

## Toronto Airport Rail Link

Comparator rail links and other services

DRAFT Technical note - for discussion

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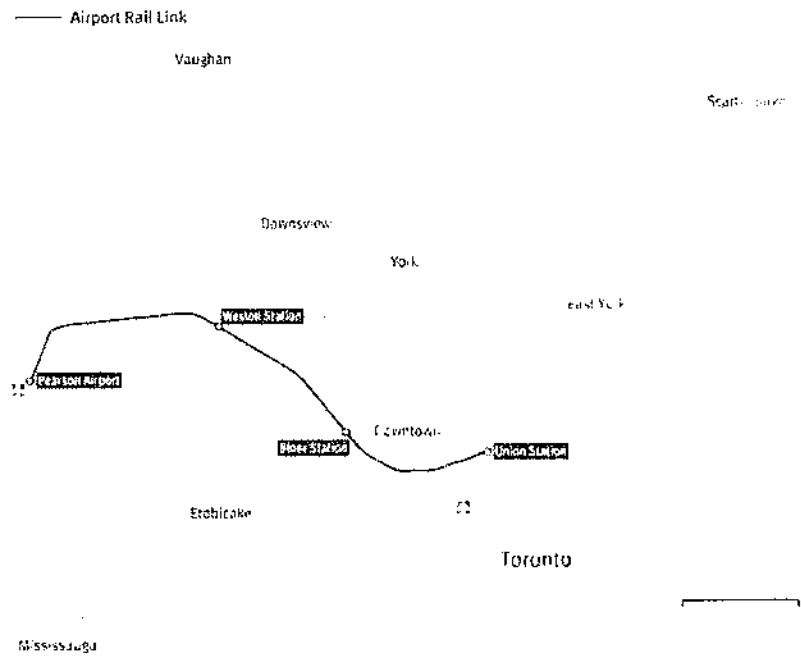
# 1 Introduction

- 1.1 As part of our on-going work supporting Metrolinx with the Toronto Airport Rail Link (TARL), we have been asked to provide further information comparing the planned service with other world examples, with particular focus on service ramp-up, where possible.
- 1.2 This document presents a number of services for which we have been able to source publically available data as well as a number of other relevant services whose success can be compared.

## About Toronto Airport Rail Link

- 1.3 The rail link will run between Union Station in downtown Toronto to Pearson Airport in the west of Toronto. The service will call at two intermediate stops, Bloor and Weston, and run four times an hour all day, in both directions.
- 1.4 The Airport Rail Link (ARL) service is planned to open on the 5<sup>th</sup> April 2015, in advance of the Pan American Games which will be held in the city of Toronto in the summer of 2015. Planned hours of operation will be from 5am to 1am the following day, and trains will run 365 days a year. The journey from Union Station to Pearson Airport will take 25 minutes.

FIGURE 1.1 TARL ALIGNMENT



Source: Steer Davies Gleave

## Comparator rail links and other services

### About Pearson Airport

- 1.5 Lester B. Pearson International Airport (LBPIA) is located in the City of Mississauga and serves the population of Toronto and the Greater Toronto and Hamilton Area (GTHA). In 2010, 33 million passengers travelled through LBPIA. By 2031 this is forecast to reach 52 million<sup>1</sup>. The airport is located 22.5 kilometres from downtown Toronto.

### Our base case forecasts

- 1.6 In developing our base case forecasts we have assumed an opening day fare of \$20 per person, one way, between Union Station and Pearson Airport. During the first three years of operation we have assumed that passenger numbers will “ramp-up”:  
**I** Year One: 65% , Year Two: 80%, Year Three: 90%, Year Four: 100%
- 1.7 This period represents the time lag required for passengers to change their existing behaviour and to learn about the new airport rail link. The ramp-up values and period of time have been selected based on professional judgement, using a broad range of rail schemes that we have worked on over the past 30 years.
- 1.8 Table 1.1 presents our base case forecasts of passengers, both with and without ramp-up assumptions. The market share shown is of the **in-scope market** which includes: those travelling to/from in-scope areas in Toronto and whom are not in transit between flights, during the hours of operation of the rail link, and currently using modes of travel from which they might reasonably transfer.

**TABLE 1.1 BASE CASE FORECASTS (\$20 FARE FROM UNION)**

	2015	2016	2017	2018	2019	2020
LBPIA passengers (millions, including transfers)	36.5	37.3	38.2	39.1	40.0	40.8
In-Scope demand (millions)	10.7	10.9	11.1	11.3	11.6	11.8
Forecast passengers (millions, no ramp-up)	2.1	2.9	2.9	3.0	3.0	3.1
Market share (in-scope no ramp-up)	19.6%	26.6%	26.1%	26.5%	25.9%	26.3%
Average daily passengers (no ramp-up)	8,122	8,285	8,453	8,623	8,797	8,974
Ramp-up profile	65%	80%	90%	100%	100%	100%
Forecast passengers (millions, with ramp-up)	1.4	2.3	2.6	3.0	3.0	3.1

Source: Steer Davies Gleave

- 1.9 The ARL share amongst the total market of those travelling to or from the airport by all modes, at all times and from all directions, is equivalent to 10.3%.

<sup>1</sup> Source: Steer Davies Gleave forecast of air passengers, validated against GTAA forecasts

## 2 Comparator services

2.1 As part of our original work, we undertook a short review of comparator services across the world. This involved a comparison of public transit mode shares against airport passenger volumes. The data was collated using a combination of airport websites and the report “Improving Public Transportation Access to Large Airports”, published by the Transportation Research Board, which is available on subscription. We present this below along with a number of additional high level comparisons focused on other factors that influence the success of airport links.

