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Land Transport and How to Unlock Investment in Support of "Green Growth"



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LAND TRANSPORT AND HOW TO UNLOCK INVESTMENT IN SUPPORT OF "GREEN GROWTH"

1. "Green Growth" and Transport

"Green growth" and transport combines several different concepts that are central to sustainable mobility, including sustainable economic activity, reduced environmental impact and sustained growth in high quality jobs. It attempts to balance the importance of economic growth, with environmental damage and social priorities through assessing positive actions that can be taken by a wide variety of public and private stakeholders. It has arisen out of the concern over the use of non-renewable resources in transport, increasing emissions of carbon and other pollutants, and the expected levels of growth in mobility over the next 40 years. But it also acknowledges the importance of transport to the economy, and its role in helping to create jobs, improving levels of productivity and output, and in promoting agglomeration benefits. This means that transport should be efficient, but at the same time make less demand on the environment through less use of resources, through recycling and reuse of materials, and through embracing a life cycle perspective.

More specifically, transport is important to "green growth" for two reasons.

- Transport has major impacts in terms of safety, greenhouse gas emissions, local air emissions and noise. And managing congestion more effectively is part of the broader agenda for more sustainable development and better use of resources invested in infrastructure.

- A large part of public expenditure to stimulate "green growth" is directed at transport sector industries. This concerns most notably alternative vehicles, and particularly electric cars, a key part of strategies to decarbonise transport.

Nevertheless, public investments in support of "green growth" need careful assessment according to their long-term economic, environmental and social impacts. This is especially true since many projects with a "green" profile compound investment risks and uncertainties that already characterise more traditional transport sector investments.

Economic development is dependent on investment in transport, and rising incomes in turn drive demand for transport services, but there is scope for decoupling the environmental impacts of transport from GDP (and other more sophisticated indicators of welfare). Integrated land-use and transport planning and development is fundamental to containing the environmental impacts of transport, as are efficient pricing and effective traffic management. Regulatory and fiscal incentives are equally important to stimulating technological development and choice to cut noise, pollution and greenhouse gas emissions. Deep decarbonisation will also require investment in alternative technologies and the infrastructure to support them.

Traditional transport appraisal has tended to emphasise the importance of time savings, which has in turn favoured the development of faster and more energy intensive modes of transport. These modes have also tended to have higher per passenger and tonne kilometre levels of CO_2 emissions. The net result of this approach has been longer travel distances, high levels of congestion, and reduced quality of urban living. The objective of "green growth" and transport is to provide more energy efficient mobility and high quality accessibility through shorter distances and the colocation of urban activities. In addition to improved fuel efficiency, this also means added emphasis on the use of public transport, cycling and walking as the main means of transport. Greater accessibility also has positive effects on the affordability of transport and provides the means by which all the population could gain access to 'needed' destinations.

2. Investment Needs

The normal approach in transport infrastructure development is to follow a demand-based investment strategy, at least in the early stages of development, where the transport network is sparse. The nature and scale of that investment is determined by the rate of economic growth, priorities for regional economic integration and the more general impacts of globalisation on international patterns of freight and passenger transport.

At the global level, emerging economies will drive the growth in transport volumes over the coming century, with motorised road traffic having the largest environmental impact. Motorcycles and heavy vehicles contribute a large part of particulate and photochemical smog emissions, and passenger cars contribute the largest part of greenhouse gas emissions. When average incomes exceed USD 2000 pa, car ownership increases rapidly. This is a critical point for policies that are directed towards greener growth, as there need to be high quality alternatives to private motorised transport, if new patterns of accessibility are to be established that are based on shorter distances and affordable public transport.

The International Transport Forum (ITF, 2013) projects that the volume of surface passenger transport in OECD countries (vehicle-kilometres) could rise by 60% between 2010 and 2050. Outside the OECD, passenger transport volumes could rise by four to five times. Carbon dioxide emissions could also double over this time period, with most of the growth being in non OECD countries. The split in carbon emissions between passenger and freight for land transport is likely to be about 50-50. One opportunity for "green growth" is offered by the way in which cities will shape passenger transport demand, as the rapid pace of urbanisation means that nearly 75% of people will live in urban areas (2050) where it is easier to provide for high levels of accessibility by public transport and the possibilities of moving by cycle and walk are greatest. A premium should be placed on investments in infrastructure for urban transport that creates efficient and liveable cities[1] that combine a concern over the health impacts of motorised transport and investment in low carbon-intensity transport.

[1] If economic growth falls below the baseline assumed in these projections, the rise in transport volumes will be lower, but not by much in the OECD economies because surface passenger transport demand is less responsive to output growth at high incomes.

The challenges will be greatest in many fast-developing urban conglomerations in low- and middle-income countries, where investments will have to meet transport needs without running up excessive debt or resulting in the lock-in of unsustainable travel and land-use patterns. At the same time, advanced economies will need to maintain and improve the quality of infrastructure as networks age. It should be noted that changes in patterns of demand in advanced economies may also require significant new investment despite slow economic growth. When considering investment in infrastructure, there are three complementary elements that have to be considered as they relate both to the physical infrastructure, the vehicles running on the infrastructure, and the control systems needed to operate the infrastructure.

1. Reinvestment in still useful but ageing infrastructure bringing it back to a high standard;

2. Upgrading and expanding the existing infrastructure to provide extra capacity, including extra lanes or tracks, longer trains, larger buses, and new control systems;

3. New infrastructure to cover roads and rail, as well as innovative integration and operating systems.

Public transport investments are a key component of transport sector "green growth" strategies. These investments will require significant and growing amounts of public funds and private capital. Efficient transport in rapidly developing cities is dependent on coordination of bus and para-transit services to provide safe, end-to-end service at affordable prices. This also means convenient transfer between modes of transport, different operators, and across different jurisdictions. Transport needs to be seen as a service where efficiency determines routes and frequencies, rather than the rents created by the uncoordinated allocation of licences. Many governments in low and middle income countries fail to address this fundamental aspect of sustainable transport service provision because of the financial interests at stake. As incomes and traffic densities rise, bus rapid transit, surface and underground rail systems become viable and essential forms of mass transit, and they also have a major role in shaping the development of the city. Buses remain the key means of motorised transport, either in their own right or as a feeder service to higher capacity systems. In London, for example, buses carry 6 million passengers a day, nearly twice the number carried by the underground, and 6 times the number of rail commuters arriving and departing from surface terminals in the central part of the city (TfL, 2013).

Cities of many different sizes are the centres of growth and innovation in developed countries and further expansion and/or densification is to be expected (Kennedy, 2011). Competition for resources takes place between reinforcement of the existing core networks and investment in new infrastructure to shape urban development, for example through concentrating housing and centres of employment along public transport axes in the periphery. The key in both types of development is that high capacity public transport provides the main means by which people get access to the city centre or goods reach highly accessible transport interchanges. "Green growth" should be based on accessibility, and if the market is working well then businesses will respond to newly accessible locations, particularly if the levels of rent are initially lower and their markets are close – see Case Study 1.

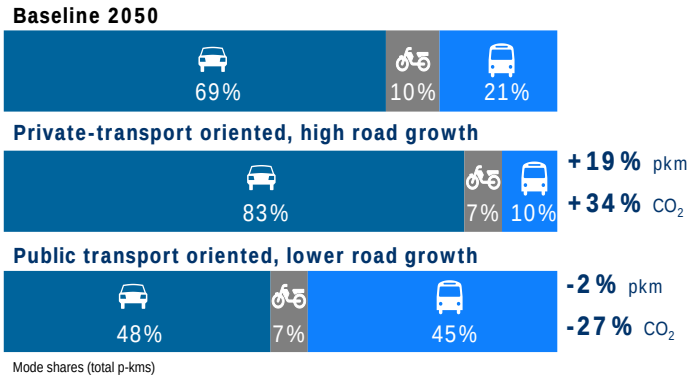
Demographic change, including population growth, ageing societies and migration, will result in the emergence of new economic and travel activity patterns, for example non-work activities (such as education, health and leisure), and all these generate additional investment demands. The potential for working whilst travelling and from remote locations, together with the flexibility provided by technological innovation, means that new travel patterns are emerging that require different thinking when it comes to investment. It suggests that investment strategies should be flexible, but this in turn may increase uncertainty and possibly risk. The changing nature of travel and the driving forces behind these changes present a far greater range of uncertainties than have been experienced in the past.

