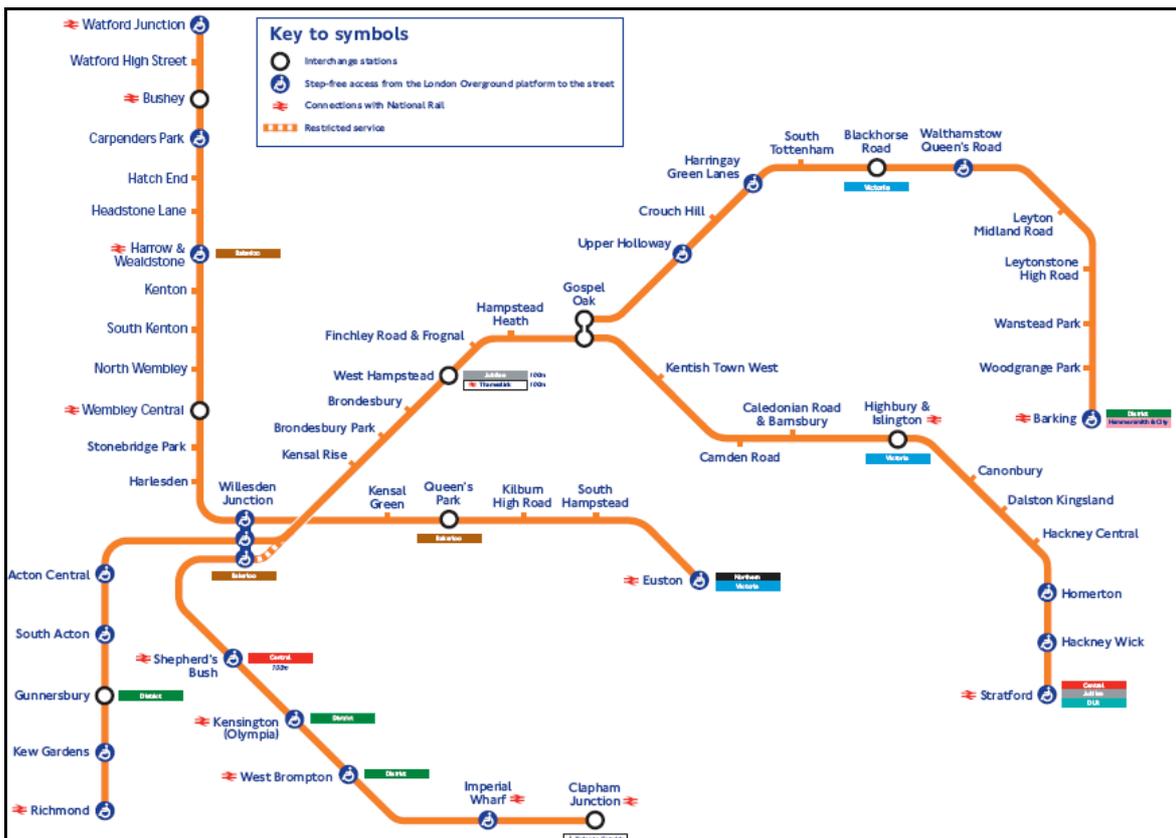


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The Journal of the Transport Economists' Group



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Container port development in China: past and present

Jamie Simpson, Jonathan Beard, Ted Laing & Robert Cochrane

Arup

28 January 2009

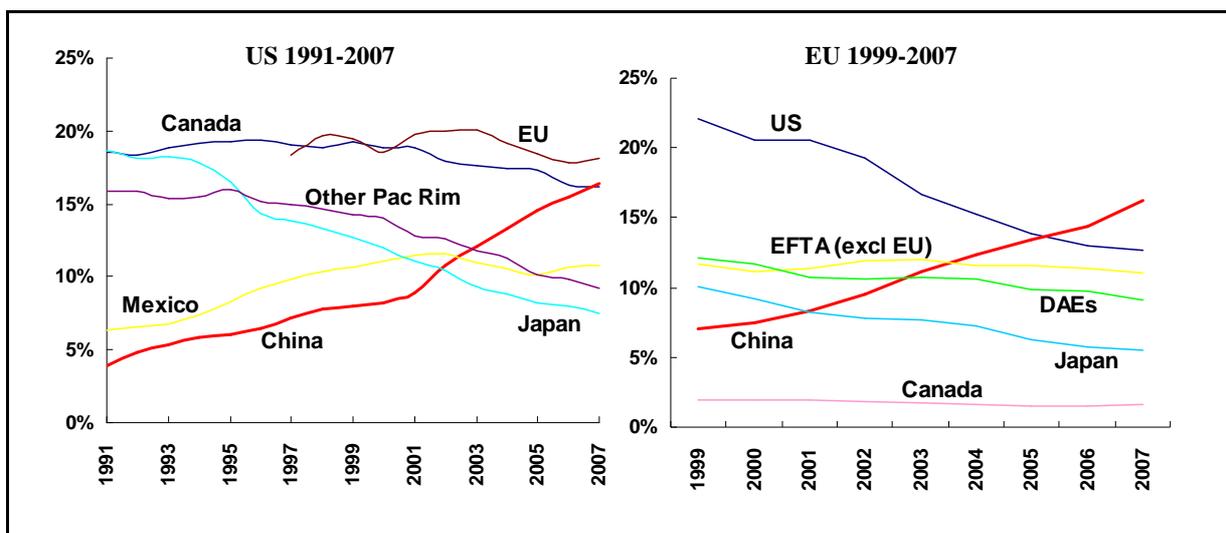
INTRODUCTION

Jamie Simpson explained that the talk represents the collective work of the three authors named in the presentation, and Ted Laing since 1993, for the Port of Hong Kong. The People's Republic of China (PRC) has seen the greatest development and growth of container ports in the world since 1985, and so allows some key themes shaping this sector in the future to be identified.

GROWTH STORY

Trade levels in China have been led over the last 15-20 years by east-west flows between the Far East and North America/Europe, most significantly in light consumer goods. China's emerging role as a producer (see Figure 1) has been driven by credit expansion and by growing consumption in North America and Europe.

Figure 1: US and EU merchandise imports



Three regions have driven the growth in container ports in China. From 1978, for the following 10-20 years, development took place in the Pearl River Delta, confined to Hong Kong and Shenzhen ports. From 1991, the second growth area of the Yangtze River Delta (YRD) took off, with a big concentration of manufacturing output in both Shanghai and the hinterland including Nanjing. More recently the Bohai region, which includes Beijing and Tianjin, has developed its port facilities.

In Hong Kong, the port development model tended to be one of concessions let to terminal operators in return for a lump sum payment to government. The concessionaires then have complete freedom to negotiate tariffs with shipping lines and consequentially the potential to secure high returns. Until 1993-97, Hutchison and the Worth Group had an effective duopoly in Hong Kong. However, high growth in trade meant that Hong Kong's relatively poor inland transport links became more apparent, and cargo owners became aware that total transportation costs might be reduced by avoiding Hong Kong ports.

In mainland China, port operators have tended to be joint ventures with foreign operators but subject to more regulatory control than those in Hong Kong. In general, "landlord" port models predominate, with high levels of public investment in infrastructure but negotiated market access and greater pricing regulation.

Hong Kong port now handles 24-25 million TEUs, a growth of 5% since 2001. Shenzhen ports' container trade has grown 27% over the same period, with new entrants, more port facilities and international port operators bringing efficiencies. The YRD's ports have shown around 30% growth in the same period, and Shanghai Port is now close to the being the world's largest container port behind Singapore. The Bohai Gulf Rim has shown similar but later growth.

BEHIND THE NUMBERS: PRODUCTIVITY

Globalisation has revealed large disparities in port performance, even though technology and management systems have become globalised through the influence of international terminal operators. The productivity measure of TEU handled per metre of quay per year varies from 3,000 in PRC to 1,200 in Europe. Far Eastern ports achieve 35 moves per crane hour against less than 20 moves per crane hour in Europe.