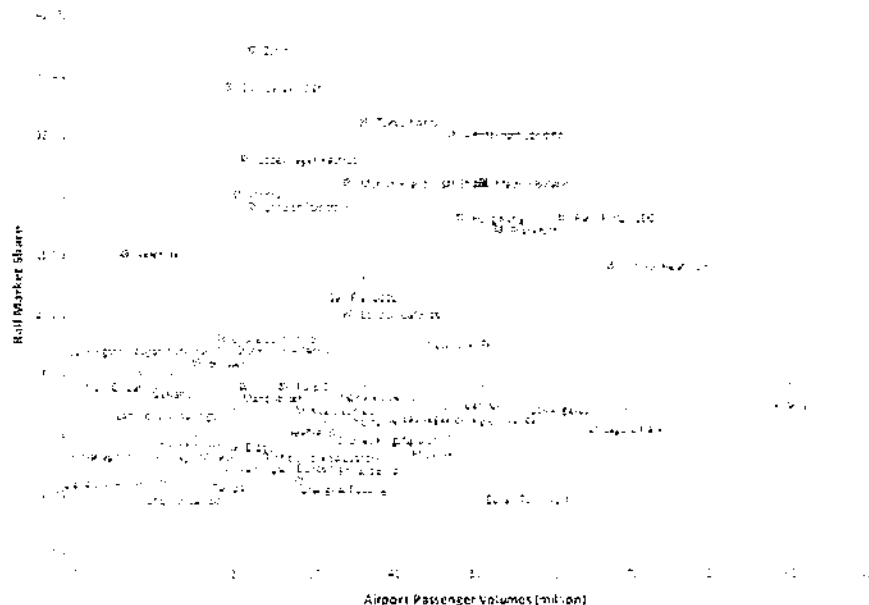
### High level comparison

#### *Market share and airport passenger volumes*

2.2 A comparison of market share and air passenger volumes has been previously provided in our project report. This information is shown below for completeness. The horizontal axis shows the volume of passengers at each airport, whereas the y axis shows the market share. Market share is labelled as “Rail”, but in cases where rail links don’t exist this is the overall transit market share.

2.3 Although the size of the airport needs to be sufficient to sustain a robust public transport offer, it does not explain the mode share on public transport. The chart shows that North American airports tend to lag behind their European and Asian counterparts. The key factor is terminating passengers where some airports will have a relatively large share of transfer/transit passengers who will not use the airport ground transportation.

FIGURE 2.1 AIRPORT PASSENGER VOLUME AND ‘RAIL’ SHARE



Source: Steer Davies Gleave analysis

## Comparator rail links and other services

2.4 The TARD service corresponds well with published statistics for other air-rail links both in North America and across the world. With 36.5 million passengers forecast to use Pearson in 2015 and a steady-state market share of around 10%, Toronto is forecast to perform similarly to international examples:

- I Sydney (Kingsford Smith) where a dedicated rail service runs every 10 minutes with a travel time of 13 minutes for a one way fare of between AUS \$15 and \$16, (broadly equivalent to CAD \$) depending on whether travel is from the domestic or International terminal<sup>2</sup>
- I Kuala Lumpur, where an express non-stop service to downtown takes 28 minutes, runs every 20 minutes for a fare of RM 35.00, which is equivalent to CAD \$11.30<sup>3</sup>.

2.5 And in North America to:

- I Seattle: where a light rail service runs between the airport and downtown every 10 minutes at a relatively low adult fare of USD \$2.75 one way<sup>4</sup>.
- I Orlando: where transit options are primarily local and shuttle buses<sup>5</sup>.

### *Market share and distance to downtown*

2.6 There is some relationship between market share and distance to downtown, but the key issue is whether demand is focussed on the downtown area served by rail or dispersed over a wider geographical area.

### *International comparison*

2.7 Figure 2.2 illustrates this, where the size of the 'bubble' indicates the relative volume of airport passengers. The red bubbles are London airports which clearly shows the relationship between market share and distance.

2.8 The following observations can be drawn:

- I Market share tends to be lower for airports closest to downtown areas where taxi provides a reasonably cost-effective alternative to transit.
- I Comparing Oslo and Stockholm, which are similar distances, the impact of higher fares on the Arlanda Express in Stockholm is quite clear in the market shares. This system is operated by a concession that sets fares to maximise profit.
- I Oslo and Narita airports both have high shares as they capitalise on well-defined markets and long-distance (but direct connection) to city centre transit networks.

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<sup>2</sup> <http://www.sydneyairport.com.au/go/by-train.aspx>

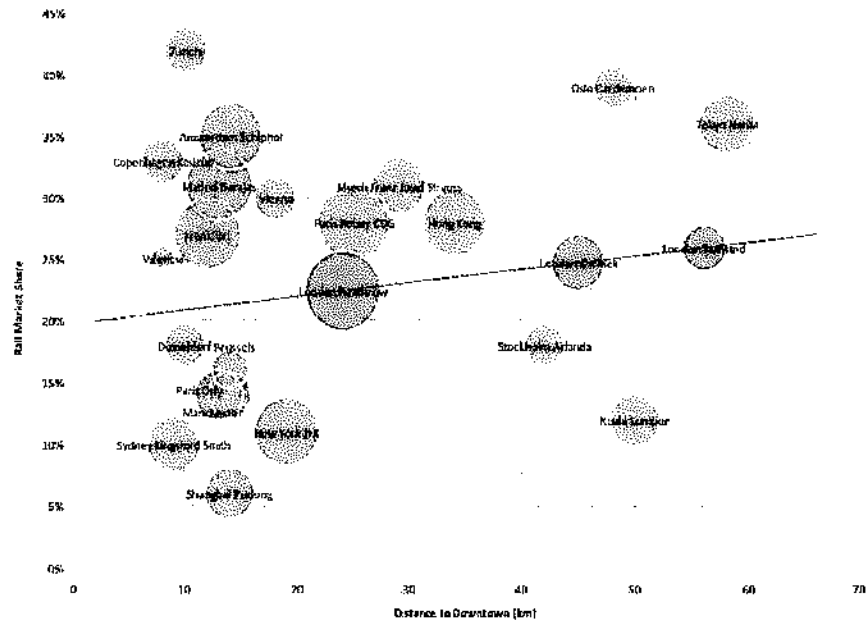
<sup>3</sup> [http://www.klia.com.my/index.php?option=com\\_content&view=article&id=15](http://www.klia.com.my/index.php?option=com_content&view=article&id=15)

<sup>4</sup> <http://www.portseattle.org/Sea-Tac/Parking-and-Transportation/Ground-Transportation/Pages/Public-Transit.aspx>