Inter-city public transport concerns mainly buses and rail. At high demand densities, high speed rail is viable, but it should be viewed primarily as a solution for delivering capacity rather than simply speed. As energy consumption increases with the square of speed, conventional rail is to some extent "greener" than high speed rail. High speed does offer a rail alternative to air travel over distances up to 800 km, and at high load factors high speed rail offers lower emissions of CO_2 per passenger than travel by air or passenger car. At low load factors, rail requires operating as well as capital subsidies, and may result in more CO_2 emissions per passenger km than transport by air or passenger car, partly because of the relatively large amount of embedded carbon in the infrastructure. But high speed rail also allows for maximum utilisation of rolling stock. For a positive social cost-benefit ratio, investment in high speed rail requires of the order of 10 million passengers from the first year of operation and for pure commercial viability, at least twice that number. Investment in high speed rail can thus contribute to "green growth" where traffic density is high, over medium distances (about 800 km), and this is a significant, but relatively small part of the overall passenger transport market (Givoni and Banister, 2012).

Case Study 1: The 2013 ITF Transport Outlook examines scenarios for the development of urban transport, focusing on middle income countries and the case of Latin American cities, with data calibrated to trends in sprawl and investment in infrastructure towards the extremes of the spectrum experienced by major cities in the region. Plausible scenarios for high density, high public transport, and low road investment on the one hand versus low density, low public transport, high road investment on the other hand show strikingly different outcomes for CO2 emissions (Figure 1). Technology for improving fuel efficiency and clean combustion is potentially even more important to cutting CO2 and noxious emissions to 2050 but this illustrates rather clearly the importance of investment in public transport infrastructure for greener growth.

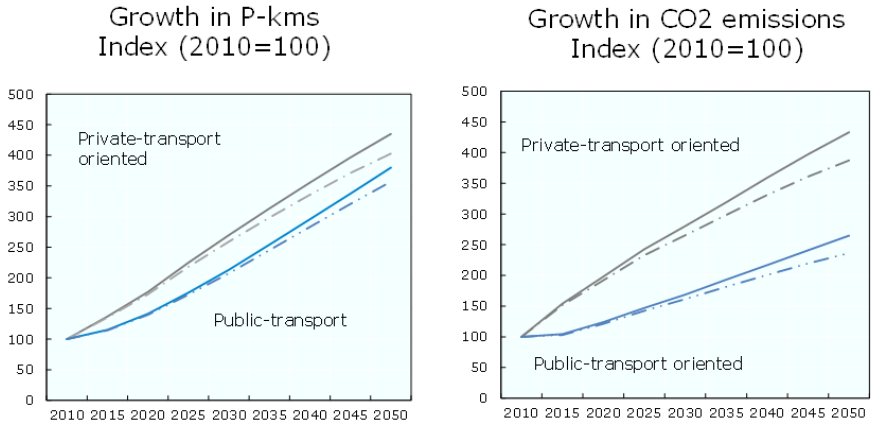
Under the modelled public transport oriented growth pattern, overall mobility is a slightly lower than the baseline by 2050. The private transport oriented path suggests much higher mobility levels but this is where growth in car traffic would like to go as incomes rise; in practice road capacity would have difficulty keeping up. Congestion would then hold passenger kilometres much closer to the baseline level. Eventually the curves would probably cross (Figure 2, left side). Investing early in public transport would enable higher levels of mobility to be sustained beyond 2050; retrofitting public transport after a long period of car-oriented development is difficult.

Figure 1: Modal shares, mobility, and CO2 emissions in different urban scenarios (2050)
(Mode shares: % of total passenger-kms)



Source: ITF Transport Outlook 2013

Figure 2: Evolution of mobility and CO2 emissions in different urban scenarios (2010-2050)
(Dotted lines: low road investment variants)



Source: ITF Transport Outlook 2013

Passenger cars and powered two wheelers will remain the mainstays of passenger transport for the foreseeable future. Low-carbon transport strategies in many countries therefore focus on encouraging the uptake of alternative fuelled vehicles, in particular electric cars and the supporting the provision of charging infrastructure. The vehicle technologies and transport systems for using electricity, hydrogen, ammonia and other energy carriers are being developed ahead of the large-scale decarbonisation of power/fuel generation. Potentially, they could also provide storage capacity for renewable energy sources. The private sector has largely carried the investment costs of developing and commercialising plug-in hybrid and pure battery electric vehicles (and e-bikes), but the risk associated with this investment has

been moderated by public commitments to subsidise the purchase of these vehicles and vehicle charging networks. Despite these support mechanisms, sales of electric cars and vans have struggled, partly because of the costs (even after subsidy), partly because of a lack of suitable vehicles, and partly because of consumer concerns with range, recharging time and reliability. But the main reason may be market inertia, and at the same time, the environmental and fuel economy performance of internal combustion vehicles is improving (Crist, 2012).

Since 2008, some new elements in the debate relating to investment have emerged, with two distinct schools of thought. Transport budgets are easy to cut in the short term for both new projects and for maintenance and upgrading projects, as their impact is not immediate, even though higher costs might be incurred later. Many governments have taken this option and cut the transport budgets substantially to meet short term fiscal objectives. The *Austerity Approach* puts reductions in public expenditure as the top priority so that debt reductions can take place, and over the longer term tax reductions can be introduced together with the private sector replacing the public sector as the main investor in infrastructure. But in the short term it may lead to a reduction in productive capacity, a loss of skills, and higher levels of unemployment. The alternative has been the *Stimulus Approach*, where large sums of public funding are invested in infrastructure so that the long term productive capacity of the economy is enhanced when growth returns, and the impacts on the loss of skills and unemployment are reduced.

The point was made by Amartya Sen in his keynote speech at the International Transport Forum Summit in May 2013, namely that opposition to austerity has also led to resistance to institutional reform as well:

> "And this unfortunate effect has been in addition to the terrible impact of austerity on the lives of people – through undue hardship and through massive unemployment…….Many countries in the world still need more institutional reform. But they do not need any more austerity – in fact the opposite. In thinking about spending and investment on transport infrastructure, it is important to see clearly that an expansion in that field does not make reform any more difficult, while helping to stimulate the economy in a powerful way, if the process is well chosen. That is the context in which, I would argue, the challenges of transport spending and funding have to be viewed today, especially in Europe." (Sen, 2013).

The core issue in this debate is determining the role that transport investment, and especially investment in "greener" transport options, can play in economic development and growth, and how its impact on employment, productivity and output can be measured, particularly where the transport network is well developed, as any increase will have a marginal impact on the overall accessibility.

Over time the share of Gross Domestic Product (GDP) countries have invested in infrastructure has declined substantially for all forms of investment, including transport (Table 1). Total investment has been set at between 20% and 25% of GDP, declining in the richer countries, but rising in the emerging economies, and this is understandable as it relates to the different stages of economic growth and the levels of infrastructure that are already in place. More generally, as income levels rise, the share of the GDP spent on road infrastructure

declines, and since the 1980s the average level of investment in the OECD countries has stabilised around 1% of GDP, and this has been used as a benchmark (Short and Kopp, 2005).