Shipping lines now tend to pursue economies of scale with larger ships, which puts pressure on ports and requires new technical operational parameters, such as:

- Dredging. 16-17m water depth alongside, and approach channels at all states of the tide where possible.
- Quays. Long straight quays/berths (1,200m to 2,000m long) for maximum flexibility.
- Container yard and gate. Areas of 25ha per 400m berth, with inland transport interface and gate, automation and incentives. Advance registration and security checks at gates.
- Equipment and systems. At least five and sometimes six cranes for each 400m berth, with an outreach 24 containers across and the capacity to lift two loaded 40 foot containers.
- Sustained productivity. 33-35 moves per crane hour and 200 moves/ship hour at berth.

The global growth in vessel size means that major ports are having to converge on performance to meet customers' priorities. Schedule integrity and crane moves per vessel hour at berth are now critical. Market factors have clearly been an important influence on what capacity/productivity performance levels can be achieved.

Figure 2: productivity and performance, 2006

| | Throughput (TEU) | Metres of Quay | Yard Area (Ha) | TEU per metre of Quay | TEU per Ha | Crane moves per hour (average) | Average TEU per crane |
|--|------------------|----------------|----------------|-----------------------|------------|--------------------------------|------------------------|
| Waigaoqiao & SCT | 18,470,000 | 7,120 | 619 | 2,594 | 29,840 | 34 | 249,600 |
| Yangshan – Phase I | 3,240,000 | 1,600 | 170 | 2,025 | 19,060 | 35 | 162,000 |
| Ningbo – NBCT, BL2, Phase IV & Daxie Phase V* | 7,068,000 | 4,388 | 276 | 1,611 | 25,630 | 34 | 164,380 |
| | Throughput (TEU) | Metres of Quay | Yard Area (Ha) | TEU per metre of Quay | TEU per Ha | Crane moves per hour (average) | Average TEUs per crane |
| Hong Kong Kwai Tsing Terminals | 13,760,000 | 7,694 | 279 | 1,788 | 48,980 | 34 | 145,470 |
| YICT | 8,863,000 | 3,045 | 208 | 2,911 | 42,610 | 35 | 216,170 |
| Shekou | 3,868,400 | 2,550 | 106 | 1,517 | 36,470 | 32 | 148,780 |
| Chiwan / Mawan | 5,684,400 | 3,878 | 139 | 1,466 | 40,810 | 32 | 120,945 |

Chinese ports have pushed the frontier in terms of operational efficiency, and few ports achieve the levels of productivity illustrated in Figure 2. It tends to be the case that more technology is applied once land becomes constrained by availability or cost.

A comparison between North American and Asian ports shows massive disparities in port capacity. One implication is that developers will need to demonstrate the effective use of existing assets before they can obtain planning approval and finance for new development.

Hong Kong's apparent efficiency in TEUs per metre of quay per year, long the world's highest, is now falling. One of the key reasons is the shift in vessel types: Hong Kong now services smaller vessels and has more transshipment. PRC ports receive larger vessels, mostly carrying direct exports.

For the shipping line the fundamental measure of productivity is vessel moves per hour, which depends on both quay crane operating efficiency and the number of cranes provided. For the port operator it is annual productivity per unit of capital which counts, as measured by annual TEU throughput per metre of berth, per hectare of land and per crane. Both sets of measures depend on the quay crane operating efficiency, but the second is also affected by vessel size, calling patterns and the service quality standards demanded by shipping lines. A major factor is annual peaking, since service quality is particularly vital in the peak. As a result of these factors, ports rarely exceed 60%-65% annual occupancy.

Flexibility on the use of labour can also be important. In Asia, there tends to be flexibility on the mix of labour and technology, whereas in Europe the labour market can be frozen, which blunts market signals.

In the UK the normal productivity level used in planning port development is 1,040 TEU/metre per year, much lower than levels abroad. In Southampton this seems to be changing, as new owners put more emphasis on productivity in awareness of what can be achieved elsewhere, and probably also of the failure of the Dibden Bay planning application. 1400 TEU/metre of quay per year are now being achieved.

BEHIND THE NUMBERS: PRICING

Ports have tended to chase volumes, but different types of cargo have different rates of return. Deep sea east-west movements have the highest rates of return, followed by transshipment. River (inland) cargo movements have the lowest rates of return, requiring the ports to work

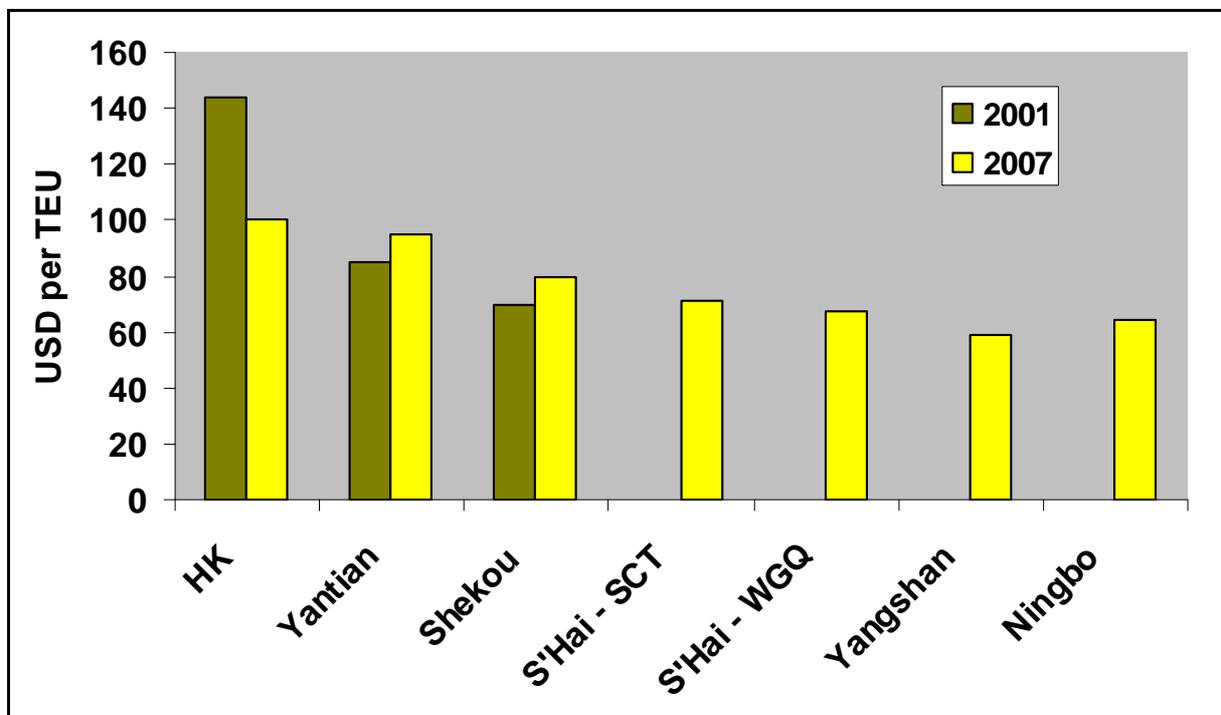
harder because ships are smaller. The port operator will have little say in the market it serves because it is one small part of the supply chain.

Hong Kong ports, for example, are at a cost disadvantage of \$200 per TEU movement compared with other Chinese ports, regardless of the pricing strategy. The “total through cost” question drives port choice decision-making, particularly as oil prices drive inland transport costs.

Hong Kong is therefore losing deep-sea cargo to Shenzhen because of inland transport barriers. The ability of container ports to control prices is dependent on the supply chain structure, which causes difficulties for investors and bankers. The concentration of shipping lines further increases their bargaining power, although aggressive port expansion and new entry can transform regional positions in the medium term. But regulation and concession agreements can limit the scope for real tariff increases.

Tariff trends in South China and the YRD (see Figure 3) show how the Hong Kong premium has fallen since 2001, with real reductions in average revenue per TEU. These very fast changes are new in a sector that used to be much more stable.

Figure 3: South China and YRD container handling charges



THE FUTURE

Late 2008 saw a dramatic downturn, with a halt in the high growth rates previously experienced. The balance between supply and demand is now changing and the consequential lack of long-term stability or growth is causing difficulties for investors.

