96%
Sydney-Melbourne (500km/h)	S-M5	4:06	1,005	50%	48%
ACT-Melbourne (500km/h)	A-M5	2:30	725	69%	88%
Brisbane-Sydney (350km/h)	B-S3	4:54	923	33%	25%
Brisbane-ACT (350km/h)	B-A3	4:48	1,203	50%	12%
Brisbane-Melbourne (350km/h)	B-M3	10:00	1,928	20%	0%
Sydney-ACT (350km/h)	S-A3	1:48	280	83%	94%
Sydney-Melbourne (350km/h)	S-M3	5:06	1,005	39%	20%
ACT-Melbourne (350km/h)	A-M3	3:48	725	62%	72%
Brisbane-Sydney (250km/h)	B-S2	5:54	923	25%	9%
Brisbane-ACT (250km/h)	B-A2	8:00	1,203	40%	1%
Brisbane-Melbourne (250km/h)	B-M2	12:00	1,928	14%	0%
Sydney-ACT (250km/h)	S-A2	2:06	280	82%	92%
Sydney-Melbourne (250km/h)	S-M2	6:06	1,005	30%	7%
ACT-Melbourne (250km/h)	A-M2	4:00	725	54%	51%

Overall, the overseas prediction model appeared more sensitive to VHST travel time than the east coast VHST patronage model and suggested higher rail shares at shorter distances and lower shares at longer distances. The overseas model also suggested higher shares for 500km/h VHST and lower shares for 250km/h VHST. Caution is required in transferring overseas experience however. Service factors such as rail fare, access and egress, frequency, and service quality were not included. Air service was also not considered. Socio-economic, travel profile and topographic differences further limit the direct transferability of results.

Concluding remarks

The model established for the ECVHST study is a powerful analytical tool for predicting demand for travel by a range of very high speed trains able to operate at speeds from 160 km/h to 500km/h on the east coast of Australia in a corridor over 2000 km in length. The model allows the testing of a large number of potential influences on patronage demand for a VHST service.

Although a likely range in VHST patronage consequent on key demand drivers has been established by the model, the study is necessarily of a preliminary nature. The forecasts presented here were based on existing information. Refinement and further validation of the base data would be essential in more detailed studies for investment purposes. In corridor of this scale, patronage risk will remain high with both market size and diversion to a VHST difficult to forecast.

The forecasts were found to accord with overseas experience in regard to the share of trips except the very long Brisbane-Melbourne market for which no comparable overseas evidence could be obtained.

The model allowed powerful insights into the way patrons might be attracted to a VHST service in the corridor and was a key foundation for the evaluation and investment appraisal undertaken in the study. A key finding of the study overall was that the most viable component of the entire corridor for commencing an east coast Very High Speed Train system was that in which Australia's greatest conurbation lies – from Newcastle through Sydney to Canberra – and that this, rather than an intercapital project, was the place to start. Furthermore, the greatest step that could be taken would be to create infrastructure to allow even a 250 km/h train to run on its merits, let alone trains with higher top speeds.

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