Table 1: Transport infrastructure, infrastructure and total investment expenditure

Percentage of GDP, developed and emerging economies		1980	2008
Developed economies	Transport infrastructure	1. 5	1.3
	Infrastructure	3.6	2.8
	Total investment	24.3	20.9
Emerging economies	Transport infrastructure	1.9	3.1
	Infrastructure	3.5	5.7
	Total investment	~20	~25

Source: McKinsey Global Institute (2010)

3. Public and Private Investment

Much investment in transport sector infrastructure is traditionally funded by the public sector. Long lead times from analysis of the need for the investment, the planning and inquiry processes, government investment cycles and the payback periods with large sunk costs all temper private investment, as the risks are perceived to be high and there is considerable uncertainty. Roads and public transport infrastructure are mostly funded publicly, although there are private urban rail and metro systems in Japan, Hong Kong and elsewhere, funded through a combination of fare revenues and joint development of real estate around stations as a mechanism to capture the amenity value of public transport networks(Case Study 2). Private investment is generally attracted as concessions for transport infrastructure or under public private partnerships and similar regulatory frameworks, where there are clear opportunities for both short term and stable long term returns.

Case Study 2: Hong Kong's Mass Transit Railway Corporation (MTRC, China) built, owns and operates all the rail lines in Hong Kong, and the MTRC is a private for profit transport system that is 76.7% owned by the Hong Kong Special Administrative Region, which in turn owns all the land in Hong Kong. The rest of the shares are publicly traded on the Hong Kong stock exchange. Due to its relationship with the MTRC, the government is able to capture the monetary value of the access and agglomeration economies that the transport service generates.

The Hong Kong government makes available the land around future stations to the MTRC on long-term leases at pre-transport development prices. The MTRC then sells the rights to develop these sites at post-development prices to designated private developers, who leverage the station locations for the creation of shopping malls and housing. The substantial difference between the two prices pays for the capital cost of the new rail infrastructure.

The MTRC also negotiates a share of the future property development profits and/or a co-ownership position from the preferred bidder, so that it retains a long-term claim on the rental income stream. This means that the MTRC is paid upfront for land, plus a post development share of the development's revenues. It also collects the fares, and these two revenue streams makes the MTRC a premium corporate performer.

In 2012, total revenues for the MTRC were HK$ 35.7 billion (US$ 4.6 billion). Property developments (development, investment and management) accounted for 9.5% of revenues, and commercial

activities at stations accounting for another 10%, with transport operations generating a further 41%. Other business accounted for 1.3% and the remaining 35.8% of revenues come from operations in mainland China (Beijing, Shenzhen and Hangzhou) and overseas (Melbourne, Stockholm and most recently in London).

The MTRC is accessible to all, as more than 40% of Hong Kong's population lives within 500 metres of a MTRC station and over 20% live within 200 metres of a station. Hong Kong has low levels of car ownership and high population densities.

Based on: UN Habitat (2013), MTRC (2013), Cervero and Murakami (2008), and Tang and Lo (2010)

Similar arrangements for urban development can also be used for bus rapid transit – BRT -- (Case Study 3) but direct value-capture mechanisms may be more difficult to implement given private ownership of land adjacent to BRT corridors and stations. Since the main beneficiaries are individual adjacent property owners, public authorities needs to find the means to recoup some of this gain through indirect value capture mechanisms such as land-value taxes.

Case Study 3: Bus Rapid Transit in Seoul (Korea) – In 2004, the Seoul Metropolitan Government took control over bus routes, schedules, fares, and overall system design. It introduced a "semi-public operation system" that retained private bus firms but left route, schedule, and fare decisions to the Seoul Metropolitan Government, and it reimbursed bus firms on the basis of vehicle km of service instead of passenger trips. By 2008, Seoul had installed 74 km of median-lane BRT services spanning 8 corridors and this research examined the land use and land value impacts since 2004 through a set of multilevel logit models. The land-market effects of converting regular bus operations to median-lane bus services are calculated for Seoul, and they revealed that BRT improvements prompted property owners to convert single-family residences to higher density apartments and condominiums. Land price premiums of up to 10% were estimated for residences within 300 m of BRT stops and more than 25% for retail and other non-residential uses over a smaller impact zone of 150 m. The research findings underscore the importance of introducing zoning and other land regulatory changes prior to the initiation of BRT improvements as well as applying value-capture tools to help finance investments and redress inequities.

Source: Cervero and Kang (2011)

Development risk can be controlled through the ownership of land adjacent to the transport investment, as this is where the value uplift takes place. The two examples given here identify the situation where the public authority owns the land and can lease it to the private developers (Case Study 2), and where the land is in private ownership and where the gain can be taxed through a value capture mechanism to share that gain between the private and public sectors (Case Study 3 and 4).

The revenue risk is the second element that is central to the financing sustainability of transport infrastructure and it is a key concern to the private sector. Many transport projects experience cost overruns (increased capital costs) and revenue shortfalls (over optimistic demand forecasts), and these two factors combine to reduce the attractiveness to the private sector (Flyvbjerg, 2007). For example, the Eurostar between the UK and Belgium and France carried 10 million passengers for the first time in 2013 – when the line was opened in 1994, the 10m passenger level was forecast for 1998. Forecasting demand over very long periods is inherently difficult, characterised in later periods by high levels of uncertainty. Uncertainty is

not amenable to the mathematics of risk management and the government will always be better placed to bear the costs of uncertainty related to overall long-run economic performance. Risk and uncertainty increase significantly with non-conventional, "green infrastructure", such as investment in electric recharging networks or hydrogen distribution networks. Uncertainty and dependence on subsidies to stimulate demand for alternative vehicles and a transition to a more sustainable transport system, all suggest that this is a clear role for public investment[2].

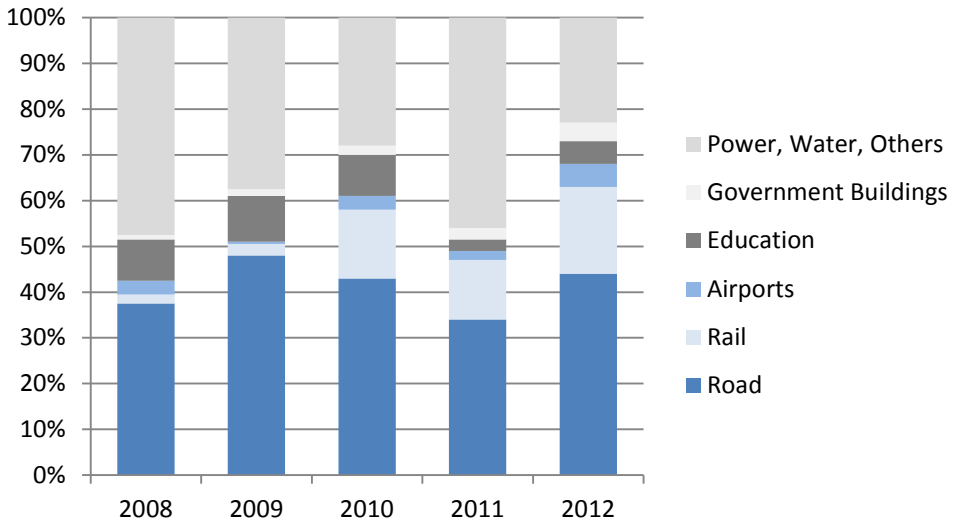
Governments are presented with a dilemma. Even if an austerity approach is being followed, governments see investment in "green" transport infrastructure, such as electric mobility, as a means to stimulate growth, but the necessary funding is not available, hence the arguments for a stimulus approach. The use of private capital through PPPs has been the main mechanism to bring forward traditional transport infrastructure projects. This process has been facilitated where the national accounts treat PPP liabilities differently to public spending. A key issue here is whether it is appropriate to add public infrastructure costs to the public spending accounts or whether they should be seen as longer term investment and moved off those accounts.