Yantian throughput, with high dependency on North America trades, experienced the earliest decline, with volumes down 5.3% in the first half of 2008. Throughput at other PRC ports turned down extremely quickly in the last quarter of 2008. Hong Kong exports of laden containers were still growing year-on-year at 6% in September, but in December, there was a fall of 24% in exports of laden containers, although the overall fall, at 19%, is lower due to the growth in empty containers returning to China, which reached 13% year-on-year in December. So the overall numbers are sure to fall further.

Data from the rest of China is harder to obtain, but current estimates give a 17% fall in exports from Shenzhen in November and 23% in December. Inward bound laden containers through Shenzhen (imports of Western goods and machinery to PRD cities) fell by 27% in December 2008. Shanghai trade fell 6% in November. Good December estimates for Shanghai and Tianjin for December are not yet available.

Future challenges for the port sector in the PRC are greater competition between ports, higher performance standards being critical to market share, and greater commercial challenges, with more pressure on port pricing power, more demanding capital markets, more demanding stakeholders and greater consideration of cost recovery of port infrastructure and related off-port investment.

The lessons for the UK are that, even here, the supply and demand balance will change in the next five years as more supply comes online, assuming planning approvals come through. With the UK ports showing relatively low productivity, at 15-20 crane movements per hour compared with 30-35 at Asian ports, the implication is that large ships may stop coming to the UK. More competition will inevitably mean lower prices. In the UK, Hutchison and Dubai Port World are effectively a duopoly. Port developers are now being required to pay the costs of inland transport, effectively internalising the externalities.

DISCUSSION

Peter Gordon (Editor, TEG Journal) asked about forecast growth rates for China. Has the market reached saturation or is there still a long way to go?

Jamie responded that the ability to grow the market is driven by consumption, so growth has recently dropped as outsourcing has reached its limit and the ability to grow is now lower. Jonathan added that growth last year was still 9.5-10%, although energy consumption was starting to fall. Next year's GDP growth is expected to be 6.5%. He reflected that it can be very difficult to turn round the economy from a manufacturing to a consumer base, although prospects were still positive for the medium to longer term, as long as there is no reversion to protectionism.

Stephen Howard (self-employed) asked about UK port efficiency. How efficient are the container ports and don't container ports have a bigger hinterland?

Ted highlighted that the sizes of ships calling at ports are the same in the UK and continental Europe. However, there has been a big increase in ship size in the last few years. UK growth has lagged behind continental Europe and productivity levels are lower. The propensity of larger ships to call in the UK therefore falls. Robert added that ports will charge what the markets will bear, bearing in mind cost recovery. The UK can achieve a peak of 25 crane movements per hour but this is not as good as sustaining 20 movements for long periods as can be achieved at ports such as Hamburg. UK average crane movements per year, on the other hand, are high, which may suggest that there is under-provision of cranes, thereby minimising investment in handling equipment. The current strategy may maximise profits now but it could be the first step in a shift towards the UK being served only by feeder vessels, where profit margins will be low.

Tom Worsley (Department for Transport) asked whether competition between ports is not limited by geography because containers have a relatively low cost for surface transport.

Robert replied that the important issue is distance to inland market compared with distance to port. Port authorities are trying hard to capture the hinterland: for example, Hamburg is trying to improve rail routes into Poland.

Sheila Farrell asked why, if European ports have more contestable hinterlands, tariffs in the PRC do not move upwards?

Jonathan compared tariffs in Shenzhen and Shanghai. Shanghai has the same quality but tighter supply, so one would expect higher tariffs. However, the public sector owner keeps rates down as it is chasing volume. Jamie added that pricing tends to be mediated by agreements, rather than pure revenue-maximising behaviour. Ted also pointed out that Hutchison did lower tariffs in Hong Kong, but not by enough.

David Starkie (Case Associates) commented that, given the dynamics of the marketplace, there is a potential problem of stranded assets. The normal response to this is vertical integration or negotiation of long term contracts. Is there an intention to pursue the latter?

Jamie outlined the key features of the business model. For international terminal operators, the service offer is to invest in ports and the key is to focus on markets in good locations with limited competition. For the shipping lines, there is vertical integration with the container terminal operator, with leases of around 15 years. The pattern in North America is for shipping lines to control much port activity. Rotterdam port, for example, builds a port with a 50-year life, matching to the bond period, and leases facilities to international operators or shipping lines. The concession agreements also match asset lives, such as 15 years for cranes. South China is dominated by international operators. Under a “virtual terminal agreement”, the shipping line has management control, long term arrangements and incentives to expand volumes.

Gregory Marchant asked about the impact of the Panama Canal.

Jamie explained that China-US trade tends to be dominated by flows between Hong Kong/Shanghai and LA Long Beach, with flows also to Oakland, Vancouver and Prince Rupert. At LA Long Beach, containers are shipped on a one-day truck or rail journey for onward distribution from centres such as Chicago or Memphis. The Panama Canal is a restriction to China-US flows, as it is limited to 4,000 TEU ships, but there are now plans to excavate the canal further to allow 12,000 TEU ships. This will provide a lower-cost shipping substitute to the high-cost rail transshipment. Eastern US ports and rail infrastructure companies in the East are now investing ready for 2015, when the canal works are expected to be complete. This will result in a big shift in US port flows.

Report by Julie Mills

London Overground concession: standards, ticketing and structure

Peter Field, London Rail Development

Carol Smales, Principal Transport Economist

Arup

24 June 2009

INTRODUCTION

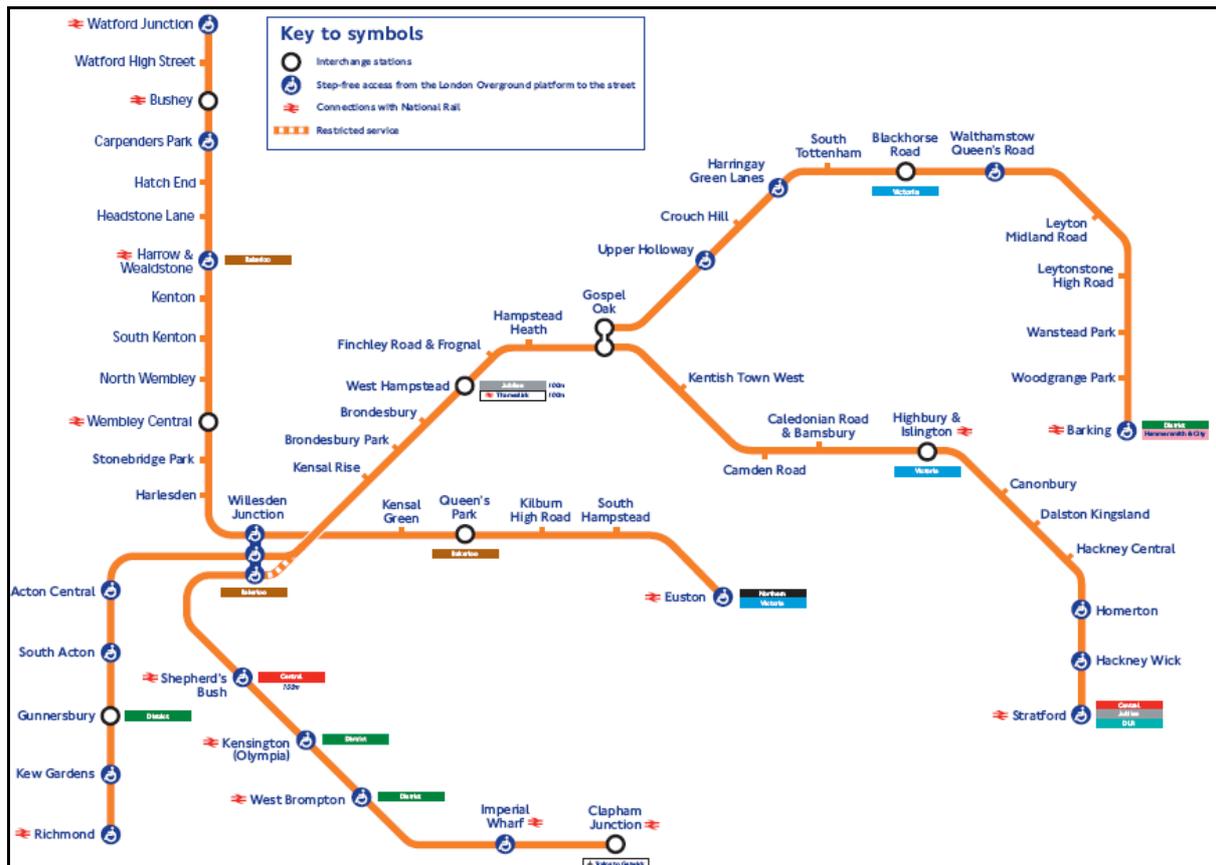
Peter Field began the presentation by explaining that they were going to talk about why London Overground is being developed. The context is that Transport for London (TfL) is one of the few multimodal transport authorities and, therefore, the Overground is part of an integrated transport system.