<sup>5</sup> <http://www.orlandoairports.net/gt.htm>



FIGURE 2.2 DISTANCE FROM DOWNTOWN AND 'RAIL' SHARE



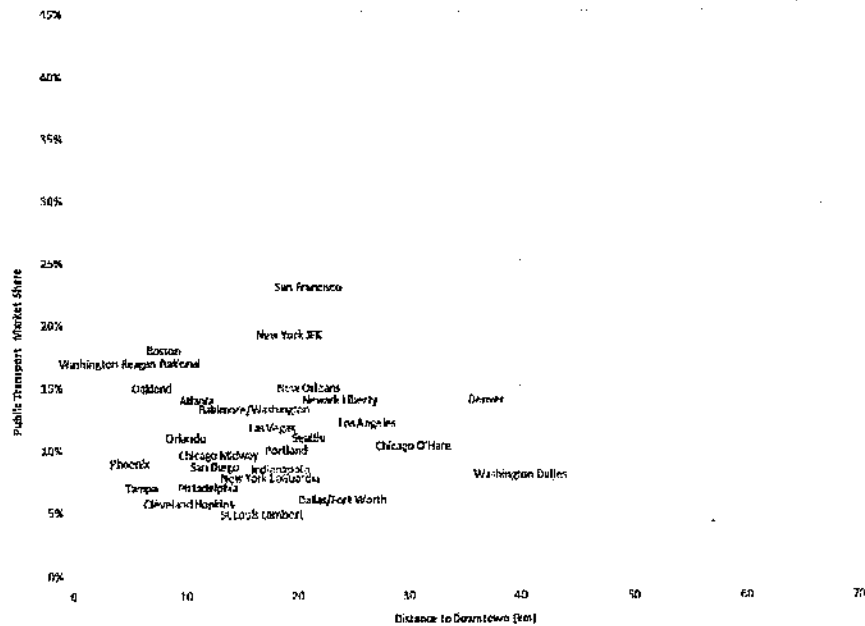
Source: Steer Davies Gleave analysis

*North American comparison*

- 2.9 Focusing further on examples in the USA where data is more widely available, the market share for transit (rail + bus) is lower as many North American airports are accessed via freeway or beltway without passing through the downtown area.
- 2.10 The contrary to this however is the Airport Express Bus to New Orleans which has witnessed strong capture rates (15%), despite the relative small size of the airport.
- 2.11 Pearson airport at a distance of 22.5 km from downtown, best compares (internationally and in North America specifically) once more to Seattle where a light rail service links the airport to downtown as noted above.

Comparator rail links and other services

FIGURE 2.3 DISTANCE FROM DOWNTOWN AND 'RAIL' SHARE: USA



Source: Steer Davies Gleave analysis

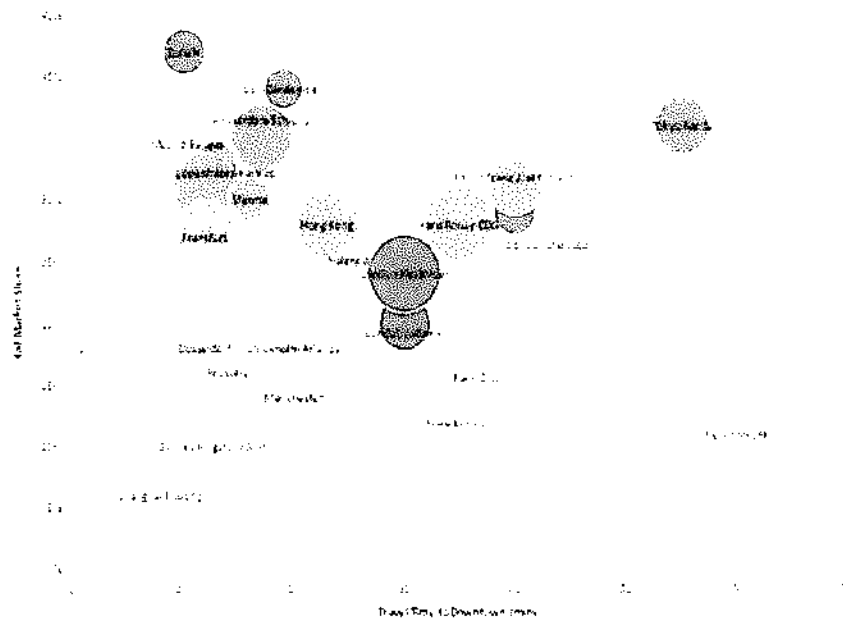
**Market share and travel time**

- 2.12 The door-to-door travel time of the fixed rail link is an important factor in ensuring competitiveness with car and taxi. However directness of service and connectivity cannot be ignored.
- 2.13 Rail links that connect into a fully-integrated rail system attract a wider catchment area / market. Whereas journeys requiring multi-modal connections to reach the final destination (i.e. bus-rail or rail-bus) become a much less attractive option, given the increased uncertainty of connection / wait time.
- 2.14 In particular:
  - I JFK in New York the highest public transport mode share of all US airports (Rail 8%, Bus 11%) however it suffers from lack of a direct service to downtown, low frequency and stopping services and a dispersed airport layout.
  - I Zurich has an exceptionally high modal share given the downtown and airport rail stations both act as hubs for onward travel both nationally and internationally.
  - I In Hong Kong, the cheaper MTR service from Tung Chung station (reached via free shuttle bus) captures only 3% market share compared to the 25% for the Airport Express. Tellingly, the slower but more direct bus services capture 35% of the market share.
  - I In Paris, the relatively poor connectivity of Paris Orly to the regional rail system (via people mover / shuttle bus) may explain this gap in performance to Charles de Gaulle.

2.15 This is illustrated in Figure 2.4. Comparing the TARL service to these international services, the journey time of 25 minutes from Union to Pearson is most similar to the service in Manchester in the UK, or Arlanda Express in Sweden, both of which are smaller airports at 18 and 19 million passengers respectively.

- I Manchester offers a frequent service to the city centre by rail at fares of CAD \$7.00<sup>6</sup>
- I Whereas Arlanda Express is a premium service, with a fare equivalent to CAD \$38<sup>7</sup>

FIGURE 2.4 TRAVEL TIME TO DOWNTOWN AND 'RAIL' SHARE



Source: Steer Davies Gleave analysis

**Selected examples: summary**

2.16 In addition to the above comparisons, we have reviewed a number of comparator airport rail links to TARL to determine further qualitative factors that may reflect the likely success of airport rail links elsewhere.