4. Sources of Private Finance for Transport Infrastructure

In the years since the financial crisis, project finance has been split roughly a third each to oil and gas; power; and transport and water infrastructure taken together. Public Private Partnerships (PPPs) have accounted for around 20% of overall project finance globally, with half going to transport infrastructure and roads taking the largest share (Dealogic, 2012 and Figure 3). The financing of a PPP project consists of debt and equity, typically up to 70-80% debt and no more than 20-30% equity (EIB, 2012). Equity is contributed by the project developer and construction companies in the special purpose vehicle (SPV) established to finance the project (see Case Studies).

[2] Public investment was not required to build filling stations in the early days of the automobile industry but neither was development of the car subject to promotion by public policy, at least beyond road building.

Figure 3: Breakdown of global infrastructure PPP/PFI investment by value



Source: Dealogic Project Finance Review, Full Year 2012.

There are different types of equity investor, and these include construction companies who are well placed to understand and manage certain types of procurement and construction risk. There are also facility management companies that make equity investments and understand the long term operating risks, and there are sometimes private equity firms that may not have a detailed understanding of either construction or operating risks. The SPV has little risk carrying capacity (ability to control construction and operating risks), and therefore the risks allocated to it by contract will be passed to the construction or facility management company. The banks in the SPV issue and syndicate the loans that make up the balance of finance. This "top tier" of finance, facilitating the project, is known as senior debt as these lenders have priority access to the cash flows of the PPP in case of distress. Top tier finance also includes contributions from capital market investors (private equity funds, sovereign wealth funds and the equity funds in the portfolios of pension and insurance funds) who typically have little detailed information on project specific risks.

In addition, many PPPs involve "pinpoint equity" (often accounting for less than 1% of finance) and this is sometimes used in conjunction with availability payment based contracts that make payments according to the time that an infrastructure facility is available. This type of contract reduces the revenue risk for lenders and therefore lowers the cost of debt. The alternative use based contracts carry more revenue risk, making debt more expensive as payments are based on the use of the infrastructure, and this requires a larger equity stake from developers and specialised equity fund investors.

Recapitalisation of banks in the wake of the financial crisis (2008) has limited the availability of debt finance (including for PPPs), and much of the available finance is extremely risk averse. Only the facility operator is prepared to take on these higher risk levels, as it is seen as part of their core business. For the construction companies the interest is in

generating cash flow from construction activity and their objective is to sell their equity as soon as possible, thus ensuring that the higher levels of risk resides with them for as short a length of time as possible (ITF, 2013).

This means that the structure of PPP finance may need to change once the construction of the infrastructure is complete. The concessionaire can now issue bonds backed by toll revenues (or infrastructure charges in the case of rail), as this "securitisation" can spread the risks that can now be much better assessed as the infrastructure is in operation, and all the preconstruction and construction risks have been accounted for. Pension funds and insurance funds can be used to purchase these long terms bonds, and the securitisation widens the access of PPPs to capital markets.

The large institutional investors such as pension funds and sovereign wealth funds with long term liabilities and a low risk appetite are ideally suited to invest in transportation infrastructure assets. Despite the theoretical ideal match between a large source of capital and an asset class in need of investment, the uptake of institutional investors has been slow. This has been due to bad experiences with early investments and the uncertainty associated with investing in transport infrastructure assets. Assessing the risks requires significant resources and only specialised investment funds may carry the expertise needed. Investment in transport infrastructure by institutional investors is growing, but slowly. It depends on the development of relationships of trust built on successful partnerships with project developers, which are repeated where there is a steady pipeline of projects let as PPPs by the public sector (Sharma 2013).

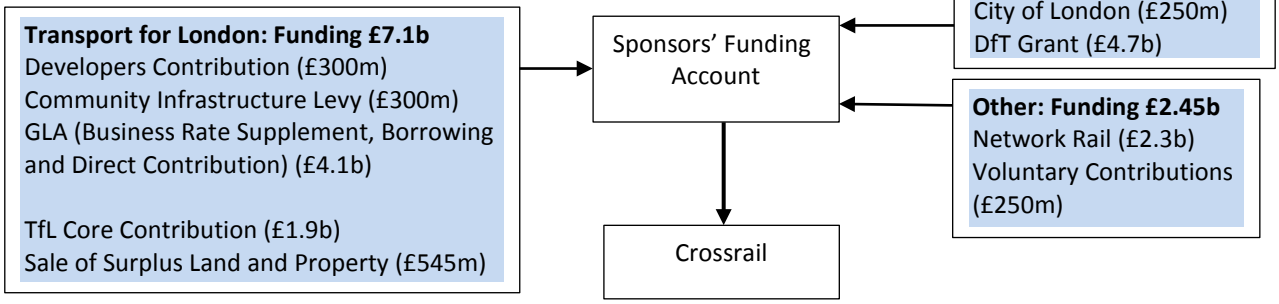
Infrastructures are now seen as an investment opportunity, but to be attractive to the private sector, they need to have stable cash flows, linked to inflation, over a long period of time, so that they would be attractive for pension funds. In addition they will be assessed for their risks, levels of return, volatility and whether there may be an element of natural monopoly (e.g. toll bridges or tunnels). This usually includes an undertaking from the government to refrain from investing in competing infrastructure or compensating the concession holder if it does make this kind of investment. The contract also establishes the degree to which the PPP facility is separated from existing networks, often politically controversial in urban areas, and the level of charges that can be levied are also a politically sensitive issue.

There are cases where private operators have fully borne the costs of developing urban public transport networks and have retained ownership and control. In Tokyo and other large Japanese cities, private metro and suburban rail operators carry a larger share of passengers than government financed metros or the suburban lines of the regional railways, and they return consistent profits. These networks were developed in a set of unique post-war conditions characterised by cheap land prices (allowing the operators to buy entire corridors and surrounding properties) and low labour costs coupled with directive land-use planning. Today, most of their revenue comes from non-transport operations linked to their real-estate holdings and in-station shops. In Hong Kong the government owned MTR funds metro construction through joint development of land for offices, retail and housing around new stations (Case Study 2). The government designates land for transport corridors and development by the MTR, which in turn seeks commercial real estate developers to fund the

rail investments. These models are clearly applicable to other rapidly developing cities, on condition that governments can provide the regulatory stability needed for the relatively long time horizon required for returns to be realised.

Integrated land use and transport development is the key to successful major urban transport infrastructure projects in many cities (Case Study 4). The Crossrail project is being partly funded through a Business Rate Supplement (BRS), and this has financed £3.5 billion worth of Greater London Authority (GLA) borrowing. THE BRS was introduced in 2010 on all commercial properties (business and non-domestic premises) in the 32 London Boroughs (and the City of London) that had a rateable value of more than £55,000, and the multiplier being charged (2013-2014) is 2p per pound of rateable value. A further £0.6 billion of BRS revenues will finance construction works directly, and the GLA has already contributed more that £3.0 billion by the end of 2013 through the BRS mechanism. The Crossrail BRS is expected to run for more than 25 years until the borrowing is repaid, and in the current financial year the contribution is expected to be £875 million (2013-2014). An important aspect of the BRS is that the rate increase was supported by businesses on the expectation of positive returns. In addition to the BRS, the Community Infrastructure Levy (CIL) was introduced in April 2012 as a levy on all new developments in London. Separate contributions have been levered out of BAA Plc (£230 million) and the City of London (£250 million), and from Canary Wharf and Berkeley Homes (£300 million). The projected tax receipts are of a broadly similar scale to some of the estimates of the productivity and agglomeration benefits expected from the project (Worsley, 2011). The supplementary tax on commercial property covers a quarter of the investment cost and reaching this agreement with the local business community ended three decades of delay in finding finance for the project.

Case Study 4: Crossrail in London - this £15 billion West- East scheme links surface rail networks through a deep tunnel crossing the centre of London, via the financial centres of the City and Docklands, and it provides direct access to central destinations. It significantly expands rail capacity in the central area of London.