THE LONDON OVERGROUND NETWORK

The London Overground network currently comprises the former “Silverlink Metro” services in North London, transferred to TfL in November 2007. In future it will also incorporate the former London Underground East London Line, currently closed for reconstruction, and extensions to West Croydon/Crystal Palace and Highbury and Islington. Figure 1 overleaf shows the extent of the North London railways part of the network in 2009.

TfL has a £1.4 billion investment programme, outside the DfT’s High Level Output Specification (HLOS) framework, to create an orbital network. It is designed to provide improved standards of service, with staff at all stations during operating hours, Oyster pay-as-you-go (PAYG) ticketing, refurbished stations and new trains. It will be to a standard comparable to other modes in London. With a minimum of four trains per hour (tph) on all services, there will be a virtual turn up and go service. There will be longer operating hours and security improvements with CCTV and help points. One of the first actions in November 2007 was to deep-clean all stations and to provide TfL’s standard of information.

Figure 1: London Overground network in 2009



Source: Transport for London

From 2010 when the East London Line reopens, the network will serve 21 boroughs including some of the most deprived areas in London.

THE KEY POINTS OF THE LONDON OVERGROUND CONCESSION

Ninety percent of the revenue risk is taken by TfL with fares and ticketing strategy set by Mayor. TfL has close involvement in specification and delivery of services and sets the service standards, and monitors and enforces service quality. TfL invests directly in infrastructure and buys and leases rolling stock directly through QW Rail Leasing, which is cheaper than via a Rolling Stock Company (ROSCO).

Table 1 overleaf sets out the division of responsibilities between TfL and London Overground Rail Operations Ltd (LOROL), the concessionaire.

Table 1: responsibilities of TfL and LOROL

| TfL | LOROL |
|--|---|
| <ul style="list-style-type: none"> • Manage the contract • Specify the service level • Specify the standards: <ul style="list-style-type: none"> • trains • stations • safety and security • passengers services • equality and inclusion • Introduce Oyster, gates, validators and ticket machines • The Mayor sets the fares • Manage communication with stakeholders • Provide 47 new trains • Meet Olympics aspiration | <ul style="list-style-type: none"> • Operate train services • Manage the stations • Deliver the stations upgrade • Start the ELL passenger operations • Staff and resources • Customer service, security and retailing activities • Collect revenue for TfL • Clean & maintain stations, trains • Report to TfL • Deliver 8 new diesel trains • Customer interface |

CONCESSION OR FRANCHISE

Table 2 lists the main differences between a concession and a franchise.

Table 2: differences between a concession and a franchise

| Concession | Franchise |
|---|--|
| Revenue risk taken by TfL | Revenue risk taken by franchisee |
| Focus at letting on service delivery and cost efficiency | Focus at letting on subsidy level subject to meeting franchise obligations |
| Close involvement in day to day operations and monitoring | Managed through contract |
| Able to respond quickly to market changes | Response through contractual mechanism |
| Enhancements funded and managed by TfL | Enhancements funded and managed by Network Rail |

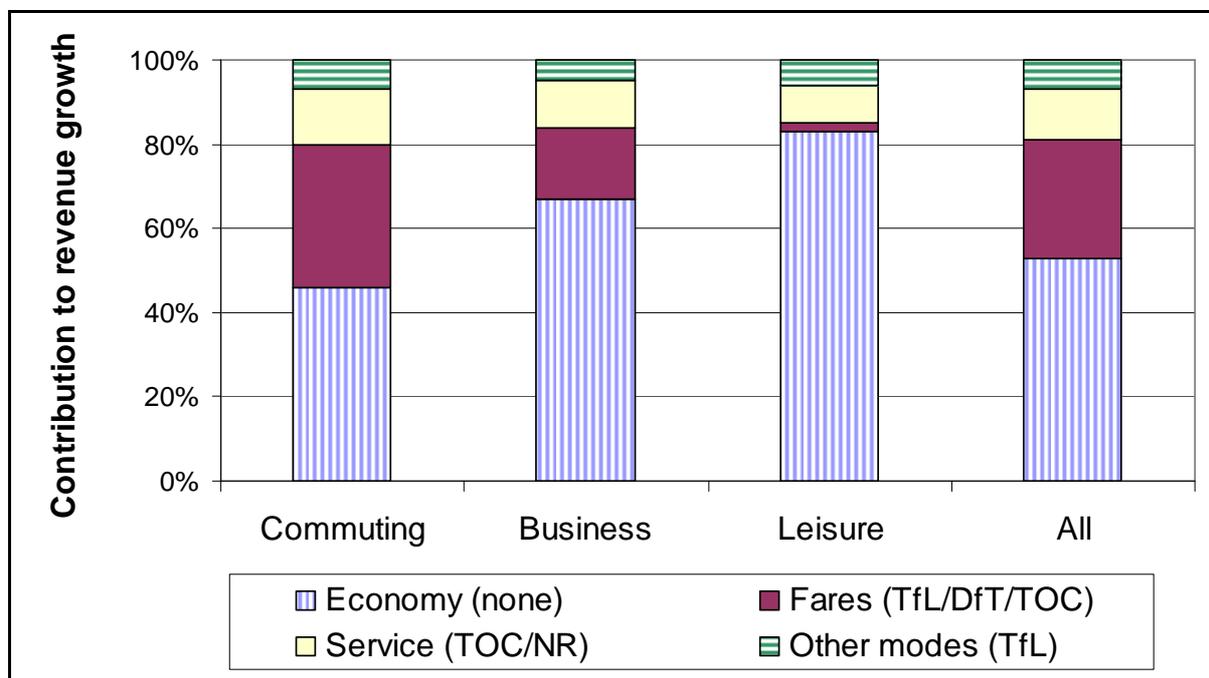
Differences are also highlighted by the type of contract: gross cost (concession) and net cost (franchise), shown in Table 3.

Table 3: revenue risk of contract types

| Gross cost concession | Net cost franchise |
|---|---|
| Operator takes cost risk | Operator takes cost risk |
| Authority takes revenue risk | Operator takes revenue risk |
| Risk may be shared | Risks shared through cap and collar |
| Operator incentivised to collect revenue through ticketless travel regime | Operator incentivised to collect revenue through fare-box |

In London, only a small part of the revenue is under the control of the train operator. Figure 2 below shows that most drivers of revenue are outside the operator’s control.