2.17 In each case we have assessed airports that display one or more of the following characteristics:

- I Airports with a similar total throughput (15-50m passengers) which are generally capital city locations or the country's main airport;
- I Airports that are well established within the city limits (10-25km) - often relatively new airports are situated beyond the city suburbs;

<sup>6</sup> <http://www.manchesterairport.co.uk/manweb.nsf>

<sup>7</sup> <http://www.arlanda.se/en/>

## Comparator rail links and other services

- | Dedicated rail links of a similar type to TARL, which focus on airport passengers, rather than network or metro systems that are part of a wider city or national system;
  - | Links which have some competition, but not those where there are multiple choices or relatively free flowing road networks.
- 2.18 In each case we provide a summary of the airport profile, the ground transportation options and their relative market share and key metrics of the transport offer. We include:
- | London Gatwick
  - | Hong Kong
  - | Oslo Gardemoen
  - | Brussels
  - | Amsterdam
  - | Frankfurt
  - | Stockholm Arlanda
  - | Vienna
  - | New York JFK
  - | Chicago Midway
  - | Vancouver

### *London Gatwick*

#### *Airport Profile*

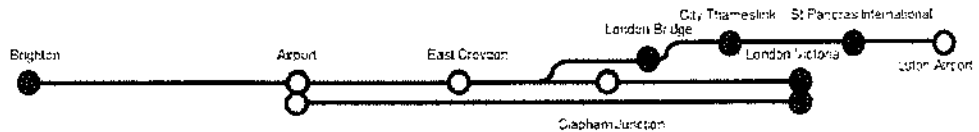
- | Annual Passenger Volume (2008): 34 million - second busiest airport in UK
- | Offer: 280 inter-continental destinations, 102 airlines, large charter market
- | Distance to Downtown: 45km
- | Market: serves two catchments - 7.5m population of London and 5-10m of the UK's most affluent area of SE England

#### *Ground Transportation*

- | **Rail (20% share):** dedicated 4 trains per hour (tph) "Gatwick Express" to London Victoria and West End (30 mins), and other mainline rail services including 4 tph Thameslink services to London Bridge, King's Cross St Pancras and Luton Airport, and South Central services to south coast
- | **Car (54% share):** easy access to motorway network (M23) and London Orbital (M25) / peripheral road network suffers no significant congestion, car parks accessed by frequent bus shuttles
- | **Coach/Bus (14% share):** Scheduled national coach services to/from central London and coastal regions plus shuttle to/from Heathrow airport (100 service per day)
- | **Taxi (12% share):** many licensed operations offering fares from £25 to local destinations up to £75-£100 to central London

## Comparator rail links and other services

### Rail network



### Transport offer to downtown: key metrics

TABLE 2.1 LONDON GATWICK: COMPARISON METRICS

	Airport Express	Commuter Rail	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	15	12	60	-	-
Interchange required?	Yes	Yes	Yes	Yes	Yes
Journey time (mins)	30 / 40	45 / 75	90	30-60	45-75
Service quality	Good	Good	Medium	Medium	-
Access to terminal (mins)	10-15	10-15	05-10	05-10	20-30
Peak / off-peak fare (\$CAD)	24	13 / 39	12	120	-
Integrated ticketing?	No	No	No	No	No
Remote check-in?	No	No	No	No	No

Source: Steer Davies Gleave analysis

### How? / why?

#### Airport Profile

- I Annual Passenger Volume (2006): 44 million
- I Offer: 150 inter-continental destinations, 85 airlines
- I Distance to Downtown: 34km
- I Market: concentrated around Kowloon and the Island with only about 1/5 passengers destined for New Territories

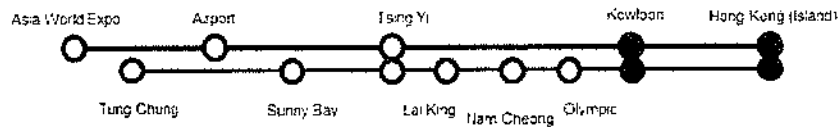
#### Ground Transportation

- I Rail (25% share, 3% for other rail services): dedicated Airport Express (24 mins) is the fastest way to access the airport from downtown and has three other stations (two with remote check-in) and passengers can interchange onto MTR system for free. MTR operate services to Tung Chung station from which it is possible to get a free shuttle bus to the airport
- I Car (37% share includes taxi): there are three car parks offering 3,000 spaces but quite expensive
- I Coach/Bus (35% share): Citybus and Long Win Bus operate dedicated airport services, which offer a cheap alternative to the train, although they are not as fast. Coach station at Terminal 2 offers 320 cross-border trips per day to 90 cities in China

## Comparator rail links and other services

- Taxi (37% share includes car):** to Hong Kong Island costs more than \$50 and takes 30 minutes, although can take longer in congested conditions. Taxis are colour-coded according to their operating areas.

### Rail network



### Transport offer to downtown: key metrics

TABLE 2.2 HONG KONG: COMPARISON METRICS

	Airport Express	MTR	Coach / Bus	Taxi	Car
Peak / off-peak interval (mins)	12	12	10-20	-	-
Interchange required?	No	Yes	No	No	-
Journey time (mins)	24	40	40	30-40	40
Service quality	High	Good	Medium	Good	-
Access to terminal (mins)	05-10	05-10	10-15	10	5-20
Peak / off-peak fare (\$CAD)	15	10	6.5	50	-
Integrated ticketing?	Yes	No	No	No	No
Remote check-in?	Yes	No	No	No	No

Source: Steer Davies Gleave analysis

### Oslo Car Terminal

#### Airport Profile

- Annual Passenger Volume (2008):** 19 million is Norway's largest airport
- Offer:** 90 international (5 inter-continental) and 24 regional destinations, 40 airlines
- Distance to Downtown:** 48km
- Market:** catchment of 2.5 million, over 70% of which is concentrated along the airport-city corridor (incl 48% for Oslo)

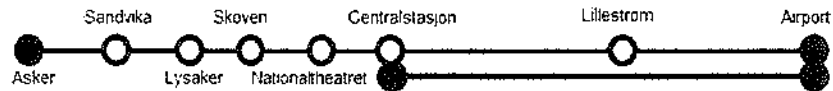
#### Ground Transportation

- Rail (39% share):** the Oslo Airport Express (Flytoget) has a competitive advantage over other modes given the distance to downtown Oslo, offer journey times of only 19 minutes with a frequency of 6 tph to Oslo (3 of which continue beyond to Asker). Norwegian State Railways (NSB) also operate services to the airport on the Kongsberg-Eidsvoll line.