In summary here, it seems that each major funding opportunity needs to be viewed separately, and although it is informative to list the different forms of PPPs and PFIs, each situation requires a different package to be used. Apart from the considerable delays in decisions being made on whether an investment is to be supported in political, economic, social and environmental terms, there is now the additional constraint of the funding of the

scheme. It is difficult to generalise about the suitability of any particular combination of funding mechanisms, and the ways in which these might change over time as new potential investors may take over once the construction phase has taken place. Every potential investment is different and requires a different combination of funding. Two other factors stand out as being essential components for effective implementation of PPPs, namely the presence of a benign regulatory system and a positive governance environment. Sharma (2012) highlights the positives with his case study of Auckland International Airport, where a relational form[3] of light-handed regulatory contract was used, and the Government was able to play a central role in bringing about investment and create the conditions for wider economic benefits from this major asset. This process was based on trust between the different agencies as well as addressing the hard financial imperatives.

5. Investment in "Green Technology"

The debate here is not just over new forms of investment in transport infrastructure, and in mobilising resources from the private sector, but also about the different forms of "green investment". Conventionally, "green investment" would cover both the technologies and the infrastructure itself, and this would include the role of government in facilitating change through providing incentives and a positive regulatory environment.

5.1 Electric Vehicles: Most debate has revolved around investment in electric vehicle, but this market is risky for both private investors and public authorities. There is no clear path to an alternative energy future, or on the timing and cost of the transition to an electric future based on renewable energy. There is also competition between the existing technologies and other energy carriers (hydrogen, pure electric, plug-in hybrid, biofuels), and each may be supported by separate government interventions that to some extent exist in isolation. Improvements in the fuel efficiency of traditional internal combustion vehicles have been robust, accelerated by regulatory requirements and tax incentives, eroding the short to middle-term business case for fossil fuel alternatives, particularly if the energy used still relies on non-renewable sources. Ironically, the main impact of the 'electric revolution' may be to stimulate much greater efficiency in the conventional ICE power train, and in the development of fuel efficient engine control systems.

The private sector has actively financed the development and deployment of electric cars and vans. Automobile companies typically bear the costs of investing in research, technology and plant capacity for their own vehicles – though in some cases they have benefited from partial public funding for production facilities. Early movers investing in hybrid and battery electric vehicles may reap large rewards when (and if) these technologies meet market success, as has been the case with Toyota which bore losses for years before sales of its hybrids took off. But even here it has taken 16 years for the HEV (Toyota Prius) to get to its current levels of sales (about 3m cars a year globally). In the UK, alternatively fuelled vehicles (including HEVs) have increased their share of the new car sales from 0.75% (2003) to 1.33% (2012) of all new cars (27,319 in 2012), and over the same period new conventional cars

[3] A relational contract is a contract whose effect is based upon a relationship of trust between the parties. The explicit terms of the contract are just an outline, as there are implicit terms and understandings which determine the behaviour of the parties.

(diesel and petrol) have reduced their CO_2 emissions from 172.1 gCO_2/km to 133.1 gCO_2/km (a 23% reduction: SMMT, 2013).

Technological prowess can be a powerful marketing tool and electric vehicles offer prospects of creating new niches and indeed new mobility markets for manufacturers that specialise in their development. The potential for returns from such new markets have motivated Renault-Nissan to invest more than €4 billion in developing market-ready electric vehicles, and other car-makers have followed this logic in developing electric vehicles as part of their own investment strategy. In a similar vein, the Paris-based network of shared-use station-based electric cars (Autolib) has been fully financed by the Bolloré group which specialises in battery technology and vehicle-based IT systems (Case Study 5).

Case Study 5: The Bolloré Group finances, produces and markets electric cars and buses equipped with its own batteries. In December 2011, it launched Autolib', a car sharing scheme using its own 100% electric vehicles in Paris and 46 municipalities in Greater Paris, as part of a public service delegation contract[4]. By the end of 2012, nearly 1,800 Bluecar vehicles have been made available, at over 820 stations, or at the 4,170 terminals in the greater Paris region (Ile-de-France), and the service has provided 2.5 million rentals, for more than 75,000 subscribers, including 30,000 yearly premium subscribers. Booking is now available through the smartphone, and up to 10000 rentals are made per day. Other schemes have been launched in Lyon-Villeurbanne (October 2013), Bordeaux (November 2013), Indianapolis (2014) and London (2014).

The Bolloré Group have also launched (2012) a long term leasing and sales of the technology to individuals and firms, and this new service includes the installation of charging stations, a maintenance service and the possible installation of photovoltaic panels. The sales of the Bluecar are second for all EVs in France (2012) with 1,800 vehicles and a 30% market share. The Bolloré Group has also launched a 22 seat electric bus (Bluebus) for city use with a range of 120kms, and 50 are now in use in Laval, Luxembourg, Reunion Island, Mont-Saint-Michel and Tours.

Source: Bolloré Group Annual Reports 2012 and 2013

Private equity has sometimes been attracted to electric car start-ups, with mixed results. Tesla Motors raised $321 million from investors from early investment rounds and its 2010 initial public offering, and this capital has enabled it to continue to develop new commercial models. Project Better Place attracted $850 million in private capital for its integrated electric vehicle and battery-swapping network but failed to deliver a commercially viable service and filed for bankruptcy in May 2013. Fisker Automotive, the producer of one of the first plug in hybrid cars (2008), attracted over $1.2 billion in private financing but eventually filed for bankruptcy in November 2013.

The bankruptcy of Fisker and Better Place underscores the considerable uncertainty regarding electric vehicle business models. It provides a classic example of the difficulties of gaining access to a well-established mature market, where the initial take-up of electric vehicles is low and the entry costs are high. By pushing a particular form of the technology with the aim locking consumers into a particular version of the technology (through the charging process), Better Place was probably going to reduce the appeal of the electric vehicle. The approach adopted by the Bolloré Group is much more flexible as it allows the sharing option and a non-ownership model. The equity investors in the automobile sector compare the potential for monopoly operations (attractive) in a very small market (unattractive), with that of a more competitive market (unattractive) with a larger urban operation (attractive). The uncertainties and risks associated with both options mean that the private sector needs to have some reassurance from the public sector through assured revenue streams, and partnership

[4] In France, a public service delegation is a set of contracts under which a public authority (city, country, region or national government) delegates the management of a public service to a public, non-profit or private organisation whose remuneration is substantially related to operating income of the service.

where the risks are shared, or some form of incentive to get consumers to buy into the innovation (electric vehicles).

There are important questions for public authorities, as many countries have introduced substantial electric vehicle purchase subsidies (and publicly-backed loans) to encourage interest in electric cars (Section 6). These "green" cars are seen as a straight substitute for ICE vehicles in a market that continues to be dominated by privately-owned full size passenger cars. These subsidies are based on debatable assumptions, given the difficulty electric cars have faced in finding any more than a niche market, in light of the fact that the current electric vehicle market is dominated by powered two wheelers (e-bikes and motorcycles), the underlying rationale behind the subsidy strategy, and the need for an exit strategy.

5.2 Green Infrastructure: Priorities here include investment in infrastructure for urban public transport systems, investment in inter-urban rail, investment in alternative vehicle technologies, and investment in the infrastructure for alternative fuelled vehicles (Section 5.1). One key difficulty here is that when urban public transport schemes are evaluated with cost benefit analysis, they give lower rates of return than those for road investment. It is only when the social and environmental costs are explicitly included in the evaluation that these schemes become more attractive, but these additional costs and benefits are not ones that the private sector can obtain a financial return on. Yet it is widely acknowledged that if transport is going to substantially contribute to reductions in energy use and carbon emissions, then the transport system needs to be based on an efficient urban public transport network, and there are many options and combinations of strategies that can be used (Table 2). The difficulty here is in providing evaluation methods that can estimate the full social and environmental costs and benefits, as conventionally seen for public investment projects (extended cost benefit analysis), but at the same time being able to present a clear financial analysis that makes the investment attractive to the private sector. Evaluating projects for fitness of purpose for PPP contracts may be helpful as this process may help elucidate what investments are most appropriate for the private sector to fund, and what needs to be a government responsibility.