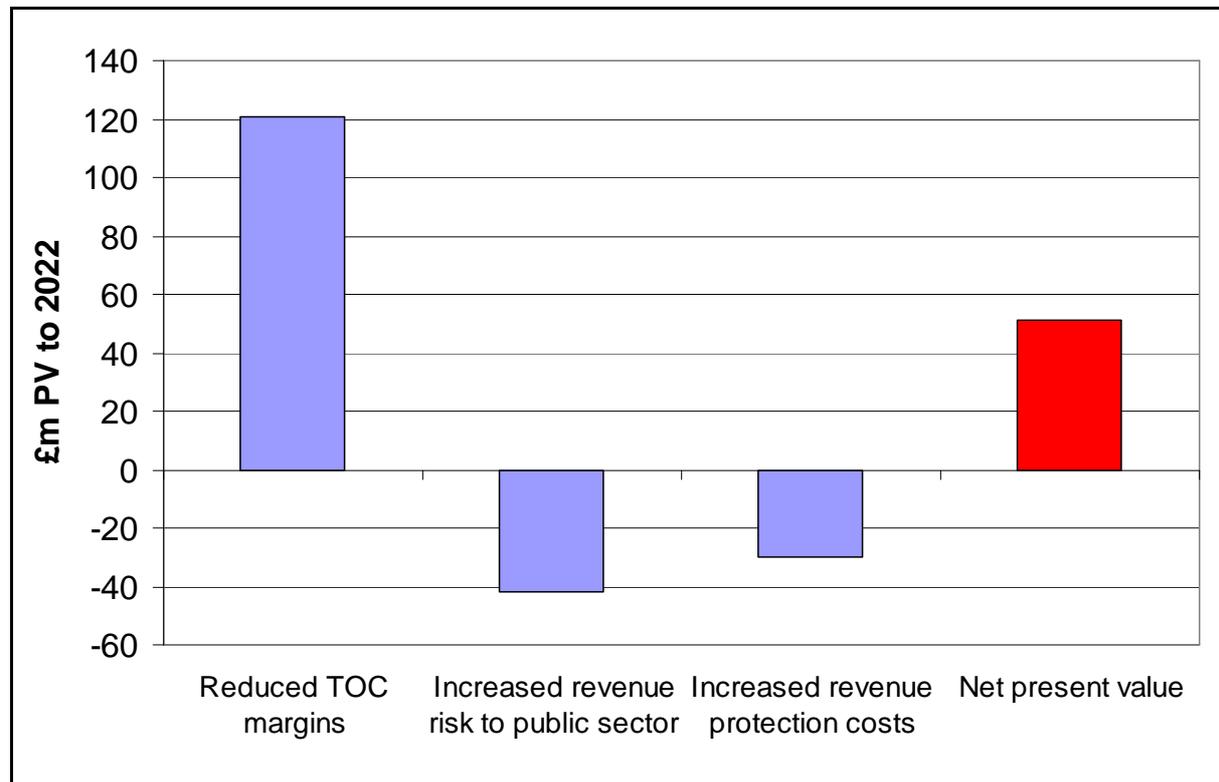
Figure 2: revenue drivers in London



There are also numerous advantages to gross cost contracts, including lower contract prices and bidding costs, which could reduce margin by 2-3%. The operator focuses its attention on service delivery and cost control.

TfL and the Mayor can take a longer term view and are better placed to manage risk than the train operator. TfL also set the fares and coordinates revenue management, and the public sector gets a return on direct investment through the fare box. Figure 3 shows the estimated London-wide present value of benefits from gross cost contracts.

Figure 3: London-wide benefits of gross cost contracts



TfL play an “intrusive” role, similar to London Underground, with a lot of passenger surveys to find out about performance and to understand users and their views. Surveys of user demographics, journey purpose, ticket type, attitudes to travel and use of Oyster data for origin and destination, yield and time of travel are augmented by passenger counts. Surveys consist of:

- Ticketless travel survey
- Customer Satisfaction Survey (CSS)
- National Passenger Survey (NPS)
- Mystery Shopper Survey (MSS)
- User and attitudes survey

Surveys are managed by TfL and conducted 2-4 times per year, are statistically robust, and a consistent approach allows comparison across franchises.

As the operator does not take all the revenue risk, it is incentivised by performance regimes linked to surveys, aggregated to the whole of the London Overground concession.

PROGRESS OF CONCESSION PERFORMANCE

Table 4 shows the performance of the Overground concession since it started in autumn 2007.

Table 4: revenue risk of contract types

| | Autumn 2007 | Spring 2009 |
|--|------------------------|------------------------|
| Fare evasion rate | 13% | 2% |
| Customer Satisfaction Survey (CSS) overall score | 71 | 74 |
| Mystery Shopper Survey (MSS) overall score | 71 | 80 |
| Public Performance Measure (PPM) | 88.4% | 93.7% |

Note: PPM is the percentage of trains arriving at destination within 5 minutes of time

On “day one” the Overground introduced Oyster pay-as-you-go (PAYG) and staff at all stations during operating hours. There are more trains on time and more off-peak services, revenue is up and ticketless travel is down. Station entrances have been branded and the “clean and repair” of all stations, which included safety and security improvements, was completed in summer 2008.

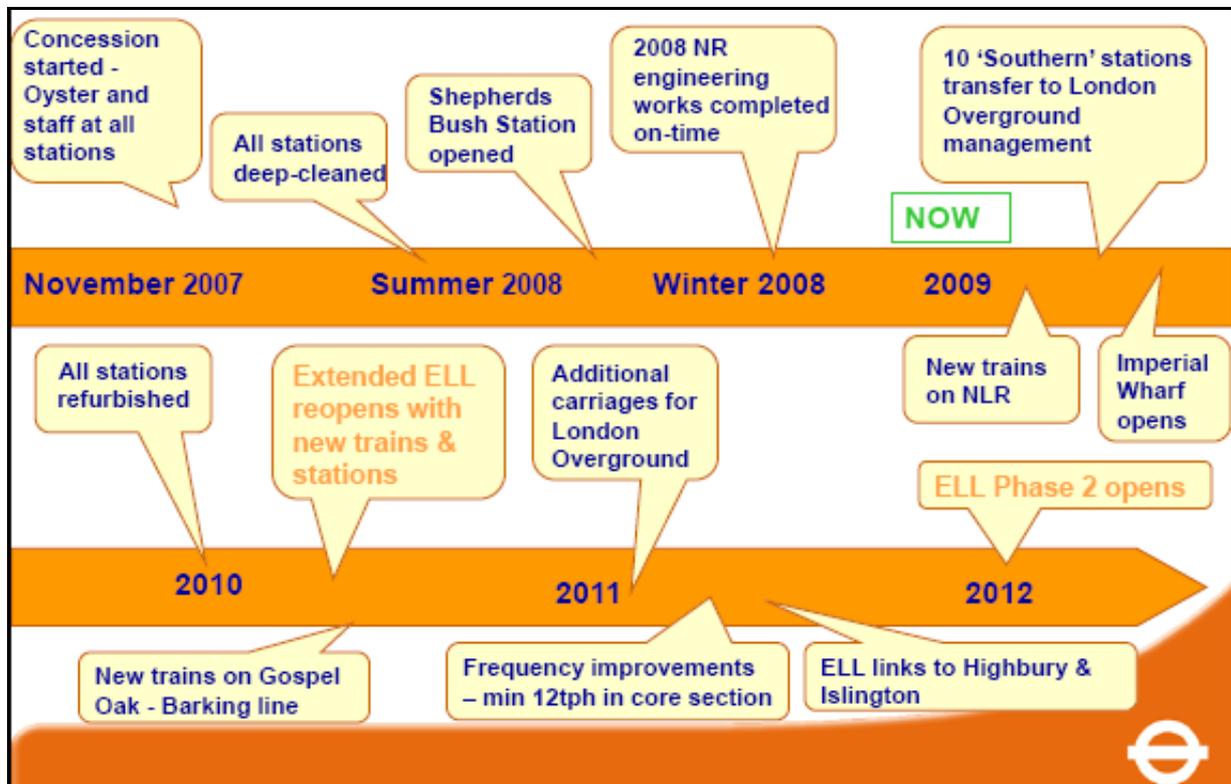
This has led to an improved customer satisfaction survey (CSS) rating.

The service will improve further with new trains coming into service in July, the successful completion of infrastructure works and the next phase of stations improvements starting this summer.

OVERVIEW OF INVESTMENT PROGRAMME

Figure 4 shows the key milestones up to 2012 for London Overground.