## Comparator rail links and other services

- I **Car (31% share):** over 16,000 spaces are provided at short- and long-term car parks spread around the terminal building with a free shuttle bus every 15 minutes
- I **Coach/Bus (25% share):** dedicated airport bus services operate to major hotels every 10 minutes taking 55 minutes. Airport Express Coach (SAS Flybussen) runs between Oslo Airport and city centre daily, every 20 minutes
- I **Taxi (5% share):** takes around 35 minutes to downtown and is charged at flat fare depending on time of day and group size

### Rail network



### Transport offer to downtown: key metrics

TABLE 2.3 OSLO: COMPARISON METRICS

	Airport Express	State Railways	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	10	30	20	-	-
Interchange required?	Yes	Yes	Yes	Yes	Yes
Journey time (mins)	19	26 / 37	40	35	35
Service quality	Good	Good	Medium	Good	-
Access to terminal (mins)	05-10	05-10	5	05-10	15-20
Peak / off-peak fare (\$CAD)	28	18.5	20	100	-
Integrated ticketing?	Yes	No	No	No	No
Remote check-in?	No	No	No	No	No

Source: Steer Davies Gleave analysis

### BRUSSELS

#### Airport Profile

- I Annual Passenger Volume (2008): 15 million , of which 80% of to destinations within Europe.
- I Offer: 135 international destinations, 70 airlines and several charter operations
- I Distance to Downtown: 14 km
- I Market: population of around 1 million

#### Ground Transportation

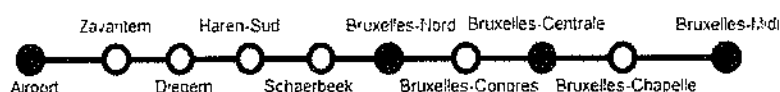
- I **Rail (16% share):** the airport is located on a spur off the main line with frequent, semi-fast services direct to downtown stations - Nord, Centrale and Midi - in 25 mins. Stopping patterns vary and there are direct links to Leuven

## Comparator rail links and other services

and Liège. In 2000 the original station was replaced by a new three-platform terminus, fully integrated with the new air terminal above.

- I **Car (74% share includes taxi):** the airport is situated just off the R0 highway and offers secure, but very expensive, parking facilities with about 2,500 spaces. Parking must be reserved in advanced and is accessed via free shuttle bus.
- I **Coach/Bus (10% share):** A large bus station is located on the ground floor, from which "Airport Express" buses operate to Brussels, and other Belgian, Dutch and French cities
- I **Taxi (74% shares includes car):** not competitive with rail given that it takes about the same amount of time at a much higher cost.

### Rail network



### Transport offer to downtown: key metrics

TABLE 2.4 BRUSSELS: COMPARISON METRICS

	Rail Link	Other Rail	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	15	-	15	-	-
Interchange required?	No	-	No	No	No
Journey time (mins)	20	-	30	20	20
Service quality	Good	-	Medium	Medium	-
Access to terminal (mins)	10	-	5	05-10	05-10
Peak / off-peak fare (\$CAD)	7	-	5	45	-
Integrated ticketing?	No	-	No	No	No
Remote check-in?	No	-	No	No	No

Source: Steer Davies Gleave analysis

### Amsterdam

#### Airport Profile

- I Annual Passenger Volume (2008): 47 million, Europe's fourth largest airport
- I Offer: 220 international destinations, 80 airlines
- I Distance to Downtown: 19 km sits within the Randstad (ring city) and serves centres of Den Haag and Rotterdam
- I Market: serves a very wide geographic feeder area with many important rail connections made at the airport



Ground Transportation

- I **Rail (27% share dedicated rail):** the airport is served by metropolitan, national and, increasingly over recent years, international high speed rail services, all within a fully integrated rail station under the terminal buildings. Services to The Hague and Rotterdam are as frequent as services to downtown Amsterdam, which takes between 15-20 mins.
- I **Car (59% shares includes taxi):** it is possible to drive to the airport in under half an hour. Private Cars and Taxis are the principal method of accessing the airport. Despite the airport having excellent road links, there is increasing congestion.
- I **Coach/Bus (4% share):** there are numerous buses which serve the airport, and the airport is developing over 100 specialist, 8-seater hotel shuttle services, which can be requested within two hours.
- I **Taxi (59% share includes car):** shared taxis can be reserved within 24 hours with the commitment on maximum distance versus non-shared trip.

Rail network



Transport offer to downtown: key metrics

TABLE 2.5 AMSTERDAM: COMPARISON METRICS

	Intercity	Sneltrain	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	15	30	20	-	-
Interchange required?	No	No	No	No	No
Journey time (mins)	14-17	20	25	15-25	15-25
Service quality	Good	Good	Medium	Good	-
Access to terminal (mins)	05-10	05-10	5	05-10	10-15
Peak / off-peak fare (\$CAD)	5	5	2	46	-
Integrated ticketing?	No	No	No	No	No
Remote check-in?	Yes	No	No	No	No

Source: Steer Davies Gleave analysis

Frankfurt

Airport Profile

- I Annual Passenger Volume (2008): 53 million, the second busiest airport in Europe
- I Offer: 266 international destinations, 108 airlines

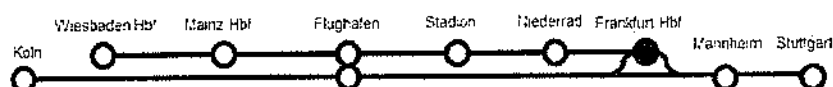
## Comparator rail links and other services

- I Distance to Downtown: 9 km
- I Market: has the largest airport catchment area in Europe with some 38 million inhabitants within a 200 km radius

### Ground Transportation

- I Rail (15% share dedicated rail, 12% other): the airport is served by two separate rail services. Intercity high speed trains between Frankfurt-Koln-Stuttgart stop at the airport while S-Bahn services to Frankfurt, Mainz, Wiesbaden, Darmstadt are substantially cheaper, and can be used for free to /from the airport with a valid air ticket. Mode share on intercity service is slightly higher.
- I Car (67% share includes taxi): takes 20-30 minutes to get to Frankfurt Central Station or the city centre, with milt-level car parks throughout the airport. Car represents 31% mode share of "other" while rental car accounts for a further 5%.
- I Coach/Bus (6% share): many local bus routes serve the airport, with Lufthansa regional bus service to Heidelberg, Mannheim, and Talheim.
- I Taxi (67% share includes car): represents 21% mode share of "other".