Table 2: Green transport modes

Modes	GHG Emissions	Air Quality and Health	Congestion	Transport Accessibility	Road Safety
Bus Rapid Transit (BRT)	Medium	Medium	High	High	Medium
Light Rail/Mass Rapid Transit (MRT)	Medium	Medium	High	Medium/High	Medium
Rail	Medium	Low	Medium/High	Medium	Low
Low Carbon Vehicles	Medium/High	High	Low/Negative	Low/Negative	None
Non Motorised Transport	Low	Medium	Medium/High	Medium/High	Medium
Land Use Planning	Medium	Medium/High	High	High	Medium

Source: Adapted from UNEP (2011) and Ang and Marchal (2013)

6. Fiscal and Regulatory Framework for Private Investment

6.1 The Role of Government: Proponents of "green growth" initiatives in transport often cite the need for government action to facilitate the movement of private capital towards sustainable transport investments. At a fundamental level, this support could take the form of re-evaluating existing policies to see if they are broadly coherent with government "green growth" objectives by, for example, reviewing fossil energy or biofuel subsidies. Typically, however, calls for subsidies in *support* of "green" transport feature heavily in the discourse. These are often justified on the basis of market imperfections and the opportunities to leverage early action in support for transformational change. Subsidies (or other indirect government support such as investment in research or public purchase commitments) can help develop early markets but they are notoriously difficult to roll back or may back less-than-optimal outcomes. Private investors may also be wary in making long-term investments where the business case rests on the perennial government support mechanisms since if these are rolled back, they may cause the collapse of the business case.

Government debt guarantees for "green infrastructure" investment may also help secure private investment in large-scale projects. However, as the public authority and the taxpayer remains ultimately responsible for covering project risk, the cost of using more expensive private capital instead of public funding may be questioned.

Governments have a role in building investor confidence by clearly communicating public policy priorities and creating certainty around these. They usually do this without favouring one technology over another. In vehicle markets, consistent, long-term fuel economy and CO_2 emission regulations have proven successful in greening vehicle fleets. However, hybrid, battery electric and fuel cell vehicles do not fit the classic emissions profile of fossil-fuelled vehicles since most of their emissions occur upstream (or in the vehicle production phase). Governments will need to ensure a harmonised approach to incorporate these factors into the next generation of energy efficiency/emissions standards so as to create certainty for self-financed or equity investments in vehicle markets.

So in addition to being a major funder of "green" infrastructure and technologies, government has a strong role to play in subsidising new technologies (at least initially), in guaranteeing investment (risk sharing), and in providing the necessary stability to build investor confidence through clear and consistent messages and through legislating on the regulatory environment. This role is not just financial, but it also covers encouraging new forms of operation and management. The private sector needs a clear framework within which to operate that is both transparent and provides continuity and stability in direction. This can only be provided by government. The ideal situation might be for government to own the land, and to lease it to the private sector (as in Hong Kong Case Study 2 and Tokyo Case Study 6), so that sufficient transport financing is realised through the value uplift from the investment in the commercial and other property developments. It is here that the risks and returns to the public and private sectors are optimised, and the potential for private investment in green infrastructure realised (Salon and Shewmake, 2010).

Case Study 6: "Tokyo is particularly unique in that it has a long history of privately built, owned, and operated railways. There are twelve distinct railway corporations operating in the city, only one of which is publicly owned (Cervero and Murakami 2008). These private corporations claim rail as their "core" business, but most of them in fact earn more of their profits from associated real estate ventures in and around their rail stations. Some of these corporations have branched out further and also operate major department stores, construction businesses, education facilities, and other services (Tang et al 2004). The Japanese government has facilitated railway investment through a combination of direct subsidies and low interest loans to help pay upfront capital costs. In Tokyo, the local government has additional policies in place to incentivize public transport ridership. These include vehicle and fuel taxes, road pricing, direct car ownership controls, and tax breaks for public transport users (Tang et al 2004). Although the capital costs of Tokyo's railways do receive government subsidies, the Tokyo system of private operators with associated real estate businesses has successfully reduced the need for the government to subsidize railway operating expenses."
Source: Salon and Shewmake (2011) p31-32

6.2 Resilient Infrastructure: A new requirement of government is to consider the redesign and retrofitting of existing infrastructure, perhaps to add capacity, but also to address the issue of vulnerability. When considering new capacity, resilience needs to be built into systems (not just transport infrastructure) at crucial links or nodes on the network, particularly where small events might trigger major impacts. This is part of the climate change agenda where mitigation and adaptation strategies are becoming increasingly important. Cities are where most people live and they are particularly vulnerable, as many of the great world cities are located at sea level and where rivers meet the sea. This means that they are vulnerable to storm surges, to river flooding and to intense rainfall. Their adaptive capacity may be low, particularly if they are located in the poorer parts of the world, yet long term investments are needed to both minimise the impacts of damage and to ensure that business activity returns to normal as soon as possible. The insurance costs are high, and in many cases the potential damage is uninsurable, which means that governments have to pay (and by implication taxpayers) – hurricane Sandy provides evidence of the damage caused (Case Study 7).

Case Study 7: Hurricane Sandy (2012) has cost $25 billion in insurance claims paid, and it is likely to be the third most expensive hurricane in terms of insured losses (2012 prices), after Hurricane Katrina (2005) ($75 billion in 2012 prices) and Hurricane Andrew (1992) ($28 billion in 2012 prices). Of all U.S. disaster events in recent history, including 9/11, Hurricane Sandy will be the fifth most costly in terms of insured losses. In the US, 10 of the 12 most costly hurricanes in insurance history (adjusted for inflation) occurred in the last eight years (2004-2012).

The number of federal disaster declarations in 2011 was 99 and 81 in 2010, both substantially above the yearly average of 35 since 1953. There have been 171 natural disasters in the U.S. from 1980-2011. The 2012 estimate for overall losses due to weather catastrophes in North America is $80 billion, but only $20 billion of that is insured. The brunt of natural disaster recovery will come from federal and state governments (from taxpayers).

Source: http://www.eesi.org/insurance-industry-perspectives-extreme-weather-events-14-dec-2012#highlights

Resilience is a difficult concept to measure, but it should cover both hard aspects that relate to the physical attributes including robustness and redundancy in the system, and soft

aspects that cover collaboration, cooperation and communication so that problems can be solved to reduce systemic failure resulting from poor response times and resource allocation (Miao, Banister and Tang, 2013). Measurement issues are also important, so that all the carbon embedded within the infrastructure is accounted for through a discounted life cycle analysis. It may mean moving away from risk assessment that is based on probabilistic analysis and past experience, as this may have too much uncertainty. New forms of vulnerability analysis that are area (or city) based could combine biophysical and socio economic sensitivities to external threats, and explicitly involve greater complexity that includes feedback effects, tipping points and irreversibility, that all point to the instability in systems. Ideally, such analyses would also link in with the business and budgetary cycles so that resilience can be explicitly related to the availability of funding so that priorities can be allocated.

In more practical terms, resilience consensus on where development should take place and the building standards required, for both buildings and infrastructure, with a more explicit allocation of risks between the public and private sectors so that it is clear where the responsibility lies in terms of insurance claims and the total costs of remediation. This implies some form of specific location based risk assessment for insurance pricing, together with mitigation actions to be taken now so that the likely impacts are substantially reduced, and this would involve both the public and private sectors.