Figure 4: London Overground milestones to 2012



Improved services

2007, longer operating hours

2010, services to West Croydon and Crystal Palace

2011, a minimum of 4tph at all stations

2012, service to Clapham Junction and a complete inner London orbital

New trains

44 new electric trains in summer 2009

8 new two-car diesel trains on Gospel Oak-Barking line in 2010

24 extra carriages to lengthen existing trains in 2011

3 extra four-car trains on the East London Line in 2011

Better stations

All stations deep cleaned in 2008

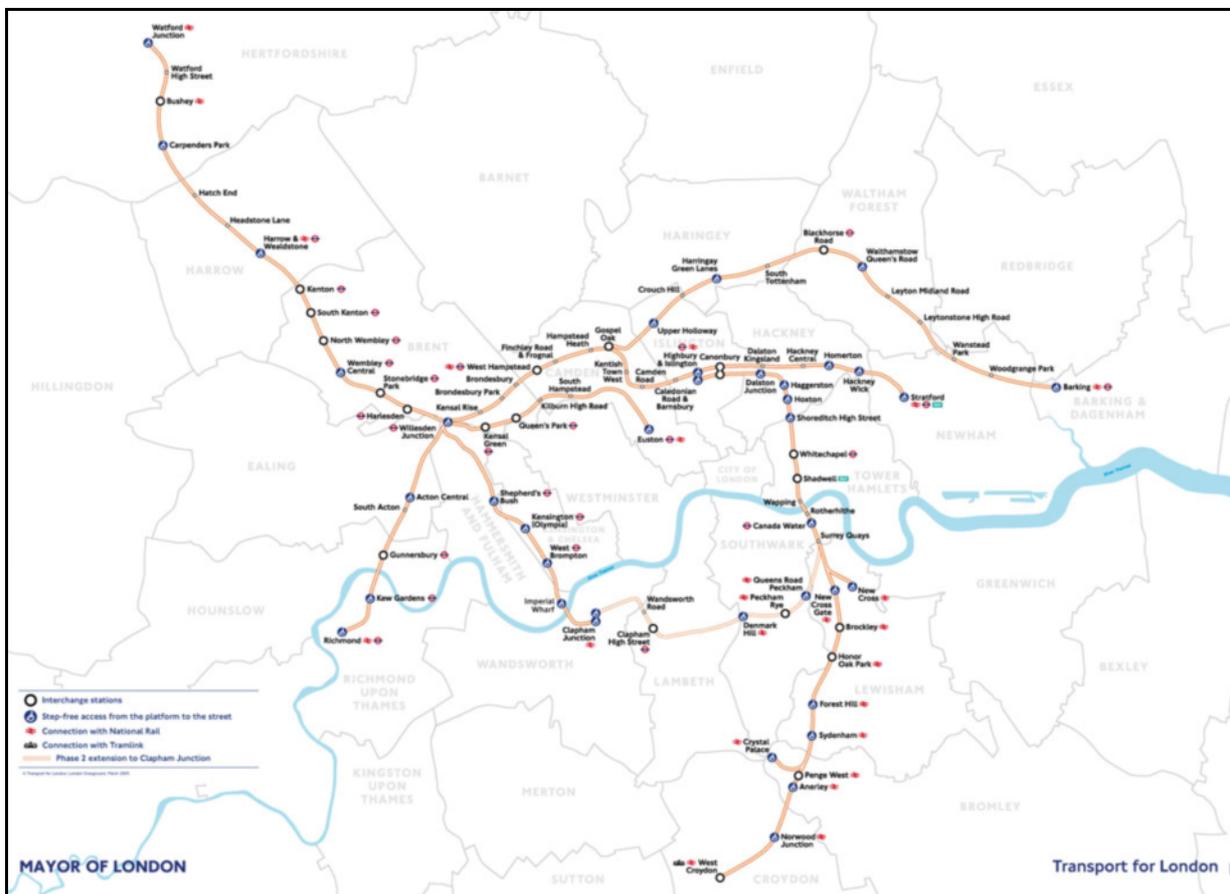
All stations refurbished in 2010

Four new step-free access stations in 2010

Aspirations to remodel some stations from 2010

Figure 5 shows the London Overground network as it will be in 2012, after the completion of works to the North London and East London lines, and incorporating the South London Railway to Clapham Junction.

Figure 5: London Overground network in 2012



TFL'S FURTHER ASPIRATIONS FOR RAIL SERVICES IN LONDON

- Increase operating hours: 0630-0030 Monday to Saturday and 0730-2330 Sunday
- Oyster PAYG ticketing on all services in London
- Safety and security: Help Points, CCTV, lighting at all stations
- Static displays to provide full multimodal information
- Real-time information: Departure displays, public address announcements and disruption information

TfL also seeks to be involved in the refranchise process throughout London. For example, with the South Central rail franchise awarded to Govia from September 2009, TfL has been working with DfT to bring Overground-style standards to passengers south of the river. The franchise includes many of TfL's recommendations:

- Platform extensions for new and longer 10-car trains
- 4 trains per hour on all routes all day (except where single tracked)
- Earlier and later weekday services and enhanced Sunday services
- Oyster PAYG acceptance and Oyster retailing
- Gating of 14 "metro" stations
- Staffing at gated stations for at least 16 hours
- Transfer to TfL of 10 Southern stations served by ELL phase 1

DISCUSSION

Peter Gordon (DeltaRail) asked whether standards on rail infrastructure were being raised. Peter said that this is impossible in some places and so other modes are looked at: for example, east of Canning Town was converted to DLR. Trade-offs are made to provide the best public transport system for London, and ideally the DfT budget for London is used to make sensible multimodal decisions.

Gregory Marchant noted that the Overground network is more complex than the Underground. Had TfL considered simplifying it? This has not happened yet, but will be considered as the number of trains grows.

Tim Yates enquired what proportion of costs come from the fare-box. Peter said that it varies by segment: DLR roughly covers operating costs, and LOROL aspires to that by 2017.

Stephen Plowden was interested in the methods of economic evaluation. On infrastructure, TfL's business case is very similar to DfT WebTAG (www.dft.gov.uk/webtag/) where the hurdle is a benefit to cost ratio of 1.5. North London and East London railways BCR is between 2 and 2.5.

Stephen Burke (Bexley) asked how much of the demand modelling is orbital. This is a difficult question to answer but the Railplan model gives some information.

Peter White (University of Westminster) opined on elements in demand drivers. Leisure travel is assumed to be more price-elastic, and there has been a reduction in sales of weekly Travelcards in favour of Oyster PAYG, which is more flexible.

John Segal (MVA Consultancy) enquired how satisfaction surveys compared with those of the Underground. Peter advised that there is some similarity but no direct comparison.

Tom Worsley thanked Peter Field and Carol Smales for giving such a full analysis of London Overground. He considered it good news that DfT and TfL are getting together to provide what Londoners want. He noted that there is a potential for better modelling with new data.

Report by Laurie Baker

Meeting transport's carbon challenges

Adrian Gault

Chief Economist, Committee on Climate Change

Arup

23 September 2009

INTRODUCTION: THE ROLE OF THE COMMITTEE ON CLIMATE CHANGE

The Climate Change Committee (CCC) was set up by the Climate Change Act 2008 to guide the Government by providing independent advice on carbon budgets. The Committee's December 2008 report advised on three 5-year budgets extending to 2022. The 2009 Annual Progress Report, the Committee's first, is to be published in October. Future progress reports will be published in June of each year.

The Committee's December report outlined its approach to setting carbon budgets. The objective is to limit the increase in global temperature to 2°C on the basis of scientific evidence, which shows high environmental damage costs of any greater rise, and to reduce the probability of an increase of 4°C to a very low level of (less than 1%). The trajectory towards the global target of 50% is the shared responsibility of all United Nations Framework Convention on Climate Change (UNFCCC) signatories, although different countries are expected to adopt different targets ("common but differentiated responsibility"), which might be expected to mean higher targets for countries which emit the most carbon per capita. The UK and other countries in the G8 have agreed a goal that developed countries should aim for an 80% reduction in emissions on 1990 levels, as an appropriate contribution to the required global cut. Since the marginal damage costs are affected by the overall stock of carbon in the atmosphere, there is a strong case of adopting policies for an early peak in emissions, with an overall decline before 2020.