### Rail network



### Transport offer to downtown: key metrics

TABLE 2.6 FRANKFURT: COMPARISON METRICS

	Intercity (ICE)	S-Bahn	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	10-15	10-15	20 - 30	-	-
Interchange required?	No	No	No	No	No
Journey time (mins)	11	11	30	20-30	30
Service quality	High	Good	Medium	Good	-
Access to terminal (mins)	5-15	5-15	5-15	5-15	15
Peak / off-peak fare (\$CAD)	15	5	2-5	30-40	-
Integrated ticketing?	Yes	Yes	No	No	No
Remote check-in?	No	No	No	No	No

Source: Steer Davies Gleave analysis

*Stockholm Arlanda*

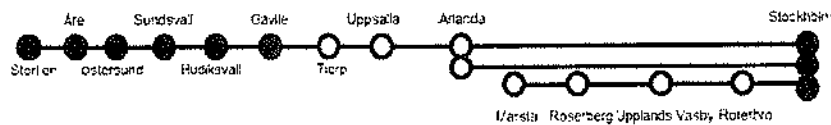
*Airport Profile*

- I Annual Passenger Volume (2008): 18 million, of which 75% were international trips
- I Offer: 32 domestic and 144 international destinations, 85 airlines
- I Distance to Downtown: 37 km north of Stockholm
- I Market: population of over 2 million in the metropolitan area

*Ground Transportation*

- I **Rail (18% share):** the “Arlanda Express” was inaugurated in 1999 and is the fastest way to reach the airport from central Stockholm and takes 20 mins. In 2008, 3.2 million passengers used the service, representing a market share of 17.7%. There are two Express stations and a third station for State railway services.
- I **Car (66% share includes taxi):** short-term car parks are integrated with the terminal complex with long-term car parks reached by free shuttle.
- I **Coach/Bus (16% share):** there are numerous airport shuttles to downtown hotels at a cost 2/3 of the express rail service but over twice the journey length depending on prevailing traffic conditions. Flybussarna operate services in the region. The cheapest way to downtown is via bus to Marsta station to connect with commuter rail services.
- I **Taxi (66% share includes car):** all companies offer flat fares at approximately \$36.5 for the 30-45 minutes journey into central Stockholm.

*Rail network*



*Transport offer to downtown: key metrics*

**TABLE 2.7 STOCKHOLM: COMPARISON METRICS**

	Arlanda Express	State Railways	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	12	30	May-15	-	-
Interchange required?	No	No	No	No	No
Journey time (mins)	20	35	30-45	30-45	30-45
Service quality	High	Medium	Medium	Good	-
Access to terminal (mins)	15	15	05-10	05-10	10-15
Peak / off-peak fare (\$CAD)	38	15	14	36.5	-
Integrated ticketing?	No	No	No	No	No

## Comparator rail links and other services

	Arlanda Express	State Railways	Coach / Bus	Taxi	Car
Remote check-in?	No	No	No	No	No

Source: Steer Davies Gleave analysis

### Vienna

#### Airport Profile

- ! Annual Passenger Volume (2008): 20 million, busiest airport in Austria
- ! Offer: 4 inter-continental (North America) and 80 international destinations, 75 airlines
- ! Distance to Downtown: 18 km south east of Vienna near town of Schwechat
- ! Market: Vienna is Austria's primary city with a population of 1.7 million

#### Ground Transportation

- ! Rail (14% share dedicated rail, 16% other): A dedicated City Airport Train "CAT" service offers non-stop connections to the airport in under 16 minutes as well as commuter S-Bahn services. In the downtown train station, Wien Mitte, there are dedicated airport facilities including remote check-in and at the airport there are dedicated platforms for Express and Commuter services.
- ! Car (59% share includes taxi): the airport can be reached in less than 25 minutes in uncongested conditions and the central car park is also fully integrated within the terminal buildings.
- ! Coach/Bus (11% share): Postbus runs services to the main downtown transport hubs, including Schwedenplatz (20 mins), UNO-City (20 mins) Südbahnhof (25 mins) and Westbahnhof (35 mins). A luxury bus service operates to Bratislava and Budapest.
- ! Taxi (59% share includes car): a number of limousine and taxi services operate.

#### Rail network



#### Transport offer to downtown: key metrics

TABLE 2.8 VIENNA: COMPARISON METRICS

	CAT	S-Bahn	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	30	30	30	-	-
Interchange required?	No	No	No	No	No
Journey time (mins)	16	24	30	25	25
Service quality	Good	Medium	Medium	Good	-

Comparator rail links and other services

	CAT	S-Bahn	Coach / Bus	Taxi	Car
Access to terminal (mins)	05-10	05-10	05-10	5	5
Peak / off-peak fare (\$CAD)	14	5	8	40	-
Integrated ticketing?	No	Yes	No	No	No
Remote check-in?	Yes	No	No	No	No

Source: Steer Davies Gleave analysis

*New York JFK*

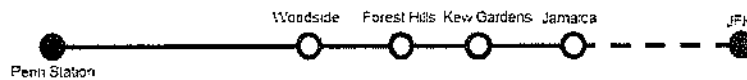
*Airport Profile*

- I Annual Passenger Volume (2008): 48 million , the busiest international gateway to US and 12th busiest in the world
- I Offer: 221 destinations across 6 continents, 90 airlines (the hub for American Airlines and Delta Air)
- I Distance to Downtown: 19 km east of Lower Manhattan on Long Island
- I Market: New York is the most populous city in the US with 8.4 million inhabitants

*Ground Transportation*

- I Rail (8% share): JFK has the highest public transport mode share of any US airport. The “AirTrain” interchange at Jamaica Station was opened in 2004 providing a connection onto the Long Island Railroad, which in turn provides onward connections onto the subway system. A number of LIRR services offers a mixture of fast/slow services into Penn station in Midtown although the most popular choice would appear to be Howard Beach on the A-line, which serves Lower Manhattan.
- I Car/Taxi (81% share): travel time to Manhattan can vary significantly from as little as 25 minutes to 120 minutes depending on traffic conditions. Taxi & Limousine Commission is conducting a flat fare program offering fares of \$45 + tolls.
- I Coach/Bus (11% share): It is a difficult airport to serve given its dispersed layout of terminal buildings but there are direct airport shuttles to Grand Central Station in Midtown with onward connections from the nearby Port Authority bus terminal.