6.3 Comment: The private sector has been seen as a way out of the public sector's lack of investment funding and high levels of debt. Yet the objectives of the private sector are clear, namely that all investments should have a return (preferably in the short term) that contributes positively to profits and to shareholder returns. The private sector is also risk averse, and these two basic factors mean that transport investments have not been seen as attractive. Novel partnership approaches where risks and returns are balanced between the public and private sectors are one way forward, but even here there are no clear set of 'blueprints', and every project has to be carefully managed to achieve a fair distribution of risks and returns, and this may involve many different agencies that in turn may change over time. In mature transport networks, there may be fewer attractive investment opportunities, as the marginal returns are low (ITC, 2012).

There may also be a decline in the availability of private funding as the population ages with less people saving and more people requiring pensions. Recent growth in national economies (2013-14) seems to have been driven by consumption and spending as households get richer or borrow more. Eventually, higher demand and lower savings will force interest rates to rise, causing a decline in borrowing and consumption. All these factors may result in less money being available for all forms of private sector investment, so only the most 'attractive' transport projects will be supported.

7. Future Funding

Infrastructure investment needs to rise to levels substantially higher than the current 1% of GDP being spent in OECD countries, possibly double this level and to even higher levels in the short term as there is a substantial backlog and remediation measures are needed to anticipate extreme weather events (the resilience arguments). This increase should not be seen as just new prestige projects, but in maintaining and upgrading the existing infrastructure

which is currently in need of substantial renovation. In the US it is estimated (Economist, 12/5/2012) that deficiencies in roads, bridges and transport systems alone cost households and businesses $130 billion (2012), as a result of higher running costs for cars and travel delays. The calculated underinvestment in transport infrastructure amounts to $94 billion a year, and there are implications for productivity and competitiveness. It is clear that significant new capital is required (a) for new infrastructure, (b) for maintenance of existing infrastructure, and (c) for the upgrading of existing infrastructure. There needs to be a much greater public awareness and acceptability of the social returns from infrastructure investment, but that higher levels of public expenditure mean less public consumption in other sectors when total budgets are not growing. The alternative is to encourage greater private investment and to find effective means to charge the user for the capacity provided. Transport also suffers from the problems of negativity in that it contributes to pollution, congestion, climate change and quality of life.

A key element here is the necessity for a longer term and consistent strategic vision to establish clear priorities and to provide the private sector with a stable framework within which to operate. Such a vision will on its own help reduce the levels of uncertainty and the associated risks. The funding sources available are also clear. As noted in this paper, General Tax Revenues have been the traditional means to pay for all three forms of transport investment (a-c above), but increasingly this source has come under pressure. The public sector can borrow more cheaply than the private sector, but the levels of public debt are also rising. One alternative would be to take transport infrastructure investment out of the Public Sector Borrowing Requirement (PBSR), as it can be seen as long term investment rather than short term borrowing. The second focus would be to concentrate public spending on those projects that have a clear societal benefit in terms of achieving clearly specified social and environmental objectives (as well as economic objectives). Such an approach is consistent with the green growth agenda that places much greater weight on the wider non-economic objectives (the co-benefits). Whatever role is assigned to the public sector, there will be a much greater importance attached to PPPs, and the nature of these partnerships will vary according to the specific project being considered. A much greater variety of procurement strategies will be adopted that are built on long term relationships of cooperation and trust (Table 3).

Table 3: The new public private partnership relationships

	Jointly Public and Private Sectors – Higher Risk		Private Sector – Lower Risk
Pre Construction Phase	Procurement Expertise in design and construction Project Management	Post Construction Phase	Refinancing of Project Securitisation Bonds
Construction Phase	Less debt funding available because of credit squeeze Investment risk of cost overruns Political risk and delay – availability of public funding	Operational Phase	Pension Funds Sovereign Wealth Funds Insurance Funds
	Climate related risks throughout the project – vulnerability and resilience – factored into design and operations		

Much discussion has been undertaken on the role of the PPP in infrastructure investment, but its main use is in the construction and operation of projects once the planning, once the

initial procurement of land and the necessary access rights has been completed. The key for much of the thinking about the private sector involvement in infrastructure investment is that costs and benefits need to be made much more transparent, and this means that the user should pay the full economic, social and environmental costs of using the infrastructure. This is the only way in which the true value of the infrastructure can be calculated, and it makes clear the financial benefits to the private sector. “Whatever form of financing of infrastructure, it is ultimately not paid by the financier but by the users or the taxpayers” (Inderst, 2013, p41).

User charges are universally seen as part of public transport, but road users do not pay directly for their use of public space, particularly in cities and at congested times. Charging the direct beneficiaries the full economic, social and environmental costs of travel is one means by which available capacity is fairly allocated. The second complementary approach would be to charge the indirect beneficiaries such as property owners and developers who gain from proximity to transport facilities and land value uplift. Pricing is the one mechanism within a social market economy that can allocate resources efficiently. It is often assumed that social acceptance of pricing is low and this is true as no one likes to pay more, but the more fundamental issue here is whether charging the full economic, social and environmental costs for the use of transport is socially progressive (and fair) – the answer is probably yes.

There are several other mechanisms available to raise capital for investment (Case Study 4), and they should also be seen as an integral part of any potential funding package – included here are transport infrastructure funds (TIF), business rates supplements (BRS), community impact levies (CIL) and many others. Fundamental to all these mechanisms is the necessity to be clear about the objectives and fairness as it relates both to the users (charges) and to businesses and developers, as all increases in their costs need to be reflected in their longer term competitive advantage.

With continued population growth and increased urbanisation, the requirements for additional infrastructure will grow, but the focus will be more on the integration of transport systems and the means to get the best use of out the existing capacity, including a greater priority allocated to public transport and to walking and cycling. For that part of the infrastructure still allocated to use by road vehicles, space will be allocated through pricing, technology and clear priority uses. Most movement would be made by public transport, linking city centres with the dense commercial centres built around accessible public transport interchanges, and well-connected residential areas, with good quality links to airports and ports. Local movement to and within neighbourhood centres would be undertaken by walk and cycle. This is the vision for green infrastructure (at least in cities) that is equitable (in terms of access) and resilient (in terms of strong network structure). The imperatives for capacity management and for demand management are clear, as the efficiency in the operation of the transport system and charging users are essential for ‘green’ and resilient systems. In addition, the case is made for mode management, where the most efficient forms of transport are used, together with the best available technology to ensure the highest levels of occupancy (and load factors for freight transport) are achieved. Yield management methods are used in aviation and rail services to make sure that capacity is used, and similar approaches can be used in other forms of public transport.

The final element is the necessary support structures for government and other organisations, both to ensure the efficient operations of all transport under normal conditions, and to be able to intervene positively to handle emergencies when they occur. Over time, new investment may be required to redesign and retrofit existing infrastructure, so that more flexibility is built into the system to deal with anticipated exceptional events. In addition, there would be a need for new capacity that has built in resilience (and possibly redundancy) at the most crucial links or nodes within the network (e.g. at bridges and interchanges), so that exceptional weather events (such as wind, heat and flood induced) can be accommodated. Linked to the transport dimensions of adaptation are the increasing interdependencies between systems, including the energy and technology sectors, as each relies on the others for effective functioning, and the transport system might fail because of failure outside the transport system.

Decisions made by businesses and individuals on location and travel do not change radically over time, as there is low adaptive capacity and lock in to the current forms of travel. This links in with the long term investment horizon of many investment decisions, so the risks for investors in ‘green’ infrastructure should be seen as being modest. But the costs of inaction in terms of new investment, reinvestment, and raising the resilience of the infrastructure, are all becoming clear as transport is the most needed infrastructure and it is the one that seems to be most vulnerable to a wide range of external factors. Sustainable growth depends on transport, and the transport system must itself become more resilient to external events as well as being more sustainable. Paying for such a sustainable transport system that supports sustainable growth is the task for the users and for taxpayers, with both the private and public sectors providing up-front capital to facilitate the initial investment and then to allocate the costs fairly between those using the system and others.