The CCC's first report recommended budgets for the UK for each 5 year period from 2008 to 2022. A 21% reduction on 2005 levels by 2020 will be required if the trajectory to 2050 is to be achieved, and this was set in December as an interim budget, and legislated for by Government in the Climate Change Act.

If agreement is reached in Copenhagen this October, the Committee proposed that this target be tightened to an intended budget of a 31% reduction. Responsibility for meeting the budget is split between the traded and non-traded sectors, with the latter covering domestic and commercial space heating and all transport other than electric rail (covered by the traded sector), aviation and shipping beyond Europe.

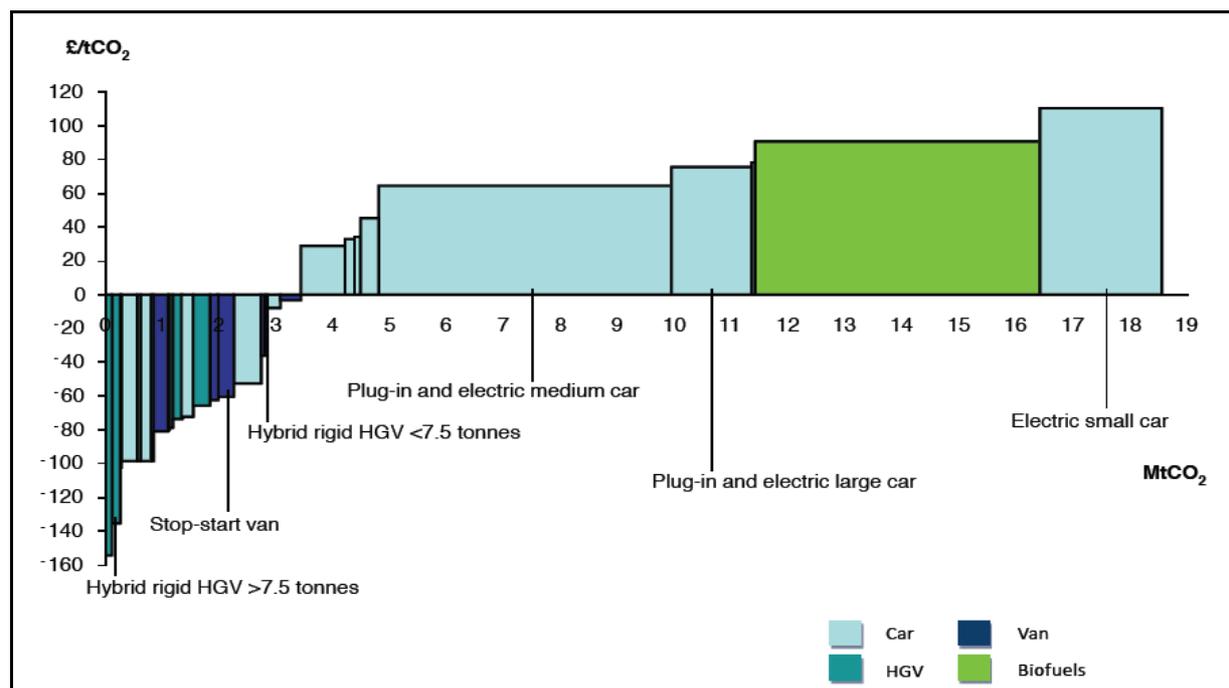
RECENT TRANSPORT TRENDS

CO₂ emissions from the transport sector have continued to increase until a recent reversal probably explained by the recession. CO₂ emissions from transport rose by 12% between 1990 and 2007 and by 4% between 2003 and 2007. Cars account for over half of all transport emissions, with vans, a rapidly growing sector, around 15% and HGVs 19%. Diesel rail makes up less than 2%. Without substantial technological or other changes, transport emissions are expected to remain broadly unchanged, with gains in the efficiency of new cars being largely offset by traffic growth.

TRANSPORT IN THE CCC'S DECEMBER REPORT

The CCC's budgets for transport were informed by analysis of marginal abatement costs, including social costs and the estimated costs of emissions reductions from a wide range of policy options (see Figure 1).

Figure 1: Marginal Average Cost curve



The Marginal Average Cost (MAC) curve plots, by ascending cost, the measures (such as plug-in electric medium cars), their social costs per tonne of carbon saved and the quantity of carbon saved by the measure.

Three scenarios were considered in drawing up the MAC curves:

- Current policies, which assume overcoming the inertia that inhibits adopting cost effective measures
- Extended policies, broadly in line with committed vehicle efficiency goals including improving average car efficiency from the current ambition scenario of 130g/km to 95g/km, smarter choices, eco-driving, effective enforcement of speed limits, increased use of biofuels
- A stretch scenario, which assumes that technology delivers savings for vans and HGVs, bigger savings from eco-driving, and lower and effectively-enforced speed limit

AVIATION

The CCC published advice on a framework for reducing aviation emissions on 9 September 2009. Aviation should be capped through global agreements and targets, making for real reductions, in addition to the purchase of permits for an interim period. More research and development is needed to encourage innovation in this sector. The CCC will publish further advice in December, proposing how this sector can meet a target of reducing 2050 emissions to 2005 levels. Containing the growth in aviation emissions is likely to require other sectors to reduce their emissions by around 90% in 2050 in order to deliver the overall 80% target consistent with the global temperature change objective.

FORTHCOMING FIRST PROGRESS REPORT

The report will update the previous scenarios for reducing emissions, taking account of both the revisions to Treasury GDP forecasts and new analysis by the Committee. It will set out a framework for assessing progress in emissions reduction along the trajectory for meeting the budgets. The framework will identify the actions that need to be taken by a given date – the milestones – if the budget is to be met.

One part of the new work focuses on the car market and the use of cars, in order to establish the role of technology and changes in behaviour in reducing emissions from transport.

The CCC has examined the market outlook and the infrastructure changes required if there is to be a substantial increase in the use of electric vehicles, on the assumption that most if not all electricity will be supplied from carbon-free or low carbon sources. Factors such as trip length, the availability of off-street parking or other places to park where vehicles can be plugged in, and the need for fast charging points, mainly to reassure drivers of a guaranteed ability to complete their trip, all influence the extent to which electric cars will be a substantial part of the policy. Demand side measures such as road pricing and Smarter Choices have also formed part of the scenarios considered by the CCC. The CCC will review the cost of purchasing electric vehicles and the level of subsidy that would be needed to make them competitive.

QUESTIONS

John Dodgson (retired): Are electric cars an essential part of the package? Adrian replied that biofuels and hydrogen are alternatives which the CCC has not assessed in depth. Electric vehicles are the most likely option and are being piloted now. All policies to reduce carbon emissions substantially rely on decarbonising electricity generation.

Chris Butt (Strathclyde PTE): How realistic are these challenges? Are we still waiting for an unknown technical fix? The technologies are known, although it is a big task to deliver them. It is even possible to envisage low carbon aviation, although there may be lower cost options in other sectors.

Chris Castles: Why have you said nothing about prices and their effect? Adrian replied that the measures adopted affect the costs of energy, and as the CCC's work progresses this will continue to be taken into account. But while the CCC looks at the responsiveness of road transport demand to increases in road fuel duty, and expects to consider broad policies such as road pricing, its remit does not directly cover detailed policy.

Dick Allard (Queen Mary, University of London): How do you accelerate the process of incentivising technical change? The CCC has been asked to review R&D into low-carbon technologies and the possible UK role in and share of this market. The reduction in electric vehicle battery costs provides a good example where there is an important role of the market incentivising technical change, though this is an area where Government support towards purchase cost of electric vehicles and infrastructure is also required, at least initially.

Robert Barrass (retired): What account is taken of other environmental impacts in formulating the CCC's advice? The CCC aims to take full account of all of the principles of sustainable development in its analysis.

David Metz (London School of Hygiene and Tropical Medicine): Has the CCC built its own transport model? Does the CCC take account of land use changes and the whole impact of policies adopted to meet carbon objectives on transport demand? The CCC has no transport model and relies on others' models, although it does not rule out its own modelling in future. The CCC has held workshops with land use experts, and some of the conclusions will be reported in the October report.