*Rail network*



## Comparator rail links and other services

*Transport offer to downtown: key metrics*

**TABLE 2.9 NEW YORK JFK: COMPARISON METRICS**

	A-line	LIRR	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	10-20	10-20	20 / 30	-	-
Interchange required?	Yes	Yes	No	No	No
Journey time (mins)	60	60	60	60	60
Service quality	Medium	Medium	Good	Good	-
Access to terminal (mins)	10-15	10-15	10-15	10-15	05-10
Peak / off-peak fare (\$CAD)	8	20	15	45	-
Integrated ticketing?	No	No	No	No	No
Remote check-in?	No	No	No	No	No

Source: Steer Davies Gleave analysis

### *Chicago Midway*

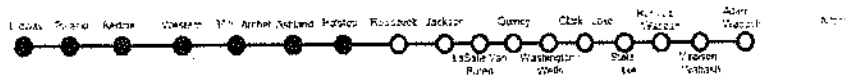
#### *Airport Profile*

- Annual Passenger Volume (2008): 17 million, second largest airport in Illinois after O'Hare
- Offer: 60 North American destinations, 10 airlines, dominated by low cost carriers including Southwest Airlines
- Distance to Downtown: 13 km south of Chicago
- Market: Population of 2.8 million in the Chicago metropolitan area

#### *Ground Transportation*

- Rail (5% share): Is one of only a handful of North American airports with a direct rail connection. The terminal building is the terminal station on Chicago Transport Authority's Orange Line station, running into downtown Chicago and the Loop in 25 mins. It captures on 6% mode share, poor compared to JFK, which has 8% mode share despite no direct link.
- Car (91% share includes taxi): downtown can be reached in as little as 19 minutes depending on prevailing traffic conditions.
- Coach/Bus (4% share): the rail station also acts as a hub for CTA bus services to surrounding areas number of bus companies operate regional services to Iowa, Wisconsin, and around Illinois, while Continental Airport Express provides door-to-door hotel shuttles.
- Taxi (91% share includes car): although easier to reach than O'Hare, fares can double during rush hour with all taxis running on meters.

Rail network



Transport offer to downtown: key metrics

TABLE 2.10 CHICAGO MIDWAY: COMPARISON METRICS

	Rail Link	Other Rail	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	10	-	-	-	-
Interchange required?	No	-	No	No	No
Journey time (mins)	30	-	45	20-25	20-25
Service quality	Good	-	Good	Good	-
Access to terminal (mins)	15	-	-	05-10	05-10
Peak / off-peak fare (\$CAD)	2.5	-	2.35	30	-
Integrated ticketing?	No	-	No	No	No
Remote check-in?	No	-	No	No	No

Source: Steer Davies Gleave analysis

Vancouver

Airport Profile

- I Annual Passenger Volume (2008): 18 million , Canada’s second busiest airport
- I Offer: 10 inter-continental and 70 international destinations, 43 airlines plus a number of charter operations
- I Distance to Downtown: 12 km south on Sea Island in Richmond
- I Market: With a population of 600,000, Vancouver is the third largest city in Canada

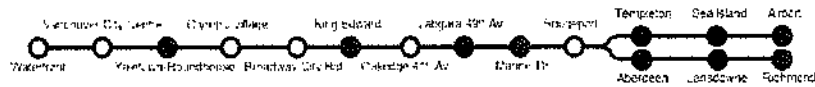
Ground Transportation

- I Rail (10% share, *estimated*): the new Canada line operates between the airport and waterfront. There are 12 intermediate stops and services alternate between two southern branches - Airport and Richmond. There are check-in desks at eight of the stations.
- I Car (90% includes all non-rail modes): access to the airport is restricted via the Arthur Laing bridge to downtown (north) and the Russ Baker Way to Richmond (south). There are premium and economy car parks.
- I Coach/Bus (90% includes all non-rail modes): an express bus departs regularly to downtown with seven intermediate stops. Long-distance buses operate to Vancouver Island (“Pacific Coach Lines”), Whistler (“Skylinx”), and Washington state (“Quickshuttle”) every other hour. The “Airporter” hotel shuttle coach service ceased operating in September 2009.

## Comparator rail links and other services

- Taxi (90% includes all non-rail modes):** offers a quick and easy alternative and is particularly competitive to rail service for groups of three or more. The approximate current fare to downtown Vancouver is between \$30 - \$32 (taxes included)<sup>8</sup>.

### Rail network



### Transport offer to downtown: key metrics

TABLE 2.11 VANCOUVER: COMPARISON METRICS

	Rail Link	Other Rail	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	04-06	-	06-08	-	-
Interchange required?	No	-	Yes	No	No
Journey time (mins)	26	-	40	20	30
Service quality	Good	-	-	Good	-
Access to terminal (mins)	05-10	-	15	05-10	10
Peak / off-peak fare (\$CAD)	9	-	3.75	30	-
Integrated ticketing?	Yes	-	No	No	No
Remote check-in?	Yes	-	No	No	No

Source: Steer Davies Gleave analysis

### Ramp-up evidence (limited)

- 2.19 In the sections below we provide further detailed information about a selection of services for which we have been able to source ramp-up information or early year passenger numbers. These examples have been selected largely due to availability of data in the public domain.

#### Canada Line, Vancouver, Canada

- 2.20 As noted earlier in the sections above, the Canada Line opened in August 2009, in advance of the Winter Olympic Games. It forms part of Translink's SkyTrain metro service serving Vancouver and Vancouver Airport.

- 2.21 In a publically available document ([http://www.translinkcommission.org/KPMG\\_Report.pdf](http://www.translinkcommission.org/KPMG_Report.pdf)) dated July 2008 it is noted that forecasts produced by PWC for the system were:

<sup>8</sup> <http://www.yvr.ca/en/getting-to-from-yvr/taxis.aspx>



- I 2010 15.1 million x 70% ramp-up = 10.6 million (entire Canada Line)
    - I 2010 1.46 million x 70% ramp-up = 1.0 million (airport rail link only)
    - I 2021 19.0 million (entire Canada Line)
  - 2.22 Ramp-up factors cited were therefore:
    - I Year one (2010): 70%
    - I Year two (2011): 85%
    - I Thereafter: 100%
  - 2.23 Actual ridership on Canada Line has been reported, unofficially, to have increased steadily with average daily ridership of:
    - I 83,000/day in September 2009<sup>9</sup>;
    - I 105,000/day in March 2010<sup>10</sup>, and
    - I 110,000/day in February 2011<sup>11</sup>
  - 2.24 This is notably for the entire line, large sections of which serve commuters, and is not just for the section serving the airport.
- Heathrow Express, London, UK**
- 2.25 Heathrow Express (HEX) serving linking Heathrow airport with Paddington Station in the west of London is a premium service running four times an hour non-stop between Paddington and Heathrow. The service opened in 1998 and serves terminals 1,2,3 and 5 with a journey time of 15 minutes for the 24 kilometre distance. Heathrow Connect is the cheaper stopping service calling at five intermediate stations: Ealing Broadway, West Ealing, Hanwell, Southall, Hayes & Harlington.
  - 2.26 Current fares for Heathrow Express travelling in standard class for an adult one way are £19 if purchased at the station and £18 if purchased on-line in advance, equivalent to \$30 and \$29 CAD respectively.
  - 2.27 According to Network Rail, the UK Infrastructure Manager Heathrow Express and Heathrow Connect (HEC) have achieved:
    - I Passenger growth since 2004 is 12.6%(HEX/HEC combined)
    - I Revenue growth since 2004 is 41.9% (HEX/HEC combined)
    - I 2010 passenger numbers have grown by 12% compared to 2009
    - I 2010 annual revenue has increased by 14% compared to 2009
    - I 2010 Inner London modal share increased by 4% to 30% v 2009

<sup>9</sup> Source Wikipedia using: "Cubic, TransLink Report Record Use of New Fare Collection System for Canada Line" (Press release). September 30, 2009. <http://www.marketwire.com/press-release/Cubic-Corporation-NYSE-CUB-1052390.html>. Retrieved October 10, 2009

<sup>10</sup> Source Wikipedia using: "Are you prepared to travel during the 2010 Winter Games in Vancouver?". VANOC Communications. January 20, 2010. [http://finance.alphatrade.com/story/2010-01-20/CNW/201001201307CANADAINVCANADAPR\\_07486.html](http://finance.alphatrade.com/story/2010-01-20/CNW/201001201307CANADAINVCANADAPR_07486.html).

<sup>11</sup> Source Wikipedia using: <http://www.surreyleader.com/news/11577789.html>

## Comparator rail links and other services

2.28 In 2002, Halcrow established the following ramp-up profile for TARL based on the passenger build up on Heathrow Express:

- I Year one: 60%
- I Year two: 90%
- I All subsequent years: 100%

### *Other services*

2.29 There are very few comparable airport link services with passenger information in the public domain. For this reason we cite ramp-up periods which have been observed on a number of high speed rail services around the world. Although not directly equivalent to airport links, these demonstrate the range of ramp-up values that have been observed in practice. We also note that advice produced for the American high speed rail alliance, a common ramp-up period is between three and five years<sup>12</sup>. Furthermore in research published by the Transport Cooperative Research Programme (TCRP)<sup>13</sup> ramp-up assumptions are noted to be typically based on rule of thumb or professional judgement.

### *High speed services*

2.30 Demand ramp-up on a number of European services has been published in the documentation produced for the proposed Californian (CA) high speed rail service, available at:

[http://www.cahighspeedrail.ca.gov/assets/0\\_152\\_302/321/739f2a3b-1db6-4c59-9e2e-3541581dbcbd.pdf](http://www.cahighspeedrail.ca.gov/assets/0_152_302/321/739f2a3b-1db6-4c59-9e2e-3541581dbcbd.pdf)

**TABLE 2.12 EUROPEAN HIGH SPEED SERVICES**

Service	Country	Ramp-up period
Madrid-Seville	Spain	2 years
TGV	France	3 - 4 years
Thalys system	France/Germany/Netherlands/Belgium	6 years

Source: California High Speed Rail study

2.31 Based on this information the ramp-up profile which has been assumed for the CA system is fairly long:

- I Year one: 40%
- I Year two: 55%
- I Year three: 70%
- I Year four: 85%
- I Year five: 100%

<sup>12</sup> Source: <http://americanshra.org/wp-content/uploads/2011/07/Ridership-Shortfall-Guarantee.pdf>

<sup>13</sup> [Onlinepubs.trb.org/onlinepubs/tcrp/tcrp\\_syn\\_66.pdf](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_syn_66.pdf)

## 3 Conclusions

- 3.1 Examples of dedicated airport-to-downtown rail services in North America are very limited, and indeed very little exists in the public domain on ramp-up.
- 3.2 High quality, dedicated express bus services do exist, for example at Logan International in Boston and the Van Nuys FlyAway in Los Angeles. However, there is little evidence to suggest that provision of a dedicated airport-to-downtown rail service can stimulate a higher public transport market share.

### Lessons from elsewhere

- 3.3 We can learn some lessons from the success of transit systems elsewhere in the world where evidence is more readily available.

#### *North America*

- 3.4 Market share for public transport access to North American airports is generally weak when compared to European and Asian counterparts. There are four main reasons:
- 1 Weak city centres - urban sprawl and low density urban areas associated with many North American cities leads to a lower proportion of air passengers with a trip end in the CBD where public transport would naturally serve.
  - 1 Poor public transport networks - lack of integrated transport networks reduces connectivity to the wider region beyond downtown.
  - 1 Strong highway networks - travel time benefits on public transport do not compare as favourably to the door-to-door times achieved by road, with airports often easily accessible by freeway beltway.
  - 1 Inherent dependency on private car - except for regular transit car is very much the predominate mode of choice (the urban design of many cities is characterised by isolated zones of development necessitating the use of car).

#### *Europe and Asia*

- 3.5 There are many explanatory variables that dictate the success of an airport link meaning that no particular modal solution is optimal everywhere:
- 1 Oslo: the high speed link runs every 10 minutes, non-stop, to city centre and the line of suburbs beyond. Sheer distance and comparative fast travel time combine to promote strong rail modal share. Taxi use is discouraged by businesses and car journeys are made expensive by the toll to enter the city centre.
  - 1 Zürich: the airport is well positioned on the national rail network and, despite its close proximity to central Zürich, acts as a hub for rail travel across Switzerland, fostering a strong rail culture. The mountainous landscape also means that tunnelled rail links provide favourable travels times for rail over road-based modes.
  - 1 München: benefits from an S-Bahn service that is fully integrated into the wider urban transport system for distributing passengers. In this case, for

## Comparator rail links and other services

interchanging trips an express link would compare less favourably when taking into consideration waiting times for onward connections.

- Hong Kong and Stockholm: high service quality but market share is depressed by high prices compared to cheaper (and more direct) bus services.
- Düsseldorf: the airport serves a widely dispersed region of smaller cities clustered together - Köln, Aachen, Essen, Leverkusen, Mönchengladbach, Duisburg - and so the dedicated link to Düsseldorf serves only a relatively small proportion of the 18 million people who live within 65 miles of the airport.
- Shanghai: extremely fast travel time but the service is poorly used because it does not reach downtown - in this case the speed advantage does not compensate for the necessary transfer onto the metro system.

- 3.6 The adoption of a high quality, dedicated airport-to-downtown rail service is not necessarily the optimal solution in each case.

### Ramp-up evidence

- 3.7 Where ramp-up assumptions are available in the public domain (actual or assumed) a wide range of values have been observed. The assumptions however that have been adopted in our forecasts are reasonably consistent with what was assumed on the Canada Line in Vancouver, which in turn was based on the profile observed at London Heathrow.