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ANNEX 1: ECONOMIC RATIONALE FOR USING PUBLIC PRIVATE PARTNERSHIPS

The basic rationale is value for money – as public sector borrowing costs are normally lower than those for the private sector, a straight comparison of the construction costs would almost always favour the public sector. The value for money analysis justifies PPPs when the discounted financial costs over the life of the project are lower than the costs of conventional procurement. But it is almost impossible to calculate these costs over the life cycle of the project. This means that a hypothetical project of the operating costs is made if it remained in the public sector (based on comparable past experiences – this is sometimes known as reference class modelling). The basic problem with such a cost comparison is deciding which party bears the risk over the time period, as the more risk that can be allocated to the public sector means the their costs are higher. Risk should be allocated to the party that can best bear the cost, and that means the public sector, hence the PPP comes out as the best value (Based on UN Habitat, 2003, p169 and ACCA, 2004).

"In practice, there are no ways to know in advance if a specific PPP will be cost effective. In effect PPPs proceed more often as a matter of faith than experience. However, this having been said, it is important to note that a 'value for money assessment should take into account the non-financial benefits of PPPs such as the accelerated and enhanced delivery of projects'" EPEC (2012).

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Types of PPPs

PPPs attempt to provide options between the extremes of full public and full private control. There are a wide variety of PPPs, as shown below. 'Partnership' begins whenever the government decides to allow the private sector to control one or more of the activities that it has traditionally managed on its own.

	More public ⟷ More private			
	Traditional government procurement	Private operation with:		Totally private ownership
		Public financing	Private financing	
New Facilities	Separate bids for design and for construction	Private sector designs and builds infrastructure in one bid	Private sector finances, designs and builds infrastructure	Private sector controls entire process
Existing Facilities	Operated by public agency	Operation and maintenance contract	Long-term leases	Private sector buys infrastructure from the public sector
Hybrid	N/A	Contract to develop and operate infrastructure		N/A
Ownership	Public	Public	Public	Private

Source: Office of the State Comptroller, New York State (2011), p3-5.

ANNEX 2: FINANCIAL INSTRUMENTS AND RISK-SHARING MECHANISMS

A number of financial instruments and risk-sharing mechanisms are available to redistribute risks and returns across stakeholders and channel private investment towards sustainable transport infrastructure. Such instruments need to be carefully designed and tailored to specific country contexts and transport options:

- *Public-private partnerships (PPPs)* can be effective sustainable transport procurement methods allowing private sector participation and risk sharing, provided that they offer sufficient "value for money" compared to traditional public procurement, and that the right institutional capacities and processes are in place. Experiences to date suggest that PPPs have been successfully implemented in bus rapid transit systems, specific rail and metro links, and shared-used bicycle and car systems.

- *Land value capture tools* capture revenues from the indirect and proximity benefits generated by transport infrastructure (*e.g.* increased real estate value) to finance transport projects. They can be used as part of the capital financing mix to improve projects' profitability. Examples of land value capture tools include tax increment financing (TIF) districts, development charges, development rights and joint development. Experiences to date have mostly been for roads, metros and rail.

- *Loans, grants* and *loan guarantees* are traditional financial tools frequently used to support private sector participation in large-scale sustainable transport infrastructure projects that would otherwise be fully owned and operated by public stakeholders, such as rail and metros. Infrastructure banks or infrastructure funds can play a transitional role to disburse financial tools such as loans and guarantees, and mainstream sustainable transport goals across levels of government.

- *Green bonds* have the potential to attract institutional investors by tapping into the debt capital market, which are currently underexploited for infrastructure investment. Currently, most of the bond markets are used to finance rail infrastructure projects in Europe.

- *Transitional domestic incentive measures and short-run subsidies,* such as tax exemptions, can also be used to provide transitional support to sustainable transport options and technologies, to foster innovation, ramp-up production, offset upfront capital costs, and compensate for network infrastructure bias towards high-carbon transport options. Temporary subsidies can notably be used to support charging infrastructure for electric vehicles (EVs) and plug-in hybrid vehicles (PHEVs).

When implementing those instruments, governments will have to carefully balance private and public goals; achieving financial sustainability while ensuring the provision of the social, economic and environmental goals of sustainable transport.

Table: Financial tools to channel private investment in sustainable transport infrastructure

Type of instrument	Level of governance	Benefits for the private sector
Public Private Partnerships	Local/ National	Share and mitigate risk for private actors
Land value capture tools	Local	Reduce investment risk
Grants and loans	International/ National/ local	Reduce upfront capital costs for private sector
Loan guarantees and credit enhancement	International/ National/ Local	Reduce financing risk, lower the cost of capital
Green bonds	National/Local	Access capital from institutional investors for large-scale rail and metro projects
Carbon finance	International	Leverage private finance, access resources from IFIs and gain political support from local governments

From Ang and Marchal (2013), p10-11 and p38.

ANNEX 3: GREEN BONDS: VOLUNTARY GUIDELINES

Green Bonds enable capital-raising and investment for new and existing projects with environmental benefits. The voluntary guidelines recommend transparency and disclosure, and promote integrity in the development of the Green Bond market:

(i) They provide issuers guidance on the key components involved in launching a credible Green Bond;

(ii) They aid investors by ensuring availability of information necessary to evaluate the environmental impact of their Green Bond investments;

(iii) They assist underwriters by moving the market towards standard disclosures which will facilitate transactions.

Four banks (Bank of America Merrill Lynch, Citi, Credit Agricole Corporation and Invesmtent Bank, and JP Morgan Chase) have drafted the Green Bond Principles (GBP) and they will propose a governance process (2014) to allow for diverse stakeholder input into the GBP. An independent third party is likely to be designated to serve as a secretariat whose administrative duties will include facilitating information exchange with issuers, investors, underwriters, and other stakeholders such as non-profit environmental organizations, non-government organizations, academics and other thought leaders.

http://www.ceres.org/resources/reports/green-bond-principles-2014-voluntary-process-guidelines-for-issuing-green-bonds/view

Green bonds have increased by more than 5 times in 2013, with 29 issues, worth a total of $11.2 billion (Dealogic). In 2014, this level has already been exceeded (April) and the total is estimated to reached $40 billion (http://www.climatebonds.net/category/green-bonds/) - top issues are EIB ($2.9bn), Toyota ($1.75bn – see below), the World Bank ($1.3bn) and Unibail-Rodamco ($1bn).

Citi Underwrites Auto Industry's First-Ever Asset-Backed Green Bond for Toyota Financial Services

Citi today announced that it has successfully closed Toyota Financial Services' (TFS) inaugural asset-backed green bond issuance. The $1.75 billion offering, which was upsized from $1.25 billion due to strong investor demand, represents a landmark transaction as the first green bond from an auto finance company in the asset-backed securities (ABS) market.

Green bonds are instruments in which the proceeds are applied exclusively toward projects and activities that promote climate or other environmental sustainability initiatives. Toyota will use the net proceeds to acquire retail instalment sale contracts and lease contracts to finance new Toyota and Lexus hybrid or electric vehicles.

Through its work in developing the transaction for TFS and serving as the structuring lead underwriter, Citi has pioneered green bonds as a new asset class in the ABS market.

Earlier this year Citi and 12 other banks introduced new Green Bond Principles. With growing demand for investments with environmentally beneficial characteristics, the Green Bond Principles serve as voluntary guidelines that recommend issuers disclose information that is important to investors, including use of proceeds, process for project evaluation and selection, and management of proceeds.

Source: Berkshire Hathaway (24th March 2014)
http://www.businesswire.com/news/home/20140324005997/en/Citi-Underwrites-Auto-Industry%E2%80%99s-First-Ever-Asset-Backed-Green#.UzqmrPldUnI

www.oecd.org/greengrowth