John Segal (MVA Consultancy): Do you take into account the effects of different settlement patterns and the location choices in analysing options for reducing carbon emissions? Adrian replied that the CCC has looked at differences in emissions per household by area types, bearing in mind Government plans for three million new homes by 2020. This has been used to make recommendations and to influence the debate about location decisions.

Eileen Hill (MVA): Have you considered how to move from implementing overall policies to getting individuals to make the choices required to deliver those policies? The CCC had done some work on the factors that influence people's choice of vehicle and the role of efficiency in this decision. There is more literature on the barriers to households taking up domestic energy efficiency measures.

Chris Butt (South Yorkshire PTE): Is the allocation of carbon budgets to be made at the level of local authorities? The CCC has not considered this.

Dick Allard (QMC): The Mayor's London Plan includes a carbon budget. Did the CCC advise the Mayor? Adrian replied the CCC had not done so to his knowledge, although the CCC can be asked to advise the devolved administrations.

Michael Spackman (NERA) noted that the CCC is in favour of the full auctioning of permits, but that some economists think that a more limited auction is preferable. The CCC wants full auctioning of aviation allowances, and more generally would like to see increased auctioning of allowances within the ETS. Issues are raised about competition in some sectors, and the CCC's main point on this is that options to address such concerns are confined to the relatively small number of sectors where there are genuine issues.

David Metz (London School of Hygiene and Tropical Medicine): Why isn't the ETS for transport implemented through fuel suppliers instead of putting transport in the non-traded sector? This is not an option that the CCC has examined recently. Treasury might have views about measures which affected road fuel taxation.

Gregory Marchant (retired): If vehicles become more efficient, can we take actions to ensure that public transport use does not fall? The CCC has considered this, including options which keep the cost of motoring constant. Again, this has implications for the tax take from transport.

Peter Barber (consultant): Does the government have to be braver in the case of transport because its emissions are growing more rapidly than other sectors? The optimal set of policy options depends not on the size of the sector, or the growth in its emissions, but on the cost-effectiveness of abatement in that sector, as illustrated through the sector's MAC curve. But decarbonising electricity remains a key option, without which the 2050 target will not be delivered.

Report by Tom Worsley

Review

The views expressed are those of the reviewer and should not be attributed to the Transport Economists' Group

Great Cities and Their Traffic, by J Michael Thomson, Victor Gollancz Ltd, 1977 (ISBN: 0 575 02146 2)

This book was published in the year I completed an MSc in Transport, and I must have read it soon afterwards, forming memories revived when a former TEG chairman enthused about it. Although it is long out of print, an internet search soon located a second-hand copy salvaged, as it happens, from the library of Fort Bragg.

On rereading, some of the language seems dated. The “coloured” populations of Detroit and New York have long been replaced with “African-Americans”, and people in Hong Kong no longer seek the safety of “the small area that is not due to come under Chinese control in 1997”. Much is, however, excellent, and I was delighted to rediscover the despairing description of how a commission set the layout and dimensions of Manhattan’s grid pattern of streets “*Contemporary highway planners would admire the decisive way in which the commission reached these conclusions on the basis of absolutely no scientific evidence*”.

Thomson made the most of limited 1970s’ graphics with excellent introductory charts of urban population, car registrations and ownership, public transport use and accident rates. In the larger cities, for example, transport killed nearly a thousand people a year.

Working through his selection of cities, Thomson noted how the scale of transport grows with both population and dispersion. London had 88 kilometres of motorways, Los Angeles had 450, and New York had 1,770, more than the whole UK. London had a million rail commuters, “*the biggest and most difficult commuting operation in the world consists of getting 2 million Americans to and from their work in lower Manhattan*”, and Tokyo’s surface railways alone carried around 20 million passengers a day, with average peak hour loads of over 300 passengers per coach.

His simple line drawing maps show how water is a major shaper of big urban areas. Shoreline Chicago, Detroit and Toronto are confined to semi-circles, Calcutta, London, Paris and Sydney are bisected by rivers,

Hong Kong, Lagos, New York and Stockholm are dissected by them, and San Francisco and Tokyo circle a bay. Most bizarre of all is Copenhagen, on the edge of an island on the edge of the country, crammed into a 120 degree arc around its airport.

The organisation of transport in each city appears to have a major influence on the control of possible outcomes. At one extreme, Singapore and Hong Kong had unitary government untroubled by a rural hinterland and, at the other, large America urban areas squat across many counties and even, in the case of New York, three different states.

Thomson contrasted the state highway authorities' ring-fenced road-building funds with the difficulty of funding public transport across even county boundaries. Massive "matching funds" from state or federal government were needed to achieve schemes which reach the car-less underclass, a forerunner of the London's current obsession that new railways stop not only where there is demand but also where there is "exclusion".

Thirty years on, the cities are still recognisable, perhaps because in the intervening years no wholly new urban transport technology, let alone the funds or space to implement it, has emerged. Thomson's hopes were limited to dial-a-bus in low density suburbs, travelators in city centres and major interchanges, and the occasional monorail. He was near enough.

He convincingly demonstrates that the commuter flows of large city centres could never be handled by urban freeways. In Singapore, unconstrained demand would have needed 36 lanes down Orchard Road, and central London commuters would have needed 40 eight-lane motorways and a car park the size of central London itself. He argued instead that freeways both increase the volume of road congestion and reduce the viability of public transport. Turning economist, he identified the marginal social cost of car use and laid out the rationale for restraining car ownership and use and improving and integrating public transport. His examples were Hong Kong, London, Singapore and Stockholm: thirty years on, all have tested or implemented congestion charging.

He also foresaw failure in Sydney. *"Already the [] suburbs are spreading out 75 kilometres to the west []. With a doubling of population forecast by the end of the century, one must wonder what Sydney will be like then if current trends are allowed to continue."*

Now we know. Driven by “the Australian dream” of a quarter-acre suburban block, the sprawl has continued, the speeds on the tolled motorways which followed it are already falling, the authorities are dithering over competing heavy rail, metro and light rail proposals, and even the famous ferries need replacing.

The risk is that weakly-planned or poor cities continue taking the “easy” option of further spread (perhaps fed by “free” privately-financed roads) leading, by design or default, to a centre too weak to sustain commerce or culture and ignored by suburbs trapping a car-less and often jobless underclass. Thomson dramatises the consequences for Detroit, killed by the cars it produces “*The streets after dark are unsafe and deserted. Two live theatres survive, for a population of nearly five million. Concerts are a rarity. The riverfront is largely given over to car parking. It is difficult to escape the impression that Detroit is dull, drab and dangerous, and has little to offer other than ordinary suburban life*”.

This is an farsighted and thought-provoking book. Find a copy while you can.

Reviewed by Dick Dunmore

TEG Committee 2009-2010

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The Transport Economists' Group, formed in 1973, provides a forum for people involved in transport economics to meet regularly and discuss matters of mutual interest. Membership is open to economists working in transport and others whose work is connected with transport economics.

The aim of the Group is to improve the quality of transport management, planning and decision making by promoting lectures, discussions and publications related to the economics of transport and of the environment within which the industry functions.

Meetings are held every month from September to June (except December) at Arup's Central London HQ at 13 Fitzroy Street. The meetings consist of short papers presented by speakers, drawn from both within the Group's membership and elsewhere, followed by discussion.

The Group's Journal, "The Transport Economist", is published three times a year reporting on meetings and other activities of the Group. It reviews recent publications of interest and contains papers or short articles from members. The Editor welcomes contributions for inclusion in the journal, and can be contacted at peter.gordon@deltarail.com

The current membership of over 150 covers a wide range of transport modes and types of organisation. Members are drawn from transport operators, consultants, universities, local and central government and manufacturing industry. All members are provided with a full membership list, updated annually, which serves as a useful source of contacts within the profession. Applications from people in all sectors are welcome.

Applications for membership should be made on a form obtainable from the Membership Secretary at gregorymarchant.teg@btinternet.com.

Alternatively, an application form can be downloaded from the Group's website: www.transecongroup.org.

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Details of meetings are provided on our website at